Exhibit "A"

TOWN OF EDINBURGH

STORM WATER STANDARDS

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1.0 Introduction **1**
2.0 Storm Water Management Approval Requirements **2**
2.1 Submittal Package 2
2.2 Approval Process 3
2.3 Storm Water Management Permit Terms and Conditions 5
3.0 Storm Water Design Standards and Specifications **11**
3.1 Easements 11
4.0 Construction Phase **12**
4.1 Pollutants of Concern During Construction 12
4.2 Construction SWPPP 12
5.0 Post-Construction **14**
5.1 Introduction 14
5.2 Applicability 14
5.3 Storm Water Quality Policy 14
5.4 Pre-Approved BMPs 15
5.5 Design Requirements 16
5.6 Methods for Sizing BMPs 16
5.7 Storm Water Quantity Policy 18
5.8 Floodplain Policy 21
5.9 BMP Inspections 21
6.0 Operation and Maintenance Manual **22**
6.1 Requirements 22
6.2 Contents 22
6.3 Right-of-Entry Statement 24
6.4 Drainage Easement(s) Documentation 24
7.0 Individual Lots **25**
7.1 Individual Lot Where Land Disturbance is Expected to be 1 Acre or More 25
7.2 Individual Lots within a Permitted Project 25
7.3 Strip Developments 26
7.4 Project Termination 26
Appendix A **0**
Definitions 0
Abbreviations 8
Appendix B **9**
Storm Water Management Approval Application 10
Construction /SWPPP Technical Review and Comment Form 13
Grant of Perpetual Drainage Easement 18
Inspection Services Agreement 21
Performance and Repair Bond 25
Maintenance Bond 27

Post-Construction Certification of Sufficiency of Plan 30
Appendix C – BMP Design Criteria 31
Storm Water Ponds 32
Storm Water Wetlands 38
Bioretention Areas 45
Water Quality Swales 51
Sand Filters 56
Infiltration Trenches 62
Biofilters 68

1.0 INTRODUCTION

The Town Department of Storm Water Management (DSM) finds that:

a) Water bodies, roadways, structures, and other property within and downstream of town are at times subjected to flooding.

b) Flooding is a danger to the lives and property of the public and is also a danger to the natural resources of the region.

c) Land development alters the hydrologic response of watersheds, resulting in increased storm water runoff rates and volumes, increased flooding, increased stream channel erosion, and increased sediment transport and deposition.

d) Soil erosion resulting from land-disturbing activities causes a significant amount of sediment and other pollutants to be transported off-site and deposited in ditches, streams, wetlands, lakes, and reservoirs.

e) Increased storm water runoff rates and volumes, and the sediments and pollutants associated with storm water runoff from future development projects within Edinburgh will, absent reasonable regulation and control, adversely affect the town's water bodies and water resources.

f) Pollutant contributions from illicit discharges within the town will, absent reasonable regulation, monitoring, and enforcement, adversely affect the town's water bodies and water resources.

g) Storm water runoff, soil erosion, non-point source pollution, and illicit sources of pollution can be controlled and minimized by the regulation of storm water management.

h) Adopting the standards, criteria, and procedures contained and referenced in this chapter and implementing the same will address many of the deleterious effects of storm water runoff and illicit discharges.

i) Adopting this chapter is necessary for the preservation of the public health, safety, and welfare, for the conservation of our natural resources, and for compliance with state and federal regulations.

These Storm Water Standards (Standards) were developed in accordance with the former requirements of 327 IAC 15-13, Storm Water Run-Off Associated with Municipal Separate Storm Sewer System Conveyances (Rule 13) and 327 IAC 15-5 for Storm Water Runoff Associated with Construction Activities (Rule 5). This document was updated to comply with the Construction Storm Water General Permit (CSGP) and the Municipal Separate Storm Sewer System (MS4) General Permit issued by the Indiana Department of Environmental Management (IDEM).

These Standards are intended to establish the minimum standards for design and construction of erosion and sedimentation controls and storm water pollution prevention measures for construction sites where land disturbing activities are equal to or greater than one acre or operations that result in the land disturbance of less than one acre of total land area that are part of a larger common plan of development or sale. The applicability and exemptions are detailed in the Storm Water Management Ordinance.

This document should be considered as a companion document to the abovementioned ordinance. Whereas the ordinance contains the regulatory authority and general requirements of comprehensive storm water management, this document contains the necessary means and methods for achieving compliance with the ordinance. This document contains formulas and methodologies for the review and design of water quality facilities and is intended as a regulatory document. In case there are conflicts between the requirements contained in this document and the ordinance, the requirements of the ordinances should prevail. The *Indiana Storm Water Quality Manual* may also be used as guidance.

2.0 STORM WATER MANAGEMENT APPROVAL REQUIREMENTS

Storm Water Management Approval is required for all residential and non-residential construction projects which result in land disturbing activities equal to or greater than one acre and are not exempt per the Soil Erosion and Sedimentation Control Ordinance. Refer to Section 7 for specific requirements for Individual Lots. An approved Storm Water Pollution Prevention Plan (SWPPP) meeting the requirements contained in these Standards, the CSGP, the applicable county's storm water quantity and quality requirements, and the Indiana Storm Water Quality Manual is required.

2.1 SUBMITTAL PACKAGE

To receive Storm Water Management Approval, items in this section must be submitted to the Town of Edinburgh Building and Zoning Department in their entirety as part of the submittal package. Digital copies, in a format accepted by the Town, and two full size hard copies are required. All plans, reports, calculations, and narratives shall be signed and sealed by a professional engineer or a licensed surveyor registered in the state. The submittal package described in this section will include the *Storm Water Management Application* provided in **Appendix A** of these Standards.

2.1.1 Notice of Intent (NOI) Form

A draft NOI with project name, location, description, and owner contact information shall be submitted. The NOI is a standard form developed and provided by IDEM which requires general project information. The form can be obtained from IDEM's website.

2.1.2 Storm Water Pollution Prevention Plan (SWPPP) for Construction Activities

SWPPPs shall include all the required elements in the *Construction/SWPPP Technical Review and Comment Form* in **Appendix B**.

2.1.3 SWPPP for Post-Construction Activities

A SWPPP shall be required that details how runoff and associated water quality impacts resulting from the development will be controlled or managed. The plan must include:

a) A description of potential pollutant generating sources and a list of pollutants from the proposed land use that may reasonably be expected to contribute pollutants to storm water discharges.

b) A description of storm water quality and storm water management measures that will be installed to address post-construction sources that are expected to generate pollutants in storm water discharges after construction activities have been completed. Such practices include infiltration of runoff, flow reduction by use of open vegetated swales and natural depressions, buffer strip and riparian zone preservation, filter strip creation, minimization of land disturbance and surface imperviousness, maximization of open space, and storm water retention and detention ponds. The measures selected should achieve, at a minimum, the following objectives:

   1) Storm water quality measures that target pollutants of concern and are designed to remove or minimize pollutants from storm water run-off that is associated with the final land use.

   2) Storm water quality measures that will be implemented to prevent or minimize adverse impacts to aquatic resources including, but not limited to, wetlands, streams, karst features, and riparian habitats.

   3) Storm water management measures that will address the potential impacts of increased run-off from the project. Measures must be designed and approved according to these Standards, the Soil Erosion and Sedimentation Control Ordinance, and the applicable county requirements

per Section 5. A certified professional must approve that the design meets the applicable requirement(s).

4) Removal of 80% for total suspended solids (TSS). Measures must be designed and approved according to these Standards, the Soil Erosion and Sedimentation Control Ordinance, and the applicable county requirements per Section 5. A certified professional must approve that the design meets the applicable requirement(s).

5) Measures, including structural and those based on low impact development principles, selected to address the pollutant(s) of concern, reduction of peak flows, and ability to infiltrate.

6) Protective measures that will be implemented during active construction when the type of post-construction measure(s) planned are susceptible to pollutants, specifically sediment that may be generated during land-disturbing activities.

7) If a pre-approved Best Management Practice (BMP) is selected from Section 5.4, Table 1, provide a discussion of how the BMP has been designed according to the BMP Design Criteria in **Appendix C**. If a pre-approved BMP is not selected, then provide a discussion of the treatment process and appropriate sampling information must be provided to verify that the BMP will meet the 80% TSS removal rate. Inlet inserts will not be approved as a stand-alone BMP.

8) The location, dimensions, detailed specifications, and construction details of all post-construction storm water quality and storm water management measures.

9) A sequence describing when each post-construction storm water measure will be installed in relation to project construction.

10) A complete set of professionally certified construction plans showing the location, dimensions, and construction details of all post-construction storm water quality measures, detailed specifications and supporting water quality BMP sizing calculations.

11) The identification and location of a required easements around the water quality treatment BMP along with an access easement to the BMP. Easements for specific post-construction BMPs are described in **Appendix C**.

2.1.4 Drainage Report

A Drainage Report shall be prepared and certified by a Professional Engineer. It must contain storm system detention and water quality treatment design calculations. Refer to Chapter 3 and 5 for design standards.

2.1.5 Operation and Maintenance (O&M) Manual

An (O&M) Manual shall be provided for each storm water quality and quantity measured installed as part of the project. Refer to Chapter 6 for details.

2.1.6 Plan Review Fees

The construction site owner shall submit a review and inspection fees according to the current Town Fee Schedule. Additional fees may be applied after the plan review process.

2.2 APPROVAL PROCESS

The Town follows the below Plan Review process.

2.2.1 Preliminary Determination

Developers may contact the Building and Zoning Department to submit conceptual drainage plans and calculations and schedule a concept meeting or a concept meeting may be required by the town prior to the submittal of an application. The project will also be discussed by Edinburgh's In-house Technical Review Committee.

Following the concept meeting, submittal packages are received by the Building and Zoning Department. The package is reviewed to determine if all the required information in Section 2.1 is provided. If the submittal package is incomplete, the site owner is contacted and the plan review process stops.

If all information is submitted, the Town and/or designated representative reviews the information and plan sheets to determine if the proposed project meets the requirements in the ordinances and these Standards. Additional information from the site owner may be requested at any time.

Once completed, a preliminary determination and notification will be made through a *Construction/Storm Water SWPPP Technical Review and Comment Form* to the site owner whether the submittal is substantially complete or insufficient. The preliminary determination will be made within 10 days (for projects at least 1 acre but less than 5 acres) or within 14 days (for projects greater than or equal to 5 acres).

2.2.2 Determination of Sensitive Areas

It is the intent of the Town to direct the community's physical growth away from sensitive areas and towards areas that can support it without compromising water quality. When construction plans are submitted for review, the reviewer will identify priority sites for inspection and enforcement. The criteria for priority sites will be based on nature and extent of the construction activity, topography, threat to the degradation of water quality, characteristics of soils, complaints, and other factors as determined by MS4 priorities. Frequency of construction sites inspections will be partially based on priority determinations.

If a project site is determined to impact or discharge to a sensitive area, the town may require more stringent storm water quantity and quality measures than detailed in this chapter or in the latest edition of the *Indiana Stormwater Quality Manual.*

Sensitive areas include highly erodible soils, wetlands, threatened or endangered species habitat, outstanding waters, impaired waters, recreational waters, and surface drinking water sources. Sensitive areas include the following:

a) Any discharge from a storm water practice that is a Class V injection well shall meet the Indiana groundwater quality standards.

b) If wetlands are suspected on a site, wetland delineation shall be completed in accordance with the methodology established by the U.S. Army Corps of Engineers (ACOE) and the wetland addressed in accordance with the ACOE requirements.

c) If the presence of threatened or endangered species habitat is suspected on a site, the site must be evaluated and inspected by a professional experienced in such and the results reported to the Town.

d) Special terms and conditions for development determined to impact or discharge to any sensitive area shall be included in the Storm Water Management Approval.

2.2.3 Submittal Package Approval

All comments shall be addressed as part of the review process. The applicant shall use the final *Construction/Storm Water SWPPP Technical Review and Comment Form* as the Storm Water Management Approval. A review letter with the final review fees and any special conditions will be issued to the professional engineer responsible for completing the design. Fees shall be paid within 30 days.

2.2.4 Prior to Construction

After receiving the department's approval, the site owner must follow the submittal requirements below prior to starting any construction:

a) The site owner is responsible for submitting the *Technical Review and Comment Form* from the Building and Zoning Department with the completed and signed NOI for the CSGP to IDEM at least 48-hours prior to any land disturbance or discharge occurs. If not already provided, a copy shall be also provided to the Building and Zoning Department.

b) The site owner shall provide a copy of the Notice of Sufficiency from IDEM to the Building and Zoning Department.

c) Upon approval of the easement location for the post-construction BMP(s) as shown on the construction plans, the easement shall be granted to the Town of Edinburgh by way of a *Grant of Perpetual Drainage Easement.*

d) Building and Zoning DepartmentThe Owner/Developer shall provide a performance bond to the Town of Edinburgh prior to project construction. The performance bond shall be in the amount of 120% of the contract amount to construct drainage improvements and shall be provided on the standard form - *Town of Edinburgh Performance and Repair Bond.*

e) A professional engineer will complete the *Post-Construction Certification of Sufficiency of Plan* (**Appendix B**) and provide to the Owner and the Town of Edinburgh Building and Zoning Department.

2.3 STORM WATER MANAGEMENT PERMIT TERMS AND CONDITIONS

2.3.1 Pre-Construction Meeting

A pre-construction meeting is required to be held with the participation of the town and other entities involved prior to any grading activity to ensure that appropriate perimeter control measures have been implemented on the site and the location of any existing tiles has been properly marked.

2.3.2 Implementation Requirements

During the period of construction activities, all storm water management measures necessary to meet the requirements of the Storm Water Management Approval must be maintained, and as necessary, alternative measures must be selected and implemented. The following minimum standards apply to activities performed under the Storm Water Management Approval:

a) Basin slopes must be stabilized upon achieving design grades to eliminate sediment inflow from the measure itself. The outfall of a basin must be stabilized and non-erosive within 24-hours of installation of the basin outlet.

b) Pipe outlets discharging from the project site must be provided with temporary or permanent energy dissipation within 24-hours of discharging run-off.

c) Roadway Clearing – Public or private roadways must be kept cleared of accumulated sediment that is a result of run-off or tracking. The following minimum conditions are applicable:

   1) Clearing of sediment must not include the utilization of mechanical methods that will result in mobilization of sediment off the project site or flushing the area with water unless the flushed water is directed to an appropriate sediment control measure.

   2) Cleared sediment must be redistributed or disposed of in a manner that is in accordance with all applicable statutes and regulations.

3) Sediment discharged or tracked onto public streets that are open to traffic must be removed as directed by a regulatory authority or at a minimum, removed by the end of the same day. Phasing of construction activities must be used, where applicable, to minimize the footprint of disturbed unstable areas.

d) Dust Suppression – Minimize the generation of dust through dust suppression techniques to prevent deposition into waters of the state.

e) Construction Entrance – A stable construction site access measure must be provided at all points of construction traffic ingress and egress to the project site. Where the selected measure is not effective, an alternative measure or additional controls must be utilized to minimize tracking. Alternative measures may include, but are not limited to, wheel wash systems and rumble strips.

f) Sediment-Laden Water – Discharge water from dewatering of ground water from excavations, trenches, foundations, etc. must not be discharged when the discharge:

1) Contains sediment and is not first directed to an appropriate storm water quality measure or a series of control measures that minimize the discharge of the sediment.

2) Has a visible sheen and/or contains pollutants at a level that requires additional treatment and/or an individual IDEM discharge permit.

g) Concrete Washout Areas – Concrete washout areas, where concrete washout is permissible, must be identified for the site and the locations clearly posted. Wash water must be directed into leak-proof containers or leak-proof containment areas which are designed to eliminate run-on and sized to prevent the discharge and/or overflow of the concrete wash water.

h) Fertilizer – Fertilizer applications associated with the stabilization plan for the project must meet the following requirements:

1) Apply fertilizer at a rate and amount as determined by a soil analysis or in accordance with the *Indiana Storm Water Quality Manual* or similar guidance documents.

2) Apply fertilizer at an appropriate time of year for the project location, taking into consideration proximity to a waterbody, and preferably timed to coincide with the period of maximum vegetative uptake and growth.

3) Avoid applying fertilizer before rainfall events that could result in the discharge of nutrients.

i) Storage and Handling of Materials and Wastes – Proper storage and handling of materials and wastes, such as fuels or hazardous wastes, and spill prevention and clean-up measures must be implemented to minimize the potential for pollutants to contaminate surface or ground water or degrade soil quality. To meet this requirement:

1) Project management and the utilization of appropriate measures including, but not limited to, eliminating a source or the exposure of materials must be completed.

2) The following activities, where applicable must be managed:

a) Fueling and maintenance of equipment.

b) Washing of equipment and vehicles.

c) Storage, handling, and disposal of construction materials, products, and wastes.

d) Application of pesticides, herbicides, insecticides, and fertilizers.

e) Dispensing and utilization of diesel fuel, oil, hydraulic fluids, other petroleum products, and other chemicals.

f) Handling and disposal of hazardous wastes, including, but not limited to paints, solvents, petroleum-based products, wood preservatives, additives, curing compounds, and acids.

g) Washing of applicators and containers used for paint, grout, or other materials.

3) Appropriate measures must be implemented to eliminate wastes or unused building materials including, but not limited to garbage, debris, cleaning wastes, wastewater, concrete washout, mortar/masonry products, soil stabilizers, lime stabilization materials, and other substances from being carried from a project site by run-off or wind. Wastes and unused building materials must be managed and disposed of in accordance with all applicable statutes and regulations.

4) Construction and domestic waste must be managed to prevent the discharge of pollutants and windblown debris. When disposed of in waste containers (trash receptacles) the receptacle must be covered when not in use and at the end of the day. Waste that is not disposed of in trash receptacles must be removed at the end of the day from the site and disposed of properly.

5) Special terms and conditions identified during plan review for development within sensitive areas.

6) The use of anionic polymers (cationic polymers are not authorized for use) on the project site are authorized for sediment control provided their use is in conformance with current State of Indiana standards and specifications and the use is identified in the SWPPP. If use of a polymer is selected, approval from IDEM and the town is required.

2.3.3 Construction Personnel Training

Personnel associated with the construction project must be informed of the terms and conditions of the Storm Water Management Approval and the requirements within the SWPPP. The permittee is required to document this process. Information must be provided through training, preconstruction meetings, written notification, contracts, or other means that effectively communicates the provisions and requirements of the Storm Water Management Approval and SWPPP. Personnel include, but are not limited to:

a) General contractors, construction management firms, grading or excavating contractors, trade industry representatives (i.e., concrete industry), and utility contractors associated with the overall project.

b) Contractors or individual lot operators that have primary oversight on individual building lots.

c) Those responsible for the implementation of the SWPPP, and the installation, repair, and maintenance of storm water measures.

d) Those responsible for the application and storage of treatment chemicals.

e) Those responsible for administering the self-monitoring program.

2.3.4 Site Construction Notice

A notice must be posted near the main entrance of the project site or at a publicly accessible location. For linear project sites, such as a pipeline or highway, the notice must be placed in a publicly accessible location near the project field office. The notice must be maintained in a legible condition and include:

a) One copy of the completed NOI or a document that contains the same information.

1) The National Pollutant Discharge Elimination System (NPDES) permit number(s), upon receipt.

2) The name, company name, telephone number, email address, and address of the permittee or a local contact person.

3) The location of the SWPPP if the project site does not have an on-site location to store the plan.

2.3.5 Stabilization Requirements

a) Un-vegetated areas that are left idle or scheduled to be left inactive for 7 days or more must be temporarily or permanently stabilized with measures appropriate for the season to minimize erosion potential. The stabilization activity must be completed within fourteen (14) days after initiation. Initiation of stabilization includes, but is not limited to, the seeding and/or planting of the exposed area and applying mulch or other temporary surface stabilization methods where appropriate. Areas that are not accessible due to an unexpected and disruptive event that prevents construction activities are not considered idle.

b) Final stabilization of a project site is achieved when all land-disturbing activities have been completed and a uniform (evenly distributed, without large bare areas) perennial vegetative cover with a density of seventy percent (70%) has been established on all unpaved disturbed areas, and areas not covered by permanent structures, or equivalent permanent stabilization measures have been employed.

2.3.6 Self-Monitoring Program Requirements

The permittee shall monitor and manage project construction and storm water activities through administration of a Self-Monitoring Program (SMP) that includes:

a) Written Evaluation – A complete written evaluation (or inspection) of the entire project site, except for those areas that are considered unsafe. The evaluation must be performed by a trained individual and include:

1) Name of the individual performing the evaluation, including printed name, title, and signature (electronic signatures are acceptable).

2) Date of the evaluation.

3) Amount of precipitation when the evaluation is conducted after a measurable storm event. Recorded rainfall may be documented utilizing an on-site rain gauge or storm event information from a weather station that is representative of the project location.

4) Observations of project performance in relation to implementation of the storm water pollution prevention plan.

b) Assessment of existing storm water measures based on industry standards to ensure each measure is operational and functioning properly.

c) Additional measures necessary in the event an existing measure fails or is not present in the landscape

d) Impacts including, but not limited to, sediment discharges, erosion, discharges that results in bank erosion, and operational activities that have the potential to generate pollutants and unauthorized discharges.

e) Documentation of an actual discharge that is visible during the assessment, the location of the discharge and a visual description of the discharge. The visual description includes, but is not limited to, color (turbidity reading is an option), odor, floatables, settled/suspended solids, foam, oil sheen, and any other visible sign that may be attributed to operations occurring on the project site.

f) Inspection Frequency – Inspections are to be performed and completed

1) By the end of the next business day following each measurable storm event (excludes accumulated snow events); which is defined as a precipitation accumulation equal to, or greater than, 0.50-inch of rainfall. If no rain event occurs within the work week a minimum of one inspection must occur. In the event of multiple rain events during one week, no more than three (3) inspection are required.

