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INTERNATIONAL

Chippewa Township

MS4 Program:

Integrated Public Education and Outreach & Public Involvement and Participation Programs

Chippewa Township
BEAVER COUNTY PENNSYLVANIA

Chippewa Township
Beaver County, PA

June 2021

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ACRONYMS

BMP	Best Management Practice
CFR	Code of Federal Regulations
CWA	Clean Water Act
HOA	Homeowners' Association
MCM	Minimum Control Measure
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollution Detection Elimination System
PADEP	Pennsylvania Department of Environmental Protection
PEOP	Public Education & Outreach Program
PIPP	Public Involvement & Participation Program
SWMP	Stormwater Management Program
TMDL	Total Maximum Daily Load
USEPA	United States Environmental Protection Agency

DEFINITIONS

Best Management Practice	Practices for reducing quantity and improving quality of stormwater, either through physical structures and practices or through planning and outreach (non-structural). BMP's are typically divided into two categories: structural and non-structural. They describe control measures taken to control stormwater changes caused by changes to land use (development or re-development). Generally, BMPs focus on water quality problems caused by increased impervious surfaces from land development.
Illicit (illegal) discharge	All discharges other than authorized discharges listed in your permit.
Minimum Control Measures	MS4 permits call for the development and implementation of a stormwater management program that addresses six "minimum control measures. Implementing these minimum control measures means identifying BMPs and measurable goals the MS4 permittee can implement to satisfy the CMC. MS4 permittees must satisfy the six MCMs in their permit. These are six elements that your Stormwater Management Plan must address.
Municipal Separate Storm Sewer System	It is any conveyance or system of conveyances (including streets, ditches and pipes) that is: owned by a municipality; designed or used for collecting or conveying stormwater; not a combined sewer (i.e., not intended for both sewage and stormwater) AND not part of a Publicly Owned Treatment Works (POTW). It is separate stormwater collection system owned and operated by a municipality.
NPDES Permit	A National Pollutant Discharge Elimination System is a permit authorized by the Clean Water Act, a federal law. In Pennsylvania, it is administered by the state's Department of Environmental Protection. It is required for any point source discharge to the waters of the Commonwealth, including stormwater. The NPDES permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States, including stormwater.
Stormwater	Water on the surface of the ground resulting from rain or melting snow (precipitation). It is also called "runoff".
Urbanized Area	Land area comprising one or more places and the adjacent densely settled surrounding area that together have a residential population of at least 50,000 and an overall population density of at least 1,000 people per square mile, as defined by the United States Bureau of the Census and is determined by the latest available decennial census.

1.0 Introduction

Chippewa Township is permitted under the Pennsylvania Department of Environmental Protection (PADEP) National Pollution Discharge Elimination System (NPDES) Permit PA 136106 for stormwater discharges from small municipal separate storm sewer systems (MS4). MS4 permittees must develop, implement and enforce a Stormwater Management Program (SWMP) designed to reduce the discharge of pollutants from the MS4 to the maximum extent practicable, to protect water quality, and to satisfy the appropriate water quality requirements of the Clean Water Act (CWA) and Pennsylvania Clean Stream Law.

The SWMP is comprised of six Minimum Control Measures (MCM's) as listed in the Township's MS4 Permit PA 136106.

- MCM #1 – Public Education and Outreach
- MCM #2 – Public Participation/Involvement
- MCM #3 – Illicit Discharge Detection and Elimination
- MCM #4 – Construction Site Runoff Control
- MCM #5 – Post-Construction Runoff Control
- MCM #6 – Pollution Prevention/Good Housekeeping

Chippewa Township is committed to continuing in the development, implementation, and enforcement of the MS4 Program that is designed to reduce the discharge of pollutants from the regulated MS4, protect water quality, and to closely follow the requirements of PADEP.

1.1 Background Information

Chippewa Township consists of approximately 16 square miles, all of which is primarily land and almost 8,000 residents. It shares its borders with seven other municipalities (Big Beaver – north, West Mayfield – northeast, Patterson Township – southeast, Brighton Township – south, South Beaver Township – west and Darlington Township – northwest). The Township's MS4 conveyance system that is regulated through an individual NPDES permit collects stormwater runoff and conveys the stormwater through a system of pipes and swales and eventually discharges into the local surface waters of one of the six watersheds within the Township. These watersheds include Brady Run, North Branch Brady Run, South Branch Brady Run, Little Beaver Creek, Wallace Run and Walnut Bottom Run.

1.2 Program Objectives

As a part of the Authorization to Discharge waters from the MS4 to surface waters, the Township must implement a public education program to distribute educational materials to the community or conduct equivalent outreach activities about the impacts of stormwater discharges on water bodies.

Specifically, the MS4 General Permit outlines the required SWMP as having six MCM's. Each MCM contains best management practices (BMPs) and measurable goals that must be met. As MCM #1 – Public Education and Outreach on Stormwater Impacts and MCM #2 – Public Involvement and Participation both address public involvement/outreach and working with the residents, business owners, and employees, Chippewa Township has decided to integrate MCM #1 and #2 into one concise plan. In accordance with the Federal Regulations and the BMPs, defined by PADEP the requirements for MCM #1 and MCM #2 are as follows:

MCM #1 – PUBLIC EDUCATION AND OUTREACH ON STORMWATER IMPACTS

Implement a public education program to distribute educational materials to the community or conduct equivalent outreach activities about the impacts of stormwater discharges on water bodies and the steps that the public can take to reduce pollutants in stormwater runoff (40 CFR Part 122.34(b)(1)(i)).

The Public Education and Outreach Program will address the following BMPs and Measurable Goals to be implemented and achieved:

- **BMP #1** – Develop, implement and maintain a written Public Education and Outreach Program (PEOP).

- **BMP #2** – Develop and maintain lists of target audience groups that are present within the areas served by your regulated small MS4. In most communities, the target audiences shall include residents, businesses (including commercial, industrial and retailers), developers, schools and municipal employees.

- **BMP #3** – Publish annually at least one issue of a newsletter, a pamphlet, a flyer or a website that includes general stormwater educational information, a general description of your SWMP, and/or information about stormwater management activities. The list of publications and content of the publications must be reviewed and updated at least once during each year of permit coverage. Publications should include a list of references (or links) to refer the reader to additional information (i.e., PADEP and USEPA stormwater websites, and any other sources that will be helpful to readers). You must implement at least one of the following alternatives:

    a. Publish and distribute in printed form a newsletter, a pamphlet or a flyer containing information consistent with this BMP.
    b. Publish educational and informational items including links to PADEP's and EPA's stormwater websites on your municipal website.

- **BMP #4** – Distribute stormwater educational materials and/or information to the target audiences using a variety of distribution methods, including but not limited to: displays, posters, signs, pamphlets, booklets, brochures, radio, local cable TV, newspaper articles, other advertisements (i.e., bus stops/stations), bill stuffers, posters, presentations, conferences, meetings, fact sheets, giveaways and storm drain stenciling.

MCM #2 – PUBLIC INVOLVEMENT/PARTICIPATION

Comply with applicable state and local public notice requirements when implementing a public involvement / participation program (40 CFR Part 122.34(b)(2)(i)).

The Public Involvement and Participation Program will address the following BMPs and Measurable Goals to be implemented and achieved:

- **BMP #1** – Develop, implement and maintain a written Public Involvement and Participation Program (PIPP) which describes various types of possible participation activities and describes methods of encouraging the public's involvement and of soliciting the public's input.

- **BMP #2** – Prior to adoption of any ordinance required by this General Permit, provide adequate public notice and opportunities for public review, input and feedback.

- **BMP #3** – Regularly solicit public involvement and participation from the target audience groups. This should include an effort to solicit public reporting of suspected illicit discharges. Assist the public in their efforts to help implement the SWMP. Conduct public meetings to discuss the on-going implementation of the SWMP.

