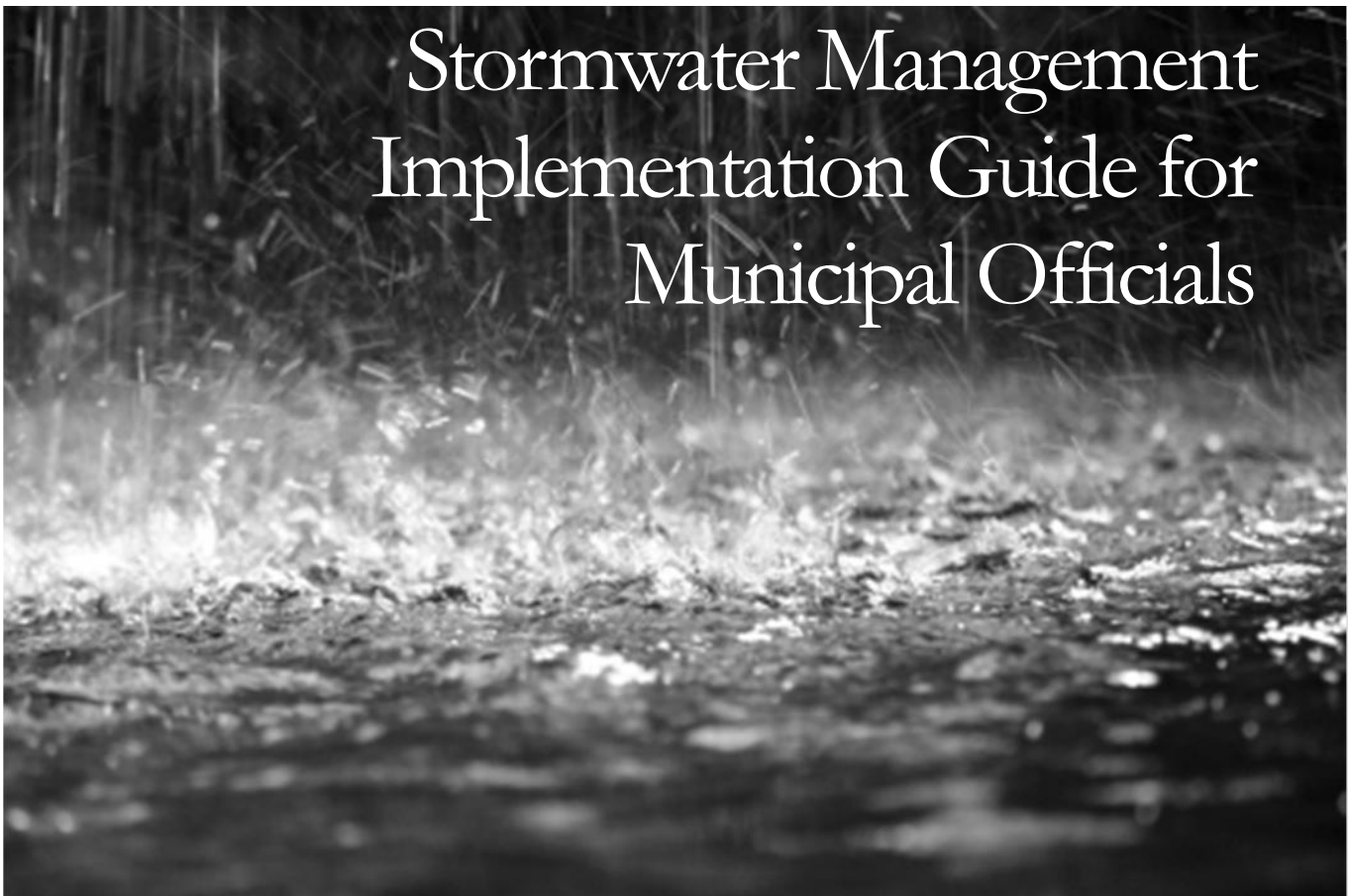


**Volume**

**3**

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Volume 3: Act 167 County-Wide Stormwater Management Plan



Stormwater Management  
Implementation Guide for  
Municipal Officials

VOLUME 3: COUNTY-WIDE STORMWATER MANAGEMENT PLAN

# Stormwater Management Implementation Guide for Municipal Officials

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PREPARED FOR:

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CRAWFORD COUNTY PLANNING COMMISSION

ERIE COUNTY DEPARTMENT OF PLANNING

VENANGO COUNTY REGIONAL PLANNING COMMISSION

WARREN COUNTY DEPARTMENT OF PLANNING AND ZONING



[ BUILDING RELATIONSHIPS.  
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## **Introduction**

*This guide was developed to provide a summary of the County-wide Act 167 Stormwater Management Plans. It is intended to aid municipal and county officials in the adoption and implementation of the model stormwater management ordinance, which was developed with the overall Plans. It is also intended to help with administration of a municipal stormwater management program once these regulations have been adopted.*

## **Importance of Stormwater Management**

**R**eplacing forested and agricultural land with urban land (pavement, roofs, and the removal of natural vegetation) negatively affects water quality and increases the amount of runoff. More than 50% of the rainfall in Pennsylvania infiltrates or is used by vegetation in well maintained forested and agricultural land. Runoff volume is dramatically increased when this natural land use is replaced with hard (or impervious) surfaces such as concrete and asphalt, and other compacted surfaces such as lawns or poorly maintained agricultural fields.

When left unmanaged, the increased impervious area also increases peak flows, reduces groundwater recharge, and contributes to the erosion of stream banks. Pollutants, such as excessive nutrients, heavy metals, and petroleum hydrocarbons wash off the impervious surfaces more rapidly and degrade the water quality of our waterways. Proper stormwater management can mitigate these detrimental effects and protect the health of our communities and preserve the values of our natural resources.

## **Intent of Act 167**

The Stormwater Management Act of 1978 (Act 167) was developed in response to several severe floods in 1972 and 1977 and the recognition that development can dramatically increase the damage of these storm events. The original act had the purpose of encouraging sound watershed-wide planning, the preservation and restoration of the natural stream cross sections of the Commonwealth's waterways, and to help provide tools so that uniform stormwater management rules could be implemented and enforced at the municipal level of government.

The Act 167 program, as administered by the Pennsylvania Department of Environmental Protection (DEP), also incorporates the overall goal of the Commonwealth to meet the federal water quality requirements.

## Implementation Options

*Municipal implementation of the provisions within the Act 167 County-Wide Stormwater Management Plan is the first step in developing a stormwater management program. This section provides an overview of the implementation process and presents different models for administration of a municipal stormwater management program.*

Upon final approval of the Act 167 County-Wide Stormwater Management Plan (Plan) by DEP, the content of the Plan is implemented through a stormwater management program. Through Act 167, the authority to implement the content of the Plan is delegated to local governments. Each municipality is responsible for adopting regulations to administer and enforce the Plan within their municipality. Per the Stormwater Management Act of 1978 [P.L. 864, No. 167, §11]:

“Within six months following adoption and approval of the watershed storm water plan, each municipality shall adopt or amend, and shall implement such ordinances and regulations, including zoning, subdivision and development, building code, and erosion and sedimentation ordinances, as are necessary to regulate development within the municipality in a manner consistent with the applicable watershed storm water plan and the provisions of this act.”

While this responsibility is specifically assigned to local governments, the method used for Plan implementation is not addressed by Act 167. Implementation of the Plan, as used in this guide, is a general term that encompasses the following activities:

- **Adoption of municipal ordinances that enable implementation of the provisions in the Plan.**
- **Review of Drainage Plans for all activities regulated by the Plan and the resulting ordinances.**
- **Enforcement of the municipal regulations.**

Each municipality will need to determine the best method to implement the Plan within their jurisdiction. There are many factors that will help you determine the best course of action for your municipality. Availability of technical staff to review Drainage Plans, the capacity of existing personnel to undertake additional workload, and the annual costs of administration and enforcement are all examples of factors that will influence this decision. The decision making process and the “best” method to implement the Plan will be unique to each municipality.

## Implementation Models

There are several models for Plan implementation that provide flexibility to meet the needs of your community. Three basic models for Plan implementation are presented in Table 1 below. In some cases it may be advantageous for multiple municipalities to implement the Plan cooperatively, or for a county government entity to fulfill implementation responsibilities for a group of municipalities.

Individual Municipality Model	The municipality adopts, implements, and enforces a SWM ordinance individually
Multi-Municipal Model	Each participating municipality adopts a similar SWM ordinance and an Intermunicipal Agreement to form a single entity responsible for review of Drainage Plans and enforcement of SWM regulations in all participating municipalities
County Service Provider Model	Each participating municipality adopts a similar SWM ordinance and a County Service Provider Agreement. The County Service Provider (e.g. County Planning Entity or County Conservation District) is responsible for review of Drainage Plans and enforcement of SWM regulations in all participating municipalities

TABLE 1. Different Models for Municipal Plan Implementation

<b>INDIVIDUAL MUNICIPALITY MODEL</b>	The Individual Municipality Model gives your municipality complete autonomy over how the provisions of the Plan are implemented. However, this model also entails full responsibility for duties related to implementation such as review of Drainage Plans and enforcement of stormwater regulations. Municipalities choosing this option may decide to adopt the Model Ordinance contained in the Plan or they may choose to incorporate the Plan's provisions into existing municipal regulations. This is the most common method for implementation of Act 167 Plans.
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Once the municipality has adopted the necessary ordinances and/or resolutions to implement the Plan, they administer and enforce the newly enacted stormwater regulations. Individual applications will need to be reviewed for administrative content and technical content. This can be done by a municipal employee or delegated to a third-party such as your municipal engineer. Many municipalities have an employee complete the administrative review and then the application is given to the municipal engineer for technical review of the application.

<b>MULTI- MUNICIPAL MODEL</b>	The Multi-Municipal Model allows a group of municipalities to share available resources in order to implement the Plan. A Joint Stormwater Management Program is developed to administer and enforce stormwater regulations based on the needs of the participating municipalities. A single entity is designated to review Drainage Plans and enforce stormwater regulations for all of the participating municipalities. Administration of the Joint Stormwater Management Program can be done by an employee of one of the participating municipalities, by an employee shared by the municipalities, or contracted through a third-party.
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The Multi-Municipal Model requires each participating municipality to adopt an ordinance that designates the entity responsible for administration of the Joint Stormwater Management Program and an Intermunicipal Agreement

that defines the role of each party to the agreement. The Intermunicipal Agreement is typically incorporated into the ordinance by reference (as an attachment to the ordinance) and adopted with the ordinance. This type of arrangement commonly requires that each participating municipality adopt a substantially identical stormwater ordinance to ease administration. However, this is not a requirement. This model can offer efficient application of regional stormwater regulations.

