

Exhibit 1

Public Presentation

Town of North Greenbush
Stormwater Management Program

The Town has developed a Public Presentation program to discuss the principals of stormwater management and the regulatory and technical tools used to help minimize stormwater impacts. The presentation highlights the key points of the Stormwater Management Program (SWMP) Plan, the Stormwater Pollution Prevention Plan (SWPPP), and the roles that the Town and the public play in the management of stormwater impacts. The Town is planning to host an informative Stormwater Program public meeting in late April to introduce and discuss the various components of the Town’s Stormwater Management Policy.

The presentation will incorporate the following general items:

What is stormwater?

Stormwater is water from rain or melting snow that does not soak into the ground. It flows from rooftops, over paved areas, bare soil, sloped lawns and other low-permeability or impervious surfaces. As it flows, stormwater runoff collects and transports soil, animal waste, salt, pesticides, fertilizers, oil and grease, debris and other potential pollutants.

What's the problem?

Rain and snowmelt wash pollutants from streets, construction sites, private and public property, and other land into storm sewers and ditches. Eventually, the storm sewers and ditches discharge the polluted stormwater into streams and rivers with no treatment. This is known as stormwater pollution.

Polluted stormwater degrades lakes, rivers, wetlands and other waterways. Nutrients such as phosphorus and nitrogen can cause the overgrowth of algae resulting in oxygen depletion in waterways. Toxic substances from motor vehicles, industry, and careless application of pesticides and fertilizers threaten water quality and can kill fish and other aquatic life. Bacteria from animal wastes and improper connections to storm sewer systems can make lakes and waterways unsafe for wading, swimming and the consumption of fish. Eroded soil is also a pollutant. It not only clouds waterways and interferes with the habitat of aquatic species and plant life, but also eventually drops out of suspension and clogs or otherwise interferes with natural drainage pathways and filtration systems.

A sanitary sewer system and a storm sewer system are not the same:

Water that goes down a sink or other inside drain flows to either a wastewater treatment plant or to a septic system for treatment. Storm sewer flows are not treated. Water that flows down driveways, streets, and outside areas and into a storm sewer or ditch flows directly to the nearest creek, wildlife habitat, downstream recreational area, and/or drinking water supply.

There are many types of pollutants that find their way into storm drains:

A discussion on Pollutants of Concern (POCs), related to the following. Some common pollutants found in storm sewers and creeks include:

- Motor oil;
- Yard clippings and debris;
- Fertilizers and pesticides;
- Soapy car wash water and other cleaning products;
- Sediment eroded from construction projects and unstabilized soils;
- Litter; and
- Animal waste

It is important to remember that any type of surface water runoff, not just rainfall, can flow into the storm sewer and collect in the stormwater management system. For example, when you wash your car on the driveway, that water ends up in the system. That is why we need to be careful with what we put into the storm sewers as traces of all this material can end up in the stormwater system and our local waterways.

What is being done?

The Town of North Greenbush is working with the other Rensselaer County Municipal Separate Storm Sewer Systems (MS4) Communities in a forum for the regulated communities to share resources and work in partnership toward compliance with the United States Environmental Protection Agency (EPA) Phase II Stormwater requirements. The overall goal of the Communities is to utilize regional collaboration to identify existing resources and develop programs to reduce the negative impacts of stormwater pollution and ultimately improve the water quality on our streams and lakes.

The EPA Phase II Rule requires operators of small MS4s to develop and implement a stormwater management program that addresses six minimum controls. For each of these six control measures, measurable goals are to be selected and management practices identified and implemented to achieve those measurable goals.

The term "MS4 communities" include states, counties, cities, towns, villages, school districts and any other quasi-governmental agencies, such as special districts, that may have storm sewers that discharge into the environment. Storm sewers include ditches, enclosed storm sewer systems, and storm drains and catch basins that have exit pipes.

The EPA Phase II MS4 six minimum control measures, as defined in the SWMP, are listed below:

A discussion related to the SWMP will highlight the following topics:

1. Public Education & Outreach
2. Public Participation and Involvement
3. Illicit Discharge Detection and Elimination
4. Construction Site Run-Off and Control
5. Post Construction Site Run-Off and Control
6. Pollution Prevention and Good Housekeeping for Municipal Operations

Public Measures

The Town has solicited, and received, active input from Town residents, particularly related to actions that townsfolk can take to minimize the impacts of stormwater events.

Literature

The Town SWMP, as posted on the North Greenbush website, will be the main focus of the public presentation. Also attached to this Exhibit are several other documents that will be considered as part of the overall public presentation.



Rensselaer County has over 500 lakes and large ponds which have provided recreational and residential opportunities for many decades. The lakes were popular places for vacation cabins, which have now turned into full time residences.

Due to the impacts of year-round residences and use, water quality in the lakes has decreased in many places. Unlike rivers and creeks, lakes have a slow water flow through them that does not allow the relatively rapid flushing of pollutants and nutrients, creating long term issues that do not have quick fixes.

To prevent these issues or to not add to them, there are many things that lakeside residents can do to maintain and improve lake water quality. It is our attempt to provide guidance to assist residents to keep their lakes clean and healthy.

To get additional information:

Contacts:

NYS DEC REGION 4 HOTLINE: 1-800-847-7332

DEC Environmental Quality: 357-2045

DEC Website: www.dec.ny.gov

Rensselaer Co. Environmental Health Section: 270-2674

Rensselaer Co. Cooperative Extension: 272-4210

Rensselaer County Soil and Water Conservation

District/NRCS: 271-1740

Rensselaer Co. MS4 Contact: Linda von der Heide, 270-2914

Brunswick MS4 Contact: Bill Bradley, 279-3461 x117

Castleton-on-Hudson MS4 Contact: Norman Wiley, 732-2211

East Greenbush MS4 Contact: Ron Stark, 477-6225

North Greenbush MS4 Contact: Mike Miner, 283-3921

Poestenkill MS4 Contact: Bob Brunet, 283-5100

Rensselaer MS4 Contact: Mark Hendricks, 465-1693

Sand Lake MS4 Contact: Mike Wager, 674-2026 x16

Schaghticoke MS4 Contact: Jean Carlson, 753-6915

Schodack MS4 Contact: Nadine Fuda, 479-7738

Troy MS4 Contact: Chris Wheland, 369-3254

www.renscostormwater.com



Rensselaer County MS4 Communities

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Troy, NY 12180

Phone (518) 270-2921

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LAKESIDE LIVING

Keeping the Waters Clean

TIPS ON MAINTAINING WATER
QUALITY IN YOUR LAKE



What You Do Makes an Impact

WATER QUALITY

What is the water quality of your lake? Many lakefront owners may only guess the water quality of their lake unless it has a public beach or regular testing is done through CSLAP – Citizens Statewide Lake Assessment Program – or another watershed or lake association program. Truly polluted or damaged ecosystems may have lake water tested regularly to measure pollutants.

Clear water is not necessarily unpolluted and slight water coloration does not necessarily mean that the lake is polluted. While fishes and the benthic organisms they eat must have some algae as a food source and plants to eat and hide in, heavy algal blooms and mats may smother fish and too dense weeds may not allow fishes in their midst.

Algae problems are often caused by nutrients from fertilizers, leaking septic systems and sewers and manure. In lakes where the nutrients settle to the bottom, the algae may be persistent even after nutrient sources are removed. Harvesting and proper disposal of weeds and removal of vegetive mats will help decrease the nutrient load over time.



Fertilizers and pesticides should be used sparingly and only when necessary. Super green lawns will lead to super green lakes. Instead of using lawn fertilizers, use lake water to water your lawn once every month or two and have your lawn absorb

lake nutrients. Do not dump leaves and grass clippings into the lake and sweep grass clippings, leaves and other substances off paved areas such as driveways and walks.