The principle elements required for these programs are interrelated because their primary goal is to attempt to establish a community that is educated, aware, and able to assist in stormwater management. The Township is dedicated to using outreach, education, and involvement opportunities to bring increased awareness of water quality issues and the importance of preventing future stormwater pollution.

It is important to note that from a municipal perspective, relying only on structural stormwater management BMPs in order to improve water quality for current and future stakeholders will not allow for a complete and thoroughly effective strategy. Every property owner, resident, business owner, and municipal employee must be reached and called upon to help prevent pollution and bring incremental improvement to the local water resources.

1.3 Driving Forces, Purpose and Goals of the PEOP and PIPP Plans

Driving Forces

Water is a resource that can easily be taken for granted in this region of the United States, whether it is the drinking water that comes out of the tap, a stream that is home to aquatic life that fishermen flock to, or the lifeline for crops and livestock. Beaver County and Chippewa Township have adequate supplies of surface and groundwater that is utilized for many purposes. The quality of these surface waters is of utmost importance to the community. Water can be degraded by soil erosion, nitrates, phosphates, household and agricultural chemicals, acid mine drainage, and many other impairments. Chippewa Township's list of impaired waters includes Brady's Run and Walnut Bottom Run watersheds.

The population of Chippewa Township is continuously growing, and the complexion of the land is expected to change reducing the areas of agriculture and empty/undeveloped to adding more property owners, housing developments, businesses, and industry. An increase in housing, business, and industry will thus bring opportunities for an increase in the sources of pollution. (Refer to **Figure 1** – Chippewa Township Existing Land Use Map). It is important for Chippewa Township to take the steps to make positive impacts through the growing community. The more people in the community that are aware of the issues affecting water quality, the better chance there is that improvement will come about through collective action.

Watershed awareness is a fundamental building block of community participation - the grassroots movement of water quality improvements. The watersheds located within the Chippewa Township boundary include Brady Run, North Branch Brady Run, South Branch Brady Run, Little Beaver Creek, Wallace Run and Walnut Bottom Run (see **Figure 2**).

Creating a better understanding on what makes up a watershed is integral in gaining public acceptance and greater participation in the health and well-being of the waterways. Individual watersheds, like Brady Run, may be impaired by different pollutants or in varying degrees and subject to Total Maximum Daily Loads (TMDLs). There are currently no TMDL watersheds in Chippewa Township.