<b>C O U N T Y S E R V I C E P R O V I D E R M O D E L</b>	<p>This model enables municipalities to defer to a county organization or agency, such as the county conservation district or county planning organization, to provide Plan implementation for a group of municipalities. This option is similar to the Multi-Municipal Model in many ways except that it designates an existing county agency to provide administration and enforcement of stormwater regulations for all of the participating municipalities.</p>
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The County Service Provider Model necessitates that each participating municipality adopt an ordinance that designates the county service provider and enacts a County Service Provider Agreement that establishes the role and responsibilities of each party. Each municipality typically adopts a substantially similar stormwater ordinance to ease administration of the regulations. This method of implementation can be very effective in achieving consistent application of stormwater regulations throughout a county.

All of these models can provide efficient and successful implementation of the Plan when thoughtfully applied to the correct situation. In order for a stormwater management program to be effective, it is important that administration and enforcement of stormwater regulations be carried out by a party with the technical ability to appropriately interpret and apply these regulations. It should be noted that each municipality retains ultimate responsibility for implementation of the Plan, regardless of the method used to do so. The municipality also retains authority over final approval of all applications.

### Adoption of Municipal Ordinances

No matter which model is used, each municipality will need to adopt regulations that enable the chosen implementation strategy and establish fees for review of Drainage Plans. The process for adopting municipal ordinances related to implementation of the Plan is the same procedure required for adoption of all municipal regulations. The procedure for adoption of municipal regulations is established by the Pennsylvania Code and is municipality specific and dependent on the classification of your municipality. Table 2 provides a summary of the municipal regulations necessary for each implementation model.

Model	SWM Ordinance	Administration Ordinance	Additional Regulations
Individual Municipality	YES	NO	Review Fee
Multi-Municipal	YES	YES	Intermunicipal Agreement; Review Fee
County Service Provider	YES	YES	County Service Provider Agreement; Review Fee

TABLE 2. Municipal Regulations Needed for Each Implementation Model

It is important that the standards and criteria contained in the Plan are implemented appropriately. This is particularly important if the municipality chooses to integrate the standards and criteria into existing regulations. Each municipality will need to review their existing regulations (i.e. Zoning, Subdivision and Land Development Ordinance, etc.) for conflicts with the new stormwater management regulations. In all cases, it is recommended that the resulting regulatory framework be reviewed by the local planning commission, the municipal solicitor, the County Planning Department and/or the County Conservation District for compliance with the provisions of the Plan and consistency among the various related regulations. Additionally, the adopted regulations may be reviewed by the Pennsylvania Department of Environmental Protection (DEP) for compliance with the Plan.

## **Establishing Review Fees**

Each municipality will need to establish fees for review of stormwater management applications. This fee, which will be paid by the applicant, is meant to offset the costs incurred by the municipality for administration of the stormwater program, technical review of stormwater site plans and reports, inspection of stormwater facilities, and enforcement of permit provisions. This can be accomplished with the appropriate provisions within a stormwater management ordinance, through another ordinance, or adoption of a resolution. The municipality may decide to charge a flat fee for review of applications or they can choose to be reimbursed for all costs incurred for review of an application. This decision will be influenced by the implementation model chosen.



## Overview of Common Best Management Practices

*Urban runoff is one of the primary contributors to water pollution. Stormwater runoff has two basic components that contribute to negative environmental impacts: 1) Increased volume and rate of runoff from developed areas; and 2) Pollutants collected and transported by the runoff to receiving streams. The preferred strategy for achieving the goals of the Plan is to reduce the impact of stormwater runoff through the use of Best Management Practices (BMPs). This section provides a summary of common BMPs and their benefits as well as an overview of the maintenance required for these facilities.*

The most effective way to reduce the number of stormwater runoff problems, and their negative impacts, is to reduce the amount of runoff generated. A combination of source reduction measures through non-structural BMPs and water quality treatment through use of structural BMPs is the proposed water quality control strategy of the Plan. Reducing the amount of runoff to be treated is the preferred strategy to meet this goal. Treating the runoff that cannot be eliminated is the secondary strategy for attaining the water quality standards. By directing runoff through one or more BMPs, runoff will receive some treatment for water quality, thereby reducing the adverse impact of contaminants on the receiving body of water.

There are a wide variety of best management practices that are used to reduce the amount of runoff generated and to minimize the potential negative impacts of runoff that is generated. Table 3 lists non-structural BMPs from the *Pennsylvania Stormwater Best Management Practices Manual* and their relative effectiveness in attaining the identified stormwater functions. These practices should be used, where applicable, to decrease the need for less cost effective structural BMPs.

### What are BMPs?

Non-Structural Best Management Practice	Stormwater Functions <sup>1</sup>			
	Peak Rate Control	Volume Reduction	Recharge	Water Quality
Protect Sensitive/Special Value Features	Very High	Very High	Very High	Very High
Protect/Conserve/Enhance Riparian Areas	Low/Med.	Medium	Medium	Very High
Protect/Utilize Natural Flow Pathways in Overall Stormwater Planning and Design	Med./High	Low/Med.	Low	Medium
Cluster Uses at Each Site; Build on the Smallest Area Possible	Very High	Very High	Very High	Very High
Concentrate Uses Area-Wide through Smart Growth Practices	Very High	Very High	Very High	Very High
Minimize Total Disturbed Area – Grading	High	High	High	High
Minimize Soil Compaction in Disturbed Areas	High	Very High	Very High	Very High
Re-Vegetate and Re-Forest Disturbed Areas using Native Species	Low/Med.	Low/Med.	Low/Med.	Very High
Reduce Street Imperviousness	Very High	Very High	Very High	Medium
Reduce Parking Imperviousness	Very High	Very High	Very High	High
Rooftop Disconnection	High	High	High	Low
Disconnection from Storm Sewers	High	High	High	Low
Street-sweeping	Low/None	Low/None	Low/None	High

<sup>1</sup> All stormwater function values obtained from the Pennsylvania Stormwater BMP Manual

TABLE 3. Stormwater Functions of Non-Structural Best Management Practices

When non-structural practices are unable to achieve the stormwater standards, it may be necessary to employ structural practices. Generally, structural BMPs address specific stormwater functions with some BMPs better suited for particular stormwater functions than others. The relative effectiveness of structural BMPs at addressing individual stormwater functions varies, as shown in *Table 4*. Additional information on each practice can be found in the *Pennsylvania Stormwater Best Management Practices Manual*.

Structural Best Management Practice	Stormwater Functions <sup>1</sup>			
	Peak Rate Control	Volume Reduction	Recharge	Water Quality
Porous Pavement with Infiltration Bed	Medium	Medium	Medium	Medium
Infiltration Basin	Med./High	High	High	High
Subsurface Infiltration Bed	Med./High	High	High	High
Infiltration Trench	Medium	Medium	High	High
Rain Garden / Bioretention	Low/Med.	Medium	Med./High	Med./High
Dry Well / Seepage Pit	Medium	Medium	High	Medium
Constructed Filter	Low-High <sup>2</sup>	Low-High <sup>2</sup>	Low-High <sup>2</sup>	High
Vegetated Swale	Med./High	Low/Med.	Low/Med.	Med./High
Vegetated Filter Strip	Low	Low/Med.	Low/Med.	High
Infiltration Berm and Retentive Grading	Medium	Low/Med.	Low	Med./High
Vegetated Roof	Low	Med./High	None	Medium
Rooftop Runoff - Capture and Reuse	Low	Med./High	Low	Medium
Constructed Wetland	High	Low	Low	High
Wet Pond / Retention Basin	High	Low	Low	Medium
Dry Extended Detention Basin	High	Low	None	Low
Water Quality Filter	None	None	None	Medium
Riparian Buffer Restoration	Low/Med.	Medium	Medium	Med./High
Landscape Restoration	Low/Med.	Low/Med.	Low/Med.	Very High
Soils Amendment and Restoration	Medium	Low/Med.	Low/Med.	Medium

<sup>1</sup> All stormwater function values obtained from the Pennsylvania Stormwater BMP Manual  
<sup>2</sup> Dependent upon if infiltration is used

TABLE 4. Stormwater Functions of Structural Best Management Practices

The table above shows the qualitative effect of individual BMPs when used as stand-alone treatment practices. The overall effectiveness of a stormwater system can be improved when several, smaller BMPs are dispersed throughout a given site. The combination of different BMPs enables each BMP to complement each other by providing a particular stormwater function then allowing the runoff to pass downstream to another BMP that is used to address different criteria. This allows designers to better mimic the site's existing hydrologic features, which are not typically isolated to one area of the site. The "treatment train" system of utilizing multiple BMPs on a single site is an effective technique that, in some cases, may be used to meet all of the stormwater criteria.

## Summary of BMP Maintenance

A BMP must be ready to perform its function at all times. Rainfall events cannot be scheduled to allow BMPs to be maintained and ready to operate immediately before a rainfall event. In addition, BMP effectiveness will decline over time if they are not adequately maintained. For a BMP to be operational, the BMP operator must establish and implement a comprehensive, regularly scheduled maintenance program.

BMP maintenance starts by ensuring BMPs are constructed properly through inspections during construction. Proper construction of the BMP will reduce the future maintenance needs of the

facility. The owner/operator needs to develop inspection checklists, and convey to the inspectors the importance of scheduling and coordinating the BMP construction with other site activities.

Changes in downstream drainage may be too subtle or long in developing to provide adequate warning that the condition of a BMP is deteriorating. By the time problems are apparent, significant damage may have occurred. Often, impacts will not be experienced until the design storm occurs. Failures triggered by large storm events may be as dramatic as washouts, flooding, and erosion of stream banks. Therefore, preventative maintenance is essential. There are two principal components of a BMP maintenance program:

**Routine Maintenance** includes maintenance activities that are performed on a regular basis to keep the facility operating as it was designed. This includes activities such as trimming vegetation, removing weeds, and removal of accumulated trash and debris.

**Non-Routine Maintenance** activities are performed less frequently and typically involve repairing some portion of the facility that has deteriorated over time. Maintenance activities in this category include removing accumulated sediment, repairing areas damaged by erosion, and replacing mulch or vegetation.