Along with nutrients, leaking septic systems and sewers can increase the amount of bacteria such as E Coli, prescription and non-prescription drugs, and household chemicals. Lakeside residences should have their septic systems inspected and cleaned every two to three years when their tanks are one third full to reduce the possibility of septic contamination. Residences with sewers should report odors of sewage or dark, discolored, marshy areas near sewage pipes to their local municipality.

Canada geese and other waterfowl are also a large contributor to bacteria counts and should be discouraged by growing bushes and keeping grasses long by the water's edge.

SILTATION AND EUTROPHICATION

The natural process of lakes is for the lake to slowly fill in as it ages to become a shallow marsh. Although different types of lakes will age and fill in at different rates, many county lakes have been aging more rapidly than normal due to overabundance of nutrients and siltation from erosion. Erosion locations can be located on and around the lake or along upstream tributaries.

To prevent erosion into lakes, care must be taken around ground disturbances, especially in areas close to the lake, tributary streams and on slopes. Mulching and seeding of bare ground, the proper use of silt fencing, directing flow away from disturbed areas and phasing of disturbed areas can greatly reduce erosion from construction areas. Proper sizing of driveway and other culverts will keep stormwater from scouring ditches, driveways and stream banks.

Trees dissipate rain water, so the preservation and planting of trees will reduce rain water sheet flow, reducing erosion potential as well as the amount of nutrients picked up from lawns and gardens. Trees shading paved areas, streams and lakes also reduce thermal loading of streams from rain, providing a better fish habitat.



BOATS AND MOTORS

One of the greatest conflicts on the larger lakes is that of boating and use of motorized water craft. Several brochures can be written on the subject.

To prevent contamination of aquatic pests from one waterbody to another, **ALL** boats, motorized or not, should be washed down in an official wash area or on land away from streams or lakes. This is done to prevent the spread of zebra mussels, aquatic weeds and the like.

Also, all petroleum-fueled motors used in or around a lake, including outboard motors, lawn mowers, ATVs and automobiles, should be serviced and fueled in a manner that reduces the likelihood of contamination of the lake by gas or oil. Engines should, if possible, be fueled and serviced out of the water, on a level, impermeable surface such as concrete which does not have a drain to any water body or underground.

What you should do if you see:

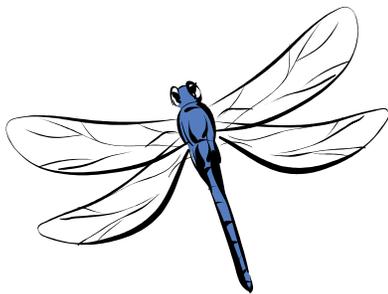
Oily sheen on the creek with no apparent cause:
call the DEC Region 4 Hotline

Sewage odors coming from an area in your yard:
Use a Septic Tank & System Service – see yellow pages

Sewage odors coming from an area in your neighbor's yard: *give them a copy of this pamphlet and encourage them to get their system serviced. If unsuccessful, call County Health Department*

Rusty color that does not smell like sewage but may have oily sheen on side of creek or in small stream: *this may be naturally occurring iron eating bacteria. There may be iron wastes in soils or fill near site.*

Green algae on rocks and/or bottom of creek:
Caused by too many nutrients in water due to over-fertilization of lawns and fields, leaking sewers and septic systems, build-up of rotting leaves in stream. Check your septic system, fertilize only when it is necessary, talk to your community about starting a watershed group.



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SO, YOU LIVE BY A CREEK?

TIPS ON MAINTAINING WATER QUALITY IN YOUR STREAM



What You Do Makes an Impact

Just 40 years ago, a house on a river, creek or stream may not have been many people's dream, due to pollution. Because of the Clean Water Act large polluters were made to clean up their act, making river- and creek -side living pleasant. Lately, water quality has not been increasing as it had a few decades ago, and in some places, water quality has degraded, due to overuse, misuse and surrounding land's uses that have contributed to pollution.

Whether you are located next to a small stream or the Hudson River, water quality can make the difference of a fresh water body with wildlife or a smelly body of water where the only animals to survive are mosquitoes and other biting insects.

We hope you will find this brochure educational on how to maintain and improve the quality of water in your river, creek or stream.

WILDLIFE

Clean streams, creeks and rivers are great places to see both water-based as well as land-based wildlife. Creeks and streams create a highway system for many animals such as moose, bear and otters searching for new territory as well as trekking to new food sources. Creeks and streams are the water sources for most wildlife and provide food sources such as lush plants, insects, frogs, fish, crayfish and smaller animals.

Aquatic animals such as frogs, fish, crayfish, birds and some insects eat insects and insect larvae, keeping the mosquito population in check. Loss of these animals in an aquatic ecosystem such as a creek can lead to increased pests such as mosquitoes.



Frogs and fish don't survive in dirty water. Even if the water looks clear, chemicals such as

pesticides and pharmaceuticals can sicken and reduce fertility of aquatic animal life as well as kill. Nutrients such as those found in lawn fertilizers or oil from motor vehicles can cause those icky algae masses which can suffocate streams and also creates hazardous substances when it rots. Oil from motor vehicles can also suffocate aquatic life.

Gravel washed into the creek from the erosion of yards, driveways and construction sites can bury fishes and frogs, with the coffee colored silt choking delicate gills. Heat from rainwater draining from hot parking lots and driveways, as well as from direct sunlight on creeks can kill sensitive fish populations such as trout.

To keep your river, creek or stream in healthy shape, use fertilizers and pesticides only when needed and only as directed on the instructions. Test your soils before adding fertilizers. Put up with a few weeds in your lawn. Dispose of household chemicals properly – at a hazardous waste day or at a facility permitted to deal with such wastes. Maintain your septic system and don't flush unused medicines down your toilet. Septic systems should be cleaned and inspected every 2 to 3 years, whenever the septic tank becomes 1/3 full.



Don't clear-cut stream banks but do maintain your trees on the stream bank. A fallen tree in a creek or river may require a permit from DEC for removal, depending on size and conditions. Use pavers and

gravel for walkways and driveways instead of asphalt. Keep vegetation by the creek side in a more natural state to slow pollutants. Follow the hints in the next section to reduce erosion from your property.

FLOODING

Man is the #1 cause of flooding problems. Placing fill along the banks of streams that creates impoundment problems, placing undersized culverts and creating straight, narrow ditches to quickly drain areas are some of the methods that increase flooding. Lots with large percentages of impervious surfaces – ground area where rain water can't sink in – increase the amount of water that reaches rivers and creeks during the early part of a rain storm. Siltation and gravel beds from erosion raise creek beds, providing less storage for water when the waters rise.

To reduce flooding threats, don't place fill in creeks and streams and make sure that stream culverts are properly sized for the stream and drainage basin. Undersized driveway culverts can lead to flooding by washing out surrounding yard and driveway, bringing gravel and silt into the receiving creek.

Reduce or eliminate erosion by seeding and mulching bare spots in lawns and construction sites. Don't cut slopes beyond the capacity of the soils unless using retaining walls or other retention methods. Don't dump leaves, brush or trash into roadside ditches. When working on drainage issues in your yard, create a rain garden or swale to allow water the chance to slow down and soak into the soil.

The mantra for reducing stormwater issues is "Slow it Down; Spread it Out; Soak it In!" Following these basic ideas will help reduce stormwater and flooding issues in local streams, rivers and lakes.

Prepared By: Rensselaer County Economic Development and Planning for the Rensselaer County MS4 Communities: cities of Rensselaer & Troy, towns of Brunswick, East Greenbush, Nassau, North Greenbush, Poestenkill, Sand Lake, Schaghticoke, and Schodack and village of Castleton-on-Hudson.

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Schodack MS4 Contact: Nadine Fuda , 766-4000
Troy MS4 Contact: Chris Wheland, 369-3254



REMEMBER, you can make a difference one little action at a time.