2) At a minimum of once per month for areas within the project which are stabilized with permanent vegetative cover at 70 percent density. Prior to reducing the monitoring to monthly, records must identify the area and the date the area became eligible for monthly monitoring. Weekly monitoring as identified above must resume if one or more of the following occurs:

   i. The vegetative cover fails or there is evidence of erosion in the identified area.

   ii. IDEM or the local inspecting authority requires monitoring to resume.

g) Corrective Actions – Provide details of corrective action(s) recommended and/or completed. Corrective actions include, but are not limited to:

1) Repairing, modifying, or replacing any storm water management measure.

2) Clean-up and proper disposal of spills, releases, or other deposits.

3) Remedying a permit violation.

4) Taking reasonable steps to remediate, minimize or prevent the discharge of pollutants associated with the construction activity until a permanent corrective solution is initiated.

5) Restoring an impacted area and/or removing accumulated sediment, provided appropriate permission and permits are obtained to conduct the activity.

6) A timeline for which the corrective action will occur to remediate the discharge of pollutants. The established corrective action, at a minimum, must occur:

   i. On the day the deficiency was discovered or when it is not practical to initiate on the discovery date, no later than the following workday for the repair of a measure.

   ii. Within 7-days of discovery for the installation of a new measure or replacement of an existing measure unless a shorter timeframe is required as part of a regulatory inspection. The inspecting authority may also allow additional time to take corrective action.

7) Documentation of corrective action taken from the previous self-monitoring report.

2.3.7 Availability of Documentation

Maintain the SMP reports, regulatory inspection reports, responses to compliance or enforcement actions, documentation of discharge from construction activities, and additional information required by these standards at the site or at an easily accessible location. Provide all reports for the project site to the local inspecting authority within 48-hours of a request. Electronic copies are acceptable, provided they are in a format consistent with the paper record. Additionally, the site owner shall implement a Project Management Log as described in the CSGP.

2.3.8 Inspection by the Town or Agency

Construction site owners shall allow right-of-entry for the Town of Edinburgh, or local, county, or state regulatory agency or a representative thereof to inspect any project site involved in construction activities, at reasonable times.

When construction plans are submitted for review, the reviewer identifies priority sites for inspection and enforcement. The criteria for priority sites are based on the nature and extent of construction, proximity to sensitive areas, steep topography on or adjacent to proposed construction site, proximity to wetlands, and potential for direct run-off to receiving waters. The frequency of construction sites inspections is based on priority determinations.

The Edinburgh Building and Zoning Department or local, county, or state regulatory agency or a representative thereof may make recommendations to the project site owner or their representative to install appropriate measures beyond those specified in the storm water pollution prevention plan to achieve compliance.

2.3.9 Project Termination Requirements

The project site owner, or a representative thereof, shall submit a written Notice of Termination (NOT) within two (2) weeks of project termination to the Edinburgh Building and Zoning Department. The NOT may only be submitted when all the conditions for permit termination are met as described in the CSGP. The NOT form is available on IDEM's website.

Building and Zoning DepartmentThe Town of Edinburgh or a representative shall inspect the project site to confirm the information provided in the NOT. Upon verification of the NOT letter, the Edinburgh Building and Zoning Department shall issue written approval to the project site owner that the project site owner shall no longer be responsible for compliance with the requirements of this Chapter. The project site owner shall then submit the NOT to IDEM.

2.3.10 Building and Zoning Department Maintenance Bond Requirements

After completion of the project, the Owner/Developer shall provide a three-year maintenance bond in the amount of 25% of the contract amount to construct said drainage improvements to protect against defective materials and workmanship. The maintenance bond shall be provided on the standard form - *Town of Edinburgh Maintenance Bond.*

2.3.11 Record Drawings

Record drawings, certified by a Professional Engineer or Land Surveyor, of the completed drainage improvements that shall become public facilities shall be provided to the Town of Edinburgh within 60 days of project completion. Record drawings shall include both a hard copy and an electronic copy (AutoCAD compatible CD) of as-built information including horizontal alignments, elevations, inverts, top-of-castings, pond cross sections, and flow lines of swales.

2.3.12 Transfer of Ownership of Storm Water Systems

Owners/Developers that will dedicate the storm water system to the Town of Edinburgh shall enter into an agreement and complete a *Transfer of Ownership* form. The Owner/Developer, at no cost to the Town of Edinburgh, shall furnish the design, labor and materials to install the storm water system. The Town of Edinburgh must approve the design, materials and the Owner/Developer's selected contractor, based upon reliability and responsiveness.

2.3.13 Enforcement

All persons engaging in construction activities on a project site shall be responsible for complying with these Standards, the Soil Erosion and Sedimentation Control Ordinance, and the CSGP. Any person causing or contributing to a violation of any provisions shall be subject to enforcement and penalty as described in the ordinance.

3.0 STORM WATER DESIGN STANDARDS AND SPECIFICATIONS

The Town of Edinburgh is in Johnson County, Shelby County, and Bartholomew County. As such, the Town defers storm water design standards and specifications to the county for which the work is occurring. This includes standards and specifications for storm sewers, detention, and drainage. These county-specific requirements can be found in the following documents, or the most recent requirements provided by the applicable county.

a) Johnson County Stormwater Technical Standards Manual

b) Shelby County Erosion and Sediment Control Ordinance

c) Bartholomew County Soil Erosion and Sedimentation Control Ordinance and Stormwater Permit Checklist

The Town takes jurisdiction over construction and post-construction standards and specifications within the Town's boundaries as is detailed in these Standards and as described in the Edinburgh Storm Water Management Ordinance.

3.1 EASEMENTS

The following applicable easements shall be granted to the Town of Edinburgh by way of a *Grant of Perpetual Drainage Easement.*

a) Twenty (20) feet for pipes 15 inches in diameter and smaller.

b) Twenty-five (25) feet for pipes larger than 15 inches in diameter.

c) Twenty (20) feet measured horizontally outside the 100-year flood elevation for detention/retention ponds and access to the pond as determined by the Town of Edinburgh.

d) Fifteen (15) feet for yard swales.

e) Easements for open channel are to be determined by the Town of Edinburg on a case-by-case basis.

f) Easements for drainage conveyances shall be centered on the centerline of the conveyance.

g) Easements for specific post-construction BMPs as described in **Appendix C**.

4.0CONSTRUCTION PHASE

4.1 POLLUTANTS OF CONCERN DURING CONSTRUCTION

The major pollutant of concern during construction is sediment. Natural erosion processes are accelerated at a project site by the construction process for a number of reasons, including the loss of surface vegetation and compaction damage to the soil structure itself, resulting in reduced infiltration and increased surface runoff. Clearing and grading operations also expose subsoils which are often poorly suited to re-establish vegetation, leading to longer term erosion problems.

Problems associated with construction site erosion include: transport of pollutants attached to transported sediment; increased turbidity (reduced light) in receiving waters; recreational use impairment. The deposited sediment may pose direct toxicity to wildlife, or smother existing spawning areas and habitat. This siltation also reduces the capacity of waterways, resulting in increased flood hazards to the public.

Other pollutants of concern during the construction process are hazardous wastes or hydrocarbons associated with the construction equipment or processes. Examples include concrete washout, paints, solvents, and hydrocarbons from refueling operations. Poor control and handling of toxic construction materials pose an acute (short-term) or chronic (long-term) risk of death to both aquatic life, wildlife, and the public.

4.2 CONSTRUCTION SWPPP

4.2.1 General Requirements

A property owner submitting a Storm Water Management Application must meet the below minimum requirements.

a) Treat sediment-laden water, which otherwise would flow from the project site, with sediment control measures appropriate to minimize sedimentation to receiving waters and adjacent properties.

b) Natural Features and Buffers

   1) Protect natural features, including wetlands and sinkholes (karst features), from pollutant discharges associated with storm water run-off.

   2) Preserve existing natural buffers that are adjacent to waters of the state to promote infiltration and provide protection of the water resource, unless infeasible. Activities performed by a county drainage board under IC 36-9-27 are excluded.

c) Preserve natural buffers, including the entire buffer bordering and/or surrounding the water resource.

d) Preserve buffers 50-feet or more in width to a minimum of 50-feet.

e) Preserve buffers less than 50-feet in width in their entirety.

f) Buffers may be enhanced with vegetation that is native and promotes ecological improvement and sustainability.

g) Run-off directed to the natural buffer must be:

   1) Treated with appropriate erosion and sediment control measures prior to discharging to the buffer.

2) Managed with appropriate run-off control measures to prevent erosion from occurring within the buffer area.

h) Soil

1) Minimize soil compaction, especially in areas where permanent vegetation will be re-established and/or areas that are designated to infiltrate storm water for the post-construction phase.

2) Topsoil will be preserved, unless infeasible.

4.2.2 Technical Design Criteria

Erosion and sediment controls shall be designed and installed in accordance with the CSGP, these Standards, and the *Indiana Storm Water Quality Manual*. Technical review of the erosion and sediment control program, storm water pollution prevention plan, and other required submittals shall be completed by the Building and Zoning Department or designated representative. The technical review shall assess the adequacy of proposed erosion and sediment control against the technical design criteria contained in the *Indiana Storm Water Quality Manual* or similar guidance documents, local ordinances, the product guidance/specifications of the manufacturer, and the most recent requirements provided by the applicable county.

a) Storm Water Management Measures – The selection, design, and implementation of all storm water quality and management measures shall:

1) Apply sound engineering, agronomic, and scientific principles.

2) Plan, design, and install appropriate measures as part of an erosion and sediment control system.

3) Discharge storm water run-off leaving the project site in a manner that is consistent with applicable local, state, or federal law.

4) Direct storm water run-off and project site discharges to an established vegetated area to increase pollutant removal and maximize storm water infiltration, where applicable.

5) Discharge collected run-off leaving the project site directly to either a well-defined, stable receiving conveyance or diffuse and release to adjacent property without causing erosion at the point of discharge.

6) Design conveyance systems to consider both peak flow and total volume and adequately protect the conveyance system so the final gradient and resultant velocity will not cause erosion at the outlet or in the receiving channel.

7) Withdraw water from sediment basins from the surface of the water column, where feasible.

8) Implement post-construction storm water management measures to manage the discharge of storm water run-off to address quality. The selection, design, and implementation of all storm water quality measures shall be in accordance with Section 5.0 in this document.

5.0 POST-CONSTRUCTION

5.1 INTRODUCTION

The purpose of this chapter is to establish minimum performance standards for management of post-construction storm water. In addition to the requirements in these Standards, projects meeting the applicability of this chapter must also comply with the Soil Erosion and Sedimentation Control Ordinance and applicable county requirements that establish requirements for post-construction storm water runoff controls. These county-specific requirements can be found in the following documents, or the most recent requirements provided by the applicable county.

a) Johnson County Stormwater Technical Standards Manual

b) Shelby County Erosion and Sediment Control Ordinance

c) Bartholomew County Soil Erosion and Sedimentation Control Ordinance and Stormwater Permit Checklist

Sediments can have adverse effects on aquatic life in streams and lakes and can transport other attached pollutants affecting the welfare of the public residing in local watersheds. Major sources of sediment include wash off of particles that are deposited on impervious surfaces and the erosion of stream banks and construction sites. Improvements in the quality of post-construction storm water runoff can be met by best management practices (BMPs) including maximizing the use of site design to reduce runoff, managing and treating storm water runoff through the use of structural controls, and implementing pollution prevention practices to prevent erosion and reduce potential contaminants.

Hydrologic studies show that small-sized, frequently occurring storms account for most rainfall events. The runoff from these storms accounts for a major portion of the annual pollutant loadings. By treating the frequently occurring smaller rainfall events, and a portion of the storm water runoff from larger events, it is possible to effectively mitigate the water quality impacts from developed areas.

5.2 APPLICABILITY

The following additional activities are exempt from post-construction requirements:

a) Construction of, or modifications to, single family structures that are not a part of a larger common plan of development,

b) Single family residential development consisting of four (4) or fewer lots,

c) Individual lots within a larger common development plan that has been previously permitted for storm water management, and

d) Any logging, agricultural, or other activity which is consistent with an approved soil conservation plan or a timber management plan prepared or approved by county, state, or federal regulating agencies.

5.3 STORM WATER QUALITY POLICY

The Town of Edinburgh has adopted a policy that the control of storm water runoff quality will be based on the management of total suspended solids (TSS). This requirement will serve as the basis of the storm water quality management program for all areas within the jurisdiction of the Town of Edinburgh. The target TSS removal rate is 80%.

One approach to reduce the post-development TSS loadings by 80% is to require treatment of a water quality volume from a site. A second approach is to require treatment of a water quality flow rate from the

site. Approved methods for calculating the water quality volume and flow rate are described in Section 5.6 of this chapter.

The appropriate storm water quality volume (WQ_v) and/or storm water quality flow rate (Q_{wq}) generated from a qualifying site shall be adequately treated before discharge.

5.4 PRE-APPROVED BMPS

Pre-approved structural BMPs are provided in **Table 1** and are presumed to comply with the 80% TSS removal rate where indicated if:

a) Sized to capture the prescribed water quality volume or flow rate, as applicable,

b) Designed according to the specific performance criteria outlined in this manual,

c) Constructed properly, and

d) Maintained regularly.

If a pre-approved structural BMP is not utilized, the project designer must provide a justification and testing data to demonstrate that the selected BMP will meet the 80% TSS removal rate as described in Section 5.6.

Post-construction storm water quality measures must be properly maintained to ensure storm water runoff is continuously treated from the developed and stabilized site. Refer to Section 6 for Operation and Maintenance requirements. Special circumstances that are not covered by these standards shall be regulated and reviewed on a case-by-case basis.

Table 1 – Pre-Approved BMPs

BMP	Description	80% TSS Removal	Selection Guidelines
Storm Water Pond	Constructed basin with a permanent pool of water in which runoff is captured and treated.	Yes	Minimum 10 acres
Storm Water Wetland	Constructed wetland areas consisting of shallow marsh areas, open water and semi-wet areas above a permanent pool.	Yes	Regional sites - Minimum 10 acres
Bioretention Area	Shallow basins or landscaped areas with engineered soils and vegetation and filter strip treatment prior to ponding area.	Yes	0.5 – 2 acres preferred Maximum 5 acres
Water Quality Dry Swale with Pretreatment	Vegetated open channel that captures and treats storm water runoff within dry cells.	Yes	Maximum 5 acres
Sand Filters with Pretreatment	Structure that treats runoff through filtration using a sand bed as the primary filter media. Requires pretreatment due to high clog factor.	Yes	Maximum 2 - 10 acres
Infiltration Trench with Forebay	Trench that captures and treats storm water runoff by allowing it to infiltrate into the ground through aggregate into highly porous underlying soils.	Yes	Maximum 5 acres
Biofilters	Densely vegetated land engineered as pretreatment or as part of a treatment train	No	Used in conjunction with other water quality treatment measures

Table 1 References:
Georgia Storm Water Management Manual, Volume 2
Maryland Storm Water Design Manual, Volume II
Indianapolis Storm Water Specifications Manual

5.5 DESIGN REQUIREMENTS

Where appropriate, storage, infiltration, filtering, or vegetative practices shall be used to reduce the impact of pollutants in storm water runoff on receiving waters. In addition to these practices, the following requirements shall be utilized:

a) Infiltration practices will not be allowed in wellhead protection areas without pretreatment to collect and remove expected pollutants from the proposed land use.

b) Discharges will not be allowed directly into sinkholes or fractured bedrock without treatment that results in the discharge meeting Indiana ground water quality standards as referenced in 327 IAC 2-11.

c) As site conditions allow, a vegetated filter strip of appropriate width shall be maintained along un-vegetated swales and ditches.

d) New gasoline outlets and refueling areas, or outlets and refueling areas that replace their existing tank systems shall be designed and installed using appropriate practices to reduce lead, copper, zinc, and polyaromatic hydrocarbons in storm water runoff.

5.6 METHODS FOR SIZING BMPS

There are two (2) methods for calculating the required size of a BMP. The first method calculates the water quality volume to be treated, which applies to detention-based BMPs. The second method calculates the water quality peak flow rate to be treated, which applies to filtration processes and mechanical-type BMPs such as hydrodynamic devices.

The water quality volume or flow rate shall be treated by an acceptable (pre-approved) BMP(s) from Section 5.4, Table 1 or an equivalent practice. Such practices or techniques and devices not pre-approved that may be more functional and desirable for storm water management may be utilized upon approval by the Town of Edinburgh. Mechanical-type BMPs must meet ASTM standard methods for verifying performance and must be certified by a professional engineer. The BMP must meet the 80% TSS removal rate at a 50 to 125-micron range (very fine/fine sand) without resuspension of particles at the design water quality flow rate resulting from a 1-inch rainfall depth. Testing of the TSS removal rate must be conducted by an independent testing facility rather than by the manufacturer.

A quick reference, minimum design criteria, and maintenance and inspection checklists for each pre-approved BMP are provided in **Appendix C**.

5.6.1 Water Quality Volume (WQ_v)

The WQ_v is the storage needed to capture and treat the runoff from the first 1-inch of rainfall. The WQ_v is equivalent to 1-inch of rainfall multiplied by the volumetric runoff coefficient (R_v) and the site area. The volume of runoff is directly related to the amount of impervious cover at the site and is calculated using the following equation:

$$WQ_v = \frac{(P)\,(R_v)\,(A)}{12}$$

Where:
- WQ_v = water quality volume (acre-feet)
- P = 1 inch of rainfall
- R_v = volumetric runoff coefficient
  = 0.05 + 0.009(I), where I is the percent (%) impervious cover
  [Example: If the I value is 80%, then use 80 and not 0.80 for the calculation.]
- A = area in acres

5.6.2 Water Quality Flow Rate (Q_{wq})

The Q_{wq} is needed to size BMP devices designed to treat runoff at a peak design flow rate through the system.

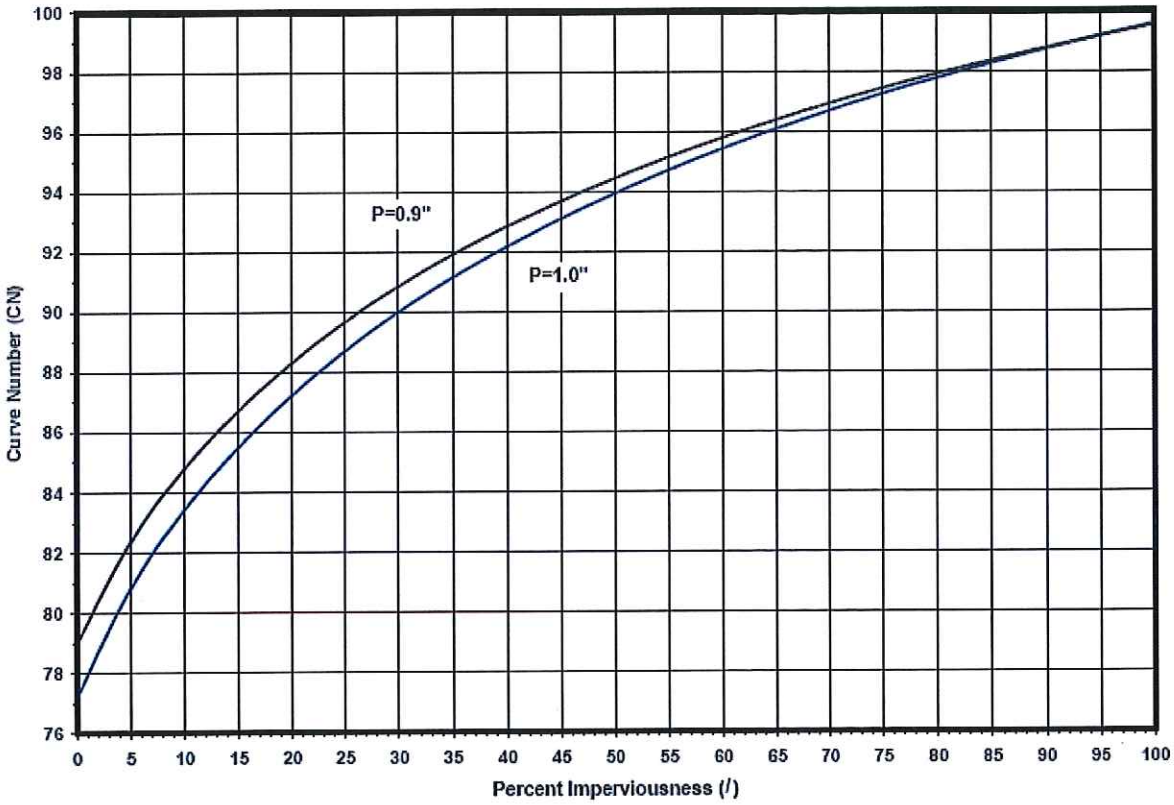
Conventional SCS methods have been found to underestimate the volume and rate of runoff for rainfall events less than 2 inches. The following procedure can be used to calculate the Q_{wq}. The method relies on the water quality volume in conjunction with an adjusted curve number (CN_{wq}) and the Natural Resources Conservation Service (NRCS) TR-55 methodology.

Step 1 - Using the water quality volume, calculate the adjusted CN_{wq}:

$$CN_{wq} = \frac{1000}{10 + 5P + 10WQ_{vi} - 10(WQ_{vi}^2 + 1.25WQ_{vi}P)^{1/2}}$$

Where:
- CN_{wq} = adjusted curve number for water quality flow rate calculation
- P = all in inches (use 1 inch for water quality storm)
- WQ_{vi} = water quality volume in inches = 1.0 inch(R_v)
- R_v = volumetric runoff coefficient
  = 0.05 + 0.009(I), where I is the percent (%) impervious cover

Graphically:



Step 2 – Calculate the site time of concentration (t_c) and area in acres (A).

Step 3 – Use the adjusted CN_{wq}, t_c and A as input for TR-55 calculations in conjunction with the SCS Type II rainfall distribution, 24-hour event, for 1 inch of rainfall depth to calculate the Q_{wq}.