## **Routine Maintenance**

At a minimum, an annual inspection of each BMP facility should be performed by a qualified professional to ensure that each BMP facility is functioning properly. Facilities should also be inspected for proper functioning after major storm events to At a minimum, an inspector should check for the following:

### **Vegetation Management**

Vegetative cover serves several purposes in BMPs: it slows the velocity of the runoff; filters sediment from runoff as it is collected in the BMP; and prevents erosion of the banks and bottom of the facility. Grass is generally used around retention basins, infiltration trenches and in and around dry detention basins. It must be mowed and maintained. Mowing requirements can be tailored to the specific needs of a site and the neighboring properties. The grass in a BMP may be hardiest if maintained as an upland meadow, cutting no shorter than 6-8 inches.

Maintaining a more manicured area of grass decreases the effectiveness of the BMP, as well as increasing its maintenance costs.

The vegetation surrounding infiltration trenches or buffer strips also removes some sediment before the stormwater enters the BMP. If plants are damaged or become laden with sediment, they can no longer perform beneficially. Therefore, the condition of these areas should be closely monitored, and vegetation replaced if necessary.

### **Debris and Litter Removal**

Regular removal of debris and litter is efficient and effective, having several benefits:

- Reduces the chance of clogging in outlet structures, trash racks and other components.
- Prevents possible damage to vegetated areas.
- Reduces potential mosquito breeding habitats.
- Maintains facility appearance.

- Reduces conditions for excessive surface algae.

### **Mechanical Component Maintenance**

Each type of BMP may have mechanical components that need periodic attention to ensure their continued performance. Valves, gates, pumps, fences, locks and access hatches should be maintained at all times. Design and site factors will determine the amount of maintenance that is necessary.

### **Pest Control**

Mosquito and other insect breeding grounds can be created by standing water. The most effective control technique in retention basins is to prevent stagnant areas. Prompt removal of floating debris helps. In larger basins, it may also be possible to maintain stocks of fish that feed upon mosquito larvae. The wave action created by surface aerators increases oxygen levels and also discourages mosquito breeding. Animal burrows will also deteriorate the structural integrity of an embankment. Muskrats and nutria, in particular, will burrow tunnels up to six inches in diameter. Existing burrows should be filled as soon as possible.

## **Non-Routine Maintenance**

### **Pond Maintenance**

To ensure peak performance of retention basins, a healthy aquatic environment should exist. A healthy aquatic ecosystem typically requires little maintenance. Excess nutrients are a common problem with retention ponds. An indicator of excess nutrients is excessive algae growth in the permanent pool of a retention basin. In most cases, growth of more desirable aquatic and semi-aquatic vegetation in and around the permanent pool will help to utilize nutrients in the pond, thus deterring the growth of algae and other nuisance vegetation.

### **Bank Stabilization**

It is very important to prevent erosion of the banks and bottom of detention basins (dry ponds) and the visible banks of retention ponds. The easiest way to do this is to keep groundcover healthy. Areas of bare soil will erode quickly, clogging the basin with soil and threatening its integrity. Any bare areas should be re-seeded and stabilized as quickly as possible.

The roots of woody growth, such as young trees and shrubs, can also destabilize embankments. Consistent maintenance can control any stray seedlings that take root in an embankment. Woody growth away from the embankment does not generally pose a threat to the stability of the embankment and can play an important role in the health of the vegetative environment. For ease of maintenance, trees and shrubs should be planted outside maintenance and access areas.

### **Sediment Removal**

Sediment removal, or dredging, may be a maintenance option for you to consider. Dredging removes the layer of highly enriched materials from the lake's bottom. Removing this nutrient "bank" prevents phosphorus from releasing back into the water column and consequently being discharged into receiving waters during the next storm. This also helps lower nutrient concentrations in the lake, thus decreasing nuisance algae blooms. Dredging can help to improve water quality by deepening the BMP, providing additional storage capacity. But, deeper is not always better! Consult a professional for optimum BMP depth.

### **Sediment Removal in Retention and Detention Basins**

Sediment will accumulate in a BMP and will eventually need to be removed, but BMP facilities vary so much that there are no hard and fast rules about when and how. For planning purposes, sediment removal should be considered on the following intervals:

- Extended detention basins (dry ponds): every 2-10 years
- Retention basins (wet ponds): every 5 –15 years

Sediment removal is usually the largest single cost of BMP maintenance; therefore, it is best to plan ahead to allow for adequate funding. The sediment removed from your basin will require proper disposal. Typically, an onsite area or a site adjacent to the facility (but outside the floodplain) can be used for the spoil. If such a disposal area is not available, transportation and disposal fees can greatly increase the cost of sediment removal. Once the sediment is removed, the bottom of the basin and any disturbed areas need to be stabilized and re-vegetated or the facility will quickly clog and require sediment removal again. Wet sediment is more difficult and expensive to remove than dry sediment. In some cases the entire basin can be drained and allowed to dry so that equipment can remove sediment from the bottom. In other cases, where this is not practical, it may be necessary to remove sediment from a vantage point on the shoreline or by hydraulic dredging from the surface. This additional cost of sediment removal for a retention facility is partially offset by the longer interval between dredging cycles. Disposal of wet sediment is not allowed in many landfills, so the material often must be dried (dewatered) prior to disposal. This extra step adds to the cost and requires a place where wet material can be temporarily placed to dry.

#### **Sediment Removal in Infiltration Trenches**

Infiltration facilities tend to clog more frequently than either detention or retention basins. Therefore, it is recommended that these facilities be inspected at least two to four times a year. Most infiltration trenches have a sediment trap or filter to remove some sediment before the stormwater enters the trench. Keeping this sediment filter clean is vital to ensuring the long-term performance of the infiltration trench.

This is especially critical for concentrated input facilities that use sediment traps. If the sediment trap is full, sediment-laden water will be conveyed into the trench. With dispersed input facilities, a clogged sediment barrier is indicated when water cannot flow into the trench and goes through the overflow channel. For any overflow condition, the observation well should be checked to determine the cause. If the trench remains filled with water after a rain event and causes regular overflow, then the aggregate stone should be excavated and the facility rebuilt.

The specific sediment removal procedure will depend on the manner in which the stormwater enters the facility. Concentrated input facilities will have some kind of in-line filter system or sediment trap. Clean-out procedures should be described in approved Drainage Plans, as well as in any maintenance agreement.

For typical infiltration facilities using dispersed input, routine sediment removal usually means removing the top 6 to 12 inches of filter media and replacing the filter cloth sediment barrier that covers the aggregate reservoir. A layer of clean filter media replaces the removed media. Any bare spots or damaged areas in the grass filter strip should be replaced with sod upon completion of the sediment removal procedure.

## BMP Maintenance Schedule

BMP	Activity	Schedule
Retention Pond / Wetland <sup>1</sup>	<ul style="list-style-type: none"> <li>• Cleaning and removal of debris after major storm events</li> <li>• Harvest excess vegetation</li> <li>• Repair of embankment side slopes</li> <li>• Repair of control structure</li> </ul>	Annual, or as needed
	<ul style="list-style-type: none"> <li>• Removal of accumulated sediment from forebays or sediment storage areas</li> </ul>	5-year cycle, or as needed
	<ul style="list-style-type: none"> <li>• Removal of accumulated sediment from main cells of pond once the original volume has been significantly reduced</li> </ul>	5- to 10- year cycle
Detention Basin	<ul style="list-style-type: none"> <li>• Removal of accumulated sediment</li> <li>• Repair of control structure</li> <li>• Repair of embankment and side slopes</li> </ul>	Annual, or as needed
Infiltration Trench <sup>1</sup>	<ul style="list-style-type: none"> <li>• Cleaning and removal of debris after major storm events</li> <li>• Mowing<sup>4</sup> and maintenance of upland vegetated areas</li> <li>• Maintenance of inlets and outlets</li> </ul>	Annual, or as needed
Infiltration Basin <sup>2</sup>	<ul style="list-style-type: none"> <li>• Cleaning and removal of debris after major storm events</li> <li>• Mowing<sup>4</sup> and maintenance of upland vegetated areas</li> </ul>	Annual, or as needed
	<ul style="list-style-type: none"> <li>• Removal of accumulated sediment from forebays or sediment storage areas</li> </ul>	3- to 5- year cycle
Sand Filters <sup>3</sup>	<ul style="list-style-type: none"> <li>• Removal of trash and debris from control openings</li> <li>• Repair of leaks from the sedimentation chamber or deterioration of structural components</li> <li>• Removal of the top few inches of sand and cultivation of the surface when filter bed is clogged (only works for a few cycles)</li> <li>• Clean-out of accumulated sediment from filter bed chamber</li> <li>• Clean-out of accumulated sediment from sedimentation chamber</li> </ul>	Annual, or as needed
Bioretention <sup>5</sup>	<ul style="list-style-type: none"> <li>• Repair of eroded areas</li> <li>• Mulching of void areas</li> <li>• Removal and replacement of all dead and diseased vegetation</li> <li>• Watering of plant material</li> </ul>	Bi-Annual, or as needed
	<ul style="list-style-type: none"> <li>• Removal of mulch and application of a new layer</li> </ul>	Annual
Grass Swale <sup>1</sup>	<ul style="list-style-type: none"> <li>• Mowing<sup>4</sup> and litter and debris removal</li> <li>• Stabilization of eroded side slopes and bottom</li> <li>• Nutrient and pesticide use management</li> <li>• De-thatching swale bottom and removal of thatching</li> <li>• Disking or aeration of swale bottom</li> </ul>	Annual, or as needed
	<ul style="list-style-type: none"> <li>• Scraping swale bottom, and removal of sediment to restore original cross section and infiltration rate</li> <li>• Seeding or sodding to restore ground cover (use proper erosion and sediment control)</li> </ul>	5- year cycle
Filter Strip <sup>6</sup>	<ul style="list-style-type: none"> <li>• Mowing<sup>4</sup> and litter and debris removal</li> <li>• Nutrient and pesticide use management</li> <li>• Aeration of soil in the filter strip</li> <li>• Repair of eroded or sparse grass areas</li> </ul>	Annual, or as needed

<sup>1</sup> Modified from Livingston et al (1997)

<sup>2</sup> Modified from Livingston et al (1997), based on infiltration trench requirements

<sup>3</sup> Modified from Claytor and Schueler (1996)

<sup>4</sup> Mowing may be required several times per year, depending on local conditions

<sup>5</sup> Modified from Prince George's County (1993)

<sup>6</sup> Modified from Livingston et al (1997), based on grass swale recommendations

TABLE 5. Recommended BMP Maintenance Schedules (Source: U.S. EPA, 1999)

## Estimating Costs

*The cost of implementing a stormwater management program is a significant concern of municipal officials and residents alike. This section is intended to offer perspective on the economic need for a comprehensive stormwater management program and to provide information on estimating the costs of implementing the stormwater management standards for proposed projects.*

There are direct economic impacts associated with administration and enforcement of stormwater management regulations. There are also direct costs associated with implementation of stormwater management facilities, regardless of the type of stormwater control standards that are proposed. However, the cost of mitigating damages caused by inadequately managed stormwater runoff can be overwhelming. In 2007, the Pennsylvania Emergency Management Agency (PEMA) completed a statewide study to determine damage estimates for all major flood events. According to the study, the total computed damages in dollars for total economic loss in Crawford, Erie, Venango, and Warren counties during a 10-year storm event is \$449.5 million dollars. This number increases to \$592.3 million for a 100-year storm event.