Reducin' Pollution

*Hints for
Homeowners to
Save Money
while
Saving the Environment*





Test - Before fertilizing, test your soil. Whether fertilizing yourself or using a company, testing the soil ensures that fertilizers are used at the amounts needed. Fertilizing when you don't need to doesn't make your grass greener, just the lakes and streams near your property. An added plus is that you can save **\$\$\$\$** every time you don't need to fertilize! For those who use lawn care companies, make sure that they test, or you will be paying for something you don't need. Optimal PH 6.2-7.2 Contact Cooperative Extension for optimal nitrogen and phosphorus levels for your soils.



Calibrate - When fertilizing, calibrate your equipment to make sure that you are putting down the right amount. Putting down too little will make you need to go out and do it again. See the previous bullet about putting down too much. Also, keep a buffer around streams, lakes and rivers that's fertilizer free.



FREE!!! For lakefront property owners, recycle other's fertilizers. Use lake water (except Nassau Lake) to water your lawn once in the spring and in the fall. You'll use the nitrogen and phosphates from other's fertilizer, detergents and decaying leaves to fertilize your lawn and improve the water quality.



Lawn Clippings - Mulch them, compost them, or bag them. Don't dump them in the culvert, ditch, road, sidewalk or waterbody. They'll make a mess, as well as create the possibility of flooding and add nutrients to local lakes and streams.



STOP! Don't use pesticides unless you have pests. Pesticides are poisons. Unless you have pests, such as grubs, ants, and other destructive insects, don't use pesticides. Otherwise, you may poison yourself, your children and your pets. Along with fish, wildlife and other people. And always use and dispose of pesticides according to instructions.



PiNG - Maintain your engines. Cars, lawn mowers and even chain saws run better if they are properly maintained. Fix oil and other fluid leaks. Get a tune up. A properly functioning engine will save on gas, which will save you \$\$\$.

Dispose your old oil at your local car repair shop instead of dumping it down the catch basin or in the back yard.



PHEW! What's that Smell??? Take care of Fido's droppings. Flush it down the toilet. Get a pet waste composter. It will keep you from stepping on it and keep fishes from swimming with it.



SQUiSH - Seed that bare patch. Whether it's from insect infestation, construction or heavy foot traffic, bare soil can lead to erosion problems. Seed, mulch, or in the case of heavy foot traffic, put gravel or pavers down to cover the bare spots. It will also keep your shoes much cleaner.



FLUSH! Maintain that septic system. Have your septic tank pumped out regularly. Cost of septic system pumping - \$200 - \$400. Cost of replacing septic leach field - \$15,000 - \$20,000. And you won't have problems flushing or that annoying smell.



SPRAY! Wash that car in the lawn instead of on the paved driveway or roadway. The grass will absorb much of the chemicals being washed from your car, such as gasoline and oils. Use an environmentally friendly detergent. **OR**, take your car to a car wash that recycles and/or treats its wash water.



KEEP those trashcans tightly lidded and keep garbage from blowing into ditches and storm drains. Culverts and grates blocked by garbage are one of the most common reasons for local flooding.

The Homeowner's Guide to Stormwater

How to develop and implement a stormwater management plan for your property





Photo by Tetra Tech

Purpose of this Guide

If you are simply looking for a way to help protect or improve your watershed or you are doing a small home improvement project that creates new impervious area and you need to manage the stormwater that is generated*, this guide is for you. It will help you better understand:

- what is stormwater, why stormwater runoff can be a problem, and what you can do about it;
- how much stormwater runoff is generated by impervious areas on your property;
- how stormwater flows across and leaves your property; and
- how you can reduce the amount of stormwater runoff leaving your property.

This guide will help you create your own stormwater management plan and select simple stormwater solutions to be implemented on your property.

** Check with your local municipality to find out more about what permits may be required for any building projects.*

Disclaimer

The practices described in the guide are provided exclusively for general educational and informational purposes. The guide is intended to help property owners evaluate and assess current runoff pathways on their properties and identify practices to better manage stormwater. The guide outlines several practices to choose from that are fairly simple to plan and construct.

All efforts have been made to ensure the material in this guide is accurate and up to date. However, the Little Conestoga Partnership and its partner organizations cannot be held responsible for any circumstances resulting from its use, unavailability, or possible inaccuracy.

This guide is not intended to be a substitute for professional design and implementation services. This guide provides you with general information on an “as is” basis. You acknowledge that you assume the entire risk of loss in using this guide and the information provided herein, including without limitation any loss incurred by any end user. You further acknowledge that the management of stormwater is a complex and site specific issue and that the general information contained in this guide may not be sufficient to assess any and all particular site conditions. Any stormwater management practice should be installed with the consultation of an experienced professional who can address specific site conditions.

The Little Conestoga Partnership and its partner organizations make no representations and specifically disclaim all liabilities and warranties, express, implied, or statutory, regarding the accuracy, timeliness, or completeness for any particular purpose of any material contained on this site.

The information presented in this guide does not in any way replace or supersede any municipal, county, state, or federal requirements or regulations related to stormwater management. You should check with all appropriate regulatory authorities before relying upon this guide to plan or implement any and all stormwater management practices on your property.

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- Penn State University



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Section 1: Introduction

What is Stormwater Runoff?

Stormwater runoff is precipitation (rain or snowmelt) that flows across the land. Stormwater may infiltrate into soil, discharge directly into streams, water bodies, or drain inlets, or evaporate back into the atmosphere.

In the natural environment, most precipitation is absorbed by trees and plants or permeates into the ground, which results in stable stream flows and good water quality.



Photo by Matt Royer, Penn State

Things are different in the built environment. Rain that falls on a roof, driveway, patio or lawn runs off the surface more rapidly, picking up pollutants as it goes. This stormwater runoff flows into streams or storm drains that discharge into waterways like the Little Conestoga Creek, the Susquehanna River and eventually the Chesapeake Bay.



Photo by Matt Kofroth, LCCD



Photo by Kristen Kyler, Penn State

Why Can Stormwater Runoff Be a Problem?

Poorly managed stormwater runoff can cause a host of problems. These include:

- ◆ **Flooding.** As stormwater runs off roofs, driveways and lawns, large volumes quickly reach streams, causing them to rise quickly and flood, instead of a natural slow and steady water rise. When more impervious surfaces exist, flooding occurs more rapidly and can be more severe, resulting in damage to property and people.
- ◆ **Pollution.** Stormwater running over roofs, driveways, roads and lawns will pick up pollutants such as oil, fertilizers, pesticides, dirt/sediment, trash, and animal waste. These pollutants “hitch a ride” with the stormwater and flow untreated into local streams, polluting our waters.
- ◆ **Stream Bank Erosion.** When stormwater flows into streams at unnaturally high volumes and speeds, the power of these flows can cause severe stream bank erosion. Eroding banks can eat away at streamside property, create dangerous situations, and damage natural habitat for fish and other aquatic life. This erosion is another source of sediment pollution in streams.

Photo by Matt Kofroth, LCCD



💧 **Threats to Human Health.** Stormwater runoff can carry many toxic pollutants, such as toxic metals, organic compounds, bacteria, and viruses. Polluted stormwater can contaminate drinking water supplies and hamper recreational opportunities as well as threaten fish and other aquatic life.

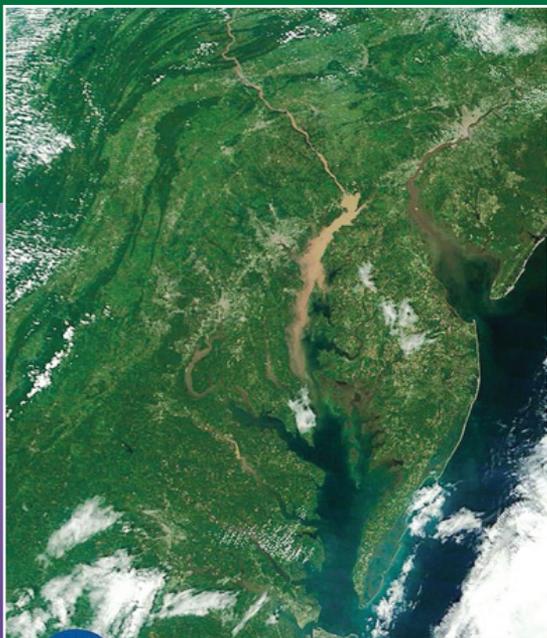
What Can I Do to Help?