5.7 STORM WATER QUANTITY POLICY

a) General release rates

1) In general, the post-development release rates for developments up to and including the 10-year return period storm may not exceed 0.1 cubic feet per second per acre of development. The post-development release rate for developments for the 11 through 100-year return period storms shall not exceed 0.3 cubic feet per second per acre of development.

b) In no instance shall the post-developed runoff exceed the pre-developed runoff in the 2-year, 10-year, or 100-year peak design storms.

c) The minimum allowable orifice size is 4 inches in diameter. When an orifice is less than 12-inches, an anti-clog device is required.

d) For sites where the pre-developed area has more than 1 outlet, the release rate should be computed based on pre-developed discharge to each outlet point. The computed release rate for each outlet point shall not be exceeded at the respective outlet point even if the post developed conditions would involve a different arrangement of outlet points.

e) Site-specific release rates for sites with depressional storage

1) For sites where depressional storage exists, the general release rates provided above may have to be further reduced. If depressional storage exists at the site, site-specific release rates must be calculated according to methodology described in the Standards, accounting for the depressional storage by modeling it as a pond whose outlet is a weir at an elevation that storm water can currently overflow the depressional storage area. Post-developed release rate for sites with depressional storage shall be the two-year pre-developed peak runoff rate for the post-developed ten-year storm and ten-year pre-developed peak runoff rate for the post-developed 100-year storm. In no case shall the calculated site-specific release rates be larger than general release rates provided above.

f) For determining the post-developed peak runoff rate, the depressional storage must be assumed to be filled unless the DSM and/or the permitting officer can be assured, through dedicated easement, that the noted storage will be preserved in perpetuity.

g) Management of off-site runoff

1) Runoff from all upstream tributary areas (off-site land areas) may be bypassed around the detention/retention facility without attenuation. Such runoff may also be bypassed through the detention/retention facility without attenuation, provided that a separate outlet system or channel is incorporated for the safe passage of such flows, i.e., not through the primary outlet of a detention facility. Unless the pond is being designed as a regional detention facility, the primary outlet structure shall be sized and the invert elevation of the emergency overflow weir determined according to the on-site runoff only. Once the size and location of primary outlet structure and the invert elevation of the emergency overflow weir are determined by considering o-site runoff, the 100-year pond elevation is determined by routing the entire inflow, on-site and off-site, through the pond.

h) Efficiency of the detention/retention facility controlling the on-site runoff may be severely affected if the off-site area is considerably larger than the on-site area. As a general guidance, on-line detention may not be effective in controlling on-site runoff where the ration of off-site area to on-site area is larger than 5:1. Additional detention (above and beyond that required for on-site area) may be required by the DSM and/or the permitting officer when the ratio of off-site area to on-site area is larger than 5:1.

i) Downstream restrictions

1) In the event the downstream receiving channel or storm sewer system is inadequate to accommodate the post-developed release rate provided above, then the allowable release rate shall be reduced to that rate permitted by the capacity of the receiving downstream channel or storm sewer system. Additional detention, as determined by the DSM and/or the permitting officer, shall be required to store that portion of the runoff exceeding the capacity of the receiving sewers or watercourses. When such downstream restrictions are suspected, the DSM and/or the permitting officer may require additional analysis to determine the receiving system's limiting downstream capacity.

2) If the proposed development makes up only a portion of the undeveloped watershed upstream of the limiting restriction, the allowable release rate for the development shall be in direct proportion to the ratio of its drainage area to the drainage area of the entire watershed upstream of the restriction.

j) Grading and building pad elevations

1) Maximum yard slopes are 3:1 where soil has been disturbed during construction processes. Finished floor elevation must be no less than 15 inches above finished grade and a minimum

of 15 inches above an adjacent road elevation unless a written variance is granted by the DSM and/or the permitting officer.

k) For all structures located in the Special Hazard Flood Area (SFHA) as shown on the Federal Emergency Management Agency (FEMA) maps, the lowest floor elevations of all residential, commercial, or industrial buildings, shall be such that lowest floor elevation, including basement, shall be at the flood protection grade and therefore have two feet of freeboard above the 100-year flood elevation.

l) The Lowest adjacent grade for residential, commercial, or industrial buildings outside a FEMA or IDNR designated floodplain shall have two feet of freeboard above the flooding source's 100-yer flood elevation under proposed conditions, unless the flooding source is a rear-yard swale. When the flooding is a rear-yard swale, the lowest adjacent grade for residential, commercial, or industrial buildings shall have two feet of freeboard above the 100-year flood elevation under proposed conditions or be separated by a minimum distance of 50 feet from the proposed-condition 100-year flood boundary.

m) For areas outside a FEMA or IDNR designated floodplain, the lowest adjacent grade (including walkout basement floor elevation) for all residential, commercial, or industrial buildings adjacent to ponds shall be set a minimum of two feet above the 100-year pond elevation or two feet above the emergency overflow weir elevation, whichever is higher. In addition to the lowest adjacent grade requirements, any basement floor must be at least a foot above the permanent water level (normal pool elevation).

n) The 100-year flow paths throughout the development, whether shown on FEMA maps or not, must be shown as hatched area on the plans and 30 feet along the centerline of the flow path contained within permanent drainage easements. No fences or landscaping can be constructed within the easement areas that may impede the free flow of storm water. These areas are to be maintained by the property owners or be designated as common areas that are to be maintained by the homeowner's association. The lowest adjacent grade for all residential, commercial, or industrial buildings shall be set a minimum of 1 foot above the noted overflow path/ponding elevation.

o) It shall be the property owners' responsibility to maintain the natural features on their lots and to take preventive measures against all erosion and/or deterioration of natural or manmade features on their lots.

p) Acceptable outlet and adjoining property impacts policies

   1) Design and construction of the storm water facility shall provide for the discharge of the storm water runoff from off-site land areas as well as the storm water from the area being developed (on-site land areas) to be acceptable outlet(s) (as determined by the DSM and/or the permitting officer) having capacity to receive upstream (off-site) and on-site drainage. The flow path from the development outfall(s) to a regulated drain or natural watercourse (as determined by the DSM and/or the permitting office) shall be provided on an exhibit that includes topographic information. Any existing field tile encountered during the construction shall also be incorporated into the proposed storm water drainage system or tied to an acceptable outlet.

q) Where the outfall from the storm water drainage system of any development flows through real estate owned by others prior to reaching a regulated drain or watercourse, no acceptance shall be granted for such drainage system until all owners of real estate crossed by the outfall consent in writing to the use of their real estate through a recorded easement. In addition, no activities conducted as part of the development shall be allowed to obstruct the free flow of flood waters from an upstream property. If an adequate outlet is not located on site, then off-site drainage improvements may be required. Those improvements may include, but are not limited to, extending

storm sewers, clearing, dredging and/or removal of obstructions to open drains or natural water courses, and the removal or replacement of undersized culvert pipes as required by the DSM and/or the permitting officer.

5.8 FLOODPLAIN POLICY

Computations must show no net loss of floodplain storage for two-year, ten-year, 50-year, and 100-year storm events. That is, the post-development two-year floodplain storage along a stream shall be the same as two-year pre-development floodplain storage along the stream within the property limits, the post-development ten-year floodplain storage along a stream shall be the same as ten-year pre-development floodplain storage along the stream within the property limits, and so on.

Calculations for floodplain volume shall be submitted in tabular form showing calculations by cross-section. The volume of floodplain storage under the without-project conditions and the with-project conditions should be determined using the average-end-area method with plotted cross-sections at a horizontal to vertical ratio of between 5:1 and 10:1, with two though 100-year flood elevations noted on each cross section. The scale chosen should be large enough to show the intent of proposed grading. Cross-sections should reflect both the existing and proposed conditions on the same plot. The location and extent of the compensatory storage area as well as the location and orientation of cross-sections should be shown on the grading plan.

5.9 BMP INSPECTIONS

The Town of Edinburgh or their designated representative may conduct inspections of the water quality treatment system construction. The project owner must notify the Town of Edinburgh at least 48-hours in advance of construction of the storm water management system. The inspection fees are provided as part of the *Storm Water Management Approval Application.* Two hundred dollars ($200.00) shall be made payable to the Town of Edinburgh to cover the cost for the first two inspections.

If required by the Town of Edinburgh the applicant shall execute an *Inspection Services Agreement* with the Town of Edinburgh and pay all applicable inspection fees per the terms stated in the agreement.

The Town of Edinburgh reserves the right perform periodic inspections of BMPs to ensure proper maintenance is completed for the life of the BMP. Fees associated with maintenance violations shall be assessed through enforcement actions if necessary.

6.0 OPERATION AND MAINTENANCE MANUAL

Each storm water quantity and quality BMP must have an Operation and Maintenance (O & M) Manual signed by the BMP Owner and submitted with the *Storm Water Management Approval Application* for approval. Routine inspection and maintenance are the responsibility of the BMP Owner. The example maintenance plan and inspection forms provided in **Appendix B** may be used in performing maintenance activities. Records of routine inspection are the responsibility of the owner and must be made available upon request of the Town of Edinburgh.

6.1 REQUIREMENTS

a) It is the designer's responsibility to determine which additional operation and maintenance measures are necessary to prolong the optimal function of the facility.

b) An O&M Manual that includes a description of the maintenance guidelines for all post-construction storm water measures to facilitate their proper long-term function.

c) The O&M Manual must be signed and provided to future parties who will assume responsibility for the operation and long-term maintenance of the post-construction storm water measures.

d) When known at the time of plan submittal, the entity that will be responsible for operation and maintenance of the system.

6.2 CONTENTS

All O&M Manuals shall include the following information, at a minimum:

6.2.1 Owner Information

The first section of the manual shall contain information about all people involved with the operations and maintenance of the facility. This section shall list the names and contact information of all responsible parties, including property owner(s), maintenance staff, and person(s) responsible for performing inspections. The responsibilities of each individual shall be clearly defined. Contact information shall include business or mobile phone number, address for giving notice, and email address (if available).

6.2.2 Owner Acknowledgement Statement

An acknowledgement statement signed by the owner and notarized. The acknowledgement statement shall indicate that the Owner understands their responsibilities to inspect and maintain BMPs in good working order and in accordance with the Town's ordinance and standards. Include a right-of-entry statement described in 6.3 below. The signed and approved O&M Manual shall be recorded with the property at the County Recorder's office. A copy of the O&M Manual shall be provided to each new owner before the transfer of ownership. The O&M Manual shall be signed by the new owner, notarized, and submitted to the Town to be kept on record.

6.2.3 Site Map

The O&M Manual must include a site map showing the locations of all BMPs that will be present at the site. The site map should show the flow of storm water through the site and provide an overview of the storm water's path through the onsite BMPs. The site map and/or exhibits shall be provided digitally or drawn to a legible scale on 8.5-inches by 11-inches or 11-inches by 17-inches sized paper that clearly indicates the following:

a) The location of the storm water management facilities and BMPs.

b) Plan and cross-section details, showing applicable features.

c) The flow of storm water through the site, including an overview of the storm water's path through the onsite storm water facilities and BMPs.

d) Dimensions, easements, outlets/discharge points and outfall locations, drainage patterns, storm water runoff flow directions, the extent and depth (elevation) of high-water levels, flood routing path, signage, connecting structures, weirs, invert elevations, structural controls used to control storm water flows, and other relevant features.

6.2.4 BMP Description

A narrative description and checklist of operation and maintenance guidelines for all post-construction storm water quality measures to facilitate their proper long-term function. This narrative description and checklist shall be made available to future parties who will assume responsibility for the operation and maintenance of the post-construction storm water quality measures. Example checklists are provided in **Appendix C**.

6.2.5 O&M Practices

Each storm water management facility and BMP shall require specific inspection and maintenance procedures. Additionally, the minimum requirements below shall be incorporated into the inspection and maintenance regimen. Guidance shall be written in simple, layman's terms, including:

a) Guidance on owner-required periodic inspections and inspections to be performed by the Town.

b) Guidance on routine maintenance including mowing, litter removal, woody growth removal, etc. to be performed by the owner.

c) Guidance on remedial maintenance such as inlet replacement, outlet work, etc. to be performed by the owner.

d) Guidance on sediment removal, both narrative and graphical, describing when sediment removal shall occur to ensure that the storm water management facility or BMP remains effective as a storm water management device. Guidance shall include instructions as to how the depth of sediment shall be measured and at what measurement removal will be required.

e) Instructions on inspection and clean-out of BMPs, sumps, trash screens, settling pits, and oil/grease collection chambers.

f) Instructions on proper disposal of removed sediments, trash, debris, and other substances.

g) Guidance and methods for preventing water stagnation and all recommended maintenance.

6.2.6 Inspection & Maintenance

The minimum requirements below shall also be incorporated into the inspection and maintenance regimen and clearly documented in the O&M Manual.

a) Operation and maintenance procedures and practices shall be reviewed and assessed annually.

b) Access routes, including roadways and sidewalks, shall be inspected annually and maintained as needed.

c) Drainage structures and flow restrictors shall be inspected and cleaned semi-annually or per the manufacturer's recommendations, whichever is more stringent.

d) Volume control facilities and BMPs shall be inspected semi-annually and after significant rainfall events exceeding 1.5-inches, or per the manufacturer's recommendations, whichever is more stringent.

e) The owner shall keep an updated log or inspection worksheets documenting the performance of the required operation and maintenance activities for perpetuity. Note inspection dates, facility components inspected, facility condition, and any maintenance performed, or repairs made. Documentation must be produced upon the request of the town within 48-hours of the request.

f) Vegetation shall be maintained on a regular basis per design specifications.

g) Pest control measures shall be implemented to address insects, rodents, and other pests. Natural pest control is preferred over chemical treatments.

h) Mechanical measures shall be maintained on a regular basis per the manufacturer's recommendations.

i) Native vegetation plantings shall have "No Mow" or other appropriate signage.

j) Underground vaults and structures shall include design measures to facilitate regular cleaning and maintenance. Confined space entry procedures shall be followed.

6.2.7 Implementation Schedule

An inspection and maintenance schedule shall be prepared in a tabular format and included in the O&M Manual. This schedule shall provide for routine examination of all storm water management facilities and BMPs.

6.3 RIGHT-OF-ENTRY STATEMENT

The O&M Manual shall include a statement that the town has the right to enter the property to inspect the storm water management facility or BMP. The statement shall be signed and notarized.

6.4 DRAINAGE EASEMENT(S) DOCUMENTATION

The O&M Manual shall include documentation of drainage easement(s) providing access to and around the storm water management facilities and BMPs. The documentation must be in graphic format.

7.0 INDIVIDUAL LOTS

7.1 INDIVIDUAL LOT WHERE LAND DISTURBANCE IS EXPECTED TO BE 1 ACRE OR MORE

Individual building lots where land disturbance is expected to be 1 acre or more and are not part of larger development shall follow all the requirements in the ordinances, Standards, and obtain coverage under the CSGP.

Single family residences and ponds where land disturbance is expected to be 1 acre or more and are not part of a larger development shall follow the requirements in the ordinances, Standards, and section 3.8 of the CSGP.

7.2 INDIVIDUAL LOTS WITHIN A PERMITTED PROJECT

All storm water quality measures, including erosion and sediment control, necessary to comply with the ordinances, the CSGP and these Standards shall be implemented in accordance with the SWPPP plan. Provisions for erosion and sediment control on individual building lots regulated under the original permit of a project site owner must include the following requirements:

a) The individual lot operator, whether owning the property or acting as the agent of the property owner, shall be responsible for erosion and sediment control requirements associated with activities on individual lots.

b) Install and maintain a stable construction site access unless the site is to be accessed solely from impervious or similar non-erosive areas.

c) Install and maintain of appropriate perimeter erosion and sediment control measures prior to land disturbance.

d) Utilize temporary stabilization on the building site, but not required during periods when accessibility to the building site is a necessity.

e) Minimize sediment discharge and tracking from each lot throughout the land disturbing activities on the lot until permanent stabilization has been achieved.

f) Clean-up sediment that is either tracked or washed onto internal site roads by the end of the same day. Bulk clearing of sediment shall not include flushing the area with water unless authorized by the permittee of the overall project and the sediment is directed to an appropriate on-site sediment control measure. Cleared sediment must be redistributed or disposed of in a manner that is compliant with all applicable statutes and rules.

g) Repair and stabilize adjacent lots disturbed by an individual lot operator with temporary or permanent surface stabilization.

h) Manage construction and domestic waste to prevent the discharge of pollutants and windblown debris. When disposed of in waste containers (trash receptacles) the receptacle must be covered when not in use and at the end of the day. Waste that is not disposed of in trash receptacles must be removed at the end of the day from the site and disposed of properly.

i) Manage demolition waste to prevent windblown debris and to protect water quality.

j) Utilize the concrete and cementitious washout areas provided by the permittee of the overall project unless a leak-proof containment system is operated on the building lot, or special arrangements are made to properly dispose of the wash water. Washout systems on individual lots are the

responsibility of the individual lot operator and must be properly installed and maintained. Wash water must be disposed of by the individual lot operator and is not allowed to discharge.

k) For individual residential lots, final stabilization will be achieved when the individual lot operator:

1) Completes final stabilization considering weather and season;

2) Initiates permanent seeding with appropriately crimped or tackified mulch cover, erosion control blanket, sod; or

3) Installs and/or ensures functional erosion and sediment control measures are in place on the individual lot. Upon occupancy and concurrence of the homeowner, the homeowner is responsible for maintaining the sediment control measures until final stabilization has occurred.

7.3 STRIP DEVELOPMENTS

Residential strip developments, when improvements are made to the property in preparation for development and the total projected land disturbance, including each building lot is one (1) acre or more must obtain permit coverage. Upon sale of the lots, the permittee must notify each individual lot owner or individual lot operator of the requirements of this permit and provide an erosion and sediment control plan and/or specifications to be implemented on the building lot.

7.4 PROJECT TERMINATION

The project site owner may obtain early release from the CSGP and thus these Standards and Construction Ordinance, if the project site owner meets the conditions identified in the CSGP as described below.

a) The project is a multi-lot development that includes residential building lots or out lots associated with a commercial/industrial project that is part of a larger common project that has permit coverage.

b) All land-disturbing activities have been completed and the entire project site meets the performance criteria for final stabilization, except for individual residential building lots or commercial/industrial out lots that have active land disturbance at the time of the request to terminate.

c) The remaining, undeveloped acreage does not exceed five (5) acres, with contiguous areas not to exceed one (1) acre.

d) A map of the project site, clearly identifying all remaining undeveloped lots, is attached to the NOT letter. The map must be accompanied by a list of names and addresses of individual lot owners or individual lot operators of all undeveloped lots.

e) All public and common improvements, including infrastructure, have been completed and permanently stabilized and have been transferred to the appropriate local entity.

f) The remaining acreage does not pose a significant threat to the integrity of the infrastructure, adjacent properties, or water quality.

g) All permanent storm water quality measures have been installed and are operational.

Upon verification of the NOT, the Edinburgh Building and Zoning Department shall issue written approval to the project site owner. Upon receipt of this approval, the project site owner shall notify all current individual lot owners and all subsequent individual lot owners of the remaining undeveloped acreage and acreage with construction activity that they are responsible for complying with under the Storm Water Management Ordinance. The remaining individual lot owners do not need to submit an NOI or NOT. The

notice must contain a verified statement that each of the conditions above have been met. The notice must also inform the individual lot owners of their responsibility to:

a) Install and maintain appropriate measures to prevent sediment from leaving the individual building lot; and

b) Maintain all erosion and sediment control measures that are to remain on-site as part of the construction plan.

APPENDIX A

DEFINITIONS

"Agricultural Activity" means tillage, planting, cultivation, or harvesting operations to produce agricultural or nursery vegetative crops. The term also includes pasture renovation and establishment, the construction of agricultural conservation practices, and the installation and maintenance of agricultural drainage tile. For purposes of this rule, the term does not include land disturbing activities for the construction of agricultural related facilities, such as barns, buildings to house livestock, roads associated with infrastructure, agricultural waste lagoons and facilities, lake and ponds, wetlands, and other infrastructure.

"Base flow" means stream discharge derived from groundwater sources as differentiated from surface runoff. Sometimes considered to include flows from regulated lakes or reservoirs.

"Best Management Practice" (BMPs) means design, construction, and maintenance practices and criteria for storm water facilities that minimize the impact of storm water runoff rates and volumes, prevent erosion, and capture pollutants.

"Capacity" (of a storm drainage facility) means the maximum flow that can be conveyed or stored by a storm drainage facility without causing damage to public or private property.

"Catch Basin" means a chamber usually built at the curb line of a street for the admission of surface water to a storm drain or subdrain, having at its base a sediment sump designed to retain grit and detritus below the point of overflow.

"Channel" means a portion of a natural or artificial watercourse which periodically or continuously contains moving water, or which forms a connecting link between two bodies of water. It has a defined bed and banks which serve to confine water.

"Concrete Washout" means the rinsing of chutes, pumps, curb and paving machines, hoppers, wheelbarrows, hand tools and any other equipment that are used to handle concrete, mortar, stucco, grout or other mixtures of cement. Concrete washout water is a wastewater slurry containing cementitious materials, metals and is caustic or corrosive, having a high pH.

"Construction Activity" means land disturbing activities and land disturbing activities associated with the construction of infrastructure and structures. This term does not include routine ditch or road maintenance or minor landscaping projects.

"Construction plan" means a representation of a project site and all activities associated with the project. The plan includes the location of the project site, buildings and other infrastructure, grading activities, schedules for implementation, and other pertinent information related to the project site. A storm water pollution prevention plan is a part of the construction plan.

"Construction site access" means a stabilized stone surface at all points of ingress or egress to a project site for the purpose of capturing and detaining sediment carried by tires of vehicles or other equipment entering or existing the project site.

"Contiguous" means adjoining or in actual contact with.

"Contour" means an imaginary line on the surface of the Earth connecting points of the same elevation.

"Contractor" means an individual or company hired by the project site or individual lot owner, their agent, or the individual lot operator to perform services on the project site.

"Conveyance" means any structural method for transferring storm water between at least two points. The term includes piping, ditches, swales, curbs, gutters, catch basins, channels, storm drains, and roadways.