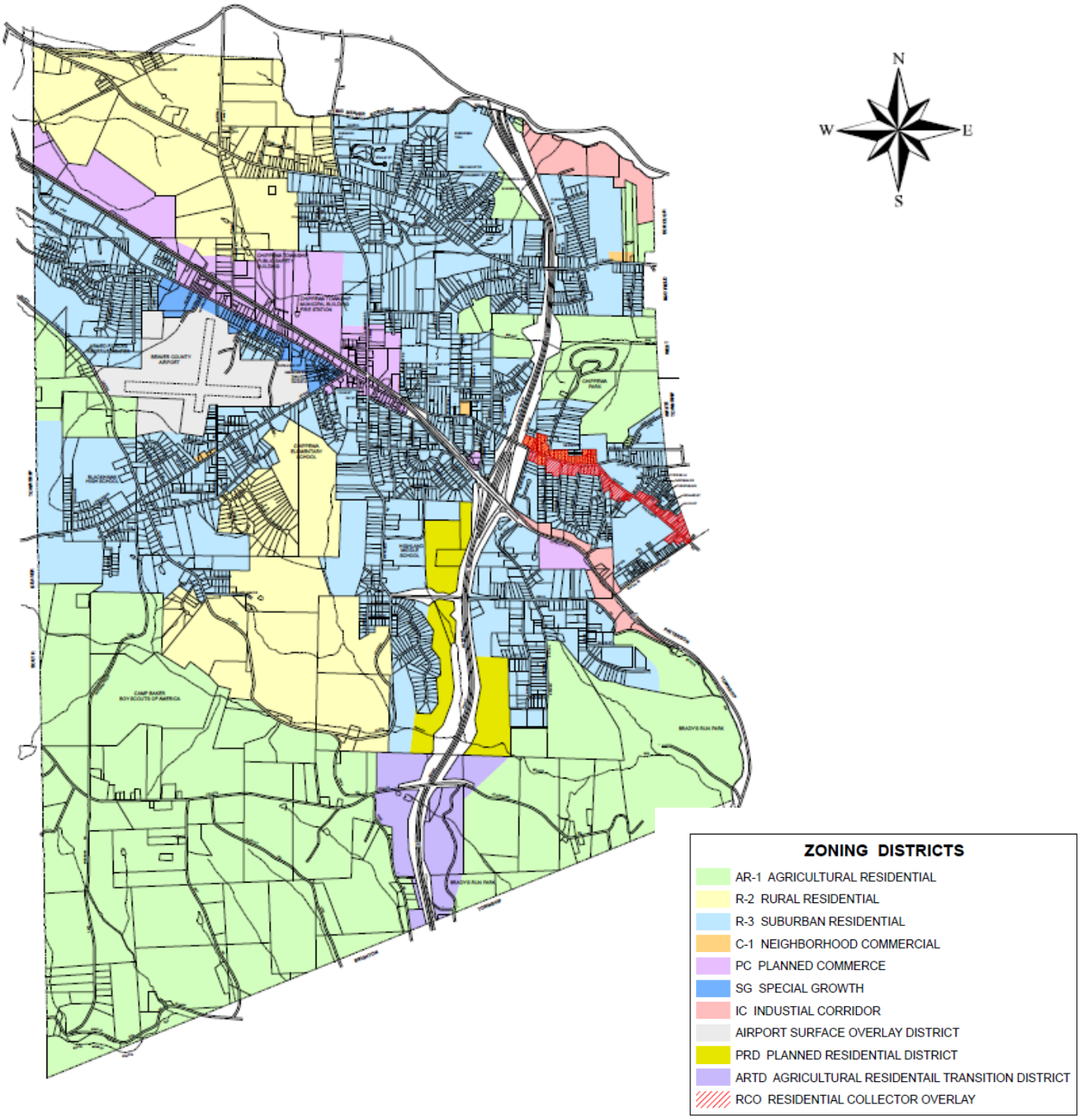


Figure 1: Chippewa Township Existing Land Use Map

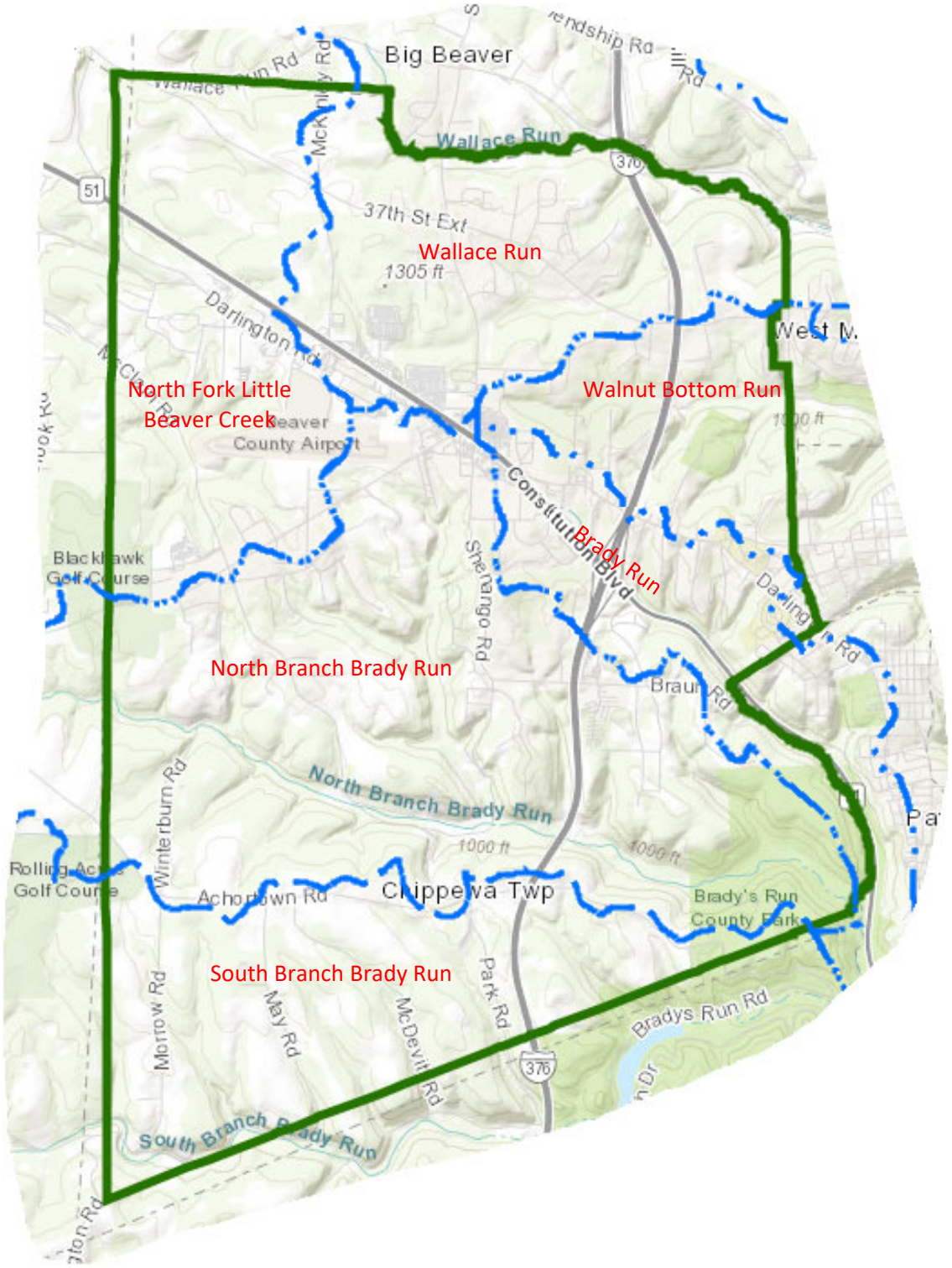


Figure 2: Chippewa Township Watershed Boundary Map

Purposes:

The primary purpose is to educate the public about the impact their behaviors can have on stormwater pollution and the significance of mitigating stormwater pollution. By encouraging the community to avoid stormwater pollution through education and outreach, it will be possible to enact changes in behavior that will prevent future stormwater pollution.

Goals:

With the above factors driving Chippewa Township to improve the connection with the public for water quality and quantity purposes the following goals have been established:

- Increase water quality knowledge about the steps that can be taken to reduce stormwater pollution. Placing priority on reducing impacts to impaired waters and other local water pollution concerns.
- Increase water quality knowledge of hazards associated with illegal discharges and improper disposal of waste, including pertinent legal implications.
- Provide the community with resources that could be easily accessible to all through the Township website and physical copies of educational materials at Township-owned buildings.
- Educate the community to develop beneficial stormwater practices in order to avoid future stormwater pollution.
- Create a better understanding of the links between land use, runoff management, water quality and flood control.
- Promote awareness of the storm sewer system as an essential component of the municipal infrastructure and how household/business pollutants must be eliminated from the system.
- Develop an implementation schedule to track and maintain records for MS4 activities.
- Satisfy the requirements of the MS4 General Permit
- Encourage public participation in community activities, such as waterway cleanup and other restoration activities.

This Plan is intended to serve as a strategic guide for Chippewa Township in order to be more effective in educating and involving its citizens to become stewards of the water resources. The next sections will detail the different groups and segments of the population and craft tailored messages and approaches that will appeal to these groups. “Branding” the program can offer a more cohesive umbrella that residents and businesses will eventually recognize and embrace. This Plan will also show some introductory initiatives that the Township hopes to pursue throughout this permit period. These initiatives will be open to changes, updates, and modifications as time goes on and shows what works and what doesn’t work.

1.4 Key Stakeholders

In order to effectively involve the community in the MS4 program, it is necessary to identify the specific target audiences within Chippewa Township. Each specific audience will have a different educational and outreach path.

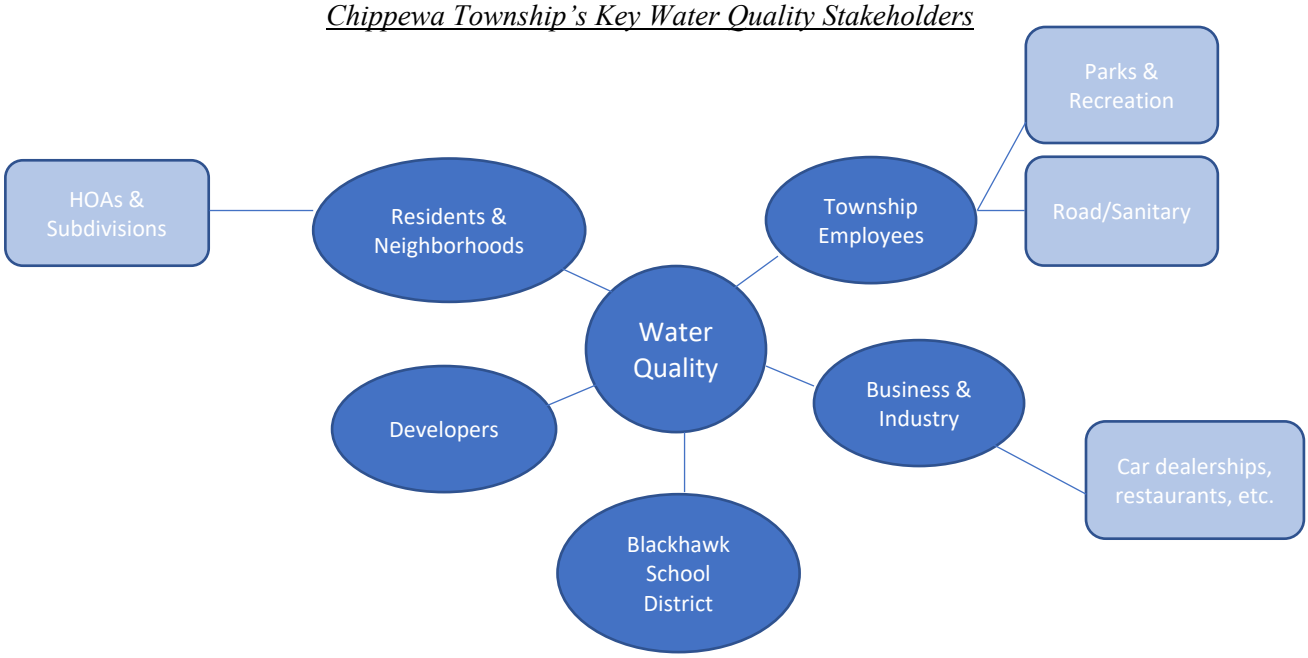
Chippewa Township understands that publishing articles on the Township website or in a Township newsletter and adding the “When it Rains it Drains” pamphlets to the Township’s literature is a great way to reach the general population with the overarching message of stormwater responsibility. The Township also recognizes that this method alone will not be enough for all audiences and that in reality there is more than just one audience. The outreach that Chippewa Township will strive to implement will be tailored to the different segments of the community that is targeted. Education and outreach to school children will

be different than the programs put together for homeowners and from industry and business leaders. Just as the level and type of information required for the Township's Municipal employees to understand and to be trained upon might be different from the information that the parks and recreations employee might need.

The identification of key stakeholder groups is a vital step in adapting the main goals to hit home with the proper message. Described below are descriptions of such groups that take into account both the general makeup of the population and the attributes of the community. Furthermore, the segments are not mutually exclusive, in that someone may fall into more than one area due to varied interests and lifestyles.