As a homeowner, you can help avoid the problems associated with stormwater runoff by:

- 💧 reducing impervious areas so that the rain soaks into the ground
- 💧 planting native trees and plants which help infiltrate stormwater and increase evaporation and transpiration
- 💧 following the lawn care practices described in this guide
- 💧 managing stormwater on-site with rain gardens, rain barrels and similar practices
- 💧 doing many small things, you have a big impact on improving stormwater management



Photos by Matt Kofroth, LCCD



Managing stormwater on your property will not only help protect local streams, but will also help clean up downstream waterways including the Chesapeake Bay.

“As of 2011, 17.5 million people were estimated to live in the Bay watershed, up from 17.4 million in 2010. Experts predict the watershed’s population will increase to more than 20 million by 2030.” (*Chesapeake Bay Program*)



CHESAPEAKE BAY FOUNDATION
Saving a National Treasure

NASA Satellite Image
September 12, 2011

Section 2: Assessing Stormwater on Your Property

In order to better manage stormwater on your property you should first understand how stormwater is generated and flows on your property. Follow these simple steps to figure out where stormwater is generated, how it flows, and approximately how much stormwater comes from your property.

1. Walk your property and map your boundaries and basic features.

Step 1: Draw your property boundaries.

Draw the boundaries of your lot. If you are not sure of your boundaries, you may be able to look this up on your property tax assessment, deed to your house, or at your county's tax office.



Map created by Kara Kalupson, LCCD

Step 2: Draw buildings and other features of your property.

Draw and label the buildings and other features of your property. These include:



Map created by Kara Kalupson, LCCD

- ◆ **Impervious areas.** These are hard surfaces on your property that prevent stormwater from soaking into the ground. They include buildings, driveways, parking areas, walkways, decks, patios, or other hard surfaces.
- ◆ **Lawn and landscaped areas.** These include any areas with grass or landscaping that you regularly maintain.
- ◆ **Natural vegetation.** These are areas of woods, meadow, or other naturally vegetated areas that are allowed to grow natural on your property.
- ◆ **Water features.** These could be streams, wetlands, ponds or swimming pools.

You can determine the approximate size of each area by using a tape measure and calculating the square footage of each. Depending on the overall size of your property, you may want to calculate these areas in square feet or convert to acres (1 acre = 43,560 square feet). If your property has no natural vegetation, such as woods or meadows, or water features on it, you can simply subtract the impervious areas from your total lot size to get your total lawn and landscaped area.



Photo by Matt Royer, Penn State

2. Assess and map your stormwater flow.

The next step is to show how and where runoff flows on your property and identify any problems it may be causing. Common stormwater problems may include large puddles (“ponding”), damp basements, soil erosion, and collapsing stream banks. The ideal time to assess stormwater flow would be during or immediately after a rain storm. Look for and map the following:

◆ **Roof downspouts.** Indicate the location of roof downspouts and the direction stormwater flows from the downspouts.

◆ **Stormwater flow paths.** Using arrows, show the direction of stormwater flow off of impervious surfaces. If you have any areas where stormwater collects, such as drainage swales or ditches, show this and label them as such.

◆ **Areas of ponding.** Indicate locations of standing water or ponding on the map.

◆ **Gullies or ditches from soil erosion.** Indicate any areas of soil erosion which have resulted in gullies or ditches. This may appear within existing drainage swales or channels, and would be good to note on your assessment.



Map created by Kara Kalupson, LCCD



If you have multiple downspouts, drainage channels, ponding areas etc., organize your map and assessment plan by numbering them.

Photo by Matt Kofroth, LCCD





3. Estimate how much stormwater is generated on your property.

The amount of stormwater runoff generated from your property depends on how long and how hard it rains, the slope of your property, the type and quality of the soils, the amount of impervious surface on your property, and other factors. Nevertheless, there is a simple calculation you can use to estimate how much stormwater runoff your property generates during a typical rainstorm.

The majority of annual rainfall in south-central Pennsylvania comes in the form of small storms of one inch or less. These small storms carry most of the pollutants that impact water quality, and thus the stormwater generated by your property for the one inch storm is a good measure of typical stormwater runoff. Use the following chart to determine how much stormwater is generated by the impervious area on your property:



Photo by Margaret Kyler

Square Feet of Impervious Area	Gallons of Runoff to be Managed
500 or less	less than 312
501 – 1,000	312 – 624
1,001 – 2,000	624 – 1,246
2,001 – 3,000	1,246 – 1,869
3,001 – 4,000	1,869 – 2,492
4,001 – 5,000	2,492 – 3,115
5,001 – 10,000	3,115 – 6,231
10,001 – 20,000	6,231 – 12,462
20,001 – 43,000	12,462 – 26,793

The above numbers were calculated using the following formula:

(Total square feet of impervious area) x 0.0833 x 7.48 = _____ gallons of runoff

Use this formula if you want a more accurate calculation of the runoff generated from your impervious area.

0.0833 is to covert feet to inches • 7.48 = number of gallons per cubic foot

Section 3: Developing Your Stormwater Management Plan

Now that you know what areas of your property generate stormwater when it rains, how the runoff flows, and what areas generate the most amount of runoff, you can start thinking about adding stormwater management practices to your property to better manage runoff.

1. Types of stormwater best management practices.

Many management practices exist for handling stormwater runoff. This guide suggests six of the simpler, easier to implement practices. Each practice is introduced briefly in this section so you can consider which ones are right for you.

<p>Rain Garden A depressed garden that uses mulch, soil, and deep-rooted native plants to capture, absorb, and infiltrate stormwater.</p> <p style="text-align: right;"><small>Photo by Matt Kofroth, LCCD</small></p>		
<p>Benefits</p> <ul style="list-style-type: none"> ◆ Manages stormwater and filters pollutants ◆ Wildlife habitat ◆ Little maintenance ◆ Adds beauty 	<p>Negatives</p> <ul style="list-style-type: none"> ◆ Plants can take 2-3 years to establish ◆ More maintenance required in first few years 	
		<p>Cost \$\$</p>
<p>Maintenance</p> <ul style="list-style-type: none"> ◆ Low once plants established ◆ Weeding and watering in first two years. ◆ Some thinning in later years 	<p>Aesthetic appeal</p> <ul style="list-style-type: none"> ◆ Ranges from medium to high ◆ Can customize based on plant selection. 	<p>Implementation Considerations</p> <ul style="list-style-type: none"> ◆ Construct downslope of runoff to be captured ◆ Plant in spring or fall ◆ Locate at least 10 feet from building foundations
<p>Riparian Buffer Planting native trees and shrubs along streams and wetlands to restore the streamside area to forested conditions. These “riparian buffers” filter runoff and have numerous water quality benefits.</p> <p style="text-align: right;"><small>Photo by Matt Kofroth, LCCD</small></p>		
<p>Benefits</p> <ul style="list-style-type: none"> ◆ Increases infiltration and groundwater recharge ◆ Improves water quality ◆ Controls erosion & sedimentation ◆ Provides wildlife habitat 	<p>Negatives</p> <ul style="list-style-type: none"> ◆ Not as effective on steep slopes ◆ More difficult to implement than some other practices 	
		<p>Cost \$</p>
<p>Maintenance</p> <ul style="list-style-type: none"> ◆ Low once native plants are established ◆ Weeding and watering in first two years ◆ Some plant thinning in later years ◆ Regularly remove debris and excessive sediment accumulation 	<p>Aesthetic appeal</p> <ul style="list-style-type: none"> ◆ Ranges from medium to high ◆ Higher aesthetic appeal than conventional stormwater conveyances 	<p>Implementation Considerations</p> <ul style="list-style-type: none"> ◆ Plant in spring or fall ◆ Locate at least 10 feet from building foundations

Tree Planting

Planting native trees and shrubs to restore a portion of your property to forested conditions.