"Cross Section" means a graph or plot of ground elevation across a stream valley or a portion of it, usually along a line perpendicular to the stream or direction of flow.

"Design Storm" means a selected storm event, described in terms of the probability of occurring once within a given number of years, for which drainage or flood control improvements are designed and built.

"Detention" means a facility constructed or modified to restrict the flow of storm water to a prescribed maximum rate, and to detain concurrently the excess waters that accumulate behind the outlet.

"Developer" means:

(1) any person financially responsible for construction activity; or

(2) an owner of property who sells or leases, or offers for sale or lease, any lots in a subdivision.

"Discharge" means the rate of water flow. A volume of fluid passing a point per unit time commonly expressed as cubic feet per second, cubic meters per second, gallons per minute, or millions of gallons per day.

"Disposal" means the discharge, deposit, injection, spilling, leaking, or placing of any solid waste or hazardous waste into or on any land or water such that the solid waste or hazardous waste, or any constituent of the waste, may enter the environment, be emitted into the air, or be discharged into any waters, including ground waters.

"Drainage Area" means the area draining into a stream at a given point. It may be of different sizes for surface runoff, subsurface flow and base flow, but generally the surface runoff area is considered as the drainage area.

"Erosion" means wearing away of the land surface by water, wind, ice, gravity, or other geological agents. The following terms are used to describe different types of water erosion:

(1) *Accelerated erosion.* Erosion much more rapid than normal or geologic erosion, primarily as a result of the activities of man. Erosion is accelerated when soil is disturbed, left bare, and exposed to the abrasive action of wind and water unless adequate measures are taken to prevent it.

(2) *Channel erosion.* An erosion process whereby the volume and velocity of flow wears away the bed and/or banks of a well-defined channel.

(3) *Gully erosion.* An erosion process whereby runoff water accumulates in narrow channels and, over relatively short periods, removes the soil to considerable depths, ranging from 1 to 2 feet to as much as 75-100 feet.

(4) *Rill erosion.* An erosion process in which numerous small channels only several inches deep are formed; occurs mainly on recently disturbed and exposed soils (see ***RILL***).

(5) *Splash erosion.* The spattering of small soil particles caused by the impact of raindrops on wet soils, the loosened and spattered particles may or may not be subsequently removed by surface runoff.

(6) *Sheet erosion.* The gradual removal of a uniform layer of soil from the land surface by runoff water.

"Erosion and sediment control measure" means a practice, or a combination of practices, to control erosion and resulting sedimentation.

"Erosion and sediment control system" means the use of appropriate erosion and sediment control measures to minimize sedimentation by first reducing or eliminating erosion at the source and then, as necessary, trapping sediment to prevent it from being discharged from or within a project site.

"Filter Strip" means usually a long, relatively narrow area (usually 20-75 feet wide) of undisturbed or planted vegetation used near disturbed or impervious surfaces to filter storm water pollutants for the protection of watercourses; reservoirs, or adjacent properties.

"Final stabilization" means the establishment of permanent vegetative cover or the application of a permanent nonerosive material to areas where all land disturbing activities have been completed and no additional land disturbing activities are planned under the current permit.

"Flood (or Flood Waters)" means a general and temporary condition of partial or complete inundation of normally dry land areas from the overflow, the unusual and rapid accumulation, or the runoff of surface waters from any source.

"Floodplain" means a channel proper and the areas adjoining the channel which have been or hereafter may be covered by the regulatory or 100-year flood. Any normally dry land area that is susceptible to being inundated by water for any natural source. The floodplain includes both the floodway and the floodway fringe districts.

"Grade" means:
(1) The inclination or slope of a channel, canal, conduit, and the like, or natural ground surface usually expressed in terms of the percentage the vertical rise (or fall) bears to the corresponding horizontal distance.

(2) The finished surface of a canal bed, roadbed, top of embankment, or bottom of excavation; any surface prepared to design elevation for the support of construction, such as paving or the laying of a conduit.

(3) To finish the surface of a canal bed, roadbed, top of embankment, or bottom of excavation, or other land area to a smooth, even condition.

"Grading" means the cutting and filling of the land surface to a desired slope or elevation.

"Groundwater" means an accumulation of underground water, natural or artificial. The term does not include manmade underground storage or conveyance structures.

"Habitat" means the environment in which the life needs of a plant or animal are supplied.

"Highly Erodible Land" means land that has an erodibility index of eight or more. The soil erodibility index provides a numerical expression of the potential for a soil to erode considering the physical and chemical properties of the soil and the climatic conditions where it is located. The higher the index, the greater the investment needed to maintain the sustainability of the soil resource base if intensively cropped. It is defined to be the maximum of (RxKxLS)/T (from the Universal Soil Loss Equation) and (CxI)/T (from Wind Erosion Equation), where R is a measure of rainfall and runoff, K is a factor of the susceptibility of the soil to water erosion, LS is a measure of the combined effects of slope length and steepness, C is a climatic characterization of windspeed and surface solid moisture, I is a measure of the susceptibility of the soil to wind erosion, and T is a unit of time. Erodibility index scores equal to or greater than 8 are considered highly erodible land.

"Illicit Discharge" means any discharge to a conveyance that is not composed entirely of storm water except naturally occurring floatables, such as leaves or tree limbs.

"Impaired Waters" means waters that do not or are not expected to meet applicable water quality standards, as included on IDEM's Clean Water Act (CWA) Section 303(d) List of Impaired Waters.

"Impervious surface" means surfaces, such as pavement and rooftops, which prevent the infiltration of storm water into the soil.

"Individual building lot" means a single parcel of land within a multiparcel development.

"Individual lot operator" means a person who has financial control of construction activities for an individual lot.

"Individual Lot Owner" means a person who has financial control of construction activities for an individual lot.

"Infiltration" means a passage or movement of water into the soil. Infiltration practices include any structural BMP designed to facilitate the percolation of runoff through the soil to groundwater. Examples include infiltration basins or trenches, dry wells, and porous pavement.

"Inlet" means an opening into a storm drain system for the entrance of surface storm water runoff, more completely described as a storm drain inlet.

"Land disturbing activity" means any manmade change of the land surface, including removing vegetative cover that exposes the underlying soil, excavating, filling, transporting, and grading.

"Larger common plan of development or sale" means a plan, undertaken by a single project site owner or a group of project site owners acting in concert, to offer lots for sale or lease; where such land is contiguous, or is known, designated, purchased or advertised as a common unit or by a common name, such land shall be presumed as being offered for sale or lease as part of a larger common plan. The term also includes phased or other construction activity by a single entity for its own use.

"Lowest Adjacent Grade" means the elevation of the lowest grade adjacent to a structure, where the soil meets the foundation around the outside of the structure (including structural members such as basement walkout, patios, decks, porches, support posts or piers, and rim of the widow well.)

"Lowest Floor" means the lowest of the following:

(1) The top of the basement floor.

(2) The top of the garage floor, if the garage is the lowest level of the building.

(3) The top of the first floor of buildings constructed on a slab or of buildings elevated on pilings or constructed on a crawl space with permanent openings; or

(4) The top of the floor level of any enclosure below an elevated building where the walls of the enclosure provide any resistance to the flow of flood waters unless:

(a) The walls are designed to automatically equalize the hydrostatic flood forces on the walls by allowing for the entry and exit of flood waters, by providing a minimum of two openings (in addition to doorways and windows) having a total area of not less than 1 square foot for every two square feet of enclosed area subject to flooding. The bottom of all such openings shall be no higher than 1 foot above grade.

(b) Such enclosed space shall be usable only for the parking of vehicles or building access.

"Municipal Separate Storm Sewers (MS4) means a MS4 meets all the following criteria:

(1) Is a conveyance or system of conveyances owned by the state, county, city, town, or other public entity:

(2) Discharges to waters of the U.S.

(3) Is designed or used for collecting or conveying storm water:

(4) Is not a combined sewer; and

(5) Is not part of a Publicly Owned Treatment Works (POTW).

"National Pollution Discharge Elimination System (NPDES)" means a permit developed by the U.S. EPA through the Clean Water Act. In Indiana, the permitting process has been delegated to IDEM. This permit covers aspects of municipal storm water quality.

"NPDES Permit" means a permit issued pursuant to Section 402 of the Clean Water Act.

"Nutrient(s)" means:
(1) A substance necessary of the growth and reproduction of organisms.

(2) In water, those substances (chiefly nitrates and phosphates) that promote growth of algae and bacteria.

"Open Drain" means a natural watercourse or constructed open channel that conveys drainage water.

"Outfall" means the point, location, or structure where a pipe or open drain discharges to a receiving body of water.

"Outlet" means the point of water disposal from a stream, river, lake, tidewater, or artificial drain.

"Peak Discharge (or Peak Flow)" means the maximum instantaneous flow from a given storm condition at a specific location.

"Percolation" means the movement of water through soil.

"Permanent stabilization" means the establishment, at a uniform design of seventy percent (70%) across the disturbed area, of vegetative cover or permanent nonerosive material that will ensure the resistance of the soil to erosion, sliding, or other movement.

"Permitting Officer" means the Town Planning Director or his designee, unless the Town Council formally designates another official or employee of the town to have the title, authority and responsibilities of this position.

"Pervious" means allowing movement of water.

"Phasing of construction" means sequential development of smaller portions of a large project site, stabilizing each portion before beginning land disturbance on subsequent portions, to minimize exposure of disturbed land to erosion.

"Post-Construction Storm Water Runoff Controls" means the is the local regulatory mechanism for the Town of Edinburgh for storm water quality. Also called "Post-Construction Ordinance."

"Professional Engineer" means a person licensed under the laws of the State to practice professional engineering.

"Project site" means the entire area on which construction activity is to be performed.

"Project site owner" means the person required to submit the NOI letter per CSGP and required to comply with the terms of these Standards, the Storm Water Management Ordinance and the CSGP, including either of the following:

a) A developer.

b) A person who has financial and operational control of construction activities and project plans and specifications, including the ability to make modifications to those plans and specifications.

"Property Owner" means the individual, partnership, or corporation holding the deed or record title to the property. A contract purchaser whose contract has been recorded shall be considered the property owner.

"Release Rate" means the amount of storm water release from a storm water control facility per unit of time.

"Reservoir" means a natural or artificially created pond, lake or other space used for storage, regulation or control of water. May be either permanent or temporary. The term is also used in the hydrologic modeling of storage facilities.

"Retention" means the storage of storm water to prevent it from leaving the development site. May be temporary or permanent.

"Retention Basin" means a type of storage practice, that has no positive outlet, used to retain storm water runoff for an indefinite amount of time. Runoff from this type of basin is removed only by infiltration through a porous bottom or by evaporation.

"Return Period" means the average interval of time within which a given rainfall event will be equaled or exceeded once. A flood having a return period of 100 years has a 1% probability of being equaled or exceeded in any one year.

"Runoff" means that portion of precipitation that flows from a drainage area on the land surface, in open channels, or in storm water conveyance systems.

"Sediment" means solid material (both mineral and organic) that is in suspension, is being 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.

"Sedimentation" means the process that deposits soils, debris and other unconsolidated materials either on the ground surfaces or in bodies of water or watercourses.

"Slope" means the degree of deviation of a surface from the horizontal, measured as a numerical ratio or percent. Expressed as a ratio, the first number is commonly the horizontal distance (run) and the second is the vertical distance (rise) - e.g., 2;1 However, the preferred method for designation of slopes is to clearly identify the horizontal (H) and vertical (V) components (length and Width (W) components for horizontal angles). Also note that according to international standards (metric), the slope is presented as the vertical or width component shown on the numerator - e.g., 1V:2H. Slope expressions in this chapter follow the common presentation of slopes - e.g., 2:1 with the metric presentation shown in parenthesis - e.g., (1V:2H). Slopes can also be expressed in "percent". Slopes given in percent are always expressed as (100*V/H) – e.g., a 2:1 (1V:2H) slope is a 50% slope.

"Soil" means the unconsolidated mineral and organic material on the surface of the earth that serves as then natural medium for the growth of plants.

"Spill" means the unexpected, unintended, abnormal, or unapproved dumping, leakage, drainage, seepage, discharge, or other loss of petroleum, hazardous substances, extremely hazardous substances, or objectionable substances. The term does not include releases to impervious surfaces when the substance does not migrate off the surface or penetrate the surface and enter the soil.

"Standards" means the Town of Edinburgh Storm Water Standards.

"Storm event" means an estimate of the expected amount of precipitation within a given period. For example, a ten-year frequency, 24-hour duration storm event is a storm that has a 10% probability of occurring in any one year. Precipitation is measured over a 24-hour period.

"Storm Water" means water resulting from rain, melting or melted snow, hail, ice, or sleet.

"Storm Water Drainage System" means all natural or man-made, used for conducting storm water to, through or from a drainage area to any of the following: conduits and appurtenant features, canals, channels, ditches, storage facilities, swales, streams, culverts, streets and pumping stations.

"Storm Water Pollution Prevention Plan (SWPPP)" means a plan developed to minimize the impact of storm water pollutants resulting from construction activities.

"Storm water quality measure" means a practice, or a combination of practices, to control or minimize pollutants associated with storm water run-off.

" Storm Water Runoff" means the water derived from rains falling within a tributary basin, flowing over the surface of the ground or collected in channels or conduits.

"Storm Water Runoff Associated with Construction Activities" means the local regulatory mechanism for the Town of Edinburgh for land disturbance. Also called "Ordinance" or "Construction Ordinance."

"Storm Water Standards of the Town of Edinburgh" means the storm water standards that contain policies and procedures, drainage, erosion and sediment control, and postconstruction standards that new development and redevelopment must meet. The plan indicates the specific measures and sequencing to be used to control sediment, soil erosion and other construction site wastes during and after construction.

"Storm Water System" means all constructed facilities, including combined sewers, structures and natural watercourses used for collecting and conducting storm water to, through and from drainage areas to the point of final outlet, including, but not limited to, any and all of the following: inlets, conduits and appurtenant features, creeks, channels, catch basins, ditches, streams, culverts, retention or detention basins, and pumping stations.

"Strip development" means a multi-lot project where building lots front on an existing road.

"Subdivision" means any land that is divided or proposed to be divided into lots, whether contiguous or subject to zoning requirements, for the purpose of sale or lease as part of a larger common plan of development or sale.

"Surface Runoff" means a precipitation that flows onto the surfaces of roofs, streets, the ground, and the like, and is not absorbed or retained by that surface but collects and runs off.

"Swale" means an elongated depression in the land surface that is at least seasonally wet, is usually heavily vegetated, and is normally without flowing water. Swales conduct storm water into primary drainage channels and may provide some groundwater recharge.

"Technical Review and Comment Form" means the form issued by the Building and Zoning Department stating that the Erosion and Sediment Control Plan is adequate or stating revisions needed in the Erosion and Sediment Control Plan and Storm Water Pollution Prevention Plan.

"Temporary stabilization" means the covering of soil to ensure its resistance to erosion, sliding, or other movement. The term includes vegetative cover, anchored mulch, or other nonerosive material applied at a uniform density of seventy percent (70%) across the disturbed area.

"Topographic Information" means graphical portrayal of the topographic features of a land area, showing both the horizontal distances between the features and their elevations above a given datum.

"Town" means the municipal corporation of Edinburgh, Indiana.

"Tracking" means the deposition of soil that is transported from one (1) location to another by tires, tracks of vehicles, or other equipment.

"Trained individual" means an individual who is trained and experienced in the principles of storm water quality, including erosion and sediment control as may be demonstrated by state registration, professional certification, experience, or completion of coursework that enable the individual to make judgments regarding storm water control or treatment and monitoring.

"Water Quality" means a term used to describe the chemical, physical, and biological characteristics of water, usually in respect to its suitability for a particular purpose.

"Water Resources" means the supply of groundwater and surface water in a given area.

'Waterbody" means any accumulation of water, surface, or underground, natural or artificial, excluding water features designed and designated as water pollution control facilities.

"Watercourse" means any river, stream, creek, brook, branch, natural or man-made drainageway in or into which storm water runoff or floodwaters flow either continuously or intermittently.

"Watershed" means the region drained by or contributing water to a specific point that could be along a stream, lake or other storm water facilities. Watersheds are often broken down into subareas for the purposes of hydrologic modeling.

"Wetlands" means areas that are inundated or saturated by surface water or groundwater at 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.

ABBREVIATIONS

BMP	Best Management Practice
CSGP	Construction Storm Water General Permit
FEMA	Federal Emergency Management Agency
IDEM	Indiana Department of Environmental Management
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NOI	Notice of Intent
NOT	Notice of Termination
SFHA	Special Hazard Flood Area
SMP	Self-Monitoring Program
SWPPP	Storm Water Pollution Prevention Plan

APPENDIX B

Storm Water Management Approval Application

Construction/SWPPP Tech Review & Comment Form

Grant of Perpetual Drainage Easement

Inspection Services Agreement

Transfer of Ownership

Performance and Repair Bond

Maintenance Bond

Post-Construction Cert of Sufficiency of Plan

STORM WATER MANAGEMENT APPROVAL APPLICATION

Town of Edinburgh, Building and Zoning Department

107 South Holland Street

Edinburgh, IN 46124-0065

Initial fees of $100 for construction plan review, $100 for post-construction review, and $200 for post-construction inspection is to be submitted with this application. All items on the Submittal Checklist must be included for the application to be complete.

Project Information:

Name of Project: _____

Legal Address: _____

Township: _____ Parcel No.: _____

Total Acres of Site: _____ Disturbed Acres of Site: _____

Impervious Area: (sq.ft.): _____

Property Use (check one) ☐ Proposed Subdivision ☐ Commercial/Industrial/Apartment

☐ Other: _____

Estimated Construction Dates: Start: _____ End: _____

Estimated Total Length of Construction in Months: _____

Project Owner Information:

Name: _____

Address: _____

Contact: _____

Telephone: _____ Email: _____

Design Firm Information:

Name: _____

Address: _____

Professional Engineer: _____

Contact: _____

Telephone: _____ Email: _____

As owner, or an authorized representative of the Owner, I agree to pay all fees incurred for the requested review and inspection for the above project according to the current Town Fee Schedule.

Printed Name and Title: _____

Signature: _____ Date: _____

Address: _____

STORM WATER MANAGEMENT APPROVAL APPLICATION

Town of Edinburgh, Building and Zoning Department

107 South Holland Street

Edinburgh, IN 46124-0065

STORM WATER SUBMITTAL CHECKLIST

The submittal package shall include 2 copies of each or electronic files if approved by the department:

- ☐ 1. Completed *Storm Water Management Approval Application*
- ☐ 2. Initial Plan Review and Inspection fees.
- ☐ 3. IDEM's Notice of Intent form.
- ☐ 4. Construction Plans showing the existing and final project site layouts and drainage plans. Provide full size plans.
- ☐ 5. Storm Water Pollution Prevention Plan (SWPPP) for Construction Activities including all information in the Standards and erosion and sediment control locations, specifications, and details.
- ☐ 6. Storm Water Pollution Prevention Plan (SWPPP) for Post-Construction Activities including design calculations and technical specifications.
- ☐ 7. Operation and Maintenance Manual(s) for proposed post-construction BMPs (storm water quantity and quality) and technical specifications.
- 8. Drainage Report including drainage design, detention and post-construction storm water quality treatment design calculations.
- ☐ 9. Completed *Grant of Perpetual Drainage Easement* for the post-construction BMP access easement.
- ☐ 10. Completed *Inspection Services Agreement*
- ☐ 11. Completed *Best Management Practice Owner Acknowledgement.*
- ☐ 12. Completed *Certification of Sufficiency of Plan.*

Town use only Submittal date: _____ Project No. _____ Approval date: _____

CONSTRUCTION /SWPPP TECHNICAL REVIEW AND COMMENT FORM

Town of Edinburgh	**Construction/ Storm Water Pollution Prevention Plan Technical Review** **Edinburgh Storm Water Management Ordinance and Standards (Revised 2023)** https://codelibrary.amlegal.com/codes/edinburgin/latest/edinburg_in/0-0-0-5379 https://www.edinburgh.in.us/egov/apps/document/center.egov?eGov_searchDepartment=66 **IDEM Construction Stormwater General Permit:** https://www.in.gov/idem/stormwater/construction-land-disturbance-permitting/ (INRA00000 effective 12/18/2021)

Construction/Storm Water Pollution Prevention Plan Technical Review and Comment

Project Name:
Scope of Project:
Location of Project:
County:
Latitude: **Longitude:**

Plan Submittal Date:
Click here to enter a date.
Plan Review Date:
Click here to enter a date.

Plan Preparer: **Affiliation:**
Address:
City: **State:** **Zip:**
Phone: **Cell Phone:** **Email:**

Project Site Owner: **Company Name (if applicable):**
Address:
City: **State:** **Zip:**
Phone: **Cell Phone:** **Email:**

Plan Reviewer: **Affiliation:** **On behalf of:**
Assisted By:
Address:
City: **State:** **Zip:**
Phone: **Cell Phone:** **Email:**

Plan Review Status:		
☐	**Plan is Adequate**	A comprehensive plan review has been completed and it has been determined that the plan satisfies the minimum requirements of the Town of Edinburgh Storm Water Management Ordinance and Standards, and the Construction Stormwater General Permit INRA00000 (Effective 12-18-2021).
☐	**Preliminary Review**	A comprehensive review will not be completed at this time. The plan review authority reserves the right to perform a comprehensive review at a later date, and revisions may be required at that time.
☐	**Conditional Acceptance**	Acceptance of the plan is conditional. The conditional acceptance is contingent upon addressing the issues identified in the comment sections.
☐	**Plan is Deficient**	Significant deficiencies were identified and must be addressed. Refer to the comment sections.