The following are the specific water quality target audiences within the community and general methods in which ways they could be reached for education, outreach and involvement in stormwater management.

Chippewa Township's Key Water Quality Stakeholders



Residents and Neighborhoods – Includes housing developments, single-family homes, multi-family homes, and apartments. It is generally the largest population within the Township. This group has the greatest effect on the MS4 both in terms of generation and prevention of stormwater pollution. Several maintenance activities that homeowners perform may affect the stormwater (i.e., lawn maintenance and car washing). Many of the lots in these areas are smaller than one acre, have lawns, and are likely to be served by stormwater infrastructure like pipe, curbed streets, and/or inlets.

> Homeowners' associations – Several residential developments built within the past ten (10) years, and/or currently being built have created homeowners' associations (HOAs) to manage specified elements of the community such as roadways, lawn care, stormwater management facility maintenance, etc. Because of the nature of these organizations, communication with an entire neighborhood can be funneled through the HOA manager and/or Board. These associations can be targeted as conduits for water quality awareness and action.

Township Employees – The staff and employees of the Township are responsible for implementing the MS4 Program. The Township owns and maintains several sites throughout the municipality, including, Township garages, municipal building, fire station, police department, parks and other associated buildings.

Please refer to the *MCM #6 – Operations and Maintenance Program* for additional information. At each of these locations, there are opportunities to utilize proper operational practices to reduce impacts on runoff and waterways. *The Good Housekeeping Operation & Maintenance Program* will be used to lead these BMP's.

Business and Industry – Includes commercial, industrial, office complexes and retail spaces within the Township. The business community can be a powerful ally in the water quality conversation. Pooled financial resources conveyed through activity sponsorships, a broad audience reach, and the unique land use characteristics of business and industry enterprises also make this group an important target. Many of the business located in Chippewa Township are along State Route 51 (Constitutional Boulevard) and along Darlington Road.

Blackhawk School District – The school district, which serves all of Chippewa Township, as well as some surrounding areas such as Patterson Heights, West Mayfield and Darlington, is a direct conduit to the students of our communities and their families. Water quality education and hands-on experiences will be part of the curriculum. The school district is comprised of four (4) schools including Patterson Primary (which does not fall within the boundary of Chippewa Township), Blackhawk Intermediate School, Highland Middle School and Blackhawk High School. Education here includes hands-on activities and lectures that could be held yearly with the students.

Developers – The developers are included to be aware of stormwater management practices to not add pollutants to the stormwater system through building development. Education and outreach activities will predominantly focus on the developer's practices.

1.5 Create the Message

Chippewa Township's water quality message must appeal to the collective citizenry in a cost-effective manner and inspire action throughout the community. This topic has started to receive more and more attention over the past few years for many reasons including the issues and cleanup of the Chesapeake Bay watershed in central and eastern Pennsylvania and here locally with the consent decrees that so many combined sewer communities are facing. As a result of this more heightened awareness for water quality requirements a wealth of educational material and techniques have been created for the public benefit. Chippewa Township has an opportunity to be very successful and proactive by developing a message that reaches out to its citizens.

Water quality has broad-ranging impacts on residents of all ages, as well as the business and agricultural sectors. Therefore, the Township's messages must consider the citizenry as a whole and also reach the different population segments detailed above. A tailored outreach and hands-on action will take the water resources campaign to another level with a more heightened awareness. The opportunity to appeal to these segments is rooted in how a common idea is framed for various perspectives. The Township will explore creating a public campaign with the following principles as its foundation:

- Water resources are extremely valuable and will become more so for future generations that will have a larger population depending on these resources.
- Improvement of water quality is made on both large and small scales by individual residents and business owners.
- Watershed awareness leads to a stronger connection between people and water resources.
- Halting current sources of pollution and sedimentation to waterways and surface water supplies is the first step in improving water quality.

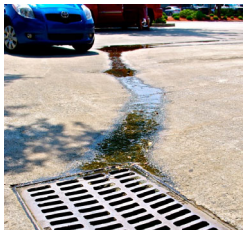
- When armed with good information, many individuals will choose to make decisions that will benefit the common good.
- Community-based organizations, such as watershed groups, are a key resource that enable the residents and community leaders to protect and improve water resources.
- Cost-efficient and/or naturally based solutions often involve simple techniques that many people can implement.

Chippewa Township will continue to utilize the Township magazine (Chippewa Life) and add information to its website to provide helpful information to the citizens and businesses on watershed and water quality issues. Additionally, the Township will begin a more proactive outreach and educational programs throughout the community. Customized messages will be relatable to each segment of the community and these messages will help relate the following:

- The most common threats to water quality (locally and regionally)
- The costs associated with impaired and polluted waters and who bears these costs
- The effect of loss of wildlife habitat
- The amount of sediment and pollutants in the surface waters (in the truckload or in a relatable measure)
- How "doing the right thing" can be not only environmentally but also economically justifiable.
- Municipal staff understanding "good housekeeping" procedures at Township facilities.

Different audiences can have different motivations for wanting to positively affect water recourses. As Chippewa Township works on its public outreach campaign, it will keep in mind the motivations and functions of the various population segments in order to customize the overarching message.

By successfully identifying the specific audiences, distributing materials, holding education sessions, and involving the groups in local stormwater activities; the Township will be able to educate the community about the importance of stormwater control and the resulting benefits of maintaining water quality.



Residents/Neighborhoods

- Chemicals and fertilizer affect the streams. Education on proper technique and greener solutions.
- Awareness of how a storm sewer works and where it drains to and the negative impacts of dumping substances into the system. (I.e. washing a car in your driveway/on the street where the water will drain into the storm sewer).
- Importance of managing stormwater associated with increases in impervious area.
- Disconnect or redirect downspouts to yards, gardens, rain barrels, etc. and away from the storm sewers.
- HOAs and subdivisions or close knit communities can be reached for clean up projects.
- Reducing lawns and planting more trees and vegetation in order to reduce runoff.

Business/Industry

- Establishments that cater to a clientele that visits a physical store or can support municipal and/or watershed group efforts by displaying posters, handouts, sponsoring events, etc.
- Keeping a clean shop is important with non-residential land that uses cleaners, chemicals, or other types of process liquids that flow into waterways or the Township storm sewer system.
- An increase in impervious coverage will cause an increase in runoff, which can be pre-treated with green infrastructure techniques like rain gardens and infiltration prior to reaching waterways or storm sewers.

Residents can also review and implement steps outlined in the “Homeowner’s Guide to Stormwater” which can be found on the township website

Blackhawk School District

- Continued success in improving water quality relies heavily on future generations, such as school aged children.
- Sources, amounts and effects of common pollutants should be discussed with students in terms that are comprehensible by various age groups.

Municipal Staff

- The municipal staff must exhibit "Good Housekeeping" principles at its facilities, including the Township Building, garages, and community parks in order to maintain water quality and provide positive examples to its citizens.

1.6 Package the Message

In getting the message out to the public, Chippewa Township will use various methods to help educate residents, students, business owners about stormwater runoff and water quality. It will be important that the message hits the target audience in a manner that is not only direct and easy to understand but also cost effective to the Township. Various means and methods to aid in a successful outreach program include:

- Door hangers
- Website/Mass media advertising
- Pamphlets and Print Materials
- Conducting presentations at public meetings, schools and park events.

1.7 Distribute the Message

Print and Electronic Media

Chippewa Township must be resourceful in broadcasting the water quality campaign as staff time and budget constraints are not conducive to a costly program employing a full-time staff member. This places a premium on partnerships with other organizations, use of electronic contract methods, and reaching out to establish neighborhood groups for education and participatory activities. A prime example of piggybacking this message with a mainstream medium is through the Township magazine. The Township will incorporate in the magazine brief pieces on topics ranging from stormwater runoff to the effects of pollution to illicit discharges and the MS4 program. Additionally, the Township will make available at its office pamphlets and materials educating the citizens about stormwater runoff and pollution issues, like the "When it Rains it Drains" pamphlet.

The Chippewa Township website (https://chippewa-twp.org/) is a low-cost resource used to convey a considerable amount of information to its constituents. The Township's News and Announcements page discusses the Township's MS4 program and has links to PADEP and EPA websites for further reading. In the future Chippewa Township will add more educational materials and further links to resources pertinent to homeowners and businesses. Water resource topics that can be included in the website page: illicit discharges, non-point source pollution, volunteer opportunities for stream clean up, tree planting, etc., and PADEP and EPA online pamphlets and links.

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Partnerships and Events

Township staff will attempt to reach out to the surrounding municipalities, especially those included in the Blackhawk School District in order to help strengthen the message and brainstorm for public events that would further get the message out. It is important for Chippewa Township to work with and continue to strengthen its partnerships by supporting and promoting events and educational outreach conducted by these organizations.

As time and financial resources permit, Chippewa Township staff will make efforts to attend and become active in some of the above organizations that impact the community and provide any necessary technical support for their operations. In addition to the media outlet discussed above, the Township will consider reaching out through various other community websites like Facebook and Twitter.

The following are additional events that can help jump-start more activity and interest in improving the water quality in the Township's community:

Earth Day - The Township will host "Community Clean Up" for Earth Day. The Township will discuss with various organizations, the Blackhawk School District, and the Township's parks and recreational department the possibility of establishing a related public event with interactive and educational exhibits and activities for the community. Having interactive activities/science experiments/visual aids allows for children and adults to connect their everyday activities to the effects of these activities on the Township's waterways and storm sewers. Examples can include experiments showing the effect of have more plants and trees versus a lawn on the storm sewer system, discussing the issues due to adding chemicals and grime

from washing a car on pavement into the waterways, or showing what happens to the litter that is thrown on the streets and into the Township inlets.

Inlet Stenciling and "Drains to River" Disks – Stenciling storm drain inlets within various developments and neighborhoods with the help of local residents and HOAs can create more awareness with people of all ages, especially children. This is particularly impactful because it is a hands-on project for those who are involved, but also one that leaves behind a visual reminder to everyone that passes by the drains stamped with a catchy phrase like "Drains to Stream Keep it Clean". This can also be effective in encouraging more eyes to keep watch of what is flowing into the Township storm sewers and waterways, which is a critical objective of the Illicit Discharge Detection & Elimination program (MCM#3). Additional assistance from residents could help identify such pollutants early and initiate a prompt cleanup response from the Township or other emergency responders.

1.8 Evaluate the Implemented Outreach Campaign

It is the goal of the Township not only to provide educational and outreach opportunities to the community, but also to ensure that the Township is providing an effective and beneficial program. Though the overall effects of the program will be difficult to monitor at first, the Township will need to continue to examine the effectiveness and success of the programs.

A few metrics to be implemented:

- Record the total number of MS4 Informational Brochures sent out each year to every stakeholder group.
- Record the number of website hits on just the MS4 page on the Township website.
- Record the number of participants at municipal meeting presentation given on stormwater through a sign-in sheet.
- Quarterly circulation information in Chippewa Life Magazine and frequency/amount/type of inserts included with the quarterly magazine each month/year.
- Number of pamphlets and/or fliers distributed at Township-owned buildings.

Throughout the development and implementation of the Program, other opportunities for public education and outreach will be developed. It is the goal of the Township to continually develop and improve the program to better inform and educate the community members about stormwater issues, as well as to maintain compliance with PADEP MS4 requirements. Ultimately, the Township will revise and adapt the program annually to come to address weaknesses and reflect the overall progress of the Program.

1.9 Public Involvement in the Planning and Implementation Processes

There are other opportunities for the public to be involved in water quality improvement efforts, namely during program planning and implementation stages. As noted above, permit requirements of the Small MS4 Permit call for a comprehensive local SWMP. The Township will make public, via the website and at least one (1) Board of Supervisors' meeting per year, the periodic progress reports of our SWMP on its website and in print at the Township Office. The Township intends to document the accomplishments no less frequently than once per year. Not only does this assist in compiling the required Annual Report to the PADEP, it can also serve as an update to the constituents. The breadth of the SWMP offers a range of topics to discuss, including public involvement, illicit discharge detection, and stormwater facility inspections.

Chippewa Township will also maintain regular communications with the Beaver County Commissioners throughout the year. This will allow the Township to be legitimate participants in their events, activities, and communications; all of which are important tools to help reach the residents and businesses.

Chippewa Township leadership recognizes the significance of the need to improve water quality, in addition to the financial impacts and regulatory obligations that come with it. Without each resident, business owner, and school-age child being part of this effort, the Township recognizes that it may see more costly structural fixes needing to be put into place for the cleaning and treatment of the waterways and drinking water.

TABLES

Table 1
PEOP Efforts (Ongoing/Completed/Continuous/Upcoming)

PEOP Efforts			
	Description	**Status**	**Comment/Note**
1	The Township distributes the PADEP educational brochures, including the "When it Rains, it Drains" brochure, and the stormwater flyers, including the "Pet Waste," "Oil Slick," "Car Wash," and "Fertilizer" flyers within the Township.	Ongoing/continuous	
2	The Township uses its website as one method to disseminate MS4 information. The Township keeps the website updated with new links, education materials, records of previously submitted MS4 materials, and updates of new reports that have been included in the Program. The Township updates this at least once per year after submittal of the Annual MS4 Status Report. The "Chippewa News and Announcements" tab is the central hub of the Township for distribution of MS4 materials, including but not limited to the individual MS4 Program plans (such as the PEOP, PIPP, IDD&E, etc.), educational flyers, and any important links related to the State MS4 Program. The Township website can be found at the following: https://chippewa-twp.org/chippewa-news/	Ongoing	In process of revamping the website to have a bigger section dedicated to the MS4 program. Currently being revised; will be forthcoming.
3	The Township has an annual MS4-focused presentation at a monthly meeting at least once per year. The presentation provides educational information regarding the MS4 Program and the importance of stormwater management. The presentation is slightly different each year depending on the current focus of the MS4 Program. As the MS4 Program continually progresses, new information is added to the educational session.	Ongoing	The latest was on 11/2020 - discussing the PRP Plan
4	Continual expansion and updates to MS4 information on the Township website. The Township will continue to modify and add to its current website in the coming years. The Township will keep updated versions of the individual MS4 Program plans (PEOP, PIPP, IDD&E, etc.), post newly developed education materials (such as brochures and presentations), and keep updated USEPA and PADEP links to MS4 info, among other things.	Ongoing	In process of revamping the website to have a bigger section dedicated to the MS4 program. Currently being revised; will be forthcoming.
5	The Township publishes its Meeting Minutes on its website following the monthly meetings. The Meeting Minutes always include any relevant information pertaining to the MS4 Program that was discussed, including issues with stormwater throughout the Municipality and additional measures that could be included as a part of the MS4 Program.	Completed; continuous	Latest updated to MS4 was at 11/2020 meeting discussing details fo the PRP plan and BMP implemenation
6	Internal training to Township employees. The training follows the practices established in the O&M Plan (found under the MCM #6 section of the MS4 Program). The training is conducted formally once per year. Periodic on-the-job training is also completed, when necessary. Refer to the O&M Plan for additional information.	Completed; continuous	Initial training was conducted in 2018; refresher every year thereafter with a few staff employees only.
7	Displays and posters will be kept in the Municipal Building as well as other Township-owned buildings. These will be targeted at the entire community, but specifically at the business district, developers, municipal employees, and residents. Displays and poster will be displayed in the building lobby.	Completed	Several posters are hung up throughout the township owned/maintained buildings
8	The Township distributes the "MS4 Informational Brochure" to the community and stakeholder groups. The brochure contains MS4 information and education tips that describe the effects stormwater can have on a community. It also gives examples of pollutants that can enter stormwater due to residential activities, such as pet waste, car fluids, gardening chemicals, and wastes/chemicals from construction activities. The Township distributes the Informational Brochure with the Recycling Calendar each year during January. Distribution of the Recycling Calendar and MS4 Informational Brochure is done door-to-door.	Upcoming	Currently provided on website and in township lobby
9	Develop and distribute additional stormwater educational materials to the majority of the Township community, including the municipal and Township employees, the business district, the developers, and the residents/neighborhoods. Additional educational measures planned include a stormwater mailer and flyers to be distributed within the community.	Upcoming	Currently provided on website and in township lobby
10	Publish an article in the quarterly Chippewa Life Magazine which describes stormwater regulations required by Chippewa Township. The artcile will contain MS4 information and education tips and describe the effects stormwater can have on a community. It also will give examples of pollutants that can enter stormwater due to residential activities, such as pet waste, car fluids, gardening chemicals, and wastes/chemicals from construction activities.	Upcoming	