Photo by Matt Royer, Penn State



Benefits

- Increases infiltration and evapotranspiration of stormwater
- Filters pollutants
- Requires little maintenance
- Provides wildlife habitat
- Large canopy of native trees maximizes benefits

Negatives

- Takes many years before trees grow to provide maximum benefit
- Regular maintenance is required where invasive plant species exist
- Must guard against deer browsing and vole damage

Cost

\$/\$\$

- Varies, depending on species, size, and type of tree planted

Maintenance

- Maintain tree tube/stakes or cages
- Spray and mow between trees at least twice a year during first 4 to 5 years

Aesthetic appeal

- High aesthetic appeal, as trees add interest, structure, color, and wildlife to property

Implementation Considerations

- Plant in spring or fall
- Watering may be necessary after planting during dry weather (25 gallons/week)



“A Wharton School of Business study found that new tree plantings in a Philadelphia neighborhood increased surrounding property values by approximately 10%.”

(Wachter 2004)

Native Meadow

An area planted with native grasses and wildflowers and maintained as a natural area. “No mow” areas can also develop into meadow areas.

Photo by Dick Brown



Benefits

- Increases infiltration and evapotranspiration of stormwater
- Filters pollutants
- Requires little maintenance
- Provides wildlife habitat

Negatives

- Site preparation (including turf grass removal) is required before planting
- Meadows may conflict with local weed ordinances

Cost

\$

- Native seed mixes vary depending on type of species and amount of variety desired

Maintenance

- Mow twice a year for first two years
- Mow annually
- Control invasive plant species

Aesthetic appeal

- High aesthetic appeal, as tall grasses and wildflowers add interest, structure, color and wildlife to property

Implementation Considerations

- Plant in spring
- Monitor and control invasive species

Appendix A: Stormwater Management Plan Template

You can use this template to create your stormwater management plan.

Map

First, use the grid paper provided to hand draw your stormwater management plan map. Or, follow the tutorial provided in **Appendix B** to create a computer generated aerial map.

If you hand draw your map, it is suggested you use one ink color to draw existing conditions and a different color to draw your proposed stormwater management practices.

Plan Details

Second, fill in the template to create the details of your plan. For both existing conditions and proposed stormwater management practices, be sure to label all features on your map with numbers that correspond to the plan template.

Stormwater Management Plan

Property Owners Name: _____

Property Address: _____

Municipality: _____ County: _____

Watershed: _____ (example: Little Conestoga)

Name of stream into which stormwater flows: _____ (example: Swarr Run)

EXISTING CONDITIONS

IMPERVIOUS AREAS		
Buildings		
Number	Description (house, shed, etc)	Square Feet
Driveways and Walkways		
Number	Description (driveway, back walkway, front walkway, etc)	Square Feet
Other Hard Surfaces		
Number	Description (patio, deck, etc)	Square Feet
Total Impervious Area:		

LAWN AND LANDSCAPED AREAS

Number	Description (front yard, back yard, flowerbed, etc)	Square Feet
Total Lawn and Landscape Area:		

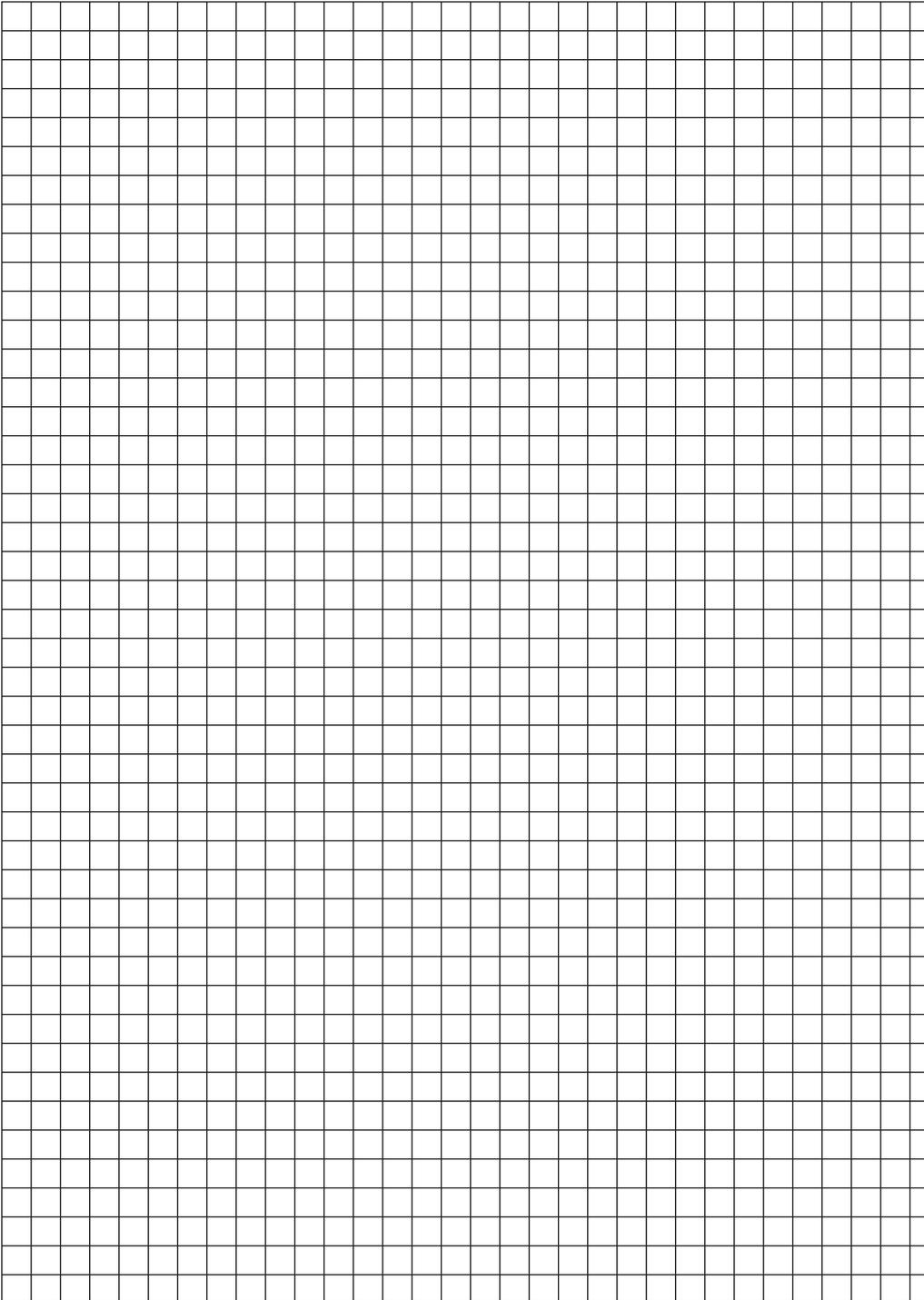
NATURAL AREAS

Woods		
Number	Description (back woodlot, side woods, etc)	Square Feet
Meadow		
Number	Description (back meadow, front meadow, etc)	Square Feet
Total Natural Area:		

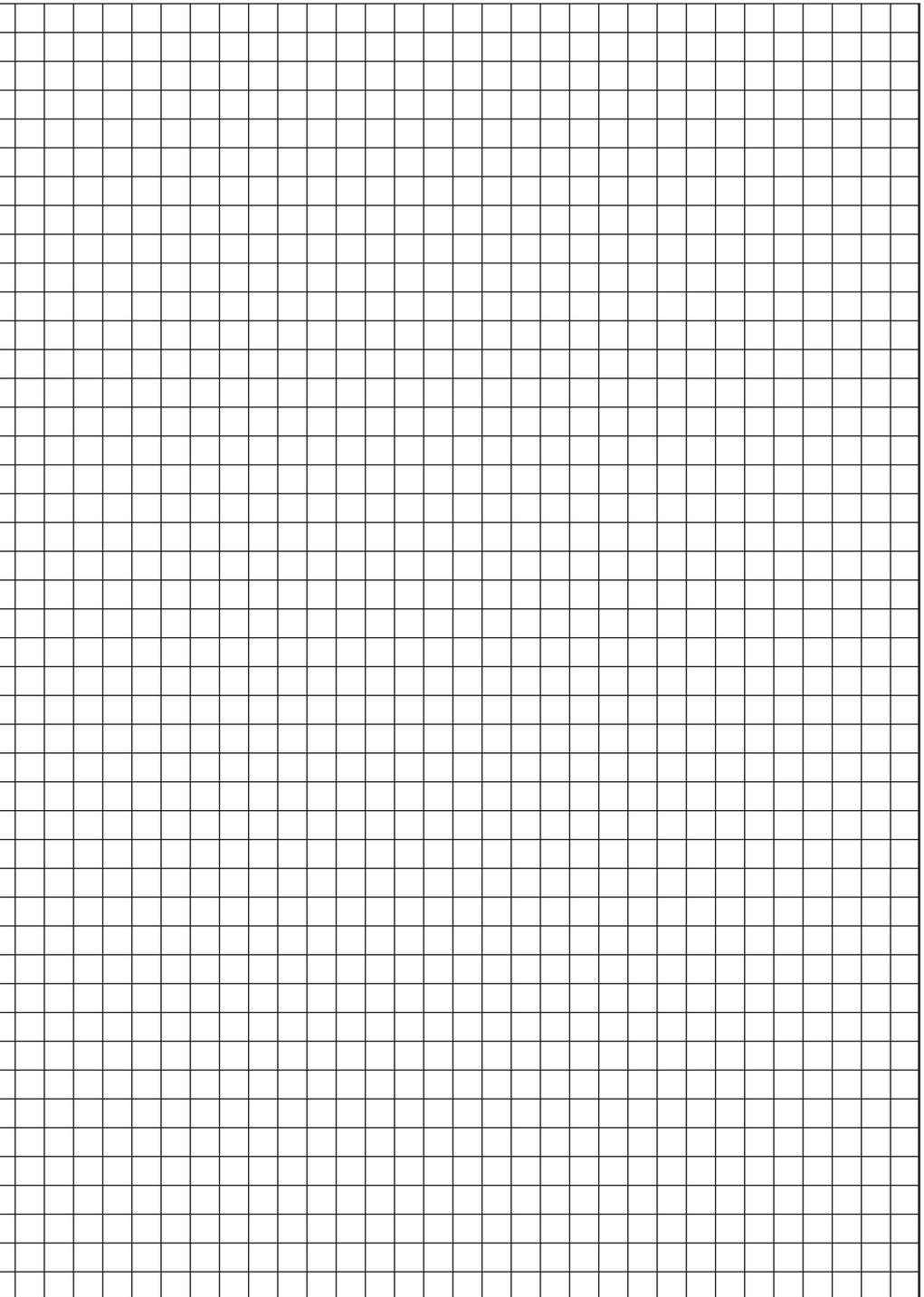
Note any water features (streams, wetlands, ponds, etc) on your property:

Total Stormwater Generated in a 1 inch rainstorm:
 (Total Impervious Areas x 0.0833 x 7.48)

_____ ft² x 0.0833 ft x 7.48gal./ft³ = _____ gallons



gement Plan Map



Proposed Stormwater Best Management Practices

Rain Garden		
Number	Description (front yard, back yard, etc)	Square Feet
Riparian Buffer		
Number	Description (tributary, main stem of creek, wetland, etc)	Linear Feet
Tree Planting		
Number	Description (backyard woods, side woods, etc)	Square Feet
Native Meadow		
Number	Description (side yard meadow, back yard meadow, etc)	Square Feet
Pervious Pavers		
Number	Description (front walkway; back patio etc)	Square Feet
Rain Barrel		
Number	Description (side house barrel, shed barrel, etc)	Gallons

Appendix B: Computer Mapping Tutorial

1. Open Internet Explorer.

Go to Google maps (www.google.com/maps) or Bing maps (www.bing.com/maps) to access an aerial map of your property.

2. Type in your property address.

Use the zoom functions to zoom in as close as you can to your property, making sure your entire lot is shown on the map. Make sure the “Satellite” or “Aerial” function is turned on so that the map is shown in aerial photography format.

3. Press “Print Screen”, Paste.

In the upper right corner of your keyboard press “Print Screen.” Paste the screen shot in the program of your choice to crop and edit. We recommend Power Point, Microsoft Word or Paint.

4. Use drawing tools to add your different elements.

Using the “shapes” or other drawing tools available you can add your areas affected by stormwater and your new BMPs. The arrows and freeform tools are particularly useful. Be sure to use different colors for different elements of your map. Text boxes can be used to add labels or a legend.

5. Save and print your map.

When you are done, you can save your map as a .pdf or print it to go with your written stormwater management plan.

<p>Pervious Pavers Impervious building materials, such as stone, concrete or brick, laid with space in between to allow for pervious areas (gravel, sand or vegetation) in driveways, parking areas, or walkways.</p> <p style="text-align: right;">Photo by Matt Kofroth, LCCD</p>		
<p>Benefits</p> <ul style="list-style-type: none"> Increases infiltration and groundwater recharge Reduces volume and rate of runoff 	<p>Negatives</p> <ul style="list-style-type: none"> More labor intensive to install than other practices Nonconventional option to pavement 	<p>Cost \$\$</p> <ul style="list-style-type: none"> Can save by installing permeable pavers May need to excavate and install sub base, increasing costs
<p>Maintenance</p> <ul style="list-style-type: none"> Moderate to high maintenance Grass between pavers may have to be mowed Inspect for signs of clogging Pressure wash and replace pea stone as needed 	<p>Aesthetic appeal</p> <ul style="list-style-type: none"> Ranges from low to medium Artistic designs with layout can increase aesthetic appeal 	<p>Implementation Considerations</p> <ul style="list-style-type: none"> Need to install permeable sub base Locate at least 10 feet from building foundations

Rain Barrel/Cistern
 A barrel that captures rainwater from a roof and stores it for later use, such as watering plants or gardens. A cistern is a larger container that does the same thing.

Photo by Fritz Schroeder, Live Green

<p>Benefits</p> <ul style="list-style-type: none"> Conserves water Captures and reuses stormwater 		<p>Negatives</p> <ul style="list-style-type: none"> Minimal volume captured Poor construction or maintenance can result in mosquitoes 	
<p>Maintenance</p> <ul style="list-style-type: none"> Clean screen/filter regularly Clean gutters twice annually Monitor during severe storms to avoid overflow Empty before winter months 		<p>Aesthetic appeal</p> <ul style="list-style-type: none"> Ranges from low to medium depending on type of barrel used 	<p>Cost \$</p> <ul style="list-style-type: none"> Very minimal cost as DIY project Can save dollars because of reduced potable water usage
		<p>Implementation Considerations</p> <ul style="list-style-type: none"> Place on level surface Full rain barrel weighs 400 lbs 	



2. Factors to consider when choosing stormwater best management practices for your property.

Here are some considerations that might help you decide which practices you would like to install on your property.

- ◆ If you would like to enhance your landscaping with flowers and other attractive plants consider a rain garden or a native meadow.
- ◆ If you want to reduce the amount of time it takes to mow the lawn, a rain garden or native meadow would help accomplish this goal.



Photo by Dick Brown



Photo by Matt Kofroth, LCCD

- ◆ If you would like to see more butterflies, a rain garden or native meadow can provide excellent butterfly habitat.
- ◆ If you have outdoor water needs (water for a vegetable garden, to water your lawn, or to wash your car) consider a rain barrel.
- ◆ If you don't have very much yard to work with, a rain barrel is probably the best choice.
- ◆ If your driveway needs repaved, consider using pervious pavers instead of traditional pavement.
- ◆ If you would like to give your patio a new look, consider pervious pavers.

Photo by Andrew Gavin, SRBC 1

- ◆ If you would like to restore forested conditions on a portion of your property, consider tree planting (or forested riparian buffer if the area to be reforested is along a stream).
- ◆ If a stream is running through your property, installing a riparian buffer would be very beneficial.
- ◆ If you want to cut down on air conditioning costs during the summer, consider planting some trees on your property.



3. Choose where to locate the stormwater best management practices on your property.

Now that you know about your property and the type of practices you would like to install, it's time to choose the right location for the practices. Some considerations in your planning are:

◆ **Ponding Water.** Many stormwater practices encourage water to infiltrate into the soil (such as rain gardens and pervious pavers). Where water ponds on your property, water is unable to infiltrate. Areas that are often saturated are not appropriate places to put these practices.

(Note- if you have an on-lot sanitary septic disposal system and an area is permanently wet near this system, the septic system may be failing. The disposal system should be evaluated and fixed before any other practices are installed.)

◆ **Depth to bedrock.** You do not want to construct infiltration practices where bedrock is visible or is close to the surface.

◆ **Proximity to foundations.** You should also avoid constructing infiltration practices within 10 feet of building foundations.

◆ **Location of underground utilities.** Do not construct infiltration practices near septic systems or drinking water wells. Also avoid any utilities like electric, cable, water, sewer, and gas lines. (make sure to use the PAONE-CALL system to locate underground utilities)

◆ **Slope.** Depending on the practice, a steeper slope may prohibit siting, or it may be something that needs to be taken into account during the design stage. Consult the chart on the next page for guidance.

◆ **Soil percolation.** Since rain gardens and pervious pavers are designed to infiltrate stormwater into the ground, the soil in the location of the rain garden or pervious pavers must be able to drain. When considering these practices, you should conduct a simple percolation test where you would like to locate them:

- Dig a 1 foot deep hole and fill with water.
- Allow the water to moisten soil and drain completely. If water is still in the hole after 24 hours, choose a different location.
- Fill the hole with water a second time and place a ruler in the hole. Note the water level and time.
- After 15 minutes, re-measure the water level. Multiply the change in water level by 4 to get the number of inches of infiltration per hour.



Photos by Kristen Kyler, Penn State



Use this summary chart to help you select one or more stormwater practices that are right for your property.

	Rain Garden	Riparian Buffer	Tree Planting	Native Meadow	Pervious Pavers	Rain Barrel/Cistern
Space Required	Minimum Size: 50 – 200 ft ² surface area 5 – 10 ft wide 10 – 20 ft long 3 – 8 inches deep	The wider the better for water quality benefits. Lot size and configuration will impact buffer width	Consider space needed for canopy spread	Not a factor	As needed to accommodate walkway, patio, or driveway	Not a factor
Slopes	Not usually a limitation, but a design consideration. Locate down slope of building foundations	Not usually a limitation, but a design consideration	Not usually a limitation, but a design consideration	5% or less	Not a factor	Not a factor
Depth to Water Table	1 – 4 ft clearance	Not a factor if correct species are planted			1 – 4 ft clearance	Not a factor
Depth to Bedrock	1 – 4 ft clearance	1 – 4 ft clearance	1 – 4 ft clearance	Not a factor	1 – 4 ft clearance	Not a factor
Building Foundations	Minimum 10 ft down slope from building foundations				Not a factor	Not a factor
Maintenance All practices should be inspected seasonally and after major storm events.	Low: Weeding and watering in first 2 years. Some thinning in later years.	Low to Moderate: Maintain tree tubes or cages. Spray and mow between trees for first 4-5 years. Control invasive plants. Water as needed.	Low to Moderate: Maintain tree tubes or cages. Spray and mow between trees for first 4-5 years. Control invasive plants. Water as needed.	Low to Moderate: Mow twice annually for first two years. Control invasive plants.	Moderate to High: Grass between pavers may have to be mowed. Inspect for signs of clogging. Pressure wash and replace pea stone as needed.	Low: Clean screen/filter regularly. Clean gutters twice annually. Monitor during severe storms for overflow. Empty before winter months.

Chart adapted from the New Hampshire Homeowner's Guide to Stormwater Management Do-It-Yourself Stormwater Solutions. NH Department of Environmental Services (March 2011, revised February 2012).

Please remember to call PA ONE CALL before digging underground so you know where your underground utilities are located (ie electrical, sanitary sewer, water, etc.).

4. List and map your chosen stormwater best management practices.

Now that you've chosen stormwater management practices for your property, list them on the stormwater management plan template provided in Appendix A. Draw them on your property map. Again, you can either hand draw them on the graph paper provided in Appendix A, or continue to follow the Computer Mapping Tutorial in Appendix B to map your chosen stormwater practices on your computer generated property map.



Map created by Kara Kalupson, LCCD

Section 4: Implementing Your Stormwater Plan

Congratulations! Your stormwater management plan is complete! You have taken an important step in managing stormwater on your property to help clean up your local stream and the Chesapeake Bay.

Now you are ready to start implementing your plan. If you are a do-it-yourselfer, there are several online resources that provide detailed design and implementation guidance for the six practices discussed in this guide. *Note: Please refer to the disclaimer at the beginning of this guide.*

The Chesapeake Stormwater Network (www.chesapeakestormwater.net) is in the process of developing a homeowner rain garden guide that will provide excellent step-by-step guidance on designing, constructing and maintaining rain gardens and other practices. Refer to the Chesapeake Stormwater Network's website often for updates as this guide is finalized.

In the meantime, here are some other online guides you can reference:

RAIN GARDENS

Rain Gardens: A How-To Manual for Homeowners (University of Wisconsin Extension)

<http://learningstore.uwex.edu/assets/pdfs/GWQ037.pdf>

Rain Gardens in Connecticut: A Design Guide for Homeowners (UConn Cooperative Extension System)

http://nemo.uconn.edu/publications/rain_garden_broch.pdf

Rain Garden Templates for the Chesapeake Bay Watershed (Low Impact Development Center)

http://www.lowimpactdevelopment.org/raingarden_design/templates.htm

RIPARIAN BUFFERS

Riparian Forest Buffer Guidance (PA Department of Environmental Protection)

<http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-82308/394-5600-001.pdf>

TREE PLANTING

Planting and After Care of Community Trees (Penn State Extension)

<http://pubs.cas.psu.edu/freepubs/pdfs/uh143.pdf>

PATrees.org: The Free Resource Guide

<http://www.patrees.org>

NATIVE MEADOWS

Meadows and Prairies: Wildlife-Friendly Alternatives to Lawn (Penn State Extension)

<http://pubs.cas.psu.edu/FreePubs/pdfs/uh117.pdf>

PERVIOUS PAVERS

New Hampshire Homeowner's Guide to Stormwater Management Do-It-Yourself

Stormwater Solutions: Pervious Walkways & Patios (NH Department of Environmental Sciences)

<http://des.nh.gov/organization/divisions/water/stormwater/documents/perv-walkw-patios-fs.pdf>

RAIN BARRELS AND CISTERNS

Rain Barrel Installation Instructions (Rutgers Cooperative Extension)

http://water.rutgers.edu/Stormwater_Management/rainbarrelbrochure.pdf

Build Your Own Rain Barrel (Chesapeake Bay Foundation) <http://www.cbf.org/Document.Doc?id=30>

Rainwater Harvesting: Guidance for Homeowners (North Carolina Cooperative Extension)

<http://www.ces.ncsu.edu/depts/agecon/WECO/documents/WaterHarvestHome2008.pdf>

Pervious Paver



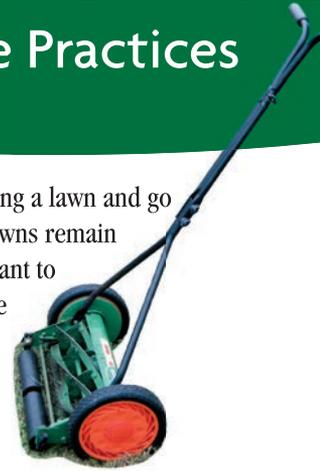
If installing these stormwater practices is not something you want to tackle, you can take your plan to a landscape professional with experience in designing and implementing these types of stormwater practices. You may want to do some of the work yourself and enlist the help of a professional to do the other part. The choice is up to you.