### Question: What is LID?

**Answer: Low Impact Development (LID)** is an approach to land development that uses various land planning and design practices and technologies to simultaneously conserve and protect natural resource systems and reduce infrastructure costs (HUD, 2003).

**LID is important** because in the vast majority of cases, the U.S. EPA has found that implementing well-chosen LID practices, like the proposed stormwater management methods, saves money for developers, property owners, and communities while protecting and restoring water quality (EPA, 2007).

### **From the municipal perspective...**

There will be some costs associated with start-up, administration, and enforcement of a stormwater management program. For not-yet-constructed future development, the majority of costs associated with implementing the stormwater management program should be covered by review fees charged to applicants, so very little cost should be incurred by the municipality after initial program implementation. For already approved and existing development, municipalities may need to budget resources to fix the most serious problems.

### **From the Developer's perspective...**

There will be additional up-front project cost to developers for review fees. However, applying the methods for implementing the stormwater control standards within the Plan can reduce overall project costs by reducing construction costs. The Design Example contained within the Plan is one example of how this is accomplished. However, the costs and benefits of implementing the stormwater management standards can be very site specific and will vary based on the BMPs used to meet the standards and site characteristics such as topography, soils, and intensity of the proposed development.



## Estimating Construction Costs

Planning for stormwater management early in the development process may decrease the size and cost of structural solutions since non-structural alternatives are more feasible early in the process. This is generally true from both the municipal and the developer's perspective. Tables 6 and 7 provide cost estimate values for a small site and general site. However, the installation costs of BMPs are very site specific. The costs between small sites and large sites will likely vary considerably due to economies of scale.

Structural Best Management Practice	Construction Costs
Level Spreader	\$5 to \$20/foot
Vegetated Filter Strip	\$0.30 /ft <sup>2</sup> for seed \$0.70 /ft <sup>2</sup> for sod
Dry Well	\$4-\$9/ft <sup>3</sup> of storage
Rain Garden	\$3-\$5/ft <sup>2</sup>
Vegetated Swales	\$0.30-\$0.70/ ft <sup>2</sup>

TABLE 6. Estimated Construction Costs for Small Site BMPs (Lycoming County, 2010)

Structural Best Management Practice	Construction Costs	Year	Source
Porous Pavement with Infiltration Bed	\$2K-\$2.5K/parking space	2005	PA BMP Manual
Infiltration Basin	\$2.5K-\$3.5K/ac	2005	PA BMP Manual (not including excavation or piping)
Subsurface Infiltration Bed	\$5.70/ft <sup>2</sup>	2005	PA BMP Manual
Infiltration Trench	\$4-\$9/ft <sup>3</sup> of storage	1991-1997	SWRPC, 1991; Brown and Schueler, 1997
Rain Garden / Bioretention	\$5-\$7/ft <sup>3</sup> of storage	2005	PA BMP Manual
Dry Well / Seepage Pit	\$4-\$9/ft <sup>3</sup> of storage	1991-1997	SWRPC, 1991; Brown and Schueler
Constructed Filter	Varies		
Vegetated Swale	\$8.5-\$50/linear foot	1991	SEWRPC, 1991
Vegetated Filter Strip	Varies		
Infiltration Berm and Retentive Grading	Varies		
Vegetated Roof	\$8-\$15/ft <sup>2</sup>	2004	PA BMP Manual
Rooftop Runoff - Capture and Reuse	\$1.25/gallon of storage	2005	PA BMP Manual
Constructed Wetland	\$30K-\$65K/ac	2004	EPA, 1999 Wetland Fact Sheet
Wet Pond / Retention Basin	\$25K-\$50K/ac-ft of storage	2004	EPA, 1999 Wet Detention Pond Fact Sheet
Dry Extended Detention Basin	12.4[Volume for 10 year-storm]0.760	1997	Brown and Schueler, 1997 (includes permitting)
Water Quality Filter	Varies		
Riparian Buffer Restoration	Varies		
Landscape Restoration	>\$3K/ac depending on facility	2005	PA BMP Manual
Soils Amendment and Restoration	\$0.8K - \$1K/ac	2005	PA BMP Manual (for either tilling or composting)

TABLE 7. Estimated Construction Costs for General BMPs (Adapted from PA BMP Manual)

## **Estimating Maintenance Costs**

The routine costs of maintaining a BMP are site specific. Factors that influence costs include the type of development on the site and the landscape of the site. Routine maintenance includes inspections, debris and litter control, mechanical components maintenance, vegetation management, and other routine tasks as determined for the specific facility. Quotations may be obtained from firms experienced with the tasks that are relevant for selected BMPs. If high costs are projected, then modifying the design or using alternative BMPs with lower maintenance costs may be considered.

An additional cost and consideration that is critical from the developer's perspective is the design cost (typically 10-15% of the construction costs) and the time required for permit approval. These costs can vary widely depending on specific municipalities and other site characteristics (the presence of wetlands, floodplains, Special Regulation watersheds, etc.).

## Small Project Application

*The Small Project Application was developed to simplify the application process for small projects that require minimal review of stormwater management facilities. This section provides a step-by-step outline of how to prepare a Small Project Application. Two design examples are also included to further clarify this process.*

**T**he Small Project Application should be used by those proposing to construct relatively small new impervious surfaces. The application was developed to assist these projects in addressing the stormwater management impacts caused by small projects. The following outlines a step-by-step process to complete the Small Project Application.

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**STEP 1**

Determine the classification of the proposed impervious surface. If the "Surface Type" is not listed use the "Other" row and list the improvement type. Determine the length (in feet) and width (in feet) of the proposed improvement and insert these values into the "Length" and "Width" columns in line with the corresponding "Surface Type" row. Multiply the "length" times the "width" and then insert the result into the "Proposed Impervious Area" column. This number will be in square feet. Complete this process for each surface type.

Area calculations for irregular shapes will require additional calculations not included on the application. In this case write the calculated area in the "Proposed Impervious Area" column and leave the other columns blank. (Supporting calculations used to determine the total surface area should be included in available space or on the back of the application).

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**STEP 2**

Add all of the numbers in the "Proposed Impervious Area" column and insert the sum into the "Total Impervious Surface Area (sum of all areas)" box.

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**STEP 3**

If the "Total Impervious Surface Area to be managed (sum of all areas)" is:

- 1,000 ft<sup>2</sup> or less - Your project is exempt from implementation of stormwater management controls and you can proceed with construction as planned.
  - 1,000 ft<sup>2</sup> to 2,499 ft<sup>2</sup> - You are required to document your project with the municipality. Sign a completed Sheet 1 of the Small Project Application and submit this to the municipality.
  - 2,500 ft<sup>2</sup> to 4,999 ft<sup>2</sup> - You are required to complete the entire Small Project Application and submit it to the municipality. Proceed to Step 4.
  - 5,000 ft<sup>2</sup> or more - The Small Project Application does not apply to your project. A SWM Site Plan must be prepared for your project by a Pennsylvania Registered Design Professional experienced in the design of such control measures. Refer to your municipality's stormwater management ordinance for the requirement of a SWM Site Plan.
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**STEP 4**

Determine if the Disconnected Impervious Area (DIA) credit applies to your project. Copy the "Proposed Impervious Surface Area" from Sheet 1 onto the table on Sheet 2. Enter a corresponding "DIA Credit Factor" from the table according to the pervious flow length. Multiply the "DIA Credit Factor" by the "Proposed Impervious Area" to determine the "Impervious Area to be Managed".

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**STEP 5**

Convert the "Impervious Area to be Managed" to "Required Capture Volume" by dividing by 6. Total the column to find the "Total Required Capture Volume".

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**STEP 6**

Determine the credit for planting trees by entering the Total Required Capture Volume in the box on Sheet 3. Subtract the calculated "Tree Planting Credit" [10 ft<sup>3</sup> for each evergreen tree planted and/or 6 ft<sup>3</sup> for each deciduous tree planted]. Subtract the Tree Planting Credit from the Total Required Capture Volume to determine the "Capture Volume to be Managed by Structural BMPs".

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**STEP 7**

Decide how much of the Volume you will manage with a Rain Garden or with a Dry Well/Infiltration Trench.

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**STEP 8**

Proceed to Sheet 4. Check the Minimum Control boxes documenting that Erosion & Sediment Pollution will be controlled, Source Pollution will be controlled and Natural Drainage Systems and Outfalls will be preserved.

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**STEP 9**

Calculate the surface area of the BMPs by multiplying the Rain Garden Capture Volume by 1.20 and the Dry Well/Infiltration Trench Capture Volume by 1.25.

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**STEP 10**

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Complete and attach a sketch that includes:

- Property lines with dimensions
  - Proposed buildings with dimensions
  - Proposed impervious surfaces with dimensions
  - Proposed septic system, if applicable
  - Proposed well, if applicable
  - Proposed stormwater management system
- 

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**STEP 11**

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Execute and attach an Operations and Maintenance Agreement (A Sample Operation and Maintenance Agreement is included in the Appendix of the Plan).