Table 1
PEOP Efforts (Ongoing/Completed/Continuous/Upcoming)

PEOP Efforts			
	Description	**Status**	**Comment/Note**
11	Development of a stormwater educational program for the Blackhawk School District. The program will include a presentation detailing the following but not limited to: basic information and concepts about stormwater, stormwater mitigation techniques, and hands-on activities. The program will be given at each school (Patterson Primary, Blackhawk Intermediate School, Highland Middle School and Blackhawk High School) and tailored based on the school it is given to (i.e., the same presentation given to the elementary school, aimed at a young crowd, will not be given to the High School students, who could be given a more detailed presentation about stormwater). Additionally, the Township plans to allow students within the schools to complete projects for the MS4 Program. This could include projects for science classes or that are required senior projects for graduation.	Upcoming	On hold due to COVID
12	Installation of storm drain placards and/or use of storm drain stenciling along catch basins across the Township. The placards will contain the description "No Dumping. Only Rain in the Drain" or something similar. The placards are used to as reminder to the community to keep pollutants out of the storm drains. It is an education measure that teaches good habits but also acts as a visual reminder to anyone passing the inlets.	Upcoming	Working on this
13	Provide stormwater management requirements to developers and property owners as a part of the construction permitting process	Upcoming	Developing a Best Management Practices quick book for all develop
14	Establishing an MS4-related block at Municipal Meetings where community members' questions and concerns about stormwater could be answered and/or reported. This activity will be focused towards the residents and will depend on the interest the public takes in stormwater management. In order for this activity to be effective, it will be necessary to involve the community with our other education and outreach efforts	Upcoming	In process of adding it as a regular agenda item.
Specifcs to the target audiences			
Residents/Neighborhoods			
15	Lawn fertilization – The Township will include information in the MS4 Informational Brochure regarding lawn fertilization. This information will include best practices for the frequency fertilizers should be applied, the quantity and the proper application technique in doing so in order to reduce pollution from residential areas.	Upcoming	Will be added to the website
16	Educational information regarding how the MS4 system works, where it discharges to and the negative water quality effects it could have on the surrounding creeks and runs	Upcoming	Will be added to the website
17	Neighborhood cleanup projects – Educational tool for helping residents learn to how to properly manage inlets and other storm sewer structures.	Upcoming	Will be added to the website
Municipal			
18	Good housekeeping procedures, which include the O&M Plan.	Ongoing	
19	Continuous training	Ongoing	
School Districts			
20	Provide education posters to be hung on bulletin boards.	Upcoming	
21	Give education presentations to the students	Upcoming	
Business			
22	Provide educational posters at local businesses to be hung on bulletin boards	Upcoming	
Developers			
23	Develop a Best Management packet	Upcoming	

Table 2

PIPP Efforts (Ongoing, Completed, Upcoming)

PIPP Efforts			
	Description	**Status**	**Comment/Note**
1	The Township has an annual MS4-focused presentation at a monthly meeting at least once per year. The presentation provides educational information regarding the MS4 Program and the importance of stormwater management. The presentation is slightly different each year depending on the current focus of the MS4 Program. As the MS4 Program continually progresses, new information is added to the educational session. Please refer to the PEOP section of this document for additional information.	Ongoing	The latest was on 11/2020 - discussing the PRP Plan
2	The Township solicits public comments regarding stormwater issues at monthly municipal meetings. Comments are tracked by the municipality through to resolution. A record of the comments are kept by the Township. The Township also solicits ideas from the public regarding MS4 involvement activities, including community service possibilities and education sessions. Comments are published in the Meeting Minutes	Ongoing	No comments have been received to date regarding stormwater
3	The Township, with the help of theTownship Engineer, will review the PIPP annually and revise it as necessary.	Ongoing	
4	The Township will make available all the stormwater-related materials (such as ordinances and MS4 materials) and MS4 Annual Status Reports on the website. The Township will also maintain physical copies of these documents at the municipal building if community members wish to have them in physical form.	Ongoing	In process of revamping the website to have a bigger section dedicated to the MS4 program. Currently being revised; will be forthcoming.
5	Adequate public notice and opportunities for review/comments are given to the public before the adoption of any new stormwater ordinance. Review of the new changes occur at municipal meetings and t public is given the chance to submit comments/concerns and voice their opinions about proposed changes. Any changes that occur are published in the Meeting Minutes.	Completed	Ordinance has been completed in 2015; comments considered and included
6	Adequate public notice and opportunities for review/comments are given to the public before any changes are finalized in the PIPP. The changes are be reviewed at municipal meetings and the public is given a chance to submit comments and express their opinions about proposed changes. Any changes that occur are published in the Meeting Minutes.	Upcoming	This has not been presented at a township meeting yet
7	The Township will establish an “MS4 Block” at Municipal Meetings where community members’ questions and concerns about stormwater could be answered and/or reported. It will be at this time that community members will have the chance to be involved in the decision-making processes related to the MS4 Program. The community is a given a chance to hear about proposed changes and activities within the MS4 Program, including new measures to be enacted, and provide comments to the Commissioners	Upcoming	In process of adding it as a regular agenda item.
8	The Township will publicly establish the use of a “complaint form,” giving stakeholder groups the ability to report any issues associated with local stormwater. The stakeholder groups will be able to fill out the form anytime a stormwater issue is seen. The Township will keep track of issues through a log kept for the stormwater complaints. The Township presently keeps track of issues, but will make aware to the community that stormwater issues and anything related to the MS4 Program could also be reported using the 'form'	Upcoming	Residents already call the township to file compliants or stop employees of the township while outside to file a complaint; but creating the online form will make it more streamlined where nothing gets lost.
9	The Township will solicit public opinions and ideas for proposed stormwater community activities that could be used in fulfillment of MCM #2. The Township will send out a Questionnaire annually soliciting suggestions for possible stormwater community activities. The Questionnaire will be developed in the 2022-2023 Reporting Period	Upcoming	
10	Developing special stormwater events and activities, including earth day, storm drain marking and stenciling, park cleanups to name a few possible programs. A special mailer will be prepared for sending out to water quality stakeholders to inform them of planned MS4 activities. The mailer will be sent to give the public notice well in advance of upcoming events. The event information will also be posted on the Township website	Upcoming	

ATTACHMENTS

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.

Table of Contents

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- Pennsylvania Landscape & Nursery Association
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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

Photo by Matt Kofroth, LCCD

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 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.

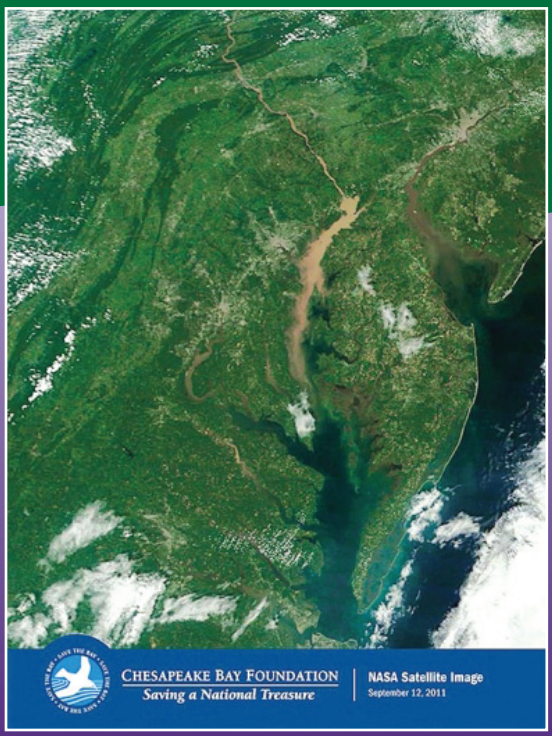
What Can I Do to Help?

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

permeable pavers

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)*

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.

Photo by Margaret Kyler

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:

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.

Rain Garden

A depressed garden that uses mulch, soil, and deep-rooted native plants to capture, absorb, and infiltrate stormwater.

Photo by Matt Kofroth, LCCD

Benefits
- Manages stormwater and filters pollutants
- Wildlife habitat
- Little maintenance
- Adds beauty

Negatives
- Plants can take 2-3 years to establish
- More maintenance required in first few years

Cost
$$

Maintenance
- Low once plants established
- Weeding and watering in first two years.
- Some thinning in later years

Aesthetic appeal
- Ranges from medium to high
- Can customize based on plant selection.

Implementation Considerations
- Construct downslope of runoff to be captured
- Plant in spring or fall
- Locate at least 10 feet from building foundations

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.

Photo by Matt Kofroth, LCCD

Benefits
- Increases infiltration and groundwater recharge
- Improves water quality
- Controls erosion & sedimentation
- Provides wildlife habitat

Negatives
- Not as effective on steep slopes
- More difficult to implement than some other practices

Cost
$

Maintenance
- 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

Aesthetic appeal
- Ranges from medium to high
- Higher aesthetic appeal than conventional stormwater conveyances

Implementation Considerations
- 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 storm-water
- 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:

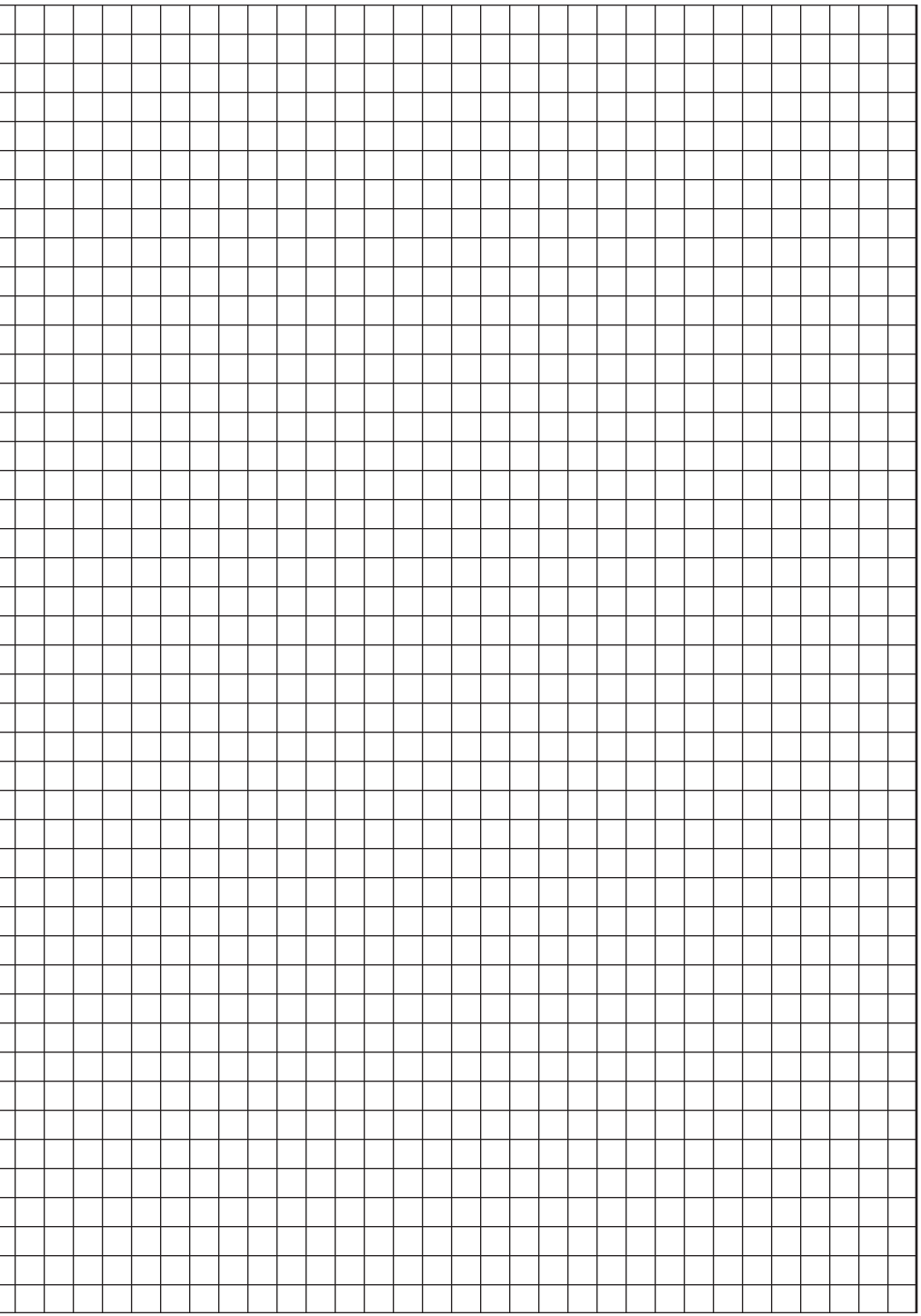
Total Stormwater Generated in a 1 inch rainstorm:
(Total Impervious Areas x 0.0833 x 7.48)

_____ft^2 x 0.0833 ft x 7.48gal./ft^3 = _____ gallons

STORMWATER FLOW	
Downspouts	
Number	Description (front house, back house, shed, etc)
Drainage Swales	
Number	Description (side yard swale, back yard swale, etc)
Areas of Ponding	
Number	Description (side yard ponding, back yard ponding, etc)

Note any areas of gullying or erosion or any other areas of concern:

gement Plan Map



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.

Notes:

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.

Photo by Matt Kofroth, LCCD

Benefits

- Increases infiltration and groundwater recharge
- Reduces volume and rate of runoff

Negatives

- More labor intensive to install than other practices
- Nonconventional option to pavement

Cost

$$

- Can save by installing permeable pavers
- May need to excavate and install sub base, increasing costs

Maintenance

- 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

Aesthetic appeal

- Ranges from low to medium
- Artistic designs with layout can increase aesthetic appeal

Implementation Considerations

- 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

Benefits

- Conserves water
- Captures and reuses stormwater

Negatives

- Minimal volume captured
- Poor construction or maintenance can result in mosquitoes

Cost

$

- Very minimal cost as DIY project
- Can save dollars because of reduced potable water usage

Maintenance

- Clean screen/filter regularly
- Clean gutters twice annually
- Monitor during severe storms to avoid overflow
- Empty before winter months

Aesthetic appeal

- Ranges from low to medium depending on type of barrel used

Implementation Considerations

- Place on level surface
- Full rain barrel weighs 400 lbs

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

Photo by Dick Brown

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 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.

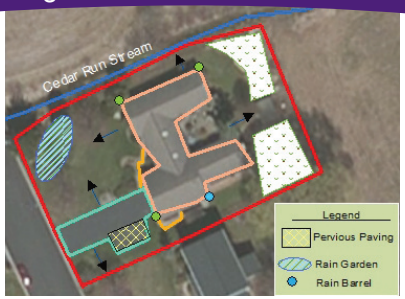
	Rain Garden	Riparian Buffer	Tree Planting	Native Meadow	Pervious Pavers	Rain Barrel/ Cistern
Space Required	Minimum Size: 50 – 200 ft² surface area 5 – 10 ft wide 10 – 20 ft long 3 – 8 inches deep	The wider the better for water quality benefits. Lot size and configuration will impact buffer width	Consider 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 Paver

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

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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NFWF

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Brandywine Conservancy
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PLNA 1904 Pennsylvania Landscape & Nursery Association

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- Lancaster County Planning Commission
- Lancaster County Clean Water Consortium

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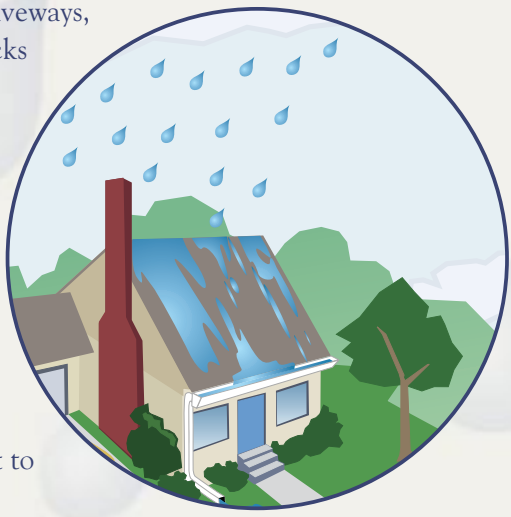
As stormwater flows over driveways, lawns, and sidewalks, it picks up debris, chemicals, dirt, and other pollutants. Stormwater can flow into a storm sewer system or directly to a lake, stream, river, wetland, or coastal water. Anything that enters a storm sewer system is discharged untreated into the waterbodies we use for swimming, fishing, and providing drinking water. Polluted runoff is the nation's greatest threat to clean water.



By practicing healthy household habits, homeowners can keep common pollutants like pesticides, pet waste, grass clippings, and automotive fluids off the ground and out of stormwater. Adopt these healthy household habits and help protect lakes, streams, rivers, wetlands, and coastal waters. Remember to share the habits with your neighbors!

Healthy Household Habits for Clean Water

Vehicle and Garage

- Use a commercial car wash or wash your car on a lawn or other unpaved surface to **minimize** the amount of dirty, soapy water flowing into the storm drain and eventually into your local waterbody.

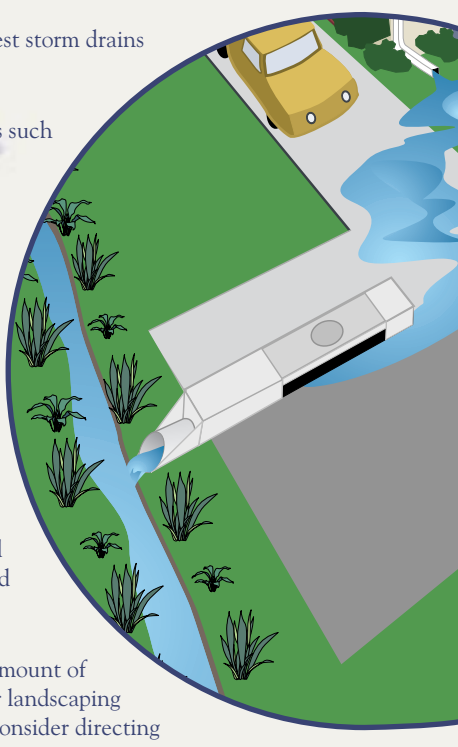
- Check your car, boat, motorcycle, and other machinery and equipment for leaks and spills. Make repairs as soon as possible. Clean up **spilled fluids** with an absorbent material like kitty litter or sand, and don't rinse the spills into a nearby storm drain. Remember to properly dispose of the absorbent material.
- **Recycle** used oil and other automotive fluids at participating service stations. Don't dump these chemicals down the storm drain or dispose of them in your trash.

Lawn and Garden

- Use pesticides and fertilizers **sparingly**. When use is necessary, use these chemicals in the recommended amounts. Avoid application if the forecast calls for rain; otherwise, chemicals will be washed into your local stream.
- Select **native** plants and grasses that are drought- and pest-resistant. Native plants require less water, fertilizer, and pesticides.
- **Sweep up** yard debris, rather than hosing down areas. Compost or recycle yard waste when possible.
- Don't overwater your lawn. Water during the **cool** times of the day, and don't let water run off into the storm drain.
- Cover piles of dirt and mulch being used in landscaping projects to prevent these pollutants from blowing or washing off your yard and into local waterbodies. **Vegetate** bare spots in your yard to prevent soil erosion.

Home Repair and Improvement

- Before beginning an outdoor project, locate the nearest storm drains and **protect** them from debris and other materials.
- **Sweep up** and properly dispose of construction debris such as concrete and mortar.
- Use hazardous substances like paints, solvents, and cleaners in the **smallest amounts possible**, and follow the directions on the label. Clean up spills **immediately**, and dispose of the waste safely. Store substances properly to avoid leaks and spills.
- Purchase and use **nontoxic**, **biodegradable**, **recycled**, and **recyclable** products whenever possible.
- **Clean** paint brushes in a sink, not outdoors. Filter and reuse paint thinner when using oil-based paints. Properly dispose of excess paints through a household hazardous waste collection program, or donate unused paint to local organizations.



- **Reduce** the amount of paved area and increase the amount of vegetated area in your yard. Use native plants in your landscaping to reduce the need for watering during dry periods. Consider directing downspouts away from paved surfaces onto lawns and other measures to increase infiltration and reduce polluted runoff.

Pet Care

- When walking your pet, remember to **pick up** the waste and dispose of it properly. Flushing pet waste is the best disposal method. Leaving pet waste on the ground increases public health risks by allowing harmful bacteria and nutrients to wash into the storm drain and eventually into local waterbodies.

Swimming Pool and Spa

- **Drain** your swimming pool only when a test kit does not detect chlorine levels.
- Whenever possible, drain your pool or spa into the **sanitary** sewer system.
- Properly store pool and spa chemicals to **prevent** leaks and spills, preferably in a covered area to avoid exposure to stormwater.

Septic System Use and Maintenance

- Have your septic system **inspected** by a professional at least every 3 years, and have the septic tank **pumped** as necessary (usually every 3 to 5 years).
- Care for the septic system drainfield by **not** driving or parking vehicles on it. Plant only grass over and near the drainfield to avoid damage from roots.
- Flush responsibly. Flushing household chemicals like paint, pesticides, oil, and antifreeze can **destroy** the biological treatment taking place in the system. Other items, such as diapers, paper towels, and cat litter, can **clog** the septic system and potentially damage components.

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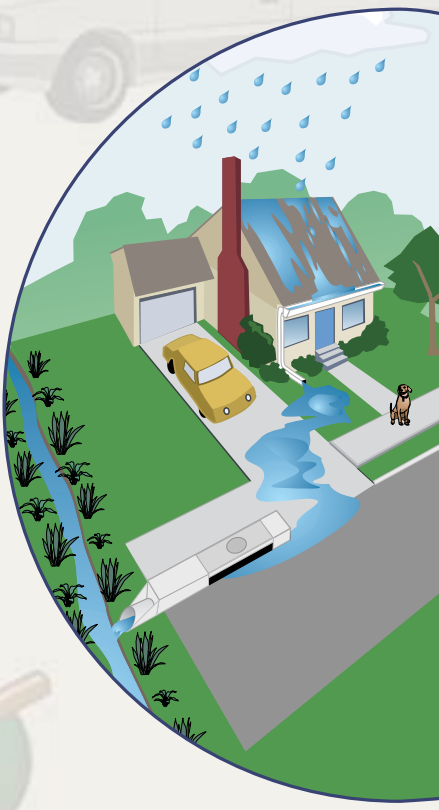

EPA United States Environmental Protection Agency