Action:	
☐	**Submit a Notice of Intent:** Submit the Notice of Intent (NOI) online through the IDEM Regulatory ePortal. It is required to upload a copy of this review form when submitting the NOI through the IDEM Regulatory ePortal; (https://stormwater.idem.in.gov/ncore/external/home)
☐	**Do not file a Notice of Intent or commence land-disturbing activities:** Deficiencies must be adequately addressed and an acceptable plan review completed.
☐	**Comments:** Refer to Plan Review Comments Sections of this document.
☐	**Revisions:** Update and submit the revised Construction/Storm Water Pollution Prevention Plan as indicated below.
	☐ Update and submit a complete plan set that addresses plan deficiencies.
	☐ Update and submit a document (narrative and/or plan sheets) that address plan deficiencies.
	☐ Update and submit a complete plan set that addresses plan deficiencies. A comprehensive plan review will not be completed.

Plan Review Information

- *The technical review and comment is intended to evaluate the completeness of the Construction/Storm Water Pollution Prevention Plan for the project. The Plan submitted was not reviewed for the adequacy of engineering design. All measures included in the plan, as well as those recommended in the comments should be evaluated as to their feasibility by a qualified individual with structural measures designed by a qualified engineer. The Plan has not been reviewed for other local, state, or federal permits that may be required to proceed with this project.*
- *Additional information, including design calculations may be requested to further evaluate the plan.*
- *All proposed storm water pollution prevention measures and those referenced in this review must meet the design criteria and standards set forth in the "Indiana Stormwater Quality Manual" from the Indiana Department of Environmental Management or similar Guidance Documents.*
- *Construction activities and unforeseen weather conditions may affect the performance of the erosion and sediment control system, individual measures, or the effectiveness of the plan. The plan must be a flexible document, with provisions to modify or substitute measures as necessary to ensure compliance.*

Priority Site Information:

☐	**Nature and Extent of Construction**	☐	**Characteristics of Soils**
☐	**Topography**	☐	**Complaints/Other Factors**
☐	**Threat to Degradation of Water Quality**	☐	**Not a Priority Site**

Section A: Construction Plan Elements

Adequate	Deficient	NA	A	*The construction plan elements include general information associated with the project site that are critical for the evaluation of the storm water pollution prevention plan component. This information includes, but is not limited to an index, resource information, reference maps, grading information, project layout and design, and drainage plan*
☐	☐	☐	1	Index of the location of required plan elements in the construction plan
☐	☐	☐	2	A vicinity map depicting the project site location in relationship to recognizable local landmarks, towns, and major roads
☐	☐	☐	3	Narrative of the nature and purpose of the project
☐	☐	☐	4	Latitude and longitude to the nearest fifteen (15) seconds
☐	☐	☐	5	Legal description of the project site
☐	☐	☐	6	11 X 17-inch plat showing building lot numbers/boundaries and road layout/names
☐	☐	☐	7	Boundaries of the one hundred (100) year floodplains, floodway fringes, and floodways
☐	☐	☐	8	Land use of all adjacent properties
☐	☐	☐	9	Identification of a U.S. EPA approved or established TMDL
☐	☐	☐	10	Name(s) of the receiving water(s)

☐	☐	☐	11	Identification of discharges to a water on the current 303d list of impaired waters and the pollutant(s) for which it is impaired
☐	☐	☐	12	Soil map of the predominant soil types
☐	☐	☐	13	Identification and location of all known wetlands, lakes and water courses on or adjacent to the project site (construction plan, existing site layout) – required 50-foot natural buffer
☐	☐	☐	14	Identification of any other state or federal water quality permits or authorizations that are required for construction activities
☐	☐	☐	15	Identification and delineation of existing cover, including natural buffers
☐	☐	☐	16	Existing topography at a contour interval appropriate to indicate drainage patterns
☐	☐	☐	17	Location(s) of where run-off enters the project site
☐	☐	☐	18	Location(s) of where run-off discharges from the project site prior to land disturbance. Erosion measures required at the discharge point.
☐	☐	☐	19	Location of all existing structures on the project site
☐	☐	☐	20	Existing permanent retention or detention facilities, including manmade wetlands, designed for the purpose of storm water management
☐	☐	☐	21	Locations where storm water may be directly discharged into ground water, such as abandoned wells, sinkholes, or karst features
☐	☐	☐	22	Size of the project area expressed in acres
☐	☐	☐	23	Total expected land disturbance expressed in acres
☐	☐	☐	24	Proposed final topography. Grading plan.
☐	☐	☐	25	Locations and approximate boundaries of all disturbed areas
☐	☐	☐	26	Location, size, and dimensions of all storm water drainage systems, such as culverts, storm sewers, and conveyance channels
☐	☐	☐	27	Locations of specific points where storm water and non-storm water discharges will leave the project site
☐	☐	☐	28	Location of all proposed site improvements, including roads, utilities, lot delineation and identification, proposed structures, and common areas
☐	☐	☐	29	Location of all on-site soil stockpiles and borrow areas. Topsoil must be preserved.

☐	☐	☐	30	Construction support activities that are expected to be part of the project
☐	☐	☐	31	Location of any in-stream activities that are planned for the project including, but not limited to stream crossings and pump arounds

Section A – Comments:

•

Adequate	Deficient	NA	B	*The construction component of the Storm Water Pollution Prevention Plan includes storm water quality measures to address erosion, sedimentation, and other pollutants associated with land disturbance and construction activities. Proper implementation of the plan, maintenance of measures, and administering a self-monitoring program is required to manage the project site to minimize the discharge of sediment and other pollutants. Construction activities and unforeseen weather conditions may affect the performance of the erosion and sediment control system, individual measures, or the effectiveness of the plan. The plan must be a flexible document, with provisions to modify or substitute measures as necessary to ensure compliance.*
☐	☐	☐	1	Description of the potential pollutant generating sources and pollutants, including all potential non-storm water discharges
				Where applicable, Items in 2 through 10 below will be evaluated for Location, dimensions, detailed specifications, and construction details
☐	☐	☐	2	Stable construction entrance locations and specifications. Plan to clear tracking of sediments on road. Dust suppression plan.
☐	☐	☐	3	Specifications for temporary and permanent stabilization. Include seeding and mulching plan and 70% coverage requirement for final stabilization. Include 7 day stabilization requirement.
☐	☐	☐	4	Sediment control measures for concentrated flow areas (sediment basins if used have specific requirements)
☐	☐	☐	5	Sediment control measures for sheet flow areas
☐	☐	☐	6	Run-off control measures
☐	☐	☐	7	Storm water outlet protection locations and specifications.
☐	☐	☐	8	Grade stabilization structure locations and specifications
☐	☐	☐	9	Dewatering applications and management methods
☐	☐	☐	10	Measures utilized for work within waterbodies
☐	☐	☐	11	Maintenance guidelines for each proposed temporary storm water quality measure
☐	☐	☐	12	Planned construction sequence describing the relationship between implementation of storm water quality measures in relation to land disturbance

☐	☐	☐	13	Provisions for erosion and sediment control on individual building lots regulated under the proposed project
☐	☐	☐	14	Material handling and spill prevention and spill response plan meeting the requirements in 327 IAC 2-6.1
☐	☐	☐	15	Material handling and storage procedures associated with construction activity. Management of waste materials and dumpsters for runoff and wind. Concrete washout management. Fueling areas. Equipment washing. Application of pesticides, herbicides, insecticides and fertilizers. Disposal of hazardous waste. Washing of paint or grout applicators.
☐	☐	☐	16	Monitoring and project management plan to include self-monitoring program (SMP), self-inspections and project management log
Section B – Comments: •				

Section C: Storm Water Pollution Prevention Plan – Post-Construction				
Adequate	**Deficient**	**NA**	**C**	*The post-construction component of the Storm Water Pollution Prevention Plan includes the implementation of storm water quality measures to address pollutants that will be associated with the final project land use. Post-construction storm water measures should be functional upon completion of the project. Long term functionality of the measures is critical to their performance and should be monitored and maintained.*
☐	☐	☐	1	Description of pollutants and their sources associated with the proposed land use
☐	☐	☐	2	Description of proposed post-construction storm water measures including storm water detention and water quality treatment according to the local ordinance (refer also to separate technical review comments)
☐	☐	☐	3	Plan details for each post-construction storm water measure
☐	☐	☐	4	Sequence describing storm water measure implementation
☐	☐	☐	5	Maintenance guidelines for proposed post-construction storm water measures. Operation and Maintenance (O&M) Manual.
☐	☐	☐	6	Entity that will be responsible for operation and maintenance of the post-construction storm water measures. Include in the O&M Manual
Section C – Comments: •				

GRANT OF PERPETUAL DRAINAGE EASEMENT

Town of Edinburgh

107 S. Holland Avenue

Edinburgh, IN 46124-0065

THIS INDENTURE, made this _____ day of _____, 20_____, by and between _____ of the County of _____, State of Indiana, hereinafter called "GRANTOR" and the Town of Edinburgh, Indiana, hereinafter called "GRANTEE":

WITNESSETH:

WHEREAS, GRANTOR must obtain from GRANTEE drainage approval, pursuant to the Storm Water Standards of the Town of Edinburgh, Johnson County, Indiana, for the construction of a development known as _____; and

WHEREAS, GRANTEE has determined that GRANTOR must grant it a perpetual easement and right-of-way to assure that GRANTOR'S drainage plan, as approved by GRANTEE, and described in GRANTEE'S Drainage Approval File No. _____ incorporated herein by reference (hereinafter called the "Drainage Plan") will be established and maintained, or to otherwise assure satisfactory drainage.

NOW, THEREFORE, in consideration of the mutual covenants herein set forth and other valuable considerations, the receipt of which is hereby acknowledged, the GRANTOR for himself, his administrators, successors and assigns, does hereby grant, convey and warrant unto the GRANTEE, its grantees, successors and assigns, forever, a perpetual right-of-way and easement, with the right, privileges and authority in GRANTEE, its grantees, successors and assigns, to enter upon, maintain, repair, continue and improve the drainage facilities described in the Drainage Plan (hereinafter called the "Drainage Facilities") located under, upon, over and across the real estate owned by GRANTOR and situated in the County of _____, State of Indiana, to wit:

A diagram map showing the route, courses and distances through the above real estate and the width of the easement and right-of-way is attached hereto and incorporated herein by reference as Exhibit "A".

The GRANTEE, its successors and assigns shall have the right to enter along, over and upon said easement and right-of-way to install, repair, maintain and continue such Drainage Facilities and to make such alterations and improvements to the Drainage Facilities as GRANTEE deems may be necessary or useful. GRANTEE shall also have the right of ingress and egress only, for temporary periods only, over GRANTOR'S property adjoining said easement when necessary to install, repair, maintain, continue or improve the Drainage Facilities. GRANTEE shall not otherwise enter upon GRANTOR'S real estate adjoining said easement and right-of-way. GRANTEE may remove any structure, pavement or landscaping on the easement to inspect and/or maintain the Drainage Facilities without liability for replacement or repair of such structure, pavement or landscaping.

GRANTEE may relinquish this easement and right-of-way, but only if GRANTOR can assure, to the satisfaction of GRANTEE, continuing and adequate drainage absent this easement and right-of-way.

GRANTOR and GRANTEE agree that this easement and right-of-way shall not create in GRANTEE a duty to maintain, repair, continue and improve the Drainage Facilities but only shall create a right so to do. The duty to maintain, repair, and continue the easement and right-of-way and Drainage Facilities shall remain with GRANTOR and shall include, but not be limited to, mowing grass and weeds and removing silt, debris and any other obstructions, to the free and unobstructed use of the easement and right-of-way or the Drainage Facilities.

GRANTOR covenants that it will not erect, maintain, or allow to continue on the portion of the GRANTOR'S real estate in which the easement and right-or-way is granted herein any building or other structure (except for paving and/or landscaping) or obstruction to the free and unobstructed use of the easement and right-of-way or the Drainage Facilities without express written permission from GRANTEE. Such permission, when duly recorded, shall run with the real estate.

GRANTOR warrants that it is the owner in fee simple of said real estate, is lawfully seized thereof and has a good right to grant and convey the foregoing easement and right-of-way therein; warrants the quiet use and enjoyment thereof; and warrants that it will defend GRANTEE'S title in said easement and right-or-way against all claims.

The easement and right-or-way granted herein, and its associated benefits and obligations, shall run with the real estate.

This indenture shall bind and inure to the benefit of the respective successors and assigns of the parties hereto.

IN WITNESS WHEREOF, GRANTOR has sent his hand and seal the day and year first written above.

_____ _____

(Signature) (Printed)

_____ _____

(Signature) (Printed)

_____

Title, if GRANTOR is Corporation

STATE OF INDIANA)

) SS:

COUNTY OF _____)

On this _____ day of _____, 20_____, before the undersigned, a NOTARY PUBLIC in and for said County and State, personally appeared _____, GRANTOR herein, who acknowledged the execution of the above and foregoing conveyance to be their voluntary act and deed.

WITNESS my hand and Notarial Seal this _____ day of _____, 20_____.

_____

(Signature)

(Printed)

COUNTY OF RESIDENCE: _____

MY COMMISSION EXPIRES: _____

This instrument prepared by _____

INSPECTION SERVICES AGREEMENT

Town of Edinburgh
107 S. Holland Avenue
Edinburgh, IN 46124-0065

AGREEMENT BETWEEN DEVELOPER/CONTRACTOR AND EDINBURGH STORM WATER UTILITY FOR STORM WATER SYSTEM INSPECTION SERVICES

PROJECT NAME: _____

ADDRESS: _____

PROJECT NO: _____

The Town of Edinburgh (Town), d/b/a Edinburgh Storm Water Utility (Utility) ("Utility", as used in this Agreement, includes "Town", and "Town" includes "Utility") agrees to provide the Inspection Services required in conjunction with the above Storm Water System Project. Such Inspection will be done to determine if the work is proceeding in accordance with the Plans and Specifications and Storm Water Utility Board (Board) approvals. Inspection Services shall include witnessing of all tests required of the Developer or Contractor for acceptance of the Storm Water System by the Town of Edinburgh.

The Developer/Contractor shall defend, indemnify, hold harmless and protect the Utility, its employees, agents, officers and directors, from and against any and all claims, demands, causes of action, liabilities, losses, damage, penalties, costs (including reasonable attorneys' fees) and suits, including without limiting the generality of the foregoing, those claims, demands, causes of action, liabilities, losses, damage, penalties, costs (including reasonable attorneys' fees) and suits for which the Utility may be, or may be claimed to be, liable through negligence or otherwise, for death, personal injury, illness or loss of damage to property, or economic loss alleged to arise out of, result from, relate to, or be in any manner connected with activities of the Developer/Contractor or the services provided by the Utility under this Agreement. The Developer/Contractor shall provide such defense and indemnity whether the claim, demand, cause of action or suit alleges that the occurrence, omission, action, liability, loss or damage was caused or contributed to by the concurrent, joint, comparative, active or passive negligent act or omission of the Utility, except that the Developer/Contractor assumes no liability for the negligent acts or omissions of the Utility, its employees, agents, officers and directors, which, without contributory fault on the part of the Developer/Contractor, its contractor(s), subcontractor(s) or their employees, agents, officers or directors, is the sole cause of loss, damage to person or property, or injury to or death of any person.

This Agreement does not include construction engineering or construction stakeout.

The Utility agrees to perform such Inspection Services for a fee of $ 50.00 per hour of actual time spent on the project by the Utility and/or an authorized representative of the Utility in performing said Inspection Services.

The estimated time for completing the project is _____ week(s).
Estimated time of Inspection Services is _____ hours.
The total estimated cost for Inspection Services is $_____.

The Developer agrees to include One Hundred percent (100%) of the total estimated cost of $_____ with this "Agreement" with the check made payable to the Edinburgh Storm Water Utility.

The actual Inspection fee will be based on the actual number of hours required to inspect the complete installation of the Storm Water System portion of the project.

Adjustments to the total Inspection fee, if needed, are to be made upon the conditional acceptance of the completed work by the Town of Edinburgh and posting of a three-year Maintenance Bond and prior to the final acceptance of the Storm Water System by the Utility.

IN TESTIMONY WHEREOF, the Developer and Contractor have hereunto set their hands and seals this ____ day of _____, 20____.

_____	_____
Owner (Print)	Contractor Print)
Organization (Print)	Organization (Print)
BY: _____	BY: _____
Signature	Signature
_____	_____
Title	Title
STATE OF INDIANA)	STATE OF INDIANA)
)SS:	)SS:
COUNTY OF JOHNSON)	COUNTY OF JOHNSON)
Subscribed and sworn to before me a Notary Public in and for said county and state this _____ day of _____, 20____.	Subscribed and sworn to before me a Notary Public in and for said county and state this _____ day of _____, 20____.
My Commission Expires:_____	My Commission Expires: _____
_____	_____
Notary Public Signature	Notary Public Signature
County of Residence:	County of Residence:

IN TESTIMONY WHEREOF, the Town of Edinburgh, Indiana, hereby accepts the foregoing Agreement and has set its hand this _____ day of _____, 20_____.

TRANSFER OF OWNERSHIP
Town of Edinburgh
107 S. Holland Avenue
Edinburgh, IN 46124-0065

TRANSFER OF OWNERSHIP
OF DEVELOPER INSTALLED STORM SEWER SYSTEM

By virtue of this document, the undersigned does sell and covenant and assign all rights, interest and ownership of storm sewer system installed at

_____
(Project Name)

_____
(Location)

as noted by the as-built drawings and per the materials listed on the "Cost of Storm Water System" form which reflects a total cost for materials and installation of $_____, to Town of Edinburgh .

DEVELOPER'S CERTIFICATION

I certify that no advance or contribution for the construction of this facility have been made by the owners of any lots being served by this facility, and there are no agreements which might result in claims that all or some part of the cost of the installed storm sewers and appurtenances at _____ _____ has been contributed by any such person. The Title to all facilities having been vested in Town of Edinburgh provided that any construction warranty received by this Developer in connection with the installation thereof shall automatically be assigned to Town of Edinburgh (Utility owning) for its benefit. This Developer further agrees that it shall not charge directly or indirectly, customers or potential customers of Town of Edinburgh for any facilities installed by the Developers.

It is mutually understood and agreed that the Storm Water Utility of the Town of Edinburgh is a municipal utility and that its rights and obligations hereunder shall be subject to all applicable orders and rules and regulations of such regulatory commissions or regulatory authorities as may have jurisdiction over the operation, maintenance and ownership of these and all facilities described above.

_____
Signature

_____
Date

STATE OF INDIANA)
) SS:
COUNTY OF _____)

Before me, the undersigned, a Notary Public in and for said County and State, this _____ day of _____, 20___, personally appeared _____

_____

and acknowledge the execution of the foregoing Transfer of Ownership.

WITNESS my hand and official seal.

_____
Notary Public

_____
Name (Typed or Printed)

_____
County of Residence

My Commission Expires:

_____

PERFORMANCE AND REPAIR BOND

Town of Edinburgh
107 S. Holland Avenue
Edinburgh, IN 46124-0065

EDINBURGH STORM WATER UTILITY
PERFORMANCE AND REPAIR BOND

KNOW ALL MEN BY THESE PRESENTS: That _____,
(Name of Developer)

_____,
(Address of Developer)

as Principal, and _____,
(Name of Surety)

_____,
(Address of Surety)

as Surety, are held and firmly bound unto the Town of Edinburgh and its Edinburgh Storm Water Utility (collectively, the Edinburgh Storm Water Utility), in the sum of ($), the payment of which sum, well and truly
(120% of Value of Storm Sewer System)
to be made, we hereby bind ourselves, our heirs, executors, administrators, successors, and assigns, firmly by these presents.

WHEREAS, _____ entered into a Contract with the
(Developer)
Edinburgh Storm Water Utility dated _____, 20____, to install a storm sewer system as described in Exhibit "A"; and has employed _____,
(Installation Contractor)
to perform said improvement.

NOW THEREFORE, if the said _____, as Principal shall
(Developer)
construct or cause to be constructed and completed the entire storm water system provided for in said Contract and shall construct same in accordance with the standards and specifications used by the Edinburgh Storm Water Utility for like constructions, all to be done subject to the approval and acceptance of the Edinburgh Storm Water Utility; and shall construct said improvement with such materials and in such manner that the same shall endure without need of any completion of said improvement and acceptance thereof ('in-service date"), then this obligation shall be void, otherwise it shall remain in full force and effect.

The performance requirements of this bond shall remain in full force and effect until the Principal shall have paid to the proper parties all amounts due for labor performed, for equipment, materials, and services furnished and consumed, for sales taxes, and for all insurance and royalties in connection with, or incidental to, the completion of the Contract. While this Bond is in full force and effect, it may be sued on at the instance of any interested party (as above mentioned), in the name of Edinburgh Storm Water Utility, to the use of such interested party, for the breach of any of the conditions of the Contract.

If the said improvement shall endure without the need of repairs for the period of one (1) year from and after the in-service date thereof as aforesaid and if all the conditions of the Contract, as above stated, have been fully discharged, the obligations of this Bond shall become void.

WAIVER, the said Surety, for value received, hereby expressly agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder shall in any way affect the obligations of the Bond, and it does hereby waive notice of any such change, extension of time, or alteration or addition to the terms of the Contract, or to the work to be performed thereunder.

IN WITNESS WHEREOF, on this _____ day of _____, 20____, the said Principal has caused this Bond to be signed by its _____ by order of its board of directors. And the said Surety _____ has caused this Bond Number_____, to be signed by its _____ by order of its board of directors.

ATTEST:

_____
Principal (Seal)

_____ By: _____

Title: _____

WITNESS

_____
Surety (Seal)

_____ By: _____

Name and local address of Surety:

_____

_____

_____

_____

The foregoing Bond is hereby approved this ____ day of _____, 20____.

_____
Name Title
Edinburgh Storm Water Utility

MAINTENANCE BOND

Town of Edinburgh

107 S. Holland Avenue

Edinburgh, IN 46124-0065

EDINBURGH STORM WATER UTILITY
MAINTENANCE BOND

Instructions:

Contractor must use this form or other form containing the same material conditions and provisions as approved in advance by Town of Edinburgh.

Date of Bond must not be prior to date of Contract. If Contractor is a Partnership, all partners should execute bond.