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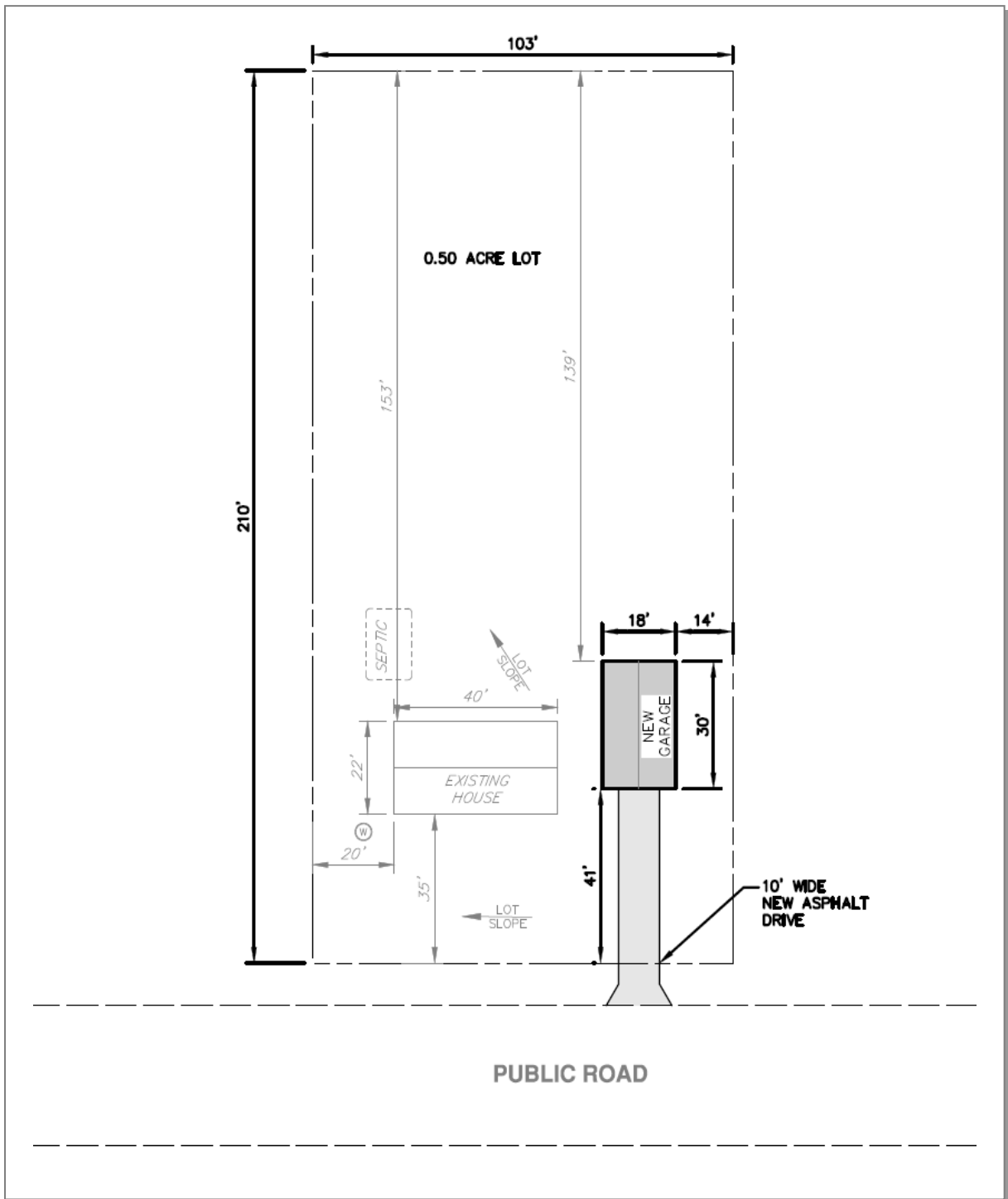
**STEP 12**

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Execute the Application acknowledging property ownership, accuracy of the information provided, and granting access for inspection. Submit the Application to your municipality.

---

# Small Project Application - Example #1



## Small Project Application for Stormwater Management

Impervious surfaces are any surface that prevents the infiltration of water into the ground. This includes house roofs, driveways, sidewalks, patios, garage roofs, storage sheds, and similar surfaces. Per [MUNICIPALITY]'s stormwater management regulations, stormwater management facilities are required whenever more than 2,500 square feet of new impervious surface is proposed. Existing impervious area and redevelopment are not considered "new" impervious surfaces for this calculation.

Complete this Table to Calculate Total Impervious Surface Area					
Surface Type	Length (ft)	X	Width (ft)	=	Proposed Impervious Area (ft <sup>2</sup> )
Buildings (area to each downspout)	30	x	18	=	540
		x		=	
		x		=	
		x		=	
Driveway	41	x	10	=	410
		x		=	
		x		=	
Parking Areas		x		=	
		x		=	
Patios/Walks		x		=	
		x		=	
		x		=	
Other		x		=	
		x		=	
		x		=	
<b>Total Impervious Surface Area (sum of all areas)</b>					<b>950</b>

**If the Total Impervious Surface Area is LESS THAN 1,000 ft<sup>2</sup>, no further action is required.**

**If the Total Impervious Surface Area is BETWEEN 1,000 ft<sup>2</sup> and 2,500 ft<sup>2</sup>, read, acknowledge and sign below.**

**If the Total Impervious Surface Area BETWEEN 2,500 ft<sup>2</sup> and 5,000 ft<sup>2</sup>, complete the remainder of the Application.**

**If the Total Impervious Surface Area EXCEEDS 5,000 ft<sup>2</sup>, this application does not apply to your project.**

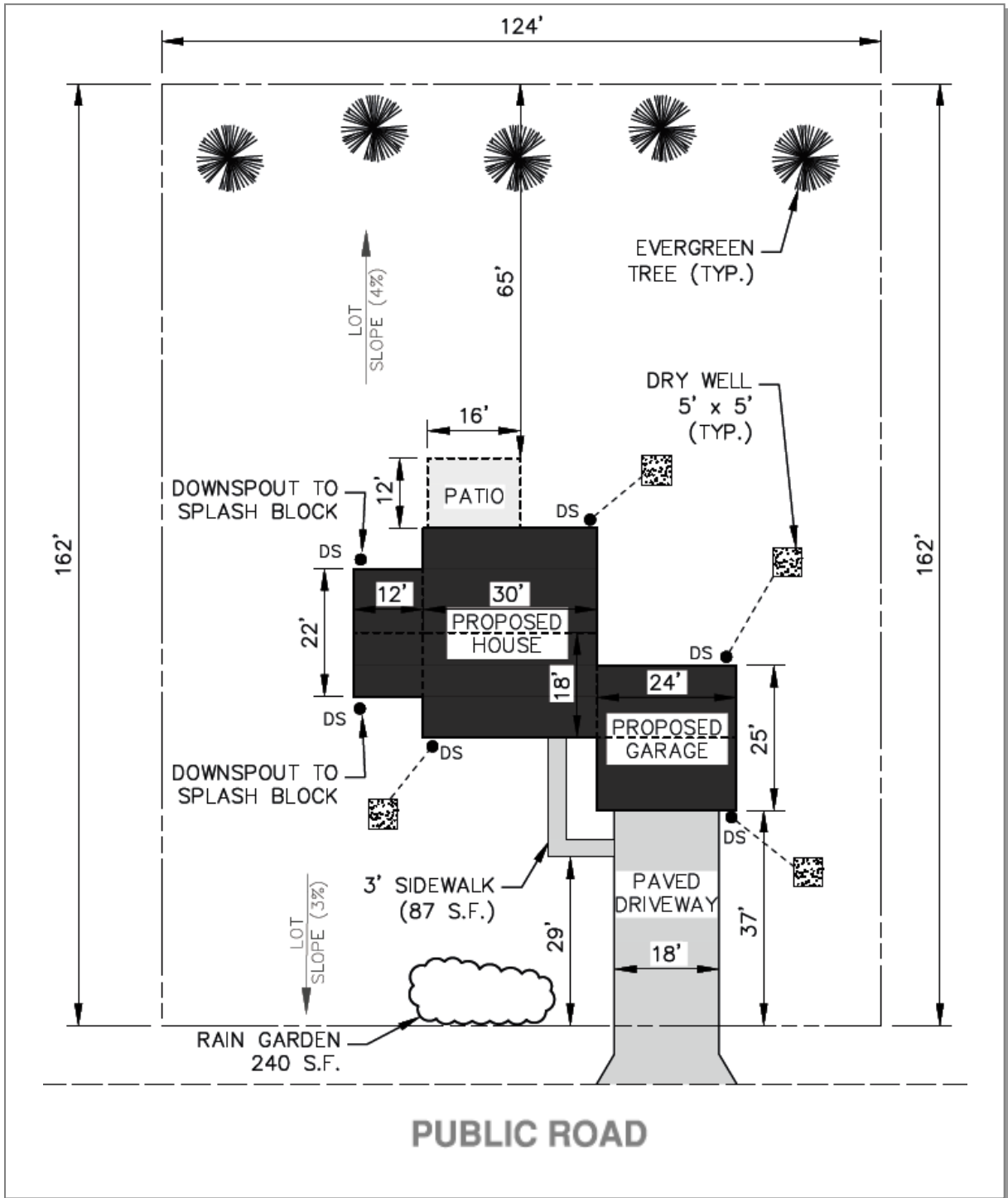
**Acknowledgement** – Based upon the information you have provided, a **Stormwater Management Plan IS NOT required** for this development activity. By executing below, the Owner acknowledges the following:

- I hereby declare that I am the Property Owner, or Owner's Representative
- The information provided on this application is accurate to the best of my knowledge. I understand that submission of inaccurate information may result in a stop work order and/or revocation of permit(s).
- Municipal representatives are hereby granted access to the above described property as may be required for review and inspection of this project

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

## Small Project Application - Example #2





## Small Project Application for Stormwater Management

Impervious surfaces are any surface that prevents the infiltration of water into the ground. This includes house roofs, driveways, sidewalks, patios, garage roofs, storage sheds, and similar surfaces. Per [MUNICIPALITY]'s stormwater management regulations, stormwater management facilities are required whenever more than 2,500 square feet of new impervious surface is proposed. Existing impervious area and redevelopment are not considered "new" impervious surfaces for this calculation.

Complete this Table to Calculate Total Impervious Surface Area					
Surface Type	Length (ft)	X	Width (ft)	=	Proposed Impervious Area
Buildings (area to each downspout)	30	x	18	=	540
	30	x	18	=	540
	11	x	12	=	132
	11	x	12	=	132
Driveway	37	x	18	=	666
		x		=	
		x		=	
Parking Areas		x		=	
		x		=	
Patios/Walks	12	x	16	=	192
	29	x	3	x	87
		x		=	
		x		=	
Other <i>Garage</i>	24	x	12.5	=	300
	24	x	12.5	=	300
		x		=	
<b>Total Impervious Surface Area (sum of all areas)</b>					<b>2,889</b>

<b>If the Total Impervious Surface Area is LESS THAN 1,000 ft<sup>2</sup>, no further action is required.</b>
<del><b>If the Total Impervious Surface Area is BETWEEN 1,000 ft<sup>2</sup> and 2,500 ft<sup>2</sup>, read, acknowledge and sign below.</b></del>
<b>If the Total Impervious Surface Area BETWEEN 2,500 ft<sup>2</sup> and 5,000 ft<sup>2</sup>, complete the remainder of the Application.</b>
<del><b>If the Total Impervious Surface Area EXCEEDS 5,000 ft<sup>2</sup>, this application does not apply to your project.</b></del>

**Acknowledgement** – Based upon the information you have provided, a **Stormwater Management Plan IS NOT required** for this development activity. By executing below, the Owner acknowledges the following:

- I hereby declare that I am the Property Owner, or Owner's Representative
- The information provided on this application is accurate to the best of my knowledge. I understand that submission of inaccurate information may result in a stop work order and/or revocation of permit(s).
- Municipal representatives are hereby granted access to the above described property as may be required for review and inspection of this project

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

## Credits

### Credit 1: DISCONNECTION OF IMPERVIOUS AREA

When runoff from impervious area is directed to a pervious area that allows for infiltration, filtration, and increased time of concentration, all or parts of the impervious area may qualify as Disconnected Impervious Area (DIA). DIA can reduce the volume of stormwater that needs to be managed. If the criteria listed below can be met, use this worksheet to calculate the DIA Credit and determine the portion of the impervious area that can be excluded from the calculation of impervious area to be managed for stormwater control.