Please note that this guide focuses on six practices that are fairly simple to plan and construct. There are many other, more complex stormwater best management practices that may be applicable to your property and that you may want to consider. These include bioswales, underground cisterns, drywells, pervious pavement, infiltration trenches and many more. If you are interested in seeing if any of these types of practices are a good fit for your property, you should consult an experienced professional to plan, design and implement them.

Section 5: Healthy Lawn Care Practices

The practices described in this guide are alternatives to maintaining a lawn and go a long way to protecting our streams and the Chesapeake Bay. Yet lawns remain a significant component of the residential landscape, and are important to homeowners for many uses. By properly managing this resource, we can significantly improve water quality in the Bay.

A recent report by the Chesapeake Bay Program of EPA compiled much of the research about lawns and their contribution to pollution in stormwater runoff. Their overall conclusion is that maintaining a dense, vegetative cover of turf grass reduces runoff, prevents erosion and retains nutrients in the turf grass (see “Expert Panel Report”). <http://chesapeakestormwater.net/wp-content/plugins/download-monitor/download.php?id=279>.



In fact, recent estimates indicate that lawns and turf grass are now the largest “crop” in the Chesapeake Bay watershed, covering more than 3.8 million acres and eclipsing pasture, hay/alfalfa and row crops like corn, soybean and wheat. See Chesapeake Stormwater Network, [Technical Bulletin No. 8: The Clipping Point](#).



Here are the EPA Expert Panel's recommendations for growing and maintaining a Bay-friendly lawn:

Lawn Care Practice 1. Consult with the local extension service office, certified plan writer or applicator to get technical assistance to develop an effective urban nutrient management plan for the property, based on a soil test analysis.

The precise lawn care prescription should be based on site-specific recommendations that take into account soil properties, the type of grass species, the age of the lawn, and other factors. Professional expertise is essential to develop an effective plan. Look for professionals who are Pennsylvania Certified Horticulturists or Landscape Industry Certified.

Lawn Care Practice 2. Maintain a dense vegetative cover of turf grass to reduce runoff, prevent erosion, and retain nutrients.

Dense vegetative cover helps to reduce surface runoff which can be responsible for significant pollution from the lawn, regardless of whether it is fertilized or not.

If your lawn does not have a dense turf grass cover, identify the factors responsible for the poor turf cover, and implement practices to improve it (e.g., tilling, soil amendments, fertilization or conservation landscaping).

Lawn Care Practice 3. Per the plan developed by your local extension agent or your lawn care professional, follow one of three fertilizer application strategies: (1) choose not to fertilize; (2) reduce rate and monitor; or (3) apply less than a pound of nitrogen per 1000 square feet per each individual application.

In order to reduce nutrient runoff from fertilizing your lawn, employ one of three fertilizer application strategies, depending upon the condition of your lawn and your needs and preferences.

First, elect not to fertilize at all. Some lawns, due to their age or natural soil fertility may be able to maintain a healthy, dense cover without additional fertilization. (However, if your lawn is thin, is weed infested or has bare spots, you should consider fertilizing to restore a thick turf grass cover, using one of the other two strategies.)



Second, take a “reduced rate and monitor” approach. For this approach, follow the nitrogen application rates on the fertilizer bag label and reduce them by one-third to a half, and monitor the results. If lawn quality starts to fall below acceptable levels, re-apply at the reduced rates.

Third, fertilize as the Penn State Extension recommended rate (3.0 to 3.5 pounds per 1,000 square feet of nitrogen per season), but split into 3 or 4 small doses during the growing season (for example, early spring, late spring, late summer and mid-fall). This will get you to an accepted application rate of less than a pound of nitrogen per 1000 square feet for each individual application.

Most bagged fertilizers in Pennsylvania have already removed phosphorus from their products, except for “starter fertilizers” used to establish grass seed in new lawns. If your soil tests show a phosphorus deficiency, ask your lawn care professional for recommendations on how to provide the phosphorus your lawn needs.

Lawn Care Practice 4. Retain clippings and mulched leaves on the lawn and keep them out of streets and storm drains.

Use a mulching mower to return grass clippings and leaves to your lawn. Lawn clippings are an important nutrient source for lawns, as well as an important source of organic matter which enhances stormwater infiltration, soil health and water retention. Nitrogen fertilization can be reduced without decreasing turf grass quality when clippings are left to decompose and return to the lawn.

Lawn clippings are high in nutrients and should be treated as if they were a fertilizer. You should keep lawn clippings and leaves on your lawn, and out of the gutter, street or storm drain system, regardless of whether you fertilize or not. In addition, the amount of nutrients supplied by lawn clippings and mulched leaves should be accounted for when assessing fertilizer needs.

Lawn Care Practice 5. Do not apply fertilizers before spring green up or after the grass becomes dormant.

The risk of pollution by leaching or surface runoff is greatest during the seasons of the year when the grass is dormant. Avoid applying fertilizer in the late fall or winter. In spring, wait until the grass begins to green.

Lawn Care Practice 6. Maximize use of slow release N fertilizer.

Less nutrient loss occurs when slow release fertilizer products are used during the growing season, compared to water soluble formulations. Slow release fertilizer is typically shown on fertilizer products as water insoluble nitrogen (WIN), and can range from 20 to 50% of the total nitrogen product. You can shop for the fertilizer product with the greatest percentage of WIN. Avoid using in late fall as they may release nitrogen when the grass is dormant or frozen.

Lawn Care Practice 7. Set Mower height at 3 inches or taller.

Maintaining taller grass produces a deeper and more extensive root system, increasing nutrient uptake and reducing runoff. The deeper roots also capture moisture during times of drought, suppress weeds and increase turf density.

Lawn Care Practice 8. Immediately sweep off any fertilizer that lands on a paved surface.

Rotary spreaders are the most common method to apply fertilizers and can broadcast fertilizer granules near the edge of the lawn, street or driveway, where they can be subsequently washed off in a rain storm. Sweep up wayward granules before they have a chance to get into gutters and storm sewers. If you use a rotary spreader, purchase one with a deflector shield to prevent spraying fertilizer on the street, driveway or sidewalks.

Lawn Care Practice 9. Do not apply fertilizer within 15 to 20 feet of a stream, pond or other water body and consider managing this zone as a perennial planting, meadow, grass buffer or forest buffer.

The risk of runoff is greatest from lawn areas adjacent to water features such as streams, shorelines, sinkholes and drainage ditches. Consider establishing a riparian buffer of shrubs, trees or perennials along streams and other water courses.

Lawn Care Practice 10. Employ stormwater practices to increase soil porosity and infiltration capability, especially along portions of the lawn that are used to convey or treat stormwater runoff.

A well maintained lawn, with a dense healthy cover of turf grass significantly slows and absorbs stormwater runoff. However, you should consider installing stormwater best management practices where runoff is causing problems. Rain gardens, rain barrels, and bioswales help lawns infiltrate excess stormwater.



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DEPARTMENT OF ENVIRONMENTAL PROTECTION

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