Surety company executing this bond shall appear on the most current list of "Surety Companies Acceptable on Federal Bonds," as specified in the U.S. Treasury Department Circular 570, as amended, and be authorized to transact business in the State of Indiana.

KNOW ALL MEN BY THESE PRESENTS: that

"Contractor" _____

and

"Surety" _____
(Name of Surety)

(Address of Surety)

a corporation chartered and existing under the laws of the State of _____, and authorized to do business in the State of Indiana, are held and firmly bound unto the Town of Edinburgh, Indiana, and its Edinburgh Storm Water Utility, hereinafter collectively called Owner, in the penal sum of _____ Dollars,

($_____) in lawful money of the United States, for the payment of which sum well and truly to be made, together with interest at the maximum legal rate from date of demand and any attorney fees and court costs incurred by Owner (the Obligee) to enforce this instrument, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Contractor has entered into a certain Agreement with the Owner, dated as of the _____ day of _____, 20___, by which Contractor has agreed to perform and furnish certain work (the Work) for or in furtherance of construction of public improvements described generally as the

_____

(Project Name)

which Agreement, and the "Contract Documents" as referred to therein, are hereby incorporated herein by reference;

WHEREAS, the Contractor has installed and completed and met all improvements, installations and requirements applicable to the above described Work, but said improvements and installations have not yet been accepted for public maintenance; and

WHEREAS, the Owner requires a guarantee from the Contractor against defective materials and workmanship in connection with such maintenances.

NOW, THEREFORE, Contractor warrants the workmanship and all materials used in the construction, installation and completion of said Work, to be of good quality and completed in a workmanlike manner in accordance with the Agreement and Contract Documents and all laws, ordinances, rules, standards and regulations applicable to said Work;

FURTHERMORE, the conditions of the Surety's obligation hereunder are such that if Contractor at his own expense, for a period of three years after said Work, improvements and installations are accepted for public maintenance by the Owner, shall make all repairs or replacements thereto which may become necessary by reason of improper or defective workmanship or materials, or any failure thereof to conform to the provisions of the Agreement or Contract Documents, then Surety's obligation is to be null and void; otherwise such obligation shall remain in full force and effect. Any repairs or replacements made under this Bond shall in like manner be subject to the terms and conditions hereof.

Contractor and Surety covenant that all action required by law to be taken by them to authorize the execution and delivery of this bond have been previously been taken, that the officers whose signatures appear below have been fully empowered to execute and deliver this instrument and that once executed and delivered, it shall represent the lawful and binding obligation of the parties.

IN WITNESS WHEREOF, this instrument is executed in duplicate counterparts, each one of which shall be deemed an original, this the day of , 20 .

CONTRACTOR:_____

By:_____ _____

(Signature) (Printed Name)

ATTEST:

_____ _____

(Signature) (Title)

SURETY:_____

By:_____, Attorney-in-Fact

(Signature)

_____ _____

(Printed Name) (Address)

_____

POST-CONSTRUCTION CERTIFICATION OF SUFFICIENCY OF PLAN

Town of Edinburgh

107 S. Holland Avenue

Edinburgh, IN 46124-0065

Project Information:

Name of Project: _____

Project Address: _____

Date of Plans: _____

I hereby certify that to the best of my knowledge and belief:

1. The storm water runoff for this project is in compliance with storm water requirements set forth in the Edinburgh Storm Water Standards.

2. The calculations, designs, reproducible drawings, masters, and original ideas reproduced in this storm water plan are under my dominion and control and they were prepared by me and my employees.

Name: _____

Title: _____

Professional Registration No.: _____

Company Name: _____

Company Address: _____

(SEAL)

Signature: _____ Date: _____

APPENDIX C – BMP DESIGN CRITERIA

Storm Water Ponds

Storm Water Wetlands

Bioretention Areas

Water Quality Swales

Sand Filters

Infiltration Trenches

Biofilters

STORM WATER PONDS

QUICK REFERENCE



Description:	Constructed storm water retention basin that has a permanent pool of water in which runoff from each rain event is captured and treated in the pool.
Site Feasibility:	Drainage Area: Minimum 10 acres Residential Subdivision Use: Yes High Density/Ultra-Urban: No
Design Criteria:	Sediment forebay required Length to width ratio is 3:1 Maximum depth of permanent pool should not exceed 8 feet Side slopes of pond should not exceed 3:1 High permeable soils (hydrologic group A or B) may require a liner
Advantages:	Moderate to high removal rate of urban pollutants Can use for water quality and flood control High community acceptance when designed with attention to aesthetics and maintained properly Opportunity for wildlife habitat
Disadvantages:	Potential for thermal impacts/downstream warming Pond drainage can be problematic for low relief terrain Dam height restrictions for high relief areas Improperly designed or maintained ponds may become stagnant causing unpleasant conditions
Maintenance:	Monitor sediment accumulation and remove periodically Remove debris from inlet and outlet structures Maintain side slopes and remove invasive vegetation

GENERAL

a) Description

Storm water ponds are constructed storm water retention basins that contain a permanent pool of water in which runoff from each rain event is captured and treated in the pool. The purpose of the pond is to retain runoff and allow contaminated sediments to settle removing particulates and, through biological uptake, some nutrients attached to the particulates. A forebay placed in front of the pond is required to intercept most sediments providing for ease of cleanout.

Underlying soils of hydrologic group C or D should be adequate to maintain a permanent pool. Most group A soils and some group B soils will require a pond liner. Subsurface analysis and permeability tests may be required to evaluate soils. Wet ponds require an adequate water source to maintain a permanent pool of water.

If storm water ponds are used on a site with an underlying water supply aquifer, a separation distance of 2 feet is required between the bottom of the pond and the elevation of the seasonally high-water table.

b) Variations

1) Wet pond – provides all the water quality volume storage volume in a permanent pool.

c) Wet extended detention (ED) pond – provides the water quality storage volume through a combination of the permanent pool and ED storage above the permanent pool. The ED storage volume should be detained and released over a 24-hour period.

d) Micro-pool ED pond – only a small micro-pool of water within an ED pond is maintained at the outlet to the pond, which is sized to detain the water quality volume for 24 hours. The micro-pool prevents resuspension of previously settled sediments.

e) Multiple ponds – provides the water quality storage volume in two or more cells that create longer pollutant removal pathways.

DESIGN CRITERIA

The following criteria are minimum standards for the design of a wet storm water pond. A storm water pond may be designed to meet water quantity and quality requirements. If considered for water quality treatment only, the pond shall be designed to capture the water quality volume (WQ_v) using the equation in Chapter 2 of this manual.

a) The minimum drainage area tributary to the pond is 10 acres.

b) Pond geometry:

1) The pond should have a minimum length to width ratio of 3:1. The flow path between the inlet and outlet should be maximized and shaped so that flow enters the pond and gradually spreads out, improving sediment removal. Baffles, pond shaping and islands can be utilized to increase the flow path.

c) The depth of the permanent pool should be greater than 4 feet to avoid resuspension of particles and less than 8 feet to avoid stratification and anoxic conditions.

d) Vegetated side slopes to the pond should not exceed 3:1 and shall terminate on a minimum 10-foot safety ledge with a maximum 10:1 slope. Side slopes steeper than 3:1 require riprap to stabilize the banks. Below the safety ledge, ponds with slopes steeper than 3:1 shall also be secured with riprap and no bank shall exceed a slope of 1½:1.

e) Sediment forebay:

1) All ponds shall include a sediment forebay that consists of a separate cell, formed by an acceptable barrier. A forebay is to be provided at each inlet to the pond unless the inlet provides less than 10% of the total design storm inflow to the pond.

f) The forebay shall be sized to contain 10% of the water quality volume. The forebay storage volume is part of the total WQv requirement.

g) Entrance and exit velocities from the forebay must be non-erosive.

h) A fixed vertical depth marker shall be installed in the forebay to continually measure sediment deposition. Sediment in the forebay shall be removed after 50% of the forebay capacity has been depleted.

i) Direct maintenance access for appropriate equipment shall be provided to the forebay.

1) Outlet Structures:

a) The outlet structure should be designed to detain the water quality volume above the permanent pool for 24 to 48 hours.

j) Flow control from a pond is typically accomplished with the use of a riser and barrel. The riser is a vertical pipe or inlet structure that is attached to the base of the pond with a watertight connection. The outlet barrel is a horizontal pipe attached to the riser that conveys flow under the embankment. The riser should be located within the embankment for maintenance access, safety, and aesthetics. Suitable erosion control measures must be provided for the outlet and all inlet structures to the pond. Energy dissipaters should be placed at the outlet of the barrel to prevent scouring and erosion.

k) Anti-seep collars or filter diaphragms must be provided for the barrel of the outlet structure. If reinforce concrete pipe is used, O-ring gaskets shall be used to create watertight joints.

l) Orifice-type outlets below the permanent pool elevation of the pond shall have an appropriate anti-clogging device.

m) Provide trash racks, filters, hoods, or other debris control. A negatively sloped pipe from the riser to one foot below the permanent pool, away from floating debris, can reduce the risk of clogging. An orifice covered by wire mesh and a hood may accomplish protection of the extended detention orifice.

n) Design and install an emergency drain (i.e., sluice gate or drawdown pipe) capable of draining within 24 hours.

1) An emergency spillway shall be designed to pass 1.25 times the peak discharge and peak flow velocity from the 100-year storm event for the entire contributing drainage area (unless bypassed), assuming post-development conditions. Provide a one-foot minimum freeboard above the maximum anticipated flow depth through the emergency spillway.

o) To prevent drawdown of the permanent pool, a clay or poly liner may be needed. Hydrologic group A soils generally require a pond liner and group B soils may require infiltration testing.

p) Storm water ponds must be constructed within an easement either platted or legally described and recorded as a perpetual storm water drainage easement. The easement shall extend a minimum of 30 feet horizontally outside of the design 100-year floodwater elevation of the basin and provide a minimum 10-feet wide access easement. A copy of the easement should be included in the BMP operations and maintenance manual.

q) A pond buffer should extend 25 feet outward from the maximum water surface elevation.

r) If the pond is used as a sediment control measure during active construction, the sediment must be cleaned out of the pond and elevations and grades reestablished as noted in the approved storm water management plan for post-construction runoff control.

Regular inspection and maintenance are critical to the effective operation of storm water ponds. The following inspection checklist, to be completed at periods indicated, is provided for the BMP owner and should be retained as a record by the owner for a period of five (5) years from the approval date of the Storm Water Pollution Prevention Plan. Evidence of inspection and maintenance shall be provided to the Town of Edinburgh upon request.

Project Name/Site Location:_____

Owner Name:_____ Phone:_____

Owner Address:_____

Date:_____ Inspector:_____

MAINTENANCE ITEM	YES/NO	COMMENTS
Embankment and Emergency Spillway		**Inspect Annually**
1. Vegetation established and thriving?		
2. Any erosion?		
3. Animal burrows present?		
4. Cracking, bulging, or sliding of dam?		
5. All drains clear and functioning?		
6. Any leaks or seeps in embankment?		
7. Any slope failure?		
8. Obstructions in emergency spillway?		
9. Other problems evident?		
Outlet Structure		**Inspect Annually**
1. Low flow orifice blocked?		
2. Trash rack clear of debris?		
3. Any corrosion evident on trash rack?		
4. Excessive sediment in riser?		
5. Cracks or spalling in concrete?		
6. Any corrosion evident on metal pipes?		
7. Are all control valves operational?		
8. Outfall channels functioning?		
9. Other problems evident?		
Permanent Pool		**Inspect Monthly**
1. Undesirable vegetative growth?		
2. Floatable debris removal needed?		
3. Any visible pollution?		

MAINTENANCE ITEM	YES/NO	COMMENTS
4. Any shoreline problems?		
5. Other problems evident?		
Sediment Forebay		**Inspect Monthly**
1. Sedimentation marker visible?		
2. Sediment cleanout needed (50% full)?		
3. Other problems evident?		
Other		**Inspect Monthly**
1. Erosion at inflow or outfall points?		
2. Condition of headwalls satisfactory?		
3. Encroachments in pond easement area?		
4. Complaints from area residents?		
5. Any public hazards present?		
6. Other problems evident?		

Additional Comments:_____

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Recommended Actions:_____

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Recommended Timeframe for Actions:_____

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STORM WATER WETLANDS

QUICK REFERENCE



Description:	Constructed shallow marsh systems designed to treat storm water runoff through settling and vegetative uptake and to control runoff volumes. .
Site Feasibility:	Drainage Area: Minimum 25 acres (Minimum 5 acres for Pocket Wetland) Residential Subdivision Use: Yes High Density/Ultra-Urban: No
Design Criteria:	Sediment forebay and micro-pool required Minimum dry weather flow path length to width ratio is 2:1 Minimum 35% of total surface area should have a depth of 6 inches or less; 10% to 20% of surface area should be deep pool (1.5 to 6-foot depth) High permeable soils (hydrologic group A or B) may require a liner
Advantages:	Effective nutrient removal Natural aesthetic qualities and wildlife habitat
Disadvantages:	Requires large land area Require a continuous base flow Sediment regulation is critical to sustain wetlands
Maintenance:	Replace wetland vegetation to maintain at least 50% surface area coverage Remove invasive vegetation Monitor sediment accumulation and remove periodically

GENERAL

a) Description

Storm water wetlands are constructed shallow marsh systems designed to control the quantity and quality of storm water runoff. Microbial breakdown, settling, adsorption, retention, and vegetative uptake remove pollutants as storm water moves through the wetland under low flow conditions.

Runoff volumes are reduced by evapotranspiration and infiltration. Peak flow is reduced by storage and slow release. Wetlands further offer erosion control, aesthetic value, and wildlife habitat.

A sediment forebay at the inflow point to a wetland is required to allow heavier sediments to drop out before the runoff enters the wetland marsh. Underlying soils of hydrologic group C or D should be adequate to maintain a permanent pool. Most group A soils and some group B soils may require a liner. Subsurface analysis and permeability tests may be required to evaluate soils. A continuous base flow or a high-water table is required to support aquatic vegetation in a wetland facility. A water balance must be performed to demonstrate the wetland can withstand a thirty-day drought at summer evaporation rates without completely drawing down.

If storm water wetlands are used on a site with an underlying water supply aquifer, a separation distance of 2 feet is required between the bottom of the pond and the elevation of the seasonally high-water table. A pocket wetland is typically below the water table.

1) Variations

   a) Shallow Wetland – most of the water quality treatment volume is in the shallow high marsh or low marsh depths. The only deep portions of the shallow wetland are the forebay and the micro-pool. A relatively large amount of land is typically needed to store the water quality volume.

b) Extended Detention (ED) Shallow Wetland – the same as the shallow wetland, except part of the water quality treatment volume is provided as extended detention above the surface of the marsh and released over a period of 24 hours. This design allows for treatment in a smaller space than the shallow wetland. Plants that can tolerate both wet and dry periods need to be specified in the ED zone.

c) Pond/Wetland System – this system has two (2) separate cells, a wet pond and a shallow marsh. The wet pond traps sediments and reduces runoff velocities prior to entry into the wetland where storm water flows receive additional treatment. Less land is required than for the shallow wetland or the ED shallow wetland systems.

d) Pocket Wetland – intended for smaller drainage areas of 5 to 10 acres and typically requires excavation down to the water table for a reliable water source to support the wetland system.

DESIGN CRITERIA

The following criteria are minimum standards for the design of a wetland. A storm water wetland may be designed to meet water quantity and quality requirements. If considered for water quality treatment only, the pond shall be designed to capture the water quality volume (WQ_v) using the equation in Chapter 2 of this manual.

a) The minimum drainage area tributary to the wetland is 25 acres (5 acres for a pocket wetland).

   1) Base flow: A water balance must be calculated to ensure enough inflow to sustain the wetland:

$$S = Q_i + R + Inf - Q_o - ET$$

Where:
S = net change in storage
Q_i = storm water runoff inflow
R = contribution from rainfall
Inf = net infiltration (infiltration – exfiltration)
Q_o = surface outflow
ET = evapotranspiration

b) Wetland geometry:

1) The surface area of the wetland should be approximately 3% of the tributary drainage area.

c) The wetland should have a minimum length to width ratio of 2:1, with 3:1 preferred. The flow path may be achieved using internal dikes or berms, marsh plantings, or multiple cells.

d) Side slopes to the wetland should not exceed 4:1, with 6:1 preferred. Minimal longitudinal slopes are required. Safety and aquatic benches should surround the perimeter of all deep pool areas.

e) Contours of the wetland should be irregular to provide a natural landscaping effect.

f) The volume of the ED must not comprise more than 50% of the total WQv and its maximum water surface elevation must not extend more than 2 feet above the normal pool. Peak flow storage can be provided above the maximum WQv elevation within the wetland.

g) Depth zones: Wetlands should be designed with the recommended proportion of depth zones as follows:

1) Deepwater zone – 1.5 to 6 feet below normal pool elevation. Includes the outlet micro-pool and deep-water channels through the wetland facility. This zone supports little emergent wetland vegetation, but may support submerged or floating vegetation.

h) Low marsh zone – 6 to 8 inches below normal pool elevation. This zone is suitable for the growth of several emergent wetland plant species.

i) High marsh zone – 6 inches or less below normal pool elevation. This zone will support a greater density and diversity of wetland species than the low marsh zone. The high marsh zone should have a higher surface area to volume ratio than the low marsh zone.

j) Semi-wet zone – areas above normal pool elevation that are inundated during larger storm events. This zone supports several species that can survive flooding.

Recommended Design Criteria for Storm Water Wetlands

Modified from Massachusetts DEP, 1997; Schueler, 1992

Design Criteria	Shallow Wetland	ED Shallow Wetland	Pond/ Wetland	Pocket Wetland
Minimum Length to Width Ratio	2:1	2:1	2:1	2:1
Extended Detention (ED)	No	Yes	Optional	Optional
Allocation of WQ_v (pool/marsh/ED) in %	25/75/0	25/25/50	70/30/0 (includes pond volume)	25/75/0
Allocation of surface area (deep-water/low marsh/high marsh/semi-wet) in %	20/35/40/5	10/35/45/10	45/25/25/5 (includes pond surface area)	10/45/40/5
Forebay	Required	Required	Required	Optional

Micro-pool	Required	Required	Required	Required
Outlet Configuration	Reverse-slope pipe or hooded broad-crested weir	Reverse-slope pipe or hooded broad-crested weir	Reverse-slope pipe or hooded broad-crested weir	Hooded broad-crested weir

k) Sediment forebay:

1) All wetlands shall include a sediment forebay that consists of a separate cell, formed by an acceptable barrier. A forebay is to be provided at each inlet to the wetland unless the inlet provides less than 10% of the total design storm inflow to the wetland.

l) The forebay shall be sized to contain 10% of the water quality volume and should be 3 to 6 feet deep. The forebay storage volume is part of the total WQv requirement.

m) Entrance and exit velocities from the forebay must be non-erosive. Inflow channels should be stabilized with flared riprap aprons, or the equivalent.

n) A fixed vertical depth marker shall be installed in the forebay to measure sediment deposition. Sediment in the forebay shall be removed after 50% of the forebay capacity has been depleted.

o) Direct maintenance access for appropriate equipment shall be provided to the forebay.

p) Outlet Structures:

1) The outlet structure should be designed to detain the water quality volume above the permanent pool for 24 to 48 hours.

q) Flow control from a storm water wetland is typically accomplished with the use of a riser and barrel. The riser is a vertical pipe or inlet structure that is attached to the base of the micro-pool with a watertight connection. The outlet barrel is a horizontal pipe attached to the riser that conveys flow under the embankment. The riser should be located within the embankment for maintenance access, safety, and aesthetics.

r) Suitable erosion control measures must be provided for the outlet and all inlet structures to the pond. Energy dissipaters should be placed at the outlet of the barrel to prevent scouring and erosion.

s) Anti-seep collars or filter diaphragms must be provided for the barrel of the outlet structure. If reinforce concrete pipe is used, O-ring gaskets shall be used to create watertight joints.

t) Orifice-type outlets below the permanent pool elevation of the pond shall have an appropriate anti-clogging device.

u) Provide trash racks, filters, hoods, or other debris control. A negatively sloped pipe from the riser to one foot below the permanent pool, away from floating debris, can reduce the risk of clogging. An orifice covered by wire mesh and a hood may accomplish protection of the ED orifice.

v) Design and install an emergency drain (i.e., sluice gate or drawdown pipe) capable of draining within 24 hours.

w) A micro-pool, 3 to 6 feet deep, shall be provided before the outlet structure of the wetland to aid in the prevention of clogging of the low flow pipe and sediment resuspension. Protection against blockage must be installed as part of the outlet design.

x) An emergency spillway shall be designed to pass 1.25 times the peak discharge and peak flow velocity from the 100-year storm event for the entire contributing drainage area (unless bypassed),

assuming post-development conditions. Provide a one-foot minimum freeboard above the maximum anticipated flow depth through the emergency spillway.

y) To prevent drawdown of the permanent pool, a clay or poly liner may be needed below the planting soil. Permeable soils are not well suited for a wetland without a high-water table. Hydrologic group A soils generally require a pond liner and group B soils may require infiltration testing through subsurface analyses.

z) A landscaping plan must be provided that indicates the methods used to establish and maintain wetland coverage. Minimum elements of a plan include delineation of pondscaping zones, selection of corresponding plant species, planting configuration, and sequence for preparing wetland bed, including any needed soil amendments. If a minimum coverage of 50% is not achieved in the planted wetland zones after the second growing season, a reinforcement planting will be required.

aa) Storm water wetlands must be constructed within an easement either platted or legally described and recorded as a perpetual storm water drainage easement. The easement shall include the frequently flooded zone surrounding the wetland and provide a minimum 10-feet wide access to the wetland facility including the forebay and outlet structure. A copy of the easement should be included in the BMP operations and maintenance manual.

bb) A wetland buffer should extend 25 feet outward from the maximum water surface elevation with an additional 15-foot setback to structures.

cc) If the wetland is used as a sediment control measure during active construction, the sediment must be cleaned out of the wetland and forebay and elevations and grades reestablished as noted in the approved storm water management plan for post-construction runoff control.