#### Criteria

An impervious area is considered to be completely, or partially, disconnected if it meets the following:

- Flow path at the discharge area has a positive slope of  $\leq 5\%$
- Soil at discharge is not classified as hydrologic soil group "D"
- Rooftop area draining to a single downspout is  $\leq 500 \text{ ft}^2$
- Paved area draining to a discharge is  $\leq 1,000 \text{ ft}^2$
- Flow path of paved impervious area is not more than 75'
- A gravel strip or other spreading device is used at paved discharges

Length of Pervious Flow Path from discharge point * (ft)	DIA Credit Factor
0 – 14	1.0
15 – 29	0.8
30 – 44	0.6
45 – 59	0.4
60 – 74	0.2
75 or more	0

\*Flow path is the length from the discharge to the nearest property line or channelized flow (measured along the ground slope). Pervious flow path must be at least 15 feet from any impervious surfaces.

Calculate DIA Credit & Required Capture Volume									
Surface Type	Proposed Impervious Area (from previous sheet)	X	DIA Credit Factor	=	Impervious Area to be Managed	÷		=	Required Capture Volume (ft <sup>3</sup> )
Building (area per downspout)	540 (back)	x	1.0	=	540	÷	6	=	90
	540 (front)	x	1.0	=	540	÷	6	=	90
	132 (back)	x	0	=	0	÷	6	=	0
	132 (front)	x	0.4	=	53	÷	6	=	8.8
Driveway	666	x	1.0	=	666	÷	6	=	111
		x		=		÷	6	=	
		x		=		÷	6	=	
Parking Areas		x		=		÷	6	=	
		x		=		÷	6	=	
Patios/Walks	192	x	0.2	=	38.4	÷	6	=	6.4
	87	x	0.8	=	69.6	÷	6	=	11.6
		x		=		÷	6	=	
		x		=		÷	6	=	
Other Garage	300 (front)	x	0	=	0	÷	6	=	0
	300 (back)	x	1.0	=	300	÷	6	=	50
		x		=		÷	6	=	
<b>Total Required Capture Volume</b>									<b>367.8</b>

**Credit 2: TREE PLANTING**

Trees provide many stormwater benefits such as intercepting rainfall, increasing evapotranspiration and increasing time of concentration. The total volume of stormwater to be managed can be further reduced by planting new trees. Provided the criteria below are met, the Total Required Capture Volume can be reduced per the following table:

Deciduous Trees	Evergreen Trees
6 ft <sup>3</sup> per tree planted	10 ft <sup>3</sup> per tree planted

**Criteria**

To receive credit for planting trees, the following must be met:

- Trees must be native species (see list below), Non-native species are not eligible
- Trees shall be a minimum 1" caliper tree and 3 feet tall shrub (min).
- Trees shall be adequately protected during construction.
- Trees shall be maintained until redevelopment occurs.
- No more than 25% of the required capture volume can be mitigated through the use of trees.
- Dead trees shall be replaced within 12 months.

**Native Species Trees (Common Name)**

<ul style="list-style-type: none"> <li>• Blackgum</li> <li>• Cucumber magnolia</li> <li>• Hophornbeam</li> <li>• Maple, (sugar, red or silver)</li> <li>• Pine, (pitch or eastern white)</li> <li>• Ironwood</li> <li>• Hickory, sweet pignut or shag-bark</li> <li>• Sycamore, American</li> <li>• Cotton-wood, eastern</li> <li>• Aspen, big-tooth or quaking</li> <li>• Cherry, black</li> </ul>	<ul style="list-style-type: none"> <li>• Oak, (white, swamp white, scarlet, pin, red, black)</li> <li>• Dogwood (silky or red osier)</li> <li>• Tuliptree</li> <li>• Willow, black</li> <li>• Chokeberry (red or black)</li> <li>• Basswood, American</li> <li>• Serviceberry, (downy or shadbush)</li> <li>• Elderberry</li> <li>• Witch hazel</li> <li>• Mountain laurel</li> </ul>
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**Calculate the Capture Volume to be Managed by Structural BMPs**

	<b>367.8</b>	<b>Required Capture Volume (ft<sup>3</sup>)</b>
-	<b>50</b>	<b>- Tree Planting Credit (ft<sup>3</sup>)</b>
	<b>317.8</b>	<b>= Capture Volume to be Managed by Structural BMPs (ft<sup>3</sup>)</b>

**Sizing of BMP**

	<b>237.8</b>	How much of the Volume will you manage with a Rain Garden?
+	<b>80.0</b>	How much of the Volume will you manage with a Dry Well or Infiltration Trench?
	<b>317.8</b>	<b>Capture Volume to be managed (ft<sup>3</sup>)</b>

Enter these volumes into the **Small Project SWM Plan Worksheet** on the following page.

## Small Project SWM Plan Worksheet

Based upon the information you have provided a **Stormwater Plan IS Required** for this development activity. The Stormwater Management Ordinance developed through the [COUNTY] Act 167 County-Wide Stormwater Management Plan (Plan) regulates compliance requirements for Stormwater management in this jurisdiction. A complete copy of the Plan can be obtained from the County Planning office.

Development activities shall begin only after [MUNICIPALITY] approves a stormwater management plan. The Plan will assist you in preparing the necessary information and plans for [MUNICIPALITY] to review and approve. **This document will constitute an approved plan if all of the relevant details are to be installed in their entirety AND no part of the stormwater system adversely affects any other property, nor adversely affects any septic systems or drinking water wells on this, or any other, parcel.** If an alternative system is to be used a plan will need to be submitted to [MUNICIPALITY] for approval. A design by a qualified professional may be required for more complex sites.

**PLEASE INITIAL EACH APPLICABLE BOX BELOW TO INDICATE THE STORMWATER MANAGEMENT PLAN FOR THIS SITE**

	Minimum Control #1 Erosion & Sediment Pollution Control
	Minimum Control #2: Source Control of Pollution
	Minimum Control #3: Preservation of Natural Drainage Systems and Outfalls

	The relevant details from [COUNTY] Act 167 County-Wide Stormwater Management Plan will be installed in their entirety AND the system will be located as not to adversely affect other property, nor any septic systems or drinking water wells on this, or any other, parcel.
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To meet this requirement, the following will be installed and maintained:

Capture Volume to be managed (ft <sup>3</sup> )			Conversion	Surface Area of BMPs (ft <sup>2</sup> )
237.8	<b>By Rain Garden</b> 6" ponding; 2' soil depth	x	1.20	285.4
80.0	<b>Dry Well or Infiltration Trench</b> 2½' aggregate depth	x	1.25	100
317.8	Total		Total	385.4

	In lieu of meeting the above, an alternative and/or professional design is attached for approval AND the system will be located as not to adversely affect other property, any septic systems or drinking water wells on this, or any other, parcel.
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	<p><b>Site Sketch Plan showing:</b></p> <ul style="list-style-type: none"> <li>▪ Property lines with dimensions</li> <li>▪ Proposed buildings with dimensions</li> <li>▪ Proposed impervious surfaces with dimensions</li> <li>▪ Proposed septic system, if applicable</li> <li>▪ Proposed well site, if applicable</li> <li>▪ Proposed stormwater management system(s)</li> </ul>
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	<b>Operation and Maintenance Agreement</b>
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**Condition on Approval** – The Stormwater Management Plan must be fully implemented prior to a request for final inspection of proposed structures or issuance of a zoning permit.

**Acknowledgement** – By executing below, the Owner acknowledges the following:

- I hereby declare that I am the Property Owner, or Owner's Representative
- The information provided on this application is accurate to the best of my knowledge. I understand that submission of inaccurate information may result in a stop work order and/or revocation of permit(s).
- Municipal representatives are hereby granted access to the above described property as may be required for review and inspection of this project

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

# **Sample Ordinance to Administer and Enforce the Provisions of the [COUNTY] Act 167 County-Wide Stormwater Management Plan**

*This sample ordinance should be used in conjunction with the Model Stormwater Management Ordinance from the Plan to enable a municipality to implement the Multi-Municipal Model or the County Service Provider Model.*

ORDINANCE NO. \_\_\_\_\_

**AN ORDINANCE OF [MUNICIPALITY],  
[COUNTY], PENNSYLVANIA FOR THE ADMINISTRATION  
AND ENFORCEMENT OF THE PROVISIONS OF THE  
[COUNTY] ACT 167 COUNTY-WIDE STORMWATER  
MANAGEMENT PLAN AND ASSOCIATED REGULATIONS.**

**WHEREAS**, the [MUNICIPALITY] is a municipality located within [COUNTY]; and

**WHEREAS**, the Municipality has recognized that a comprehensive program of stormwater management, including reasonable regulation of development and activities causing accelerated erosion and loss of natural infiltration, is fundamental to the public health, safety and welfare and the protection of the residents of the Municipality, their resources and the environment; and

**WHEREAS**, the [MUNICIPALITY] has recognized that enforcement of the Stormwater Management Model Ordinance, Implementing the Requirements of the [COUNTY] Act 167 County-Wide Stormwater Management Plan (the “[COUNTY] Stormwater Management Ordinance”) would be both beneficial for its residents and would protect and preserve the health, safety, and welfare of its citizens; and

**WHEREAS**, the [MUNICIPALITY] is empowered to regulate these activities by the authority of the Act of October 4, 1978, P.L. 864 (Act 167), 32 P.S. Section 680.1, et seq., as amended, the “Stormwater Management Act” and the [MUNICIPALITY] Stormwater Management Ordinance; and

**NOW, THEREFORE**, it is hereby enacted and ordained as follows:

1. The [MUNICIPALITY] has elected to administer and enforce the provisions of the [COUNTY] Stormwater Management Ordinance through adoption of the [MUNICIPALITY] Stormwater Management Ordinance.
2. **Effective Date.** This ordinance shall be effective fourteen (14) days after the date of adoption of this Ordinance.
3. **Administration and enforcement.** Administration and enforcement of the Stormwater Management Ordinance within [MUNICIPALITY] shall be undertaken in any of the following ways as determined by the governing body of this Municipality from time to time by resolution.
  - a. By the designation of an employee of [MUNICIPALITY] to serve as the [MUNICIPALITY] Stormwater Program Administrator to act on behalf of the [MUNICIPALITY].
  - b. By the retention of one or more Stormwater Program Administrator(s) or third-party agencies to act on behalf of the [MUNICIPALITY].
  - c. By agreement with one or more other municipalities for the joint administration and enforcement of this Ordinance through an Intermunicipal Agreement.
  - d. By entering into a contract with another municipality for the administration and enforcement of this Ordinance on behalf of the [MUNICIPALITY].
4. **Effect on prior ordinances.** All stormwater management ordinances or portions of ordinances which were adopted by the [MUNICIPALITY] on or before \_\_\_\_\_, 2011, and which equal or exceed the requirements of the Stormwater Management Ordinance shall continue in full force and effect until

such time as such provisions fail to equal or exceed the minimum requirements of the Ordinance, as amended from time to time.

- a. All Stormwater Management Ordinances or portions of ordinances which are in effect as of the effective date of this ordinance and whose requirements are less than the minimum requirements of the Stormwater Management Ordinance are hereby amended to conform with the comparable provisions of the Stormwater Management Ordinance.
  - b. All relevant ordinances regulations and policies of the [MUNICIPALITY] not governed by the Stormwater Management Ordinance shall remain in full force and effect.
  - c. All ordinances or parts of ordinances which are inconsistent herewith are hereby repealed.
5. **Severability.** The provisions of this Ordinance are severable, and if any section, sentence, clause, part of provision hereof shall be held to be illegal, invalid or unconstitutional by any court of competent jurisdiction, such decision of the court shall not affect or impair the remaining sections, sentences, clauses, parts or provisions of this Agreement. It is hereby declared to be the intent of the governing body of this Municipality that this Ordinance would have been adopted if such illegal, invalid or unconstitutional section, sentence, clause, part or provisions had not been included herein.
6. **Fees.** Fees assessable by the [MUNICIPALITY] for the administration and enforcement undertaken pursuant to this ordinance shall be established by the governing body of this Municipality by resolution from time to time.

**DULY ENACTED AND ORDAINED** this [DATE] day of [MONTH], 2011 by the [MUNICIPALITY] in public session duly assembled.

[MUNICIPALITY]

[COUNTY]

Commonwealth of Pennsylvania

By: \_\_\_\_\_  
[TITLE]

ATTEST:

\_\_\_\_\_  
[TITLE]

## **Sample Intermunicipal Agreement**

*This sample Agreement should be used in conjunction with the “Model Stormwater Management Ordinance” from the Plan and the “Sample Ordinance to Administer and Enforce the Provisions of the [COUNTY] Act 167 County-Wide Stormwater Management Plan” to enable a municipality to implement the Multi-Municipal Model.*



## MODEL INTERMUNICIPAL COOPERATION AGREEMENT

THIS AGREEMENT made this \_\_\_\_\_ day of \_\_\_\_\_, 2011, by and between [MUNICIPALITY], a municipal corporation organized under the laws of Pennsylvania with its municipal offices located in [COUNTY], Pennsylvania, and various other local participating Boroughs and Townships within the Commonwealth, for a purpose.

### **WITNESSETH:**

**WHEREAS**, the [MUNICIPALITY] and several other participating communities (the “Municipalities”) are municipalities located within [COUNTY]; and

**WHEREAS**, the Municipalities have recognized that watersheds cross municipal boundaries and coordinated enforcement of the [COUNTY] Stormwater Management Ordinance is to the benefit of all participating municipalities; and

**WHEREAS**, the Municipalities have recognized that administration of a Stormwater Management Ordinance enforcement program would be best undertaken through the employment or contract of a Professional Engineer; and

**WHEREAS**, the Municipalities recognize that the separate employment or contract of a Professional Engineer(s) to perform identical tasks within each Municipality could result in the duplication of effort to the detriment of the residents of the Municipalities; and

**WHEREAS**, the Municipalities recognize that the coordination of services would enable each Municipality to minimize the costs of the administration of a stormwater management enforcement program; and

**WHEREAS**, the Act of July 12, 1972, P.L. 762, as amended, 53 P.S. §481, et seq., also known as the Intergovernmental Cooperation Act, permits Municipalities to enter into agreements to cooperate in the performance of their respective functions, powers or responsibilities; and

**WHEREAS**, the [MUNICIPALITY], and the Municipalities, hereby enter into an agreement whereby they will jointly establish a program of stormwater management enforcement to serve the Municipalities.

**NOW, THEREFORE**, with the foregoing background incorporated herein by reference and made part hereof, and in consideration of the mutual promises and obligations set forth herein, and intending to be legally bound, hereby, the parties agree as follows:

1. **Establishment of Joint Stormwater Management Program**. The [MUNICIPALITY], and the Municipalities, shall establish a program for the enforcement of municipal codes which shall include the enactment of certain ordinances and the sharing of a Stormwater Program Administrator(s) in accordance with the provisions of this Agreement. Such program shall be known as the “Joint Stormwater Management Program” and shall be administered in accordance with the provisions of this Agreement.
2. **Establishment of Ordinances**. It is the intention of the [MUNICIPALITY], and the Municipalities, that the Joint Stormwater Management Program shall include the [COUNTY] Stormwater Management Ordinance and all applicable codes by reference. Within ninety (90) days following execution of this Agreement, the Municipalities shall enact ordinances, in substantially identical form, to adopt the [COUNTY] Stormwater Management Ordinance.

3. **Establishment of Program Committee.** The Joint Stormwater Management Program shall be administered by the Program Committee.
  - A. Membership. The Program Committee shall be composed of one (1) member of the governing body of each participating Municipality, appointed for a one (1) year term by the governing body at its first meeting in January of each calendar year. The initial members of the Program Committee shall be appointed by the governing bodies within thirty (30) days from the execution of this Agreement. Each governing body may, if it so desires, appoint an alternate member to the Program Committee.
  - B. Meetings. The Program Committee shall meet at times to be selected by the members of the Program Committee.
  - C. Voting. All actions by the Program Committee shall be taken by a majority of the members of the Program Committee. In the event that there is a tie vote upon a particular item, any Municipality may request that the issue be mediated.
4. **Responsibility of Municipalities.** The following activities are the individual responsibility of each Municipality:
  - A. Drafting and enacting an ordinance that ratifies the Municipality's participation in the Joint Stormwater Management Program and the entering of this Agreement in accordance with the requirements of the Intergovernmental Cooperation Act.
  - B. Adopting or amending the Municipality's existing fee resolution providing for identical fees to be imposed for the issuance of stormwater permits or other permits required under the Stormwater Ordinance to be enforced as part of the Joint Stormwater Management Program.
  - C. Provide adequate insurance coverage for all aspects of the Program to include errors and omissions insurance and general liability insurance for actions of the Stormwater Program Administrator and the Program Committee.
  - D. In the event a third-party agency or individual is retained for stormwater enforcement services, verification of the mandatory liability insurance and evidence of certifications must be provided to the Program Committee.
  - E. Eliminate the position of, or modify the responsibilities of, any existing Municipal employee so as to eliminate conflicts and/or overlaps with the responsibilities of the Stormwater Program Administrator.
  - F. If required, provide adequate office space to house the Stormwater Program Administrator(s). This space shall be readily accessible to the public, and provision shall be made for secure record-keeping facilities, telephone service, computers and copying equipment.
5. **Responsibility of Stormwater Program Committee.** The following activities are the responsibility of the Program Committee:
  - A. Recruitment and hiring of the Stormwater Program Administrator.
  - B. Establishment of the salary and benefit package for the Stormwater Program Administrator(s).
  - C. Evaluation of the performance of the Stormwater Program Administrator(s) within the first six (6) months and annually thereafter.

- D. Review of ordinances of each Municipality with suggestions for the enactment of new ordinances to be administered by the Joint Stormwater Management Program.
  - E. Resolution of any problems or concerns between the Municipalities and the formulation of policy-oriented decisions.
6. **Stormwater Program Administrator.** A Stormwater Program Administrator shall be hired or retained in accordance with the terms of the Agreement in order to implement the Joint Stormwater Management Program.
- A. Hiring. A mutually acceptable organization or agency shall advertise for a Stormwater Program Administrator. Such advertisement shall set forth criteria for the positions, as developed by the Program Committee. The organization or agency shall interview candidates for the position and shall present a candidate for the consent of the Program Committee. No candidate shall be selected who does not meet the qualifications set forth in the advertisement for the position.
  - B. The Stormwater Program Administrator(s) shall be hired for a ninety (90) day probationary period. If the performance of the Stormwater Program Administrator(s) is not satisfactory during the probationary period, the Stormwater Program Administrator(s) shall be discharged.
  - C. The Stormwater Program Administrator(s) shall allocate time as required between the Municipalities. The Municipalities recognize that it is impossible to equally divide time because permit applications or inspections may be needed more frequently in one Municipality than in another in any given time period. However, it is the intent of the Agreement that the Municipalities shall receive the required allocations of the services of the Stormwater Program Administrator(s).
  - D. Office hours shall be established by the Stormwater Program Administrator(s) with the consent of the Program Committee.
7. **Program Cost Sharing.** Each Municipality shall participate in a prorated or equal share of the cost of the salary and benefit package of the Stormwater Program Administrator(s) and in generally acceptable office administrative costs and expenses. Each Municipality shall participate and pay for other costs of administering the Joint Stormwater Management Program within that Municipality, including but not limited to the enactment, amendment and updating of ordinances, and prosecution costs for violations of ordinances. Any fines or penalties recovered by a Municipality for a violation of its ordinances shall be the sole property of the prosecuting Municipality.
8. **Duration of Agreement.** The terms of this Agreement shall be for a period of one (1) year commencing with the date of execution hereof by [MUNICIPALITY] and the Municipalities. This Agreement shall be automatically renewed for an additional term of one (1) year at the conclusion of the initial term and each renewal term thereafter unless, at least ninety (90) days prior to the beginning of the fiscal year, the Municipality which does not desire to renew the Agreement gives written notice of such refusal to renew to the other Municipalities in writing.
9. **Participation of Other Municipalities.** Additional Municipalities may become a party to this Agreement upon the consent of the Program Committee at the time such a request is made. A Municipality which desires to become a party to this Agreement shall make application to the Program Committee and shall in writing agree to accept all terms and conditions of this Agreement. Failure to act upon an application to

become a party to this Agreement within sixty (60) days of receipt of such application shall be considered to be a denial of consent to become a party to this Agreement.

10. **Withdrawal from Agreement.** Any Municipality may withdraw from participation at the end of the term of this Agreement, or any extension thereof, by notifying the Program Committee in writing of the intention to withdraw at least ninety (90) days before the expiration of such term as provided in Section 8 herein. Notwithstanding the foregoing, any Municipality may withdraw for cause by providing the Program Committee with written notification of the cause of such withdrawal. During such notification period, the governing body of any other Municipality shall have the right to challenge the cause for withdrawal. In the event such a challenge is made, the withdrawing Municipality and the challenging Municipality shall mediate their differences within thirty (30) days. If, after meeting with a mediator, such differences cannot be resolved, the withdrawing Municipality shall be permitted to withdraw on the next anniversary date of this Agreement.
11. **Amendment.** The Agreement may be amended only by written instrument signed by all Participating Municipalities.
12. **Interpretation.** This Agreement shall be interpreted in accordance with the laws of the Commonwealth of Pennsylvania.
13. **Severability.** The provisions of the Agreement are severable, and if any section, sentence, clause, part of provision hereof shall be held to be illegal, invalid or unconstitutional by any court of competent jurisdiction, such decision of the court shall not affect or impair the remaining sections, sentences, clauses, parts or provisions of this Agreement. It is hereby declared to be the intent of the governing bodies of each Participating Municipality that this Agreement would have been entered into if such illegal, invalid or unconstitutional section, sentence, clause, part or provisions had not been included herein.
14. **Enactment of Ordinance Under Intergovernmental Cooperation Act.** The governing body of each Municipality agrees to enact an ordinance within ninety (90) days from the date hereof pursuant to, and in accordance with, the Pennsylvania Intergovernmental Cooperation Act for the purpose of authorizing and effectuating this Agreement.
15. **Construction.** When the tense so requires, words of any gender used in this Agreement shall be held to include any other gender, and words in the singular number shall be held to include the plural, and vice versa.

**IN WITNESS WHEREOF**, the parties hereto have caused this Agreement to be executed as of the day and year first written.

[MUNICIPALITY]

[COUNTY]

Commonwealth of Pennsylvania

By: \_\_\_\_\_

[TITLE]

ATTEST:

\_\_\_\_\_

[TITLE]

# **Sample County Service Provider Agreement**

*This sample Agreement should be used in conjunction with the “Model Stormwater Management Ordinance” from the Plan and the “Sample Ordinance to Administer and Enforce the Provisions of the [COUNTY] Act 167 County-Wide Stormwater Management Plan” to enable a municipality to implement the County Service Provider Model.*

## MODEL COUNTY SERVICE PROVIDER AGREEMENT

THIS AGREEMENT made this \_\_\_\_\_ day of \_\_\_\_\_, 2011, by and between [MUNICIPALITY], a municipal corporation organized under the laws of Pennsylvania with its municipal offices located in [COUNTY], Pennsylvania, and [COUNTY SERVICE PROVIDER], for a purpose.

**Statement of Purpose:** The [MUNICIPALITY] and [COUNTY SERVICE PROVIDER] will work together to minimize the costs of the implementation of a Stormwater Management Ordinance administration and enforcement program while managing the impacts of stormwater runoff in a manner consistent with the [COUNTY] Act 167 County-Wide Stormwater Management Plan.

This County Service Provider Agreement provides for cooperation and mutual benefit between the [COUNTY SERVICE PROVIDER] and [MUNICIPALITY] jointly promoting administration and enforcement of a Stormwater Management Program within [MUNICIPALITY] to implement the provisions of the [COUNTY] Act 167 County-Wide Stormwater Management Plan.

**The [MUNICIPALITY] agrees to:**

1. Establish a program for the enforcement of stormwater management regulations consistent with the [COUNTY] Act 167 County-Wide Stormwater Management Plan which shall include enactment of a Stormwater Management Ordinance in substantially identical form to the Model [COUNTY] Stormwater Management Ordinance. Such program shall be known as the [MUNICIPALITY] Stormwater Enforcement Program.
2. Adopt, or amend, the Municipality's fee resolution providing for fees to be imposed for the issuance of stormwater permits or other permits required under the Model [COUNTY] Stormwater Ordinance to be enforced as part of the [MUNICIPALITY] Stormwater Enforcement Program.
3. Encourage the implementation of stormwater management practices on sites less with less than 1,000 square feet of impervious surface where runoff will be accelerated by development or land use changes.
4. Require submission of a Small Project SWM Plan Application that is consistent with the requirements of the Model [COUNTY] Stormwater Management Ordinance for all development activities with more than 1,000 square feet and less than 5,000 square feet of proposed new impervious surface
5. Require submission of a SWM Site Plan and Report that is consistent with the requirements of the Model [COUNTY] Stormwater Management Ordinance for all development activities with more than 5,000 square feet of proposed new impervious surface.
6. Take official action approving or denying all stormwater management applications based on the recommendations of [COUNTY SERVICE PROVIDER].
7. Take official enforcement action on any party found to be in violation of [MUNICIPALITY] Stormwater Enforcement Program.

**The [COUNTY SERVICE PROVIDER] agrees to:**

1. Provide information and technical assistance relative to administration and enforcement of [MUNICIPALITY] Stormwater Enforcement Program.
2. Provide administrative and technical review of Small Project SWM Plan Application and SWM Site Plans and Reports and provide recommendations on planned actions. [COUNTY SERVICE PROVIDER] will provide written comments to the Municipality within thirty days of initial application.
3. **[OPTIONAL]** Inspect development activities to insure proper implementation of the Small Project SWM Plan Application and SWM Site Plans and Reports and compliance with [MUNICIPALITY] Stormwater Enforcement Program. [COUNTY SERVICE PROVIDER] will notify [MUNICIPALITY] of site conditions by submitting copies of site inspection reports. [COUNTY SERVICE PROVIDER] will provide written recommendations to the Municipality on the proposed course of action for any sites in violation of the [MUNICIPALITY] Stormwater Enforcement Program.
4. Notify the Municipality of any stormwater management related problem/complaint brought to the [COUNTY SERVICE PROVIDER] attention by a resident of the Municipality.

**It Is Mutually agreed that:**

1. The terms of this Agreement shall be for a period of one (1) year commencing with the date of execution hereof by [MUNICIPALITY] and [COUNTY SERVICE PROVIDER]. This Agreement shall be automatically renewed for an additional term of one (1) year at the conclusion of the initial term and each renewal term thereafter unless, at least ninety (90) days prior to the beginning of the fiscal year, the party which does not desire to renew the Agreement gives written notice of such refusal to renew to the other party.
2. Either party may withdraw from participation at the end of the term of this Agreement, or any extension thereof, by notifying the other party in writing of the intention to withdraw at least ninety (90) days before the expiration of such term as provided in this Agreement.

[MUNICIPALITY]

[COUNTY SERVICE PROVIDER]

This action authorized at an official meeting of the [MUNICIPALITY] held on: \_\_\_\_\_.

This action authorized at an official meeting of the [COUNTY SERVICE PROVIDER] held on: \_\_\_\_\_.

\_\_\_\_\_  
(Name) (Title)

\_\_\_\_\_  
(Name) (Title)

\_\_\_\_\_  
(Name) (Title)

\_\_\_\_\_  
(Name) (Title)

\_\_\_\_\_  
(Name) (Title)

\_\_\_\_\_  
(Name) (Title)

## **Sample Agreement for Engineering Services**

*This sample Agreement should be used in conjunction with the “Model Stormwater Management Ordinance” from the Plan and the “Sample Ordinance to Administer and Enforce the Provisions of the [COUNTY] Act 167 County-Wide Stormwater Management Plan” to enable a municipality to contract third-party services for a Stormwater Program Administrator.*



## **SAMPLE AGREEMENT FOR ENGINEERING SERVICES**

THIS AGREEMENT is made between [MUNICIPALITY], [COUNTY], Pennsylvania, (hereinafter called MUNICIPALITY) and [THIRD-PARTY ENGINEER], (hereinafter called ENGINEER).

MUNICIPALITY and ENGINEER, in consideration of the mutual covenants hereinafter set forth, agree as follows:

### **SCOPE OF SERVICES**

The MUNICIPALITY will require various engineering services to assist the Municipality in the implementation and enforcement of the Stormwater Management Ordinance. Specific tasks include:

1. Review of any and all Stormwater Management Plans, studies, or other correspondence relating to the Landowners submission;
2. Attendance at any and all meetings relating to Landowner's plan;
3. Preparation of reports, legal documents, or other correspondence relating to Landowner's plan;
4. Review and inspection of construction activities.

The ENGINEER shall furnish services as requested by the MUNICIPALITY.

### **CONTRACT TIME**

This Agreement shall be in effect for one year from the date of this Agreement. The Agreement may be renewed for an additional period of service, at the discretion of the MUNICIPALITY, for up to two additional years.

### **COMPENSATION**

Compensation for each project assigned to the ENGINEER shall be on a Time and Materials basis for the time required on an hourly charge basis according to the rate schedule attached.

### **PAYMENT PROCEDURES**

The Engineer shall submit itemized invoices on a monthly basis with payment due within 30 days of invoice. If MUNICIPALITY fails to make payment due to the ENGINEER within 30 days of invoicing, then ENGINEER shall be entitled to interest in accordance with state law.

### **TERMINATION**

The obligation to provide services under this Agreement may be terminated by either party upon thirty days written notice.

### **ENGINEER'S REPRESENTATIONS**

In order to induce MUNICIPALITY to enter into this Agreement, ENGINEER makes the following representations:

1. ENGINEER has examined and carefully studied the Stormwater Management Ordinance as well as other related data.

2. ENGINEER is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress, performance and furnishing of the Work. reimbursement

**WITNESSTH**

That for, and in consideration of the mutual covenants and promises between the parties hereto, it is hereby agreed:

[MUNICIPALITY]

[THIRD-PARTY ENGINEER]

This action authorized at an official meeting of the [MUNICIPALITY] held on: \_\_\_\_\_.

\_\_\_\_\_  
(Name) (Title)

\_\_\_\_\_  
(Name) (Title)

\_\_\_\_\_  
(Name) (Title)

\_\_\_\_\_



# **Administrative Flow Chart**

# Administrative Flow Chart for the Stormwater Management Program