MAINTENANCE AND INSPECTION CHECKLIST — STORM WATER WETLANDS

Regular inspection and maintenance are critical to the effective operation of storm water wetlands. The following inspection checklist, to be completed at periods indicated, is provided for the BMP owner and should be retained as a record by the owner for a period of five (5) years from the approval date of the Storm Water Pollution Prevention Plan. Evidence of inspection and maintenance shall be provided to the Town of Edinburgh upon request.

Project Name/Site Location:_____

Owner Name:_____ Phone:_____

Owner Address:_____

Date:_____ Inspector:_____

MAINTENANCE ITEM	YES/NO	COMMENTS
Embankment and Emergency Spillway		**Inspect Annually**
1. Vegetation established and thriving?		
2. Any erosion?		
3. Animal burrows present?		
4. Cracking, bulging, or sliding of dam?		
5. All drains clear and functioning?		
6. Any leaks or seeps in embankment?		
7. Any slope failure?		
8. Obstructions in emergency spillway?		
9. Other problems evident?		
Outlet Structure		**Inspect Annually**
1. Low flow orifice blocked?		
2. Trash rack clear of debris?		
3. Any corrosion evident on trash rack?		
4. Excessive sediment in riser?		
5. Cracks or spalling in concrete?		
6. Any corrosion evident on metal pipes?		
7. Are all control valves operational?		
8. Outfall channels functioning?		
9. Other problems evident?		
Wetland Area		**Inspect Annually**
1. Is vegetation healthy and growing?		

MAINTENANCE ITEM	YES/NO	COMMENTS
2. Any evidence of invasive species?		
3. Sediment cleanout needed (50% full)?		
4. Other problems evident?		
Permanent Pool		**Inspect Monthly**
1. Undesirable vegetative growth?		
2. Floatable debris removal needed?		
3. Any visible pollution?		
4. Any shoreline problems?		
5. Other problems evident?		
Sediment Forebay		**Inspect Monthly**
1. Sedimentation marker visible?		
2. Sediment cleanout needed (50% full)?		
3. Other problems evident?		
Other		**Inspect Monthly**
1. Erosion at inflow or outfall points?		
2. Condition of headwalls satisfactory?		
3. Encroachments in pond easement area?		
4. Complaints from area residents?		
5. Any public hazards present?		
6. Other problems evident?		

Additional Comments:_____

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Recommended Actions:_____

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Recommended Timeframe for Actions:_____

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BIORETENTION AREAS

QUICK REFERENCE



Newly Constructed Bioretention Area

Description:	Shallow storm water basins or landscaped areas that utilize engineered soils and vegetation to capture and treat runoff.
Site Feasibility:	Drainage Area: Maximum 5 acres Residential Subdivision Use: Yes High Density/Ultra-Urban: Yes
Design Criteria:	Consists of grass filter strip, ponding area, organic/mulch layer, planting soil, vegetation, and possibly a sand bed. Typically requires 5 feet of head.
Advantages:	High pollutant removal. Often located in landscaping islands of parking lots. Good retrofit capability for redevelopment. Aesthetic qualities.
Disadvantages:	Requires extensive landscaping. Not acceptable for site slopes greater than 6%. Generally requires an underdrain system. Clogging may be a problem in areas with high sediment loads.
Maintenance:	Inspect and repair/replace treatment area components.

GENERAL

a) Description

Bioretention areas are structural storm water controls that capture and temporarily store the WQ_v using engineered soils and vegetation in shallow basins or landscaped areas to remove pollutants from storm water runoff. Runoff is conveyed as sheet flow to the bioretention area, which consists of a grass filter strip, ponding area, organic or mulch layer, planting soil, and vegetation. A sand bed can also be included in the design to provide aeration and drainage of the planting soil. The

filtered runoff is typically collected and returned to the conveyance system, though it can also be exfiltrated into the surrounding soil in areas with porous soils.

Bioretention systems are designed for intermittent flow and need to drain and reaerate between rainfall events. The systems should not be used on sites with a continuous flow from groundwater, sump pumps, or other sources.

A separation distance of 2 feet is required between the bottom of the bioretention facility and the elevation of the seasonally high-water table.

b) Bioretention Components

   1) Stone diaphragm at the beginning of the grass filter strip - to reduce runoff velocities and spread flow into the grass filter strip.

c) Grass filter strip – further reduces incoming runoff velocity and filters particulates from runoff.

d) Ponding area – provides temporary storage of storm water runoff prior to its evaporation, infiltration, or uptake and provides settling capacity.

e) Organic or mulch layer – provides filtration as well as an environment conducive to the growth of microorganisms that degrade hydrocarbons and organic material.

f) Planting soil – acts as a filtration system, and clay in the soil provides adsorption sites for hydrocarbons, heavy metals, nutrients, and other pollutants.

g) Woody and herbaceous plants – provide vegetative uptake of runoff and pollutants and serve to stabilize the surrounding soils.

h) Sand bed – provides positive drainage and aerobic conditions in the planting soil and serves as a final treatment media.

i) Gravel and perforated pipe underdrain system – collects runoff that has filtered through the soil layers. Bioretention areas can be designed to infiltrate into surrounding soils having infiltration rates greater than 0.5 inch per hour.

DESIGN CRITERIA

The following criteria are minimum standards for the design of a bioretention area, which is designed for storm water quality treatment only. Flow from runoff more than the WQ_v must be diverted or the bioretention area designed to safely pass higher flows to protect the ponding area, mulch layer and vegetation. The WQ_v in the bioretention area can be subtracted from detention storage requirements for the contributing area.

a) The maximum drainage area tributary to a bioretention area is 5 acres (½ to 2 acres is preferred).

b) Bioretention area geometry:

   1) The surface area of the bioretention area should be approximately 5% of the tributary impervious area and a minimum of 200 ft^2 for small sites. The bioretention area should have a minimum length to width ratio of 2:1

c) The elevation difference (head) needed from inflow to outflow is 5 feet.

d) The site slope should be a maximum of 6%. Velocities entering the mulch layer should be less than 2 fps.

e) The maximum ponding depth in the bioretention area is 6 inches.

f) The area of the planting soil filter bed is sized using Darcy's Law equation with a filter bed drain time of 48 hours and a coefficient of permeability (k) of 0.5 ft/day. The planting soil bed must be at least 4 feet in depth.

$$A_f = (WQ_v)(d_f) / [(k)(h_f+d_f)(t_f)]$$

Where:

A_f = surface area of ponding area (ft^2)

WQ_v = water quality volume (ft^3)

d_f = filter bed depth (4 feet minimum)

k = coefficient of permeability of filter media (ft/day) (use 0.5 ft/day for silt-loam)

h_f = average height of water above filter bed (ft) (typically 3 inches, which is half of the 6-inch ponding depth)

t_f = design filter bed drain time (days) (2 days maximum)

g) Pretreatment:

1) A grass filter strip with a pea gravel diaphragm is typically utilized for pretreatment. See attached schematic for design criteria for the grass filter strip.

h) For off-line applications, a grass channel with a pea gravel diaphragm flow spreader is typically used for pretreatment. The minimum grassed channel length is 20 feet. See attached schematic for design criteria for the grass channel.

i) Components:

1) Pea gravel for the diaphragm and curtain should be ASTM D 448 size No. 6 (1/8" to ¼"). A drop of at least six inches should be provided at the inlet of the stone diaphragm.

j) The mulch layer shall consist of 2 to 4 inches of commercially available fine shredded hardwood mulch or shredded hardwood chips.

k) Planting soils shall be sandy loam, loamy sand, or loam texture and shall have an infiltration rate of at least 0.5 inches per hour. The planting soil shall be tested and shall meet the following criteria:

clay content	10% to 25% by volume
silt content	30% to 55% by volume
sand content	35% to 60% by volume
pH	5.2 to 7.0
organic matter	1.5% and 4% by weight
magnesium	35 lb./ac
phosphorus (phosphate–P_2O_5)	75 lb./ac
potassium (potash-K_2O)	85 lb./ac
soluble salts	500 ppm maximum

l) The sand bed should be 12 to 18 inches thick. Sand should be clean and have less than 15% silt or clay content.

m) The underdrain collection system shall consist of a 4- to 6-inch perforated PVC pipe (Schedule 40 or greater in strength) in an 8-inch gravel layer (clean washed aggregate 0.5 to 2-inches in diameter). The pipe is spaced at a maximum of 10 feet on center at a minimum grade of 0.5%. A permeable filter fabric is required between the gravel layer and the planting soil bed. An

observation well/clean out must be provided; a minimum of one well for every 1000 ft^2 of surface area. A visible floating marker shall be provided to indicate the water level. The ends of the underdrain pipes must be capped. The underdrain pipe must discharge to an appropriate facility.

n) Compaction during construction must be minimized at both the base of the bioretention area and for the backfill materials. Use of equipment causing excessive compaction will result in reduced infiltration rates contributing to failure of the system and is not acceptable. Do not use heavy equipment within the bioretention basin.

o) Overflow structure:

1) An overflow structure and nonerosive overflow channel must be provided to safely pass flows from the bioretention area that exceeds the system storage capacity to a stabilized downstream area or watercourse.

p) An overflow structure within the bioretention system may consist of a catch basin with the inlet placed 6 inches above the mulch layer at the elevation of the shallow ponding area.

q) An overflow structure may consist of a weir sized using the Weir equation.

$$Q = CLH$$

Where:

Q = peak flow

C = 2.65 for a smooth crested grass weir

L = length

H = 6 inches of head

r) A landscaping plan must be provided. The bioretention area should be vegetated to resemble a terrestrial forest ecosystem, with a mature tree canopy, sub canopy of understory trees, scrub layer, and herbaceous ground cover. Three species each of trees and shrubs should be planted. The tree-to-shrub ratio should be 2:1 to 3:1. Trees should be spaced 8 feet apart.

s) Bioretention areas must be constructed within an easement either platted or legally described and recorded as a perpetual storm water drainage easement. The easement shall extend a minimum of 30 feet horizontally outside of the bioretention system limits and provide a minimum 10-feet wide access easement. A copy of the easement should be included in the BMP operations and maintenance manual.

t) The bioretention facility shall not be constructed until all contributing drainage area has been stabilized. The bioretention facility shall not be used as a sediment control measure during active construction.

Regular inspection and maintenance are critical to the effective operation of bioretention facilities. The following inspection checklist, to be completed at periods indicated, is provided for the BMP owner and should be retained as a record by the owner for a period of five (5) years from the approval date of the Storm Water Pollution Prevention Plan. Evidence of inspection and maintenance shall be provided to the Town of Edinburgh upon request.

Project Name/Site Location:_____

Owner Name:_____ Phone:_____

Owner Address:_____

Date:_____ Inspector:_____

MAINTENANCE ITEM	YES/NO	COMMENTS
Vegetation		**Inspect Monthly**
1. Vegetation established and thriving?		
2. Does mulch require replacement due to erosion, silting, or deterioration? (Mulch should be replaced every 3 years).		
3. Any weeding or pruning needed?		
4. Grass less than 6 inches in height?		
5. Any trash or plant debris to be cleared?		
6. Any dead or diseased vegetation or trees to be cleared and replaced?		
7. Is soil pH test satisfactory? (5.2 to 7.0)		**Inspect Annually**
8. Is surface of ponding area becoming clogged with sediment?		
9. Other problems evident?		
Inflow/outlet areas		**Inspect Annually**
1. Does filter strip need reseeding?		
2. Does sediment need to be removed?		
3. Does pea gravel diaphragm need to be replaced due to clogging?		
4. Any clogging of underdrain?		**Inspect Monthly**
5. Is overflow structure operating properly?		
6. Other problems evident?		

Additional Comments:_____

Recommended Actions:

Recommended Timeframe for Actions:

WATER QUALITY SWALES

QUICK REFERENCE



Description:	Vegetated open channels that are explicitly designed and constructed to capture and treat storm water runoff within dry cells formed by check dams or other means.
Site Feasibility:	Drainage Area: Maximum 5 acres Residential Subdivision Use: Yes High Density/Ultra-Urban: No
Design Criteria:	Pretreatment forebay required. Longitudinal slopes must be less than 4%. Maximum side slopes 2:1 with 4:1 preferred.
Advantages:	Combines storm water treatment with runoff conveyance system. Relatively inexpensive to install. Reduces runoff velocities. Aesthetic qualities.
Disadvantages:	Cannot be used on steep slopes. Large area requirement - not feasible for high-density areas
Maintenance:	Maintain grass height of 4 to 6 inches Remove sediment from forebay and channel

GENERAL

a) Description

Water quality swales are conveyance channels engineered to capture and treat the WQ_v for a drainage area. They differ from normal drainage channels or swales through the incorporation of specific features that remove storm water pollutants by filtration through an engineered media. Water quality swales are not the same as filter strips, which are limited application structural controls and not considered acceptable for meeting the TSS removal requirements independently. Water quality swales are designed to include a forebay in addition to a filter bed of prepared soil that overlays an underdrain system. The swales are sized to allow the entire WQ_v to be filtered and

discharged or infiltrated through the bottom of the swale. Limited longitudinal slopes, in conjunction with berms and/or check dams installed perpendicular to the flow path, force the flow to be slow and shallow allowing for particulates to settle and limiting erosion. Runoff is collected by a perforated pipe and discharged to an appropriate outlet.

A separation distance of 2 feet is required between the bottom of the water quality swale and the elevation of the seasonally high-water table.

DESIGN CRITERIA

The following criteria are minimum standards for the design of a water quality swale, which is acceptable for storm water quality treatment only and does not provide detention storage. Flow from runoff more than the WQ_v must be diverted or the water quality swale adequately designed to safely pass higher flows to prevent erosion of the swale.

a) The maximum drainage area tributary to a water quality swale is 5 acres.

b) Peak flows are limited to 10 cfs and runoff velocities are limited to 2.5 fps.

c) The maximum ponding time in the water quality swale is 48 hours.

d) The swale shall have a maximum ponding time of 48 hours. Soil media shall have an infiltration rate of at least 1 foot per day (fc > 0.5 inches per hour), with 1.5 feet per day maximum. Infiltration of the WQv will only be allowed when proven by geotechnical evaluation that underlying soils have an infiltration rate of 0.5 inches per hour (typically hydrologic group A soils). Infiltration will not be allowed in wellhead protection areas.

e) Water quality swale geometry:

   1) The surface area of the water quality swale should be approximately 10% to 20% of the tributary impervious.

f) The elevation difference (head) generally needed from inflow to outflow is 3 to 5 feet.

g) The longitudinal slope of the swale shall be a maximum of 4%, with 1% to 2% preferred.

h) Side slopes of the swale shall be no greater than 3:1. Swales shall be parabolic or trapezoidal in shape to maximize vegetative areas and to provide ease of maintenance.

i) The maximum design flow depth shall be 12 inches. The depth of the WQv at the downstream end of the swale should not exceed 18 inches.

j) A minimum bottom channel width of 2 feet is required to ensure adequate filtration.

k) The bed of the swale shall have a minimum permeable soil layer 30 inches in depth.

l) The swale must have a minimum length of 100 feet.

m) Pretreatment:

   1) All water quality swales shall include a sediment forebay that consists of a separate cell, formed by an acceptable barrier. See A.1. - Storm Water Ponds for design criteria for a forebay.

n) Runoff can also enter along the sides of the channel as sheet flow through a grass filter strip containing a pea gravel flow spreader trench (diaphragm) along the entrance to the filter strip. Slopes to the diaphragm shall not exceed 6% for the last 20 feet prior to entering the spreader.

o) The underdrain collection system shall consist of a 4- to 6-inch perforated PVC pipe (Schedule 40 or greater in strength) in an 8-inch gravel layer (clean washed aggregate 0.5 to 2-inches in

diameter). A permeable filter fabric is required between the gravel layer and the planting soil bed. A clean out must be provided and the underdrain pipe must discharge to an appropriate facility.

p) Compaction during construction must be minimized at both the base of the water quality swale and for the backfill materials. Use of equipment causing excessive compaction will result in reduced infiltration rates contributing to failure of the system and is not acceptable. Do not use heavy equipment within the bioretention basin.

q) An overflow structure and nonerosive overflow channel must be provided to safely pass flows from the water quality swale that exceeds the system storage capacity to a stabilized downstream area or watercourse.

r) Proper grass species and plants should be specified for the water quality swale.

s) Water quality swales must be constructed within an easement either platted or legally described and recorded as a perpetual storm water drainage easement. The easement shall extend a minimum of 30 feet horizontally outside of the water quality swale limits and provide a minimum 10-feet wide access easement. A copy of the easement should be included in the BMP operations and maintenance manual.

t) The water quality swale shall not be constructed until all contributing drainage area has been stabilized. The swale shall not be used as a sediment control measure during active construction.

Regular inspection and maintenance are critical to the effective operation of water quality swales. The following inspection checklist, to be completed at periods indicated, is provided for the BMP owner and should be retained as a record by the owner for a period of five (5) years from the approval date of the Storm Water Pollution Prevention Plan. Evidence of inspection and maintenance shall be provided to the Town of Edinburgh upon request.

Project Name/Site Location:_____

Owner Name:_____Phone:_____

Owner Address:_____

Date:_____Inspector:_____

MAINTENANCE ITEM	YES/NO	COMMENTS
Vegetation		**Inspect Monthly**
1. Is vegetation and/or grass cover dense and vigorous?		
2. Any weeds or debris to be cleared?		
3. Any erosion of swale?		
4. Any sediment build-up in bottom of swale?		
5. Is grass height maintained at 4 to 6 inches?		
6. Other problems evident?		
Pretreatment		**Inspect Monthly**
1. Sedimentation marker visible?		
2. Sediment cleanout needed (50% full)?		
3. Does pea gravel diaphragm need to be replaced due to clogging?		
4. Other problems evident?		
Outlet areas		**Inspect Monthly**
1. Any evidence of erosion or failure at berms or check dams?		
2. Any clogging of underdrain?		
3. Is overflow structure operating properly?		
4. Other problems evident?		

Additional Comments:_____

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Recommended Actions:_____

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Recommended Timeframe for Actions:_____

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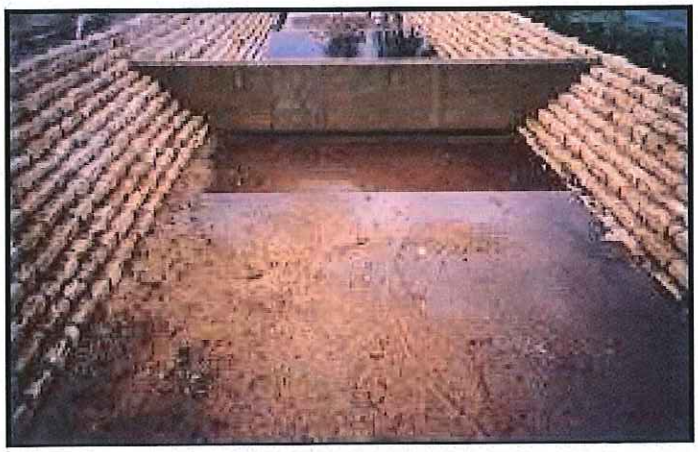
SAND FILTERS

QUICK REFERENCE



Description:	Multi-chamber structure consisting of a pretreatment chamber, a sand bed as its primary filter media, and an underdrain collection system - designed to treat storm water runoff through filtration.
Site Feasibility:	Drainage Area: Maximum 2-10 acres
	Residential Subdivision Use: No
	High Density/Ultra-Urban: Yes
Design Criteria:	Pretreatment forebay/chamber required.
	Requires 2 to 6 feet of head.
	Sand filter media with underdrain system.
Advantages:	Good for highly impervious areas.
	Good retrofit capability.
Disadvantages:	High maintenance burden.
	Not recommended for areas with high sediment content in runoff.
	Relatively costly.
	Possible odor problems.
Maintenance:	Inspect for clogging.
	Remove sediment from forebay/chamber.
	Replace sand filter media as needed

GENERAL

a) Description

Sand filters are structural storm water controls that capture and temporarily store storm water runoff and pass it through a filter bed of sand. Most sand filter systems consist of two-chamber structures.

The first chamber is a sediment forebay or chamber, which removes floatables and heavy sediments. The second is the filtration chamber, which removes additional pollutants by filtering the runoff through a sand bed. The filtered runoff is collected and returned to the conveyance system by way of an underdrain system.

Sand filters are typically designed as off-line systems. Storm water pollutants are removed through a combination of gravitational settling, filtration, and adsorption. Surface sand filters with a grass cover have additional opportunities for bacterial decomposition as well as vegetation uptake of pollutants, particularly nutrients. Sand filter systems are designed for intermittent flow and must be allowed to drain and reaerate between rainfall events. They should not be used on sites with a continuous flow from groundwater, sump pumps, or other sources.

Because they have few site constraints besides head requirements, sand filters can be used on development sites where the use of other structural controls may be precluded. However, sand filter systems can be relatively expensive to construct and install.

b) Variations

   1) Surface sand filter – a ground-level open-air structure that consists of a pretreatment sediment forebay and a filter bed chamber. This system can treat drainage areas up to 10 acres in size and is typically located off-line. Surface sand filters can be designed as an excavation with earthen embankments or as a concrete or block structure.

c) Perimeter sand filter – an enclosed filter system typically constructed just below grade in a vault along the edge of an impervious area such as a parking lot. The system consists of a sedimentation chamber and a sand bed filter. Runoff flows into the structure through a series of inlet grates located along the top of the control.

d) Underground sand filter – located in an underground vault designed for high-density land use or ultra-urban applications. Typically, a three-chamber system consisting of a sedimentation chamber, a filter chamber, and an overflow chamber. Underground sand filters have a high maintenance burden and should only be used where adequate inspection and maintenance can be ensured. Underground sand filters are typically constructed on-line, but can be constructed off-line. For off-line construction, the overflow between the second and third chambers is not included.

DESIGN CRITERIA

The following criteria are minimum standards for the design of a sand filter system, which is acceptable for storm water quality treatment only and does not provide detention storage. The WQ_v is generally routed to the sand filter using a diversion structure. Runoff more than the WQ_v must be diverted or the sand filter adequately designed to safely pass higher flows to prevent erosion of pretreatment sediment and filter media.

a) Surface Sand Filter Criteria

   1) Description - A surface sand filter facility consists of a two-chamber open-air structure, which is located at ground level. The first chamber is the sediment forebay and the second chamber contains the sand filter bed. Flow enters the forebay for settling of larger sediment particles. Runoff is then discharged from the forebay through a perforated standpipe into the filtration chamber. After passing through the filter bed, runoff is collected by a perforated pipe and gravel underdrain system. See attached schematics of a surface sand filter.

b) The maximum drainage area tributary to a surface sand filter is 10 acres.

c) Surface sand filter geometry:

1) The elevation difference (head) needed from inflow to outflow is 5 feet.

d) The slope across the filter location shall be a maximum of 6%.

e) The area of the filter bed is sized using Darcy's Law equation with a filter bed drain time of 36 hours and a coefficient of permeability (k) of 3.5 ft/day.

$$A_f = (WQ_v)(d_f) / [(k)(h_f+d_f)(t_f)]$$

Where:

A_f = surface area of filter bed (ft^2)

WQ_v = water quality volume (ft^3)

d_f = filter bed depth (1.5 feet minimum)

k = coefficient of permeability of filter media (ft/day) (use 3.5 ft/day for sand)

h_f = average height of water above filter bed (ft)

t_f = design filter bed drain time (days) (1.5 days maximum)

f) Pretreatment:

a) The surface sand filter system shall include a sediment forebay that consists of a separate cell, formed by an acceptable barrier. The forebay shall be sized to contain 25% of the WQv.

g) The forebay shall have a minimum length-to-width ratio of 2:1.

h) Inlet and outlet structures shall be located at opposite ends of the forebay.

i) Entrance and exit velocities to the forebay shall be non-erosive. A flow distribution chamber shall be provided at the entrance to the filter media to spread the flow evenly across the surface of the filter media. Erosion protection shall be provided over the filter media using riprap, grass, or other dissipation devices.

1) Filter media shall be a minimum 18-inch layer of clean washed medium sand (ASTM C-33 concrete sand) on top of an underdrain system. Three inches of topsoil (or other erosion protection) are placed over the sand bed. Permeable filter fabric is required above and below the sand bed to prevent clogging of the sand filter and underdrain system.

j) The underdrain collection system shall consist of a 4- to 6-inch perforated PVC pipe (Schedule 40 or greater in strength) in an 8-inch gravel layer (clean washed aggregate 0.5 to 2-inches in diameter). The underdrain shall have a minimum slope of 1%. A clean out must be provided and the underdrain pipe must discharge to an appropriate facility.

k) The surface sand filter structure may be constructed of concrete or earthen embankments. When constructed with earthen walls/embankments, filter fabric shall be used to line the bottom and side slopes of the structures before installation of the underdrain system and filter media.

l) An emergency spillway must be included to safely pass flows that exceed the design storm flows.

m) Perimeter Sand Filter Criteria

1) Description - A perimeter sand filter facility is a vault structure located just below grade level. Runoff enters a sedimentation chamber through inlet grates along the top of the structure. Runoff is discharged from the sedimentation chamber through a weir into the filtration

chamber. After passing through the filter, runoff is collected by a perforated pipe and gravel underdrain system. See attached schematics of a perimeter sand filter.

n) The maximum drainage area tributary to a perimeter sand filter is 2 acres.

o) Perimeter sand filter geometry:

   a) The elevation difference (head) needed from inflow to outflow is 2 to 3 feet.

p) The area of the filter bed is sized using Darcy's Law equation with a filter bed drain time of 36 hours and a coefficient of permeability (k) of 3.5 ft/day. (See 3.c. above - surface sand filter criteria.)

   1) Pretreatment: The perimeter sand filter system shall include a sediment chamber that consists of a separate cell. The sediment chamber shall be sized to contain 50% of the WQ_v.

q) Filter media shall be a minimum 18-inch layer of clean washed medium sand (ASTM C-33 concrete sand) on top of an underdrain system. Permeable filter fabric is required between the sand bed and the underdrain gravel layer to prevent clogging.

r) The underdrain collection system shall consist of a 4- to 6-inch perforated PVC pipe (Schedule 40 or greater in strength) in an 8-inch gravel layer (clean washed aggregate 0.5 to 2-inches in diameter). The underdrain shall have a minimum slope of 1%. A clean out must be provided and the underdrain pipe must discharge to an appropriate facility.

s) Underground Sand Filter Criteria

t) Description – An underground sand filter is in an underground vault. The filter is a three-chamber system. The first chamber is a sedimentation chamber that temporarily stores runoff and utilizes a wet pool to capture sediment. The sedimentation chamber is connected to the sand filter chamber by a submerged wall that protects the filter bed from oil and trash. The filter bed is 18 to 24 inches deep and may have a protective screen of gravel or permeable geotextile to limit clogging. The sand filter chamber also includes an underdrain system with inspection and clean out wells. Perforated pipes under the sand filter bed extend into a third chamber that collects filtered runoff. Flows beyond the filter capacity are diverted through an overflow weir.

   1) The maximum drainage area tributary to a perimeter sand filter is 2 acres.

u) Underground sand filters are typically constructed on-line, but can be constructed off-line. For off-line construction, the overflow between the second and third chambers is not included.

v) The underground vault shall be tested for water tightness prior to placement of filter layers.

w) Adequate maintenance access must be provided to the sedimentation and filter bed chambers.

x) General

   1) Sand filter facilities must be constructed within an easement either platted or legally described and recorded as a perpetual storm water drainage easement. The easement shall extend a minimum of 30 feet horizontally outside of the facility limits and provide a minimum 10-feet wide access easement. A copy of the easement should be included in the BMP operations and maintenance manual.

y) The sand filter facility shall not be constructed until all contributing drainage area has been stabilized. The sand filter facility shall not be used as a sediment control measure during active construction.

Regular inspection and maintenance are critical to the effective operation of sand filter facilities. The following inspection checklist, to be completed at periods indicated, is provided for the BMP owner and should be retained as a record by the owner for a period of five (5) years from the approval date of the Storm Water Pollution Prevention Plan. Evidence of inspection and maintenance shall be provided to the Town of Edinburgh upon request.

Project Name/Site Location:_____

Owner Name:_____Phone:_____

Owner Address:_____

Date:_____Inspector:_____

MAINTENANCE ITEM	YES/NO	COMMENTS
Pretreatment		**Inspect Monthly**
1. Any evidence of erosion?		
2. Are grass clippings removed from contributing areas that are mowed?		
3. Are inlets, outlets, and filter area clear of debris?		
4. Is normal pool level being retained (perimeter and underground facilities)? Any leaks evident?		
5. Other problems evident?		
Filter Bed		**Inspect Monthly**
1. Is filter bed free of sediments? Is sediment cleanout needed (50% full or 6 inches, whichever is less)?		
2. Is filter bed free of oil and grease?		
3. If clogging of filter bed is present, remove the top few inches of sand and replace.		
4. Any clogging of underdrain?		
5. Any clogging of filter fabric?		
6. Other problems evident?		
Structural		**Inspect Annually**
1. Any evidence of deterioration, spalling or cracking of concrete vault, spillway, etc.?		
2. Are inlet grates in good condition?		
3. Is overflow structure operating properly?		
4. Other problems evident?		

Other		**Inspect Monthly**
1. Any odors?		
2. Any evidence of flow bypassing the facility?		

Additional Comments:_____

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Recommended Actions:_____

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Recommended Timeframe for Actions:_____

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INFILTRATION TRENCHES

QUICK REFERENCE



Description:	Excavated trench filled with stone aggregate used to capture and allow infiltration of storm water runoff into the surrounding soils from the bottom and sides of the trench.
Site Feasibility:	Drainage Area: Maximum 5 acres Residential Subdivision Use: Yes High Density/Ultra-Urban: Yes
Design Criteria:	Pretreatment forebay required. Minimum surrounding soil infiltration rate of 0.5 inches per hour. Excavated trench filled with stone media, pea gravel and sand filter layers Observation well required to monitor percolation.
Advantages:	Good for small sites with porous soils. Good retrofit capability for redevelopment.
Disadvantages:	Geotechnical testing required. High clogging potential; not to be used on sites with fine-particle soils in drainage area.
Maintenance:	Remove sediment from forebay. Inspect for clogging. Replace pea gravel layer as needed.

GENERAL

a) Description

Infiltration trenches are excavations filled with stone to create an underground reservoir of storm water runoff. The runoff volume gradually exfiltrates through the bottom and sides of the trench into the subsoil over a 2-day period and eventually reaches the water table. By diverting runoff into the soil, an infiltration trench treats the water quality volume and helps to preserve the natural water balance on a site and can recharge groundwater and preserve base flow. Due to this fact, infiltration systems are limited to areas with highly porous soils where the water table and/or

bedrock are located well below the bottom of the trench. Infiltration trenches must be carefully sited to avoid the potential of groundwater contamination.

Infiltration trenches are not intended to trap sediment and must always be designed with a sediment forebay and grass channel or filter strip, or other appropriate pretreatment measures to prevent clogging and failure. The facility is only for impervious areas where there are not high levels of fine particulates (clay/silt soils) in the runoff and will only be considered for sites where the sediment load is relatively low.

A separation distance of 4 feet is required between the bottom of the infiltration trench and the elevation of the seasonally high-water table.

Infiltration trenches are designed for intermittent flow and need to drain and reaerate between rainfall events. The systems should not be used on sites with a continuous flow from groundwater, sump pumps, or other sources.

Infiltration trenches shall not be used for manufacturing and industrial sites, where there is a potential for high concentrations of soluble pollutants and heavy metals. In addition, infiltration shall not be considered for areas with a high pesticide concentration.

DESIGN CRITERIA

The following criteria are minimum standards for the design of an infiltration trench, which is designed for storm water quality treatment only. Flow from runoff more than the WQ_v must be diverted. The WQ_v in the infiltration trench can be subtracted from detention storage requirements for the contributing area.

a) The maximum drainage area tributary to an infiltration trench is 5 acres.

b) Underlying soils shall have a minimum infiltration rate (f_c) of 0.5 inches per hour as determined from geotechnical tests. The minimum geotechnical testing is one test hole per 5,000 ft^2, with a minimum of two borings per facility taken within the limits of the facility. Infiltration trenches cannot be used in fill soils.

c) Soils on the drainage area tributary to an infiltration trench shall have a clay content of less than 20% and a silt/clay content of less than 40% to prevent clogging and failure.

d) Clay lenses, bedrock, and other restrictive layers below the bottom of the trench will reduce infiltration rates unless excavated.

e) To reduce the potential for costly maintenance and/or system reconstruction, the trench should be in an open or lawn area. Infiltration trenches shall not be located beneath paved surfaces.

f) Minimum setback requirements for infiltration trench facilities (unless otherwise specified by local ordinance or criteria):

   1) From a property line – 10 feet

g) From a building foundation – 25 feet

h) From a private well – 100 feet

i) From a public water supply well – 1,200 feet

j) From a septic system tank/leach field – 100 feet

k) From surface waters – 100 feet

l) From surface drinking water sources – 400 feet (100 feet for a tributary)

m) Infiltration trench geometry:

1) The required trench storage volume is equal to the WQv.

n) The trench must be designed to fully dewater the WQv within 24 to 48 hours. The slowest infiltration rate obtained from geotechnical tests performed at the site should be used in the design calculations.

o) Trench depths should be 3 to 8 feet. The width of the trench must be less than 25 feet.

p) Broader, shallow trenches reduce the risk of clogging by spreading the flow over a larger area for infiltration.

q) The surface area is calculated based on the trench depth, soil infiltration rate, aggregate void space, and fill time (assume a fill time of 2 hours for most designs).

r) The bottom of a trench shall be flat across its length and width to evenly distribute flow, encourage uniform infiltration through the bottom, and reduce the risk of clogging.

s) Stone aggregate should be washed, bank-run gravel, 1.5 to 2.5 inches in diameter with a void space of about 40%. Aggregate contaminated with soil shall not be used. A porosity value (void space/total volume) of 0.32 should be used in calculations unless aggregate specific data exist.

t) A 6-inch layer of clean, washed sand is placed on the bottom of the trench to encourage drainage and prevent compaction of the native soil while the stone aggregate is added.

u) The trench shall be lined on the sides and top by an appropriate geotextile filter fabric that prevents soil piping but has greater permeability than the parent soil. The top layer of filter fabric is placed 2 to 6 inches from the top of the trench to prevent sediment from passing into the stone aggregate. This top layer will need to be replaced more frequently and must be readily separated from the side section.

v) The top surface of the trench above the filter fabric is covered with pea gravel to improve sediment filtering. It shall be removed and replaced should the device clog. Alternatively, the trench can be covered with permeable topsoil and planted with grass in a landscaped area.

w) An observation well consisting of 4- to 6-inch perforated PVC pipe must be installed and extend to the bottom of the trench. The well should be installed along the centerline of the structure, flush with the ground elevation of the trench. A visible floating marker shall be provided to indicate the water level.

x) The trench excavation shall be limited to the width and depth specified in the design. The bottom of the excavated trench shall not be loaded in a way that causes soil compaction and shall be scarified prior to placement of sand. The sides of the trench shall be trimmed of all large roots.

y) Pretreatment:

1) For an infiltration trench receiving sheet flow from an adjacent drainage area, the pretreatment system may consist of a vegetated filter strip with a minimum 25-foot length. A vegetated buffer strip around the entire trench is required if the facility is receiving runoff from other directions. See the attached schematic for design criteria for the vegetated filter strip.

z) For off-line applications, pretreatment shall consist of a sediment forebay or similar sedimentation chamber (with energy dissipaters) sized to 25% of the WQv. Exit velocities from the pretreatment chamber must be nonerosive.

aa) Overflow structure - a nonerosive overflow channel must be provided to safely pass flows from the infiltration trench that exceeds the system storage capacity to a stabilized downstream area or watercourse.

bb) Infiltration trenches must be constructed within an easement either platted or legally described and recorded as a perpetual storm water drainage easement. The easement shall extend a minimum of 30 feet horizontally outside of the system limits and provide a minimum 10-feet wide access easement. A copy of the easement should be included in the BMP operations and maintenance manual.

cc) The infiltration trench shall not be constructed until all contributing drainage area has been stabilized. The infiltration trench shall not be used as a sediment control measure during active construction.

Regular inspection and maintenance are critical to the effective operation of infiltration trenches. The following inspection checklist, to be completed at periods indicated, is provided for the BMP owner and should be retained as a record by the owner for a period of five (5) years from the approval date of the Storm Water Pollution Prevention Plan. Evidence of inspection and maintenance shall be provided to the Town of Edinburgh upon request.

Project Name/Site Location:_____

Owner Name:_____Phone:_____

Owner Address:_____

Date:_____Inspector:_____

MAINTENANCE ITEM	YES/NO	COMMENTS
Vegetation/Pretreatment		**Inspect Monthly**
1. Any evidence of erosion? Does filter strip need to be reseeded?		
2. Are grass clippings removed from contributing areas that are mowed?		
3. Are inlets and filter area clear of debris?		
4. Sedimentation marker visible?		
5. Sediment cleanout needed (50% full)?		
6. Other problems evident?		
Trench		**Inspect Monthly**
1. Any vegetative growth in trench area?		
2. Are observation wells clear of water after 3 days of dry weather?		
3. Does pea gravel/topsoil need to be replaced due to clogging?		
4. Does top surface filter fabric need to be replaced due to clogging?		
5. Other problems evident?		
6. Upon failure of trench, perform total rehabilitation to maintain design storage capacity. Excavate trench walls to expose clean soil.		

Additional Comments:_____

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Recommended Actions:_____

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Recommended Timeframe for Actions:_____

_____

_____

BIOFILTERS

QUICK REFERENCE



Description:	Uniformly graded and densely vegetated sections of land engineered and designed to treat runoff and remove pollutants through vegetative filtering and infiltration.
Site Feasibility:	Drainage Area: 10 acres maximum - 5 preferred
	Residential Subdivision Use: Yes
	High Density/Ultra-Urban: No
Design Criteria:	Requires slopes between 2% and 6%.
	Level spreader required where concentrated runoff flows into biofilter.
Advantages:	Relatively inexpensive to install.
	Reduces runoff velocities.
	Aesthetic qualities and preservation of riparian zones.
Disadvantages:	TSS removal is less than 80%.
	Cannot be used on steep slopes.
	Large land requirement.
Maintenance:	Maintain grass height of 2 to 6 inches.
	Requires periodic sediment removal.

GENERAL

a) Description

Biofilters are densely vegetated sections of land designed to treat runoff and remove pollutants through vegetative filtering and infiltration. Biofilters must receive runoff from adjacent areas as sheet flow to provide treatment and prevent erosion. The vegetation slows the runoff and filters out sediment and other pollutants. Biofilters provide less than 80% TSS removal but can be used as pretreatment measures in conjunction with other water quality treatment practices.

Biofilters are best suited to treat runoff from roads and highways, rooftops, small parking lots, and pervious surfaces. Biofilters can be incorporated into residential developments as land-use buffers and setbacks.

b) Variations

   1) Filter strip – a uniformly graded and densely vegetated strip of land. The vegetation can be grasses or a combination of grass and woody plants.

c) Riparian buffer – a strip of land with natural, woody vegetation along a stream or other watercourse. The riparian zone includes deep-rooted trees with undergrowth of grasses and herbaceous vegetation.

DESIGN CRITERIA

The following criteria are minimum standards for the design of biofilters, which can be used as pretreatment in conjunction with other water quality measures. Biofilters alone do not fulfill the 80% TSS removal requirement.

a) Uniform sheet flow must be maintained across the entire biofilter using consistent grades and low slopes. The biofilter area shall be free of gullies or rills that can concentrate overland flow.

b) Filter strips can be used as pretreatment measures. The minimum length (parallel to the flow path) sizing criteria shall be:

   1) Impervious area approach length of 35 feet or less – 15 feet minimum filter strip length.

c) Impervious area approach length of 35 to 75 feet – 25 feet minimum filter strip length.

d) Pervious area approach length of 75 feet or less – 12 feet minimum filter strip length.

e) Pervious area approach length of 75 to100 feet – 18 feet minimum filter strip length.

f) A level spreader is required at the end of sheet flow paths longer than 75 feet for impervious surfaces and 100 feet for pervious surfaces. In addition, areas of concentrated runoff tributary to a biofilter shall require a level spreader.

g) The maximum drainage area tributary to a biofilter is 10 acres with 5 acres preferred.

h) The level spreader shall have a 0% slope and encompass the entire width of the biofilter (perpendicular to the flow path).

i) The slope of the surface prior to the level spreader should provide a smooth transition into the spreader.

j) If a channel is directing runoff to the level spreader, the last 20 feet of the channel shall have a slope of 1% or less and shall provide a smooth transition of flow to the level spreader. The depth of the level spreader must be a minimum of six inches. The level spreader lip must be constructed on undisturbed soil to a uniform height and 0% slope over the length of the spreader to ensure even runoff distribution.

k) If the runoff is being directed to the level spreader overland as sheet flow, the last 20 feet of the ground shall be 6% or less.

l) A pea gravel diaphragm at the top of the slope of a biofilter receiving sheet flow provides settling of sediment particles and acts as a level spreader, maintaining sheet flow over the biofilter.

m) Filter strip geometry: The filter strip should be designed based on Manning's equation for channel design using the following criteria:

1) Rectangular shape for the filter strip.

n) Maximum design flow depth of 0.5 inches.

o) Velocity no greater than 0.9 ft/s to prevent flattening of grasses.

p) Manning's n of 0.02 for grassed strips, 0.024 for infrequently mowed strips, or appropriate n for wooded strips.

q) Width of the strip shall be dependent upon where uniform flow is obtained from the site.

r) Because the strip is wide, the hydraulic radius approaches the flow depth and is taken to be equal to the design flow depth.

s) Slope is between 2% and 6%.

t) Dense grasses must be specified.

u) Riparian zone geometry: At a minimum, a riparian zone should consist of a 20-foot strip of trees and herbaceous vegetation closest to the stream or watercourse and a 30-foot strip of dense grasses prior to the tree zone.

v) Biofilters must be constructed within an easement either platted or legally described and recorded as a perpetual storm water drainage easement. The easement shall encompass the biofilter and level spreader and provide a minimum 10-feett wide access easement. A copy of the easement should be included in the BMP operations and maintenance manual.

Regular inspection and maintenance are critical to the effective operation of biofilters. The following inspection checklist, to be completed at periods indicated, is provided for the BMP owner and should be retained as a record by the owner for a period of five (5) years from the approval date of the Storm Water Pollution Prevention Plan. Evidence of inspection and maintenance shall be provided to the Town of Edinburgh upon request.

Project Name/Site Location:_____

Owner Name:_____ Phone:_____

Owner Address:_____

Date:_____ Inspector:_____

MAINTENANCE ITEM	YES/NO	COMMENTS
Vegetation		**Inspect Monthly**
1. Is vegetation and/or grass cover dense and vigorous?		
2. Any gullies or rills present?		
3. Any erosion evident?		
4. Any sediment build-up present?		
5. Is grass height maintained at 2 to 6 inches?		
6. Other problems evident?		
Level Spreader		**Inspect Monthly**
1. Is vegetation and/or grass cover dense and vigorous?		
2. Any signs of erosion on lip of spreader?		
3. Any sediment build-up present?		
2. Does pea gravel diaphragm need to be cleaned out due to sediment build-up?		
3. Does pea gravel diaphragm need to be replaced due to clogging?		
4. Other problems evident?		

Additional Comments:_____

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Recommended Actions:_____

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Recommended Timeframe for Actions: