

# GROUNDWORK/CIVIL

ENGINEERING + DESIGN

Harris Mahmud  
MS4 Coordinator  
Pennsylvania, Department of Environmental Protection  
Southwest Regional Office  
400 Waterfront Drive  
Pittsburgh, PA 15222-4745

June 15, 2015

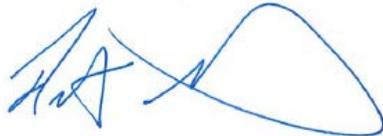
**RE: MS4 Program  
2014-2015 Annual MS4 Report  
NPDES Permit NO. PAG136306  
Marshall Township, Allegheny County**

Dear Mr. Mahmud:

Please find attached the Marshall Township 2014 - 2015 Biannual MS4 Report.

Let me know if you require any additional information, I can be reached at 412-297-6401.

Sincerely,



Art Gazdik, P.E.  
Township Engineer

Enclosures: MS4 Annual Progress Report with Attachments

Cc: Neil McFadden, w/encl.  
Bill Campbell  
Bruce Dickson  
Allegheny County Conservation District

Art Gazdik, P.E., Marshall Township Engineer  
525 Pleasant Hill Road, Wexford, PA 15090  
artgazdik@groundworkcivil.net



## MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) ANNUAL/PROGRESS REPORT

For the Reporting Period: March 16, 2013 to March 16, 2015

- Annual Report     Progress Report  
 New Permittee     Renewal Permittee

Due Date: June 16, 2015

GENERAL INFORMATION			
Permittee Name:	Marshall Township	NPDES Permit No.:	PA136306
Mailing Address:	525 Pleasant Hill Road	Effective Date:	3/16/2013
City, State, Zip:	Wexford, PA 15090	Expiration Date:	3/15/2018
MS4 Contact Person:	Neil McFadden	Renewal Due Date:	9/15/2017
Title:	Township Manager	Admin. Extended?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Phone:	724-935-3090	Municipality:	Marshall Township
Email:	neilmc@twp.marshall.pa.us	County:	Allegheny
Co-Permittees (if applicable): None			

WATER QUALITY INFORMATION					
Are there any discharges to waters within the Chesapeake Bay Watershed? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					
Identify all surface waters that receive stormwater discharges from storm sewers within the MS4 urbanized area and provide the requested information (see instructions).					
Receiving Water Name	Ch. 93 Class.	Impaired?	Cause(s)	TMDL?	WLA?
Pine Creek	CWF	Yes	Bacteria, Urban Runoff	Yes	Yes
Brush Creek	WWF	Yes	Urban Runoff	No	No
Big Sewickley Creek	TSF	No			

Identify any Wasteload Allocations (WLAs) identified in TMDLs for the MS4, if applicable. Identify the pollutant(s) and mass load(s):

**The waste load allocation for Pine Creek was not in effect until after the current MS4 Permit was issued. It is the Township's understanding that a TMDL control plan will be required during the next MS4 Permitting Period.**

**GENERAL MINIMUM CONTROL MEASURE (MCM) INFORMATION**

Have you completed all MCM activities required by the permit for this reporting period?  Yes  No

Provide current contact name and phone number information for the required MCMs (if same as page 1, leave blank):

MCM	Contact Name	Phone
#1 Public Education and Outreach on Storm Water Impacts	Neil McFadden, Manager	724-935-3090
#2 Public Involvement/Participation	Neil McFadden, Manager	724-935-3090
#3 Illicit Discharge Detection and Elimination (IDD&E)	Neil McFadden, Manager	724-935-3090
#4 Construction Site Storm Water Runoff Control	Art Gazdik, PE & the Allegheny County Conservation District	412-297-6401
#5 Post-Construction Storm Water Management in New Development and Redevelopment	Art Gazdik, PE	412-297-6401
#6 Pollution Prevention / Good Housekeeping	Bruce Dickson, Director of Public Works	724-935-3090

**MCM #1 – PUBLIC EDUCATION AND OUTREACH ON STORM WATER IMPACTS**

**BMP #1: Develop, implement and maintain a written Public Education and Outreach Program**

**Measurable Goal:** For new permittees a Public Education and Outreach Program (PEOP) shall be developed and implemented during the first year of permit coverage and shall be re-evaluated each permit year thereafter and revised as needed. For renewal permittees, the existing PEOP shall be reviewed and revised as necessary. The permittee's PEOP shall be designed to achieve measurable improvements in the target audience's understanding of the causes and impacts of stormwater pollution and the steps they can take to prevent it.

1. For new permittees only, attach the written PEOP or a summary thereof to the first report submitted to DEP.

2. If you are not a new permittee, did you complete and submit your written PEOP to DEP?  Yes  No  
If Yes, provide the latest submission date: **3/2009**

3. Date of last evaluation of or revision to the PEOP: **Reviewed annually and currently being revised**

4. What were the plans and goals for public education and outreach for the reporting period?

**To insure that developers, contractors and the public are aware of their responsibilities to protect our waterways.**

5. Did the MS4 achieve its goal(s) for the PEOP during the reporting period?  Yes  No

Explain the rationale for your answer:

Education materials were included with each grading, land development and building permit. See the Small Project E&S handout in the Attachment for MCM#1.

The Township Recreation Department has several water quality based education programs. For example, the Township is working with the Pine Creek Watershed Coalition to test the dissolved oxygen levels in the Knob Park Pond; it also sponsors a summer Nature Camp that informs children of the importance of good water quality in our local watersheds; and, an Eagle Scout established a Vernal Pool within Knob Park to provide habitat. The Township also partners with "Keep Pennsylvania Beautiful" for the annual "Great American Cleanup".

Marshall Elementary Students partnered with Marshall Township Parks and Recreation on an Emerald Ash Project. Marshall Elementary fifth grade students partnered with the Marshall Township Parks and Recreation Department, Soergels Orchards, Treemendous LLC, Bartlett Tree Service and Beckwith Landscaping on a replanting and public awareness project in response to the Emerald Ash Borer invasion in the area. The fifth grade classroom is participating in an environment contest through Disney Corporation. They were the Pennsylvania state winners last year and this year are competing for the national title in the Disney Planet Challenge. This project is showing how students can make a difference in our community and the environment.

On November 19, 2014 from 10:00 a.m. to 12:00 p.m. , the students and their families planted trees in Knob Hill Community Park, Marshall Township. Seventeen trees were donated through Treemendous LLC, Bartlett Tree Service and Beckwith Landscaping. Marshall Township and surrounding communities have lost thousands of trees due to the Emerald Ash Borer outbreak. The class is also working with local, federal, and national organizations to write grants for the Township to help replace the hundreds of trees lost to the Emerald Ash Borer. A healthy woods leads to a healthy watershed. A public education seminar took place on January 19, 2015 at the Marshall Township Municipal Building.

6. Identify specific plans and goals for public education and outreach for the upcoming year:

**Plans include improvements to the Township Website. The target audience list will continue to be updated.**

**BMP #2: Develop and maintain lists of target audience groups present within the areas served by your MS4**

***Measurable Goal:** For new permittees, the lists shall be developed within the first year of coverage under the permit and reviewed and updated as necessary every year thereafter. For renewal permittees, the lists shall continue to be reviewed and updated annually.*

1. For new permittees only, attach your target audience list(s) to the first report submitted to DEP.

2. If you are not a new permittee, did you complete and submit your target audience list to DEP?  Yes  No  
If Yes, provide the latest submission date: **The target audience includes municipal employees, residents, schools, businesses and developers. The Township will continue to collaborate with local watershed organizations, and through the Township recreation department summer program, teach children the importance of clean streams.**

3. Date of last review or revision to target audience list(s): **6/2015**

**BMP #3: Annually publish at least one educational item on your Stormwater Management Program**

***Measurable Goal:** For new permittees, stormwater educational and informational items shall be produced and published in print and/or on the Internet within the first year of permit coverage. In subsequent years (and for renewal permittees), the list of items published and the content in these items shall be reviewed, updated, and maintained annually. Your publications shall contain stormwater educational information that addresses one or more of the 6 MCMs.*

1. For new permittees only, attach your published stormwater educational or informational materials to the first report submitted to DEP.
2. If you are not a new permittee, did you complete and submit your published stormwater educational or informational materials to DEP?  Yes  No  
If Yes, provide the latest submission date: **6/2004. The Township provides MS4 materials on its website. See the Attachment for MCM #1 for examples.**

3. Do you have a municipal newsletter?  Yes  No  
If Yes, how often was it published during the reporting period and what MS4-related material did it contain?
4. Do you have a municipal website?  Yes  No (URL: [twp.marshall.pa.us](http://twp.marshall.pa.us))  
If Yes, what MS4-related material does it contain?  
**The website contains fact sheets describing MS4s and illicit discharges and provides contact information for the reporting of illicit discharges to the Township.**
5. Describe any other method(s) used during the reporting period to provide information on stormwater to the public:  
**Materials on the proper construction site erosion and sedimentation controls are provided to developers and home builders and educational materials are placed on the Township website.**
6. Date of most recent review and/or update to published stormwater educational materials: **6/2015**
7. Identify specific plans for the publication of stormwater materials for the upcoming year:  
**Published events will include collection and recycle events, stream clean-ups and workshops in the Township and surrounding municipalities that promote awareness of stormwater related issues.**

**BMP #4: Distribute stormwater educational materials to the target audiences**

**Measurable Goal:** *All permittees shall select and utilize at least two distribution methods in each permit year. These are in addition to the newsletter and website provisions of BMP #3.*

Identify the two additional methods of distributing stormwater educational materials during the previous year (e.g., displays, posters, signs, pamphlets, booklets, brochures, radio, local cable TV, newspaper articles, other advertisements, bill stuffers, posters, presentations, conferences, meetings, fact sheets, giveaways, or storm drain stenciling).

**MS4 educational materials are provided at the Township Municipal building and event information will be promoted at the local library and through newspaper and local magazine articles.**

**MCM #2 – PUBLIC INVOLVEMENT/PARTICIPATION**

**BMP #1: Develop, implement and maintain a written Public Involvement and Participation Program (PIPP)**

**Measurable Goal:** A new permittee’s PIPP shall be developed and implemented during the first year of coverage under this General Permit. All permittees shall re-evaluate the PIPP each permit year and revise as needed. Your PIPP shall include, but not be limited to:

- a. Opportunities for the public to participate in the decision-making processes associated with the development, implementation, and update of programs and activities related to this General Permit.
- b. Methods of routine communication to groups such as watershed associations, environmental advisory committees, and other environmental organizations that operate within proximity to the permittee’s regulated small MS4s or their receiving waters.
- c. Making your periodic reports available to the public on your website, at your municipal offices, or by US Mail upon request.

1. For new permittees only, attach your written PIPP or a summary thereof to the first report submitted to DEP.
2. If you are not a new permittee, did you complete and submit your written PIPP or summary to DEP?  Yes  No  
If Yes, provide the latest submission date: **6/2004**
3. Date of last review and/or update to the PIPP: **Currently being updated.**
4. Explain how your PIPP addresses items a, b and c of the Measurable Goal:  
**The Township will continue to partner with local environmental groups as well as the residents, businesses and developers.**

**BMP #2: Prior to adoption of any ordinance (municipal permittees) or SOP (non-municipal permittees) required by the permit, provide adequate public notice and opportunities for public review, input, and feedback.**

**Measurable Goal:** Advertise any proposed MS4 Stormwater Management Ordinance or SOP, provide opportunities for public comment, evaluate any public input and feedback, and document the comments received and the municipality’s response.

1. Was an MS4-related ordinance or SOP developed during the reporting period?  Yes  No
2. If Yes, describe how you advertised the draft ordinance and how you provided opportunities for public review, input and feedback:
3. If an ordinance or SOP was enacted/developed or amended during the reporting period, provide the following information:

Ordinance No. / SOP Name	Date of Public Notice	Date of Public Hearing	Date Enacted

**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 your SWMP. Conduct public meetings to discuss the on-going implementation of your SWMP.**

***Measurable Goals:** Conduct at least one public meeting per year to solicit public involvement and participation from target audience groups. The public should be given reasonable notice through the usual outlets a reasonable period in advance of each meeting. During the meetings, you should present a summary of your progress, activities, and accomplishments with implementation of your SWMP, and you should provide opportunities for the public to provide feedback and input. Your presentation can be made at specific MS4 meetings or during any other public meeting. Under this MCM, you should document and report instances of cooperation and participation in your activities; presentations you made to local watershed organizations and conservation organizations; and similar instances of participation or coordination with organizations in your community. You also should document and report activities in which members of the public assisted or participated in your meetings and in the implementation of your SWMP, including education activities or organized implementation efforts such as cleanups, monitoring, storm drain stenciling, or others.*

1. Date of the public meeting(s): **6/29/2015**
2. How were meeting(s) advertised to the public? **Newspaper.**
3. Indicate where the meeting(s) were held and the number of attendees:  
**Public meetings are held at the Marshall Township Municipal Building.**
4. What types of MS4-related activities did you solicit public involvement and participation for?  
**The Township hopes the public will participate in the reporting of suspected illicit discharges.**
5. What MS4-related activities did the public participate in?

### **MCM #3 – ILLICIT DISCHARGE DETECTION AND ELIMINATION (IDD&E)**

**BMP #1: You shall develop and implement a written program for the detection, elimination, and prevention of illicit discharges into your regulated MS4s. Your program shall include dry weather field screening of outfalls for non-stormwater flows, and sampling of dry weather discharges for selected chemical and biological parameters. Test results shall be used as indicators of possible discharge sources.**

***Measurable Goal:** For new permittees, the IDD&E program shall be developed during the first year of coverage under this General Permit and shall be implemented and evaluated each year thereafter. For renewal permittees, the existing IDD&E program shall continue to be implemented and evaluated annually. Records shall be kept of all outfall inspections, flows observed, results of field screening and testing, and other follow-up investigation and corrective action work performed under this program.*

1. For new permittees only, attach your written IDD&E program to the first report.
2. If you are not a new permittee, did you complete and submit your written IDD&E program to DEP?  Yes  No  
If Yes, provide the latest submission date: **Date unavailable.**
3. Date of last review and/or update to IDD&E program: **Currently Being Updated**

**BMP #2: Develop and maintain a map of your regulated small MS4. The map must also show the location of all outfalls and the locations and names of all surface waters of the Commonwealth (e.g., creek, stream, pond, lake, basin, swale, channel) that receive discharges from those outfalls.**

***Measurable Goals:** For new permittees, develop the map(s) of your regulated small municipal separate storm sewer systems and the information on all outfalls from your regulated small MS4 by the end of the fourth (4th) year of permit coverage. For renewal permittees, the existing map(s) of your regulated small MS4 shall be updated and maintained as necessary during each year of coverage under the permit.*

1. Have you completed a map(s) of all outfalls and receiving waters of your storm sewer system?  Yes  No

2. For new permittees only, attach the completed map to the 4<sup>th</sup> year Annual Report.
3. Date of last update or revision to map(s): **6/2015**
4. Total number of discharge points in your storm sewer system that:  
Discharge directly to surface waters (outfalls): **237**  
Discharge to storm sewers owned by others: **NA**
5. Total number of outfalls that are mapped at this time: **237**

**BMP #3: In conjunction with the map(s) created under BMP #2 (either on the same map or on a different map), new permittees shall show, and renewal permittees shall update, the entire storm sewer collection system, including roads, inlets, piping, swales, catch basins, channels, basins, and any other features of the permittee's storm sewer system including municipal boundaries and/or watershed boundaries.**

***Measurable Goals:** For new permittees, develop the map(s) by the end of the fourth (4th) year of coverage under the permit and update and maintain the map(s) as necessary each year of permit coverage thereafter. For renewal permittees, update and maintain the map(s) as necessary during each year of permit coverage.*

1. Have you completed a map(s) that includes roads, inlets, piping, swales, catch basins, channels, basins, municipal boundaries and watershed boundaries?  Yes  No
2. If Yes, is the map(s) on the same map(s) as for outfalls and receiving waters?  Yes  No
3. For new permittees only, attach the completed map to the 4<sup>th</sup> year Annual Report.

4. If you are not a new permittee, did you complete and submit your map to DEP?  Yes  No  
If Yes, provide the latest submission date: **2007**
5. Date of last update or revision to map: **6/2015**

**BMP #4: Following the IDD&E program created pursuant to BMP #1, the permittee shall conduct outfall field screening, identify the source of any illicit discharges, and remove or correct any illicit discharges using procedures developed under BMP #1.**

*For all permittees, outfall inspections need to be prioritized according to the perceived chance of illicit discharges within the outfall's contributing drainage area. Observations of each outfall shall be recorded each time an outfall is screened, regardless of the presence of dry weather flow. Proper quality assurance and quality control procedures shall be followed when collecting, transporting or analyzing water samples. All outfall inspection information shall be recorded on the Outfall Reconnaissance Inventory/Sample Collection field sheet excerpted from the Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments (CWP, October 2004). Adequate written documentation shall be maintained to justify a determination that an outfall flow is not illicit. If an outfall flow is illicit, the actions taken to identify and eliminate the illicit flow also shall be documented.*

*The results of outfall inspections and actions taken to remove or correct illicit discharges shall be summarized in periodic reports.*

1. For new permittees only, were at least 40% of all outfalls screened during dry weather?  Yes  No  
  
If Yes for #1, indicate the number screened and the percent of all outfalls it represents. If No for #1, indicate reason(s) why this was not completed:  
  
Are you on pace to screen all outfalls twice during the permit term?  Yes  No

2. For renewal permittees, indicate the percent of outfalls screened during the reporting period: **All were previously surveyed during the last permit cycle. The schedule for the current cycle is as follows: July-December 2015 - At least 120 outfalls to be screened. January-December 2016 - The remaining (+/- 117) outfalls to be screened. January-December 2017 - New outfalls added to the system will be screened. No outfalls have been screened to date during the current permit cycle. 0%**

Are you on pace to screen all outfalls once during the permit term?  Yes  No

3. For all permittees, indicate the percent of outfalls screened that revealed dry weather flows: **NA%**

4. Did any dry weather flows reveal color, turbidity, sheen, odor, floating or submerged solids?  Yes  No

5. If Yes for #4, attach all sample results to this report with a map identifying the sample location. Explain the corrective action(s) taken in the attachment.

6. Do you use the "Outfall Reconnaissance Inventory / Sample Collection Field Sheet" provided in the permit?

Yes  No

If No, attach a copy of your monitoring form.

**BMP #5: Enact a stormwater management ordinance (municipal entities) or develop an SOP (non-municipal entities) to implement and enforce a stormwater management program that includes prohibition of non-stormwater discharges to the regulated small MS4.**

***Measurable Goal:** Within the first year of coverage under the permit, new permittees shall enact and implement an ordinance from an Act 167 Plan approved by the Department in 2005 or later, the MS4 Stormwater Management Ordinance; or an ordinance that satisfies all applicable requirements in a completed and signed MS4 Stormwater Management Ordinance Checklist. (For non-municipal permittees, new permittees shall develop and implement a Standard Operating Procedure (SOP) within the first year of coverage).*

*Renewal permittees must continue to maintain, update, implement, and enforce a Stormwater Management Ordinance that satisfies all applicable requirements. (For non-municipal permittees, the SOP satisfies this requirement. If no existing SOP exists, it should be developed during the first year of coverage).*

***Measurable Goal:** New permittees shall submit a letter signed by a municipal official, municipal engineer, or the municipal solicitor as an attachment to their first year report certifying the enactment of an ordinance that meets all applicable requirements of this permit. Renewal permittees shall update their existing ordinance, if necessary, and submit documentation of completion to the Department. (For non-municipal permittees, submit the SOP to the first report).*

1. Do you have an ordinance (municipal) or SOP or other mechanism (non-municipal) that prohibits non-stormwater discharges?  Yes  No

If Yes, indicate the date of the ordinance or SOP: **9/29/2008**

2. For new permittees only, attach an ordinance (or SOP) and letter from an official, engineer or solicitor that prohibits non-stormwater discharges to the first report submitted to DEP.

3. If you are not a new permittee, did you complete and submit your ordinance (or SOP) and letter from an official, engineer or solicitor that prohibits non-stormwater discharges to DEP?  Yes  No

4. Were there any violations of the ordinance during the reporting period?  Yes  No

If Yes, describe what enforcement actions were taken for each violation:

Work was stopped until a proper Storm Water Management plan was received by the Township.

**BMP #6: Provide educational outreach to public employees, business owners and employees, property owners, the general public and elected officials (i.e., target audiences) about the program to detect and eliminate illicit discharges.**

**Measurable Goals:** During each year of permit coverage, appropriate educational information concerning illicit discharges shall be distributed to the target audiences using methods outlined under MCM #1. If not already established, set up and promote a stormwater pollution reporting mechanism (e.g., a complaint line with message recording) by the end of the first year of permit coverage for the public to use to notify you of illicit discharges, illegal dumping or outfall pollution. Respond to all complaints in a timely and appropriate manner. Document all responses, include the action taken, the time required to take the action, whether the complaint was resolved successfully.

1. Was IDD&E-related information distributed to public employees, businesses, and the general public during the reporting period?  Yes  No

If Yes, what was distributed? **Information is provided on the Township website.**

2. Is there a well-publicized method for employees, businesses and the public to report stormwater pollution incidents?

Yes  No

3. Do you maintain documentation of all responses, action taken, and the time required to take action?  Yes  No

#### MCM #4 – CONSTRUCTION SITE STORM WATER RUNOFF CONTROL

Are you relying on PA's statewide program for stormwater associated with construction activities to satisfy this MCM?

Yes  No **(If No, complete all remaining questions for this MCM; if Yes, skip to MCM #5).**

**BMP #1: Develop your program consisting of all procedures necessary to comply with the requirements of this MCM. Your program shall provide for construction stormwater permitting, construction inspection, and enforcement of installation and maintenance of the necessary E&S control measures. Your program shall describe clearly how your program will be coordinated with DEP's NPDES Construction Stormwater Permitting program.**

**Measurable Goals:** For new permittees, the written program for this MCM shall be developed during the first year of permit coverage; nevertheless, you are responsible for implementation of this MCM during entire term of this permit, including the time you are developing your program.

For all permittees, your program shall be reviewed and updated during each year of permit coverage. The purpose of the written program is to establish clear roles and responsibilities for the implementation of the MCM #4 requirements. An agreement between the permittee, the CCD, and any other resources to be used by the permittee that clearly defines roles for each entity is recommended. If an agreement is made, you shall place and keep a written copy in your file, consistent with the Retention of Records requirements in this Permit. Please note that in accordance with Section A.2.h in Part A of the Authorization to Discharge, as the permittee you are responsible to ensure that implementation of all requirements under this Permit are fulfilled.

1. For new permittees only, attach the written stormwater associated with construction activities program to the first report submitted to DEP.
2. If you are not a new permittee, did you complete and submit your written stormwater associated with construction activities program to DEP?  Yes  No
- If Yes, provide the latest submission date:
3. Date of last update or revision to the stormwater associated with construction activities program:

**BMP #2: The permittee shall enact, implement, and enforce an ordinance to require the implementation of erosion and sediment control BMPs, as well as sanctions to ensure compliance.**

**Measurable Goal:** Within the first year of coverage under the permit, new permittees shall enact and implement an ordinance that meets all applicable requirements of this permit. (Non-municipal permittees shall develop and implement an SOP).

**Measurable Goal:** Permittees shall submit a letter signed by a municipal official, municipal engineer or the municipal solicitor as an attachment to their first periodic report certifying the enactment and implementation of a stormwater management ordinance that meets all requirements of this permit.

1. For new permittees only, attach an ordinance (or SOP) and letter from an official, engineer or solicitor that addresses stormwater associated with construction activities to the first report submitted to DEP.
2. If you are not a new permittee, did you complete and submit your ordinance (or SOP) and letter from an official, engineer or solicitor that addresses stormwater associated with construction activities to DEP?  Yes  No

If Yes, provide the latest submission date:

**BMP #3: Develop and implement requirements for construction site operators to control waste at the construction site that may cause adverse impacts to water quality. While sediment is the most common pollutant of concern for MCM #4, there are other types of pollutants that also can be a concern and the intent of this BMP is to address these other types of pollutants, such as, but not limited to, discarded building materials, washout from concrete trucks, chemicals, litter, and sanitary waste.**

**Measurable Goal:** *New permittees shall establish requirements to address this BMP by the end of the first year of permit coverage. Renewal permittees shall continue to implement existing requirements and update as necessary. This could be implemented by written municipal ordinance/code provisions, by standard notes on the site plans, by any other written format that accomplishes the objectives of this BMP, or by any combination of these measures. The goal of this BMP shall be communicated to construction site operators during pre-construction meetings. This BMP shall be implemented during each year of the MS4 permit. Permittees must prepare and maintain records of site inspections, including dates and results and you must maintain these records in accordance with the Retention of Records requirements in this Permit.*

1. Identify the mechanism(s) in place to regulate construction site operators and wastes produced at construction sites:
2. During the reporting period what has been the results of implementing the mechanism(s) described above?

**BMP #4: Develop and implement procedures for the receipt and consideration of public inquiries, concerns, and information submitted by the public (to the permittee) regarding local construction activities. The permittee shall demonstrate acknowledgement and consideration of the information submitted, whether submitted verbally or in writing.**

**Measurable Goal:** *Permittees shall establish and implement a tracking system to keep a record of any submitted public information as well as your response, actions, and results. This BMP shall be implemented during each year of coverage under this General Permit and information should be submitted with the each periodic report.*

Describe the tracking system established for documenting public information concerning local construction activities and describe responses taken during the reporting period:

#### **MCM #5 – POST-CONSTRUCTION STORM WATER MANAGEMENT IN NEW DEVELOPMENT AND REDEVELOPMENT**

Are you relying on PA's statewide program for MCM #5 BMPs #1 - #3?  Yes  No

**(If No, complete all remaining questions for this MCM; if Yes, skip to BMP #4)**

**BMP #1: Develop a written procedure that describes how the permittee shall address all required components of this MCM. Guidance can be found in the Pennsylvania Stormwater Best Management Practices Manual.**

**Measurable Goal:** *The written procedure shall be developed by the end of the first year of permit coverage and be reviewed and updated every permit year thereafter, as needed. The intent of BMP #1 is for the permittee to describe how the listed tasks will be accomplished.*

1. For new permittees only, attach your written procedure for post-construction management to the first report.
2. If you are not a new permittee, did you complete and submit your written procedure for post-construction management to DEP?  Yes  No

If Yes, provide the latest submission date: **6/2009 See SWM Ordinance**

3. Date of last review or update of post-construction management procedure: **9/29/2008 SWM Ordinance**

**BMP #2: Require the implementation of a combination of structural and/or non-structural BMPs that are appropriate to the local community, that minimize water quality impacts, and that are designed to maintain pre-development runoff conditions. This requirement can be met by ensuring that the selected BMPs comply with the municipal Stormwater Management Ordinance that meets the requirements of the permit.**

**Measurable Goal:** All qualifying development or redevelopment projects shall be reviewed to ensure that their post-construction stormwater management plans and selected BMPs conform to the applicable requirements. A tracking system (e.g., database, spreadsheet, or written list) shall be maintained to record qualifying projects and their associated BMPs. In your records, you shall note if there are no qualifying projects in a calendar year.

1. Number of development or redevelopment projects in urbanized area during reporting period: **A list of projects within the Township for the years 2011 - 2015 was provided by the Allegheny County Conservation District and is included in the Attachment for MCM #5.**

2. Describe the tracking system in place:

3. Describe the structural and/or non-structural BMPs that were required for these projects:

**BMP #3: Ensure that controls are installed that shall prevent or minimize water quality impacts.**

**Measurable Goal:** All qualifying development or redevelopment projects shall be inspected during the construction phase to ensure proper installation of the approved structural PCSM BMPs. A tracking system (e.g., database, spreadsheet, or written list) shall be implemented to track the inspections conducted and to track the results of the inspections (e.g., BMPs were, or were not, installed properly). Permittees not relying on DEP's statewide QLP to satisfy requirements under this BMP shall summarize construction inspections and results in periodic reports. See BMP #6 for requirements related to post-construction inspection and tracking of PCSM BMPs to ensure that the operation and maintenance plan is being implemented.

If there were development or redevelopment projects during the reporting period, attach documentation of inspections of PCSM BMPs to this report.

**BMP #4: The permittee shall enact, implement, and enforce an ordinance (municipal) or SOP or other regulatory mechanism (non-municipal) to address post-construction stormwater runoff from new development and redevelopment projects, as well as sanctions and penalties associated with non-compliance, to the extent allowable under State or local law.**

**Measurable Goal:** Within the first year of coverage under this permit, new permittees shall enact and implement a stormwater management ordinance (municipal) or SOP (non-municipal) that meets the requirements of this General Permit.

**Measurable Goal:** All permittees shall submit a letter signed by a municipal official, municipal engineer or the municipal solicitor as an attachment to their first periodic report certifying the enactment of a stormwater management ordinance that meets the requirements of this General Permit.

1. Do you have an ordinance (or SOP) to address post-construction stormwater runoff from new and redevelopment projects and does it include sanctions?  Yes  No

If Yes, indicate the date of the ordinance or SOP: **2008**

For new permittees only, attach a copy of the ordinance or SOP.

2. If you are not a new permittee, has the ordinance (or SOP) been submitted to DEP with a letter from an official, engineer or solicitor that certifies the enactment of an ordinance or SOP for PCSM activities?  Yes  No

3. Do you have authority to take enforcement action for failure to properly operate and maintain stormwater practices/facilities?  Yes  No

**BMP #5: Develop and implement measures to encourage and expand the use of Low Impact Development (LID) in new and redevelopment. Measures also should be included to encourage retrofitting LID into existing development. DEP's Pennsylvania Stormwater Best Management Practices Manual provides guidance on implementing LID practices.**

**Measurable Goal:** *In your inventory of development and redevelopment projects authorized for construction since March 10, 2003, that discharge stormwater to your regulated MS4s, indicate which projects incorporated LID practices and for each project list and track the BMPs that were used.*

**Measurable Goal:** *Enact ordinances consistent with LID practices and repeal sections of ordinances that conflict with LID practices. Progress with enacting and updating your ordinances to enable the use of LID practices shall be summarized in the periodic reports.*

1. Identify ordinances enacted or updated during the reporting period to ensure consistency with LID practices:

New ordinances were not enacted during the reporting period. Existing Storm Water Management ordinances encourage low impact development approaches. The Marshall Township website provides links to the Township's Chapter 165 Stormwater Ordinance and Appendices and Chapter 88 Rules and Regulations for Grading and Excavating.

**BMP 6: Ensure adequate operation and maintenance of all post-construction stormwater management BMPs installed at all qualifying development or redevelopment projects (including those owned or operated by the permittee).**

**Measurable Goal:** *Within the first year of coverage under this permit, new permittees shall develop and implement a written inspection program to ensure that stormwater BMPs are properly operated and maintained. The program shall include sanctions and penalties for non-compliance. All permittees shall review and update the inspection program annually and shall continue to implement this BMP.*

**Measurable Goal:** *An inventory of PCSM BMPs shall be developed by permittees and shall be continually updated during the term of coverage under the permit as development projects are reviewed, approved, and constructed. This inventory shall include all PCSM BMPs installed since March 10, 2003 that discharge directly or indirectly to your regulated small MS4s. The inventory also should include PCSM BMPs discharging to the regulated small MS4 system that may cause or contribute to violation of water quality standard. The inventory shall include:*

- *all PCSM BMPs that were installed to meet requirements in NPDES Permits for Stormwater Discharges Associated with Construction Activities approved since March 10, 2003;*
- *the exact location of the PCSM BMP (e.g., street address);*
- *information (e.g., name, address, phone number(s)) for BMP owner and entity responsible for BMP Operation and Maintenance (O&M), if different from BMP owner;*
- *the type of BMP and the year it was installed;*
- *maintenance required for the BMP type according to the Pennsylvania Stormwater BMP Manual or other manuals and resources;*
- *the actual inspection/maintenance activities for each BMP;*
- *an assessment by the permittee if proper operation and maintenance occurred during the year and if not, what actions the permittee has taken, or shall take, to address compliance with O&M requirements.*

1. For new permittees only, attach the written inspection program to ensure that stormwater BMPs are properly operated and maintained.

2. If you are not a new permittee, did you complete and submit your written inspection program to ensure that stormwater BMPs are properly operated and maintained to DEP?  Yes  No

If Yes, provide the latest submission date: **See Attachment for MCM #5 titled "Pollution Prevention Good House Keeping Plan, Appendix D".**

3. How do you ensure that stormwater BMPs are properly operated and maintained? Explain if you rely on means other than municipal inspections to ensure adequate O&M (consistent with your stormwater ordinance).

**Privately owned systems are required to enter into a Recorded Stormwater Management Plan Maintenance Agreement with the Township. An example SWM Agreement is located in Attachment MCM #5. The Township inspects and maintains the Township owned systems.**

4. Date that inspection program was last reviewed or updated: **6/2015**

5. Total number of sites with PCSM BMPs installed as of the date of this report: **56**

6. Total number of sites inspected during this reporting period: **15**
7. Number of sites found to have PCSM BMP deficiencies: **0**
8. Number of enforcement actions taken during this reporting period: **0**

## MCM #6 – POLLUTION PREVENTION / GOOD HOUSEKEEPING

**BMP #1:** Identify and document all facilities and activities that are owned or operated by the permittee and have the potential for generating stormwater runoff to the regulated small MS4. This includes activities conducted by contractors for the permittee. Activities may include the following: street sweeping; snow removal/deicing; inlet/outfall cleaning; lawn/grounds care; general storm sewer system inspections and maintenance/repairs; park and open space maintenance; municipal building maintenance; new construction and land disturbances; right-of-way maintenance; vehicle operation, fueling, washing and maintenance; and material transfer operations, including leaf/yard debris pickup and disposal procedures. Facilities can include streets; roads; highways; parking lots and other large paved surfaces; maintenance and storage yards; waste transfer stations; parks; fleet or maintenance shops; wastewater treatment plants; stormwater conveyances (open and closed pipe); riparian buffers; and stormwater storage or treatment units (e.g., basins, infiltration/filtering structures, constructed wetlands, etc.).

**Measurable Goal:** *By the end of the first year of permit coverage, new permittees shall identify and document all types of municipal operations, facilities and activities and land uses that may contribute to stormwater runoff within areas of municipal operations that discharge to the regulated small MS4. Renewal permittees should have completed this list during the previous permit term. For all permittees, this information shall be reviewed and updated each year of permit coverage, as needed. Part of this effort shall include maintaining a basic inventory of various municipal operations and facilities.*

1. Have you identified all facilities and activities owned and operated by the permittee that have the potential to generate stormwater runoff into the MS4?  Yes  No
2. When was the inventory last reviewed? **6/2015**
3. When was it last updated? **6/2015**
4. How many new facilities and/or activities were added to this inventory during this reporting period? **0**

**BMP #2:** Develop, implement and maintain a written operation and maintenance (O&M) program for all municipal operations and facilities that could contribute to the discharge of pollutants from the regulated small MS4s, as identified under BMP #1. This program (or programs) shall address municipally owned stormwater collection or conveyance systems, but could include other areas (as identified under BMP #1). The O&M program(s) should stress pollution prevention and good housekeeping measures, contain site-specific information, and address the following areas:

- Management practices, policies, procedures, etc. shall be developed and implemented to reduce or prevent the discharge of pollutants to your regulated small MS4s. You should consider eliminating maintenance-area discharges from floor drains and other drains if they have the potential to discharge to storm sewers.
- Maintenance activities, maintenance schedules, and inspection procedures to reduce the potential for pollutants to reach your regulated small MS4s. You also should review your procedures for maintaining your stormwater BMPs.
- Controls for reducing or eliminating the discharge of pollutants from streets, roads, highways, municipal parking lots, maintenance and storage yards, waste transfer stations, fleet or maintenance shops with outdoor storage areas, and salt / sand (anti-skid) storage locations and snow disposal areas.
- Procedures for the proper disposal of waste removed from your regulated small MS4s and your municipal operations, including dredge spoil, accumulated sediments, trash, household hazardous waste, used motor oil, and other debris.

**Measurable Goal:** *During the first year of permit coverage, new permittees shall develop and implement a written O&M program that complies with BMPs #1 and #2. Renewal permittees shall continue to implement their existing program. All permittees shall review the O&M program annually, edit as necessary, and continue to implement during every year of permit coverage.*

1. For new permittees only, attach the written O&M program to the first Annual Report.

2. If you are not a new permittee, did you complete and submit your written O&M program to DEP?  Yes  No  
If Yes, provide the latest submission date: **See the Pollution Prevention / Good Housekeeping Plan in the Attachment for MCM #6.**

3. Date of last review or update to O&M program: **6/2015**

**BMP #3: Develop and implement an employee training program that addresses appropriate topics to further the goal of preventing or reducing the discharge of pollutants from municipal operations to your regulated small MS4s. The program may be developed and implemented using guidance and training materials that are available from federal, state or local agencies, or other organizations. Any municipal employee or contractor shall receive training. This could include public works staff, building / zoning / code enforcement staff, engineering staff (on-site and contracted), administrative staff, elected officials, police and fire responders, volunteers, and contracted personnel. Training topics should include operation, inspection, maintenance and repair activities associated with any of the municipal operations / facilities identified under BMP #1. Training should cover all relevant parts of the permittee's overall stormwater management program that could affect municipal operations, such as illicit discharge detection and elimination, construction sites, and ordinance requirements.**

**Measurable Goal:** *During the first year of permit coverage, new permittees shall develop and implement a training program that identifies the training topics that will be covered, and what training methods and materials will be used. Renewal permittees shall continue to operate under their existing program. All permittees shall review the training program annually, edit it as necessary, and continue to implement it during every year of permit coverage.*

**Measurable Goal:** *Your employee training shall occur at least annually (i.e., during each permit coverage year) and shall be fully documented in writing and reported in your periodic reports. Documentation shall include the date(s) of the training, the names of attendees, the topics covered, and the training presenter(s).*

1. For new permittees only, attach the written training program to the first Annual Report.
2. If you are not a new permittee, did you complete and submit your written training program to DEP?  Yes  No  
If Yes, provide the latest submission date:
3. Date of last review or update to training program: **6/2015**
4. Identify the date(s) of employee training, the names of attendees, the topics covered, and the training presenters:  
**On 6/10/15, Bruce Dickson, Director of Public Works, provided training to the public works staff. See Attachment MCM #6 for the presentation.**

**BEST MANAGEMENT PRACTICES (BMPs)**

Provide an assessment of the appropriateness of the BMPs implemented to date, and identify any steps that will be taken to address deficiencies in the BMPs or make changes to BMPs or other aspects of the SWMP developed by the permittee.

**The program is working as designed. The Township works closely with the Allegheny County Conservation District to manage MS4 construction controls and permits. The Township's stormwater ordinance was updated in 2008 and approved by the PA DEP.**

MS4 TMDL Plan	Chesapeake Bay Pollutant Reduction Plan (CBPRP)
Is the permittee required to develop an MS4 TMDL Plan? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Is the permittee required to develop a CBPRP? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
What is the status of the TMDL Design Details (if applicable)? <input type="checkbox"/> Under Development (Due Date:        ) <input type="checkbox"/> Submitted to DEP (Submission Date:        ) <input type="checkbox"/> Approved by DEP (Approval Date:        )	What is the status of the CBPRP (if applicable)? <input type="checkbox"/> Under Development (Due Date:        ) <input type="checkbox"/> Submitted to DEP (Submission Date:        ) <input type="checkbox"/> Approved by DEP (Approval Date:        )

For permittees with DEP-approved MS4 TMDL Plans and/or CBPRPs, describe progress with implementing BMPs and other activities identified in those plans:

For permittees with DEP-approved MS4 TMDL Plans and/or CBPRPs, complete the section below. Identify the required pollutant reductions (for those with MS4 TMDL Plans) or pollutant reductions committed to by the permittee (for those with CBPRPs) and the cumulative reductions achieved through implementing the BMPs, as of the end of the reporting period:



### OTHER REQUIRED REPORT ELEMENTS

Identify the progress towards achieving the statutory requirements of reducing the discharge of pollutants to the Maximum Extent Practicable (MEP) and complying with water quality standards.

**Progress will be measured through the improvement of public information & outreach programs, continuing to work with the Allegheny County Conservation District to manage NPDES Permit activities and updating the PCSM BMP Inspection Program.**

Provide a summary of stormwater activities planned during the next reporting cycle (not identified previously in this report):

Provide a summary of notices, intergovernmental agreements and other relevant documents if the permittee is relying on another governmental entity to satisfy any of its permit obligations

**There is an agreement with the Allegheny County Conservation District for NPDES Construction Discharge Permit review and site inspections.**

**CERTIFICATION**

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowledge of violations. See 18 Pa. C.S. § 4904 (relating to unsworn falsification).

Neil D. McFadden, Manager Marshall Township



Name of Responsible Official

Signature

724-935-3090

6/15/2015

Telephone No.

Date

Attachment

for

MCM #1 Public Education and Outreach on Storm Water Impacts

## Municipal Separate Storm Sewer Systems or MS4s

### What is an MS4?

Stormwater runoff is commonly transported through Municipal Separate Storm Sewer Systems (MS4s), from which it is often discharged untreated into local waterways. These storm sewer systems are:

- Owned by a state, city, town or other public entity that discharges to waters of the U.S.;
- Designed or used to collect or convey stormwater (including storm drains, pipes and ditches);
- Not a combined sewer (which carries stormwater and sewage); and
- Not part of a Publicly Owned Treatment Works (sewage treatment plant).

To prevent harmful pollutants from being washed or dumped into an MS4, operators must obtain a National Pollutant Discharge Elimination System (NPDES) permit and develop a stormwater management program.

### What is included in an MS4 Program?

Listed below are the six minimum control measures that operators of regulated small MS4s must incorporate into stormwater management programs. These measures are expected to result in significant reductions of pollutants discharged into receiving waterbodies.

- **Public Education and Outreach** - An informed and knowledgeable community is crucial to the success of a stormwater management program, since it helps to ensure greater support and program compliance as the public becomes aware of individual actions they can take to protect or improve the quality of area waters.
- **Public Participation/Involvement** - An active and involved community allows for broader public support, a broader base of expertise and a connection to other local environmental programs.
- **Illicit Discharge Detection and Elimination** – Illicit discharges are untreated discharges that could contribute high levels of pollutants, including heavy metals, toxics, oil and grease, solvents, nutrients, viruses and bacteria to receiving waterbodies. Operators of a regulated small MS4 are required to develop, implement and enforce an illicit discharge detection and elimination program.
- **Construction Site Runoff Control** - Stormwater runoff from construction activities can have a significant impact on water quality. As stormwater flows over a construction site, it can pick up pollutants like sediment, debris, and chemicals and transport these to a nearby storm sewer system or directly to a river, lake or stream.

- **Post-Construction Runoff Control** - Increased impervious surfaces, like parking lots, driveways, and rooftops, interrupt the natural cycle of gradual percolation of water through vegetation and soil. Instead, water is collected from surfaces such as asphalt and concrete and routed to drainage systems where large volumes of runoff quickly flow to the nearest receiving water. The effects of this process can include stream bank scouring and downstream flooding, which often lead to a loss of aquatic life and damage to property. Ordinances and other regulations are required to determine the appropriate best management practices and to ensure adequate long-term operation and maintenance of storm water controls.
- **Pollution Prevention/Good Housekeeping** – This measure involves recognizing the benefits of pollution prevention practices and includes the development and implementation of an operation and maintenance program. Reducing pollutant runoff from municipal operations into the storm sewer system can include employee training on how to incorporate pollution prevention/good housekeeping techniques into municipal operations. These controls could also include programs that promote recycling (to reduce litter), minimize pesticide use and ensure the proper disposal of animal waste.

# Illicit Discharges

## What is an illicit discharge?

EPA defines illicit discharges in general as any discharge into a storm drain system that is not composed entirely of stormwater. The exceptions include water from fire fighting activities, discharges from de-chlorinated waterlines, fire hydrant flushing and discharges from facilities already under an NPDES Permit.

## Why are illicit discharges a problem?

Illicit discharges are a problem because unlike wastewater, which flows to a wastewater treatment plant, stormwater generally flows to waterways without any additional treatment. Illicit discharges often include pathogens, nutrients, surfactants, and various toxic pollutants.

## What are examples of illicit discharges?

Illicit discharges are activities that may allow for waste water to enter into a storm drain, ditch, or waterway, for example:

- Motor vehicle fluid spills or illegal disposal into a storm drain
- Improper disposal of household or other hazardous materials, including paints & stains
- Vehicle wash water from loading areas in the vicinity of storm drain inlets
- Improper storage of oil, pesticides, dirt, or fertilizers
- Leaking dumpsters
- Improper pet waste disposal
- Erosion of dirt or landscaping materials being swept into a storm drain or water body (including from construction sites)
- Damaged sanitary sewer lines or sewer cross connections to stormwater systems
- Septic system failure

Examples of what you might see that result from illicit discharges:

- Oily/greasy sheen in the stream water
- Foamy/soapy water in the waterway
- Muddied water from sediment and dirt
- Discoloration of water
- Overflowing manholes



## How to Report an Illicit Discharge

If you encounter what you suspect to be an illicit discharge during normal business hours (weekdays from 8:00 a.m. to 4:30 p.m.) please notify: Bill Campbell, Manager of the Marshall Township Municipal Sanitary Authority at 724-935-3090.

**For emergency situations that include hazardous waste spills, spills of raw sewage, gasoline, or other hazardous materials, dial 911.**

## What is Storm Water?

Storm water is water from precipitation that flows across the ground and pavement when it rains or when snow and ice melt. The water seeps into the ground or drains into what we call storm sewers. These are the drains you see at street corners or at low points on the sides of streets. Collectively, the draining water is called storm water runoff.

## Why is Storm Water "Good Rain Gone Wrong?"

Storm water becomes a problem when it picks up debris, chemicals, dirt, and other pollutants as it flows or when it causes flooding and erosion of stream banks. Storm water travels through a system of pipes and roadside ditches that make up storm sewer systems. It eventually flows directly to a lake, river, stream, wetland, or coastal water. All of the pollutants storm water carries along the way empty into our waters, too, because storm water does not get treated!



**Pet wastes left on the ground get carried away by storm water, contributing harmful bacteria, parasites and viruses to our water.**



**Vehicles drip fluids (oil, grease, gasoline, antifreeze, brake fluids, etc.) onto paved areas where storm water runoff carries them through our storm drains and into our water.**



**Chemicals used to grow and maintain beautiful lawns and gardens, if not used properly, can run off into the storm drains when it rains or when we water our lawns and gardens.**

**Waste from chemicals and materials used in construction can wash into the storm sewer system when it rains. Soil that erodes from construction sites causes environmental degradation, including harming fish and shellfish populations that are important for recreation and our economy.**



## Where To Go To Continue the Information Flow

Your community is preventing storm water pollution through a storm water management program. This program addresses storm water pollution from construction, new development, illegal dumping to the storm sewer system, and pollution prevention and good housekeeping practices in municipal operations. It will also continue to educate the community and get everyone involved in making sure the only thing that storm water contributes to our water is . . . water! Contact your community's storm water management program coordinator or the Pennsylvania Department of Environmental Protection for more information about storm water management.



Pennsylvania Department of Environmental Protection  
www.dep.state.pa.us

1. **Ditch** – Part of the storm sewer system. Most people think that the system is just a series of underground pipes. It can also include ditches used to convey storm water from the land to a receiving lake, river, or stream.
2. **Fire Hydrant** – Not part of the storm sewer system. Water sprayed from fire hydrants is not storm water, but is allowed by law to enter the storm sewer system.
3. **Curb with Storm Drain Inlet** – Part of the storm sewer system. Many people do not realize that this is an opening leading to the storm sewer system. Anything going into this inlet (e.g., trash, leaves, improperly disposed of hazardous materials) travel directly to a receiving lake, river, or stream without being treated first. Many communities stencil storm drains with "Do Not Dump" messages to let people know.
4. **Storm Sewer Outfall** – Part of the storm sewer system. An outfall is where storm water drains from the storm sewer system into a receiving lake, stream, or river. If there is a flow from an outfall when it isn't raining, there could be a problem with the system or someone has used a storm drain for illegally disposing of materials.
5. **Toilet** – Not part of the storm sewer system. Wastewater from sinks and toilets in houses and businesses travel through a sewer system constructed to carry sanitary wastes. In some instances, older communities may have a combined sewer system designed to carry both storm water and sanitary waste.
6. **Septic System** – Not part of the storm sewer system. Homeowners use septic tanks to manage sanitary wastes on-site. Improperly maintained septic systems can leak and contribute pollutants to the storm sewer system, as well as directly to lakes, rivers, and streams.
7. **Roads and Other Paved Areas** – Not part of the storm sewer system. Roads and other hardened surfaces such as parking lots and sidewalks can accumulate pollutants (e.g., oil, grease, dirt, leaves, pet wastes) that storm water eventually washes into the storm sewer system.
8. **Storm Drain Inlet** – Part of the storm sewer system. This is another example of what a storm drain may look like. Like the storm drain inlet shown in picture #3, anything that enters this drain will go directly to streams, rivers, and lakes without being treated first. It is important to recognize this as a storm drain to prevent it from being used as a trash can.

## Answers to Test Your Storm Sewer System Savvy:

# When It Rains, It Drains

Understanding Storm Water and How It Can Affect Your Money, Safety, Health, and the Environment



## What Happens When It Rains?

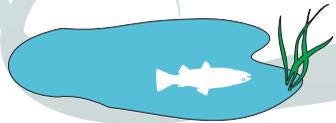


Rain is an important part of nature's water cycle, but there are times it can do more damage than good. Problems related to storm water runoff can include:



**Flooding caused by too much storm water flowing over hardened surfaces such as roads and parking lots, instead of soaking into the ground.**

**Increases in spending on maintaining storm drains and the storm sewer system that become clogged with excessive amounts of dirt and debris.**



**Decreases in sportfish populations because storm water carries sediment and pollutants that degrade important fish habitat.**

**More expensive treatment technologies to remove harmful pollutants carried by storm water into our drinking water supplies.**



**Closed beaches due to high levels of bacteria carried by storm water that make swimming unsafe.**

We can help rain restore its good reputation while protecting our health and environment while saving money for ourselves and our community. Keep reading to find out how...

## Test Your Storm Sewer System Savvy!



What does the storm sewer system look like in your community? See if you can identify which pictures are part of the storm sewer system. (Answers are on the back.)



## Restoring Rain's Reputation: What Everyone Can Do To Help

Rain by nature is important for replenishing drinking water supplies, recreation, and healthy wildlife habitats. It only becomes a problem when pollutants from our activities like car maintenance, lawn care, and dog walking are left on the ground for rain to wash away. Here are some of the most important ways to prevent storm water pollution:

- Properly dispose of hazardous substances such as used oil, cleaning supplies and paint—never pour them down any part of the storm sewer system and report anyone who does.
- Use pesticides, fertilizers, and herbicides properly and efficiently to prevent excess runoff.
- Look for signs of soil and other pollutants, such as debris and chemicals, leaving construction sites in storm water runoff or tracked into roads by construction vehicles. Report poorly managed construction sites that could impact storm water runoff to your community. (See the back of this brochure for contact information.)
- Install innovative storm water practices on residential property, such as rain barrels or rain gardens, that capture storm water and keep it on site instead of letting it drain away into the storm sewer system.
- Report any discharges from storm water outfalls during times of dry weather—a sign that there could be a problem with the storm sewer system.
- Pick up after pets and dispose of their waste properly. No matter where pets make a mess—in a backyard or at the park—storm water runoff can carry pet waste from the land to the storm sewer system to a stream.
- Store materials that could pollute storm water indoors and use containers for outdoor storage that do not rust or leak to eliminate exposure of materials to storm water.



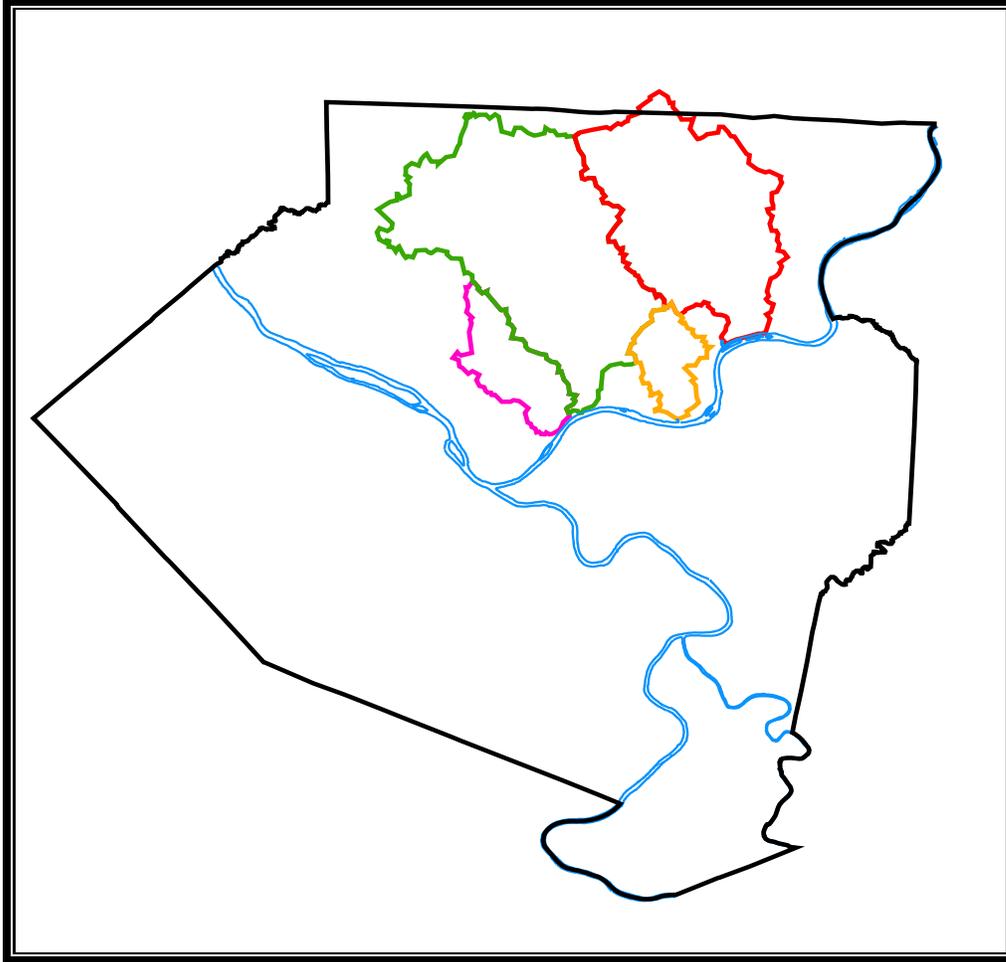
## 10 Things You Can Do to Prevent Stormwater Runoff Pollution

- Use fertilizers sparingly and sweep up driveways, sidewalks, and roads
- Never dump anything down storm drains
- Vegetate bare spots in your yard
- Compost your yard waste
- Avoid pesticides; learn about Integrated Pest Management (IPM)
- Direct downspouts away from paved surfaces
- Take your car to the car wash instead of washing it in the driveway
- Check car for leaks, and recycle motor oil
- Pick up after your pet
- Have your septic tank pumped and system inspected regularly

For more information, visit

[www.epa.gov/npdes/stormwater](http://www.epa.gov/npdes/stormwater)

**Small Project  
Standardized Stormwater Management Planning Guidance**



**Act 167 Stormwater Management Plan Update  
Girtys Runs, Pine Creek, Squaw Run and Deer Creek Watersheds  
Allegheny County, Pennsylvania**

**Prepared By  
Art Gazdik, P.E.**

April 28, 2008

## Standardized Stormwater Management Planning Guidance For Small Projects

### **Applicability**

These criteria may be used to develop a stormwater management (SWM) plan for a small projects, having a disturbed area of less than 5000 square feet, in an area where a comprehensive subdivision SWM plan has not been planned or constructed. It is not to be used to plan for multiple lots without the written approval of the Municipal Engineer.

This guidance may not be appropriate for all locations (e.g., in areas on or adjacent to steep slopes, in areas on or adjacent to fill slopes, in areas having unsuitable soil conditions (e.g., clayey soils) or in areas having a high water table). The Municipal Building Inspector or Engineer may require that a more detailed stormwater management plan be prepared by a qualified design professional if, in their opinion, unusual site conditions exist.

These standardized SWM facilities, if properly sized and installed, should provide the water quality volume, infiltration volume and extended detention protections required by the municipality's SWM Ordinance. These standardized facilities are not specifically sized to provide for the peak flow reduction requirement, if any, but will generally provide peak flow control of storm events that do not exceed a 10 year – 24 hour return period.

### **What are the Standardized SWM facilities?**

The Standardized SWM facilities (Standardized BMPs) are a set of three methods, or best management practices (BMPs), that have been selected because of their potential for being sited on individual residential lots. Each of the methods has been sized using a specific set of design assumptions. A list of the Standardized SWM facilities and the basic design assumptions used are outlined below. A more detailed set of the design assumptions used to size the Standardized SWM facilities is provided later in this Guide. It is the Applicant's responsibility to verify that the assumptions are appropriate for the subject property. Construction details and more detailed information about the design installation and maintenance requirements for each of the facilities are also provided later in this document.

SWM Facility Name	Basic Design Assumptions		
Bioretention	4' Filter Bed Depth	0.5' Ponding Depth	Drain Time = 2 Days
Rock Sump	4' Rock Depth		
Porous Pavement	2' Gravel Depth	0.32 Gravel Porosity	Fill Time = 2 Hours

### **What is required?**

- A. Install "Stormwater Management Facilities (BMPs)" to reduce downstream flooding and protect the water quality of our streams.
- B. Install erosion and sedimentation control devices during construction to keep silt and sediment from washing into the storm sewers, ditches or streams on or adjacent to the site.
- C. Properly record a maintenance agreement to insure the continued maintenance and protection of the SWM facilities.

**When is it required?**

Applicants will be required to file a SWM plan with their building permit or land disturbance / grading permit application as per the municipality's requirements.

**Are professional services required?**

Yes, the SWM facilities must be designed by a licensed professional engineer or other Qualified Professional experienced in the design of stormwater management.

**Are the Standardized SWM facilities in this Guide required?**

No, any SWM facilities meeting the municipality's Stormwater Management Regulations will be acceptable.

**How should this Guide be used?****Step 1 – Determine the Impervious Area and the Disturbed Area**

Calculate the following:

1. The total area in square feet of roofs, driveways, sidewalks, paved areas and any other impervious surfaces proposed for the lot.
2. The total area in square feet of the lot that is to be disturbed. "Disturbed Area" is all area that is to be stripped of natural vegetation and converted to lawn, roof, pavement, sidewalk or driveway.

**Step 2 – Determine the required surface area of the Standardized BMPs**

Go to the Determination of SWM Facility Sizing Tables (Disturbed Area Table) and find the table that is titled with a "Disturbed Area = [Value] SF" where [Value] is equal to or greater than the proposed "Disturbed Area" for the lot. For example, if the lot will have a disturbed area of 2200 SF, use the table titled "Disturbed Area = 2500 SF or Less" as shown below.

Using the correct Disturbed Area Table, determine the sizing of the standardized SWM facility or facilities to be used, using the area in square feet of **all** impervious surface tributary to the SWM facility or facilities. This area is referred to as "Area Impervious" on the Table and is found in Column "1".

Go down Column "1" to the "Area Impervious" value that is greater than or equal to the impervious area tributary to the SWM facilities. For example, if it is determined that the total area of all roof and pavements tributary to the SWM facilities will be 1921 square feet (SF), use a value of 2000 square feet to determine the SWM facility sizing for the three standardized best management practices provided in Columns 3, 4 and 5 of the table. NOTE: If runoff from existing impervious areas will also be tributary to the SWM facilities, that area must also be included in the calculations.

For this example where the Disturbed Area is 2200 SF and the Area Impervious is 1921 SF, the surface area (foot print size) of the Standardized BMP Options provided are:

Column 3 - Bioretention Surface Area = 151 SF

Column 4 – Rock Sump Foot Print = 212.5 SF

Column 5 – Porous Pavement Surface Area = 222 SF

1		2		3		4		5		
Area Impervious (Square Feet)	Area Impervious (acre)	Disturbed Area (Square Feet)	Disturbed Area (acre)	Percent Impervious (%)	Volumetric Runoff Coefficient (Rv)	Water Quality Volume (acre - feet)	Water Quality Volume (cubic feet)	Bioretention Surface Area (Square Feet)	Rock Sump Surface Foot Print (Square Feet)	Porous Pavement Surface Area (Square Feet)
250	0.005739	0.0573921	2500	10.00%	0.1400	0.0006896	29	27	26.6	40
300	0.006887	0.0573921	2500	12.00%	0.1580	0.0007557	33	31	31.9	46
400	0.009183	0.0573921	2500	16.00%	0.1940	0.0009278	40	38	42.5	56
500	0.011478	0.0573921	2500	20.00%	0.2300	0.0011000	48	45	53.1	66
600	0.013774	0.0573921	2500	24.00%	0.2660	0.0012722	55	52	63.8	77
700	0.016070	0.0573921	2500	28.00%	0.3020	0.0014444	63	59	74.4	87
800	0.018365	0.0573921	2500	32.00%	0.3380	0.0016165	70	66	85.0	97
900	0.020661	0.0573921	2500	36.00%	0.3740	0.0017887	78	73	95.6	108
1000	0.022957	0.0573921	2500	40.00%	0.4100	0.0019609	85	80	106.3	118
1100	0.025253	0.0573921	2500	44.00%	0.4460	0.0021331	93	87	116.9	128
1200	0.027548	0.0573921	2500	48.00%	0.4820	0.0023052	100	95	127.5	139
1300	0.029844	0.0573921	2500	52.00%	0.5180	0.0024774	108	102	138.1	149
1400	0.032140	0.0573921	2500	56.00%	0.5540	0.0026496	115	109	148.8	160
1500	0.034435	0.0573921	2500	60.00%	0.5900	0.0028218	123	116	159.4	170
1600	0.036731	0.0573921	2500	64.00%	0.6260	0.0029940	130	123	170.0	180
1700	0.039027	0.0573921	2500	68.00%	0.6620	0.0031661	138	130	180.6	191
1800	0.041322	0.0573921	2500	72.00%	0.6980	0.0033383	145	137	191.3	201
1900	0.043618	0.0573921	2500	76.00%	0.7340	0.0035105	153	144	201.9	211
2000	0.045914	0.0573921	2500	80.00%	0.7700	0.0036827	160	151	212.5	222
2100	0.048209	0.0573921	2500	84.00%	0.8060	0.0038548	168	158	223.1	232
2200	0.050505	0.0573921	2500	88.00%	0.8420	0.0040270	175	165	233.8	243
2300	0.052801	0.0573921	2500	92.00%	0.8780	0.0041992	183	172	244.4	253
2400	0.055096	0.0573921	2500	96.00%	0.9140	0.0043714	190	179	255.0	263
2500	0.057392	0.0573921	2500	100.00%	0.9500	0.0045435	198	186	265.6	274

Figure -Example Table "Determination of SWM Facility Sizing (Disturbed Area Table)

Applicants may use a single option to satisfy the SWM requirements or a combination of options.

For example, a single type of facility, say Bioretention, could be installed as set forth below:

SWM Facility Type	Total Required (SF)	Actual SF Installed (SF)	Percentage of SWM Requirement (%)
Bioretention	151	151	100%
Rock Sump	212.5	0	0%
Porous Pavement	222	0	0%
			100%

or multiple SWM facility types could be proposed:

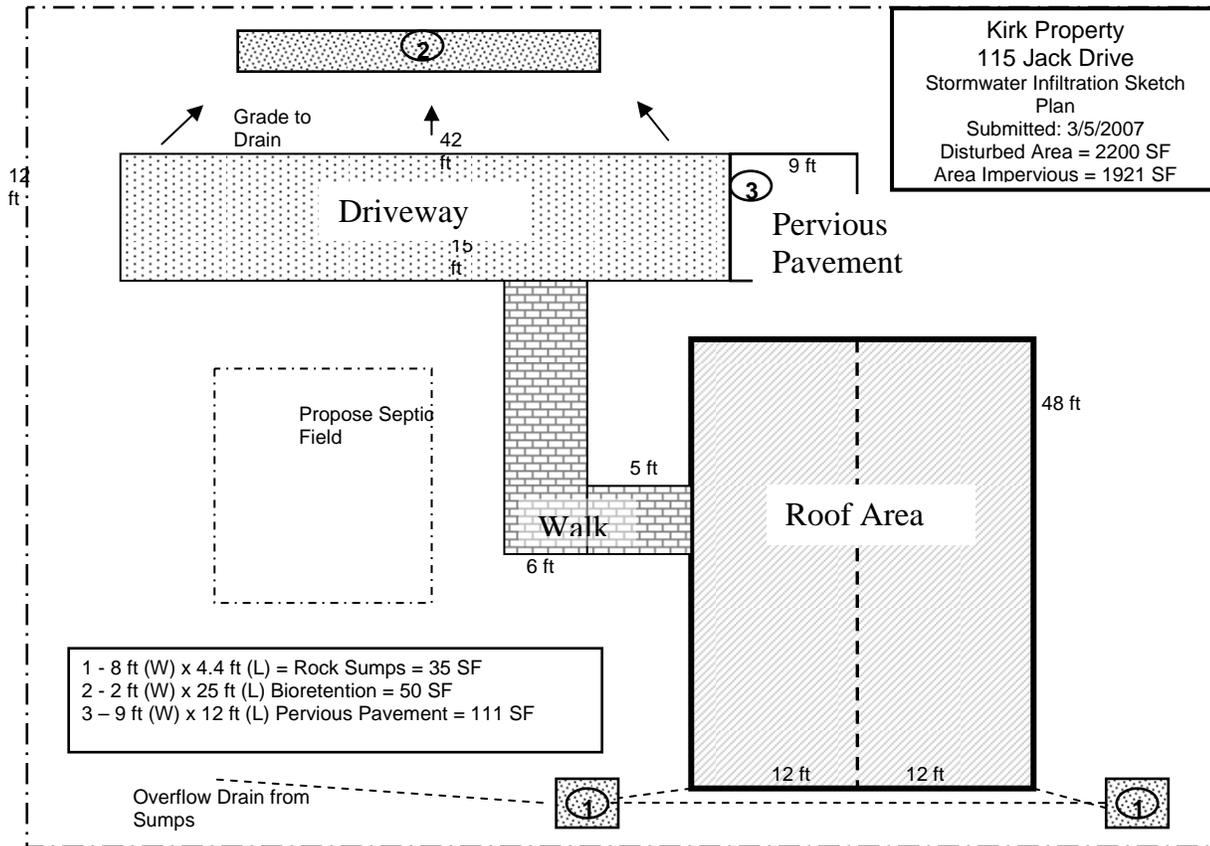
SWM Facility Type	Total Required (SF)	Actual SF Installed (SF)	Percentage of SWM Requirement (%)
Bioretention	151	50	33%
Rock Sump	212.5	35	16%
Porous Pavement	222	111	50%
			100%

**Step 3 – Preparing the SWM Site Plan**

Applicants shall submit three (3) copies of a plot plan survey or site plan drawn on a single sheet no larger than 8 1/2" x 14" (or folded to 8 1/2" x 11") containing all of the following information. (Submission of one plan showing existing conditions and a second plan(s) showing proposed work generally will not be acceptable.)

- 1) Name and address of owner(s).
- 2) Lot number, name of subdivision, size of lot, street address, scale, date.
- 3) North arrow.
- 4) All existing and proposed structures, including accessory structures, additions, driveways, decks, patios, utilities, storm sewers, sanitary sewers including laterals, fresh-air vents and cleanouts, storm water sumps, swimming pools and sports courts with all dimensions. When the existing sewer lateral is within the limit of disturbance, the site plan must show its exact location based on existing records. When no such records exist, laterals shall be located using underground pipe locator equipment.
- 5) Setback distances from all property lines. Building lines must be shown.
- 6) The distance and direction to the nearest intersection.
- 7) Existing topography by two-foot (2') contours and all proposed grading clearly delineated to distinguish between existing and proposed grades and the datum upon which the grades are based.
- 8) The limits, type and degree of risk as shown on any Hazard Maps that the municipality has available.
- 9) Shading, coloring, cross-hatching, etc. between contour lines to clearly distinguish the areas of Steep Slopes (15% - 25%) and Very Steep Slopes (25%+).
- 10) The PRECISE "Limit of Disturbance" and the area thereof.
- 11) All right-of-ways, easements, streams or ponds.
- 12) The location of all proposed utility lines and the associated "Limit of Disturbance".
- 13) The method of stormwater management in accordance with the requirements set forth in the municipality's Stormwater Management Regulations. The applicant shall include two (2) copies of the design criteria and method of stormwater management with the application.
- 14) Soil erosion and sedimentation control measures.
- 15) A registered Engineer's or other Qualified Professionals seal.

A simple example site plan is provided on the next below.



#### **Step 4 – Submitting the SWM Plan**

The following information shall be submitted with the application for a building permit or, if applicable, the Environmental Disturbance / Grading Permit:

- The Standardized SWM Permit Application
- A fully executed “Stormwater BMPs Operations and Maintenance Agreement”
- The SWM site plan.
- A copy of the “Guidance Sheet” for each type of BMP used.

#### **Step 5 – Installing the Standardized BMPs**

Insure that each SWM facility is installed as per the requirements of the “Guidance Sheet” for the type(s) of facilities proposed.

#### **Step 6 – Understanding your maintenance responsibilities**

In order to insure that the BMPs will continue to be protected and properly maintained, applicants will be required to enter into a “Stormwater Best Management Practices Operations and Maintenance Agreement”. A copy of the agreement is provided in the Appendix C of this document.

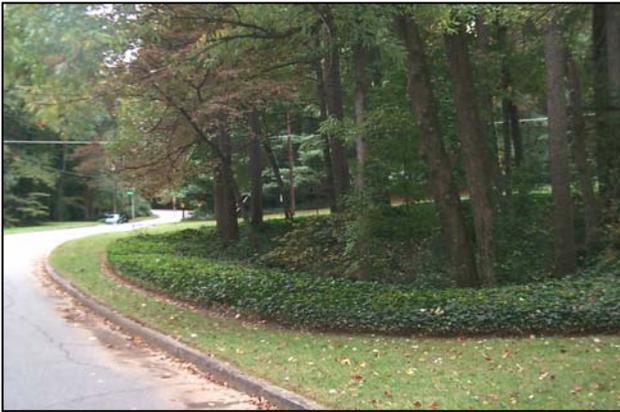
<b>Disturbed Area = 1000 SF or Less</b>										
<b>Determination of SWM Facility Sizing</b>				AG 3/3/7		<b>Bioretention Assumptions</b> k = 0.5 ft/day for silt loam df = filter bed depth = 4' hf = half of ponding depth = 0.25' tf = filter drain time = 2 days		<b>Rock Sump Assumptions</b> Assume 4' Sump Depth	<b>Porous Pavement Assumptions</b> n = porosity of gravel = 0.32 d = gravel depth = 2' k = percolation = 0.5 in/hour T = fill time = 2 hours	
Note: Disturbed area is all area that is to be stripped of natural vegetation and converted to lawn, roof, pavement, sidewalk or driveway.										
1			2					3	4	5
Area Impervious (Square Feet)	Area Impervious (acre)	Disturbed Area (acre)	Disturbed Area (Square Feet)	Percent Impervious (%)	Volumetric Runoff Coeficient (Rv)	Water Quality Volume (acre - feet)	Water Quality Volume (cubic feet)	Bioretention Surface Area (Square Feet)	Rock Sump Surface Foot Print (Square Feet)	Porous Pavement Surface Area (Square Feet)
250	0.005739	0.02295684	1000	25.00%	0.2750	0.0005261	23	22	NA	32
300	0.006887	0.02295684	1000	30.00%	0.3200	0.0006122	27	25	NA	37
400	0.009183	0.02295684	1000	40.00%	0.4100	0.0007844	34	32	42.5	47
500	0.011478	0.02295684	1000	50.00%	0.5000	0.0009565	42	39	53.1	58
600	0.013774	0.02295684	1000	60.00%	0.5900	0.0011287	49	46	63.8	68
700	0.016070	0.02295684	1000	70.00%	0.6800	0.0013009	57	53	74.4	78
800	0.018365	0.02295684	1000	80.00%	0.7700	0.0014731	64	60	85.0	89
900	0.020661	0.02295684	1000	90.00%	0.8600	0.0016452	72	67	95.6	99
1000	0.022957	0.02295684	1000	100.00%	0.9500	0.0018174	79	75	106.3	109

Disturbed Area = 2500 SF or Less						AG 3/3/7		Bioretention Assumptions		Rock Sump Assumptions	Pourous Pavement Assumptions
Determination of SWM Facility Sizing								k = 0.5 ft/day for silt loam df = filter bed depth = 4' hf = half of ponding depth = 0.25' tf = filter drain time = 2 days		Assume 4' Sump Depth	n = porosity of gravel = 0.32 d = gravel depth = 2' k = percolation = 0.5 in/hour T = fill time = 2 hours
Note: Disturbed area is all area that is to be stripped of natural vegetation and converted to lawn, roof, pavement, sidewalk or driveway.											
1			2					3	4	5	
Area Impervious (Square Feet)	Area Impervious (acre)	Disturbed Area (acre)	Disturbed Area (Square Feet)	Percent Impervious (%)	Volumetric Runoff Coefficient (Rv)	Water Quality Volume (acre - feet)	Water Quality Volume (cubic feet)	Bioretention Surface Area (Square Feet)	Rock Sump Surface Foot Print (Square Feet)	Pourous Pavement Surface Area (Square Feet)	
250	0.005739	0.0573921	2500	10.00%	0.1400	0.0006696	29	27	NA	40	
300	0.006887	0.0573921	2500	12.00%	0.1580	0.0007557	33	31	NA	46	
400	0.009183	0.0573921	2500	16.00%	0.1940	0.0009278	40	38	42.5	56	
500	0.011478	0.0573921	2500	20.00%	0.2300	0.0011000	48	45	53.1	66	
600	0.013774	0.0573921	2500	24.00%	0.2660	0.0012722	55	52	63.8	77	
700	0.016070	0.0573921	2500	28.00%	0.3020	0.0014444	63	59	74.4	87	
800	0.018365	0.0573921	2500	32.00%	0.3380	0.0016165	70	66	85.0	97	
900	0.020661	0.0573921	2500	36.00%	0.3740	0.0017887	78	73	95.6	108	
1000	0.022957	0.0573921	2500	40.00%	0.4100	0.0019609	85	80	106.3	118	
1100	0.025253	0.0573921	2500	44.00%	0.4460	0.0021331	93	87	116.9	128	
1200	0.027548	0.0573921	2500	48.00%	0.4820	0.0023052	100	95	127.5	139	
1300	0.029844	0.0573921	2500	52.00%	0.5180	0.0024774	108	102	138.1	149	
1400	0.032140	0.0573921	2500	56.00%	0.5540	0.0026496	115	109	148.8	160	
1500	0.034435	0.0573921	2500	60.00%	0.5900	0.0028218	123	116	159.4	170	
1600	0.036731	0.0573921	2500	64.00%	0.6260	0.0029940	130	123	170.0	180	
1700	0.039027	0.0573921	2500	68.00%	0.6620	0.0031661	138	130	180.6	191	
1800	0.041322	0.0573921	2500	72.00%	0.6980	0.0033383	145	137	191.3	201	
1900	0.043618	0.0573921	2500	76.00%	0.7340	0.0035105	153	144	201.9	211	
2000	0.045914	0.0573921	2500	80.00%	0.7700	0.0036827	160	151	212.5	222	
2100	0.048209	0.0573921	2500	84.00%	0.8060	0.0038548	168	158	223.1	232	
2200	0.050505	0.0573921	2500	88.00%	0.8420	0.0040270	175	165	233.8	243	
2300	0.052801	0.0573921	2500	92.00%	0.8780	0.0041992	183	172	244.4	253	
2400	0.055096	0.0573921	2500	96.00%	0.9140	0.0043714	190	179	255.0	263	
2500	0.057392	0.0573921	2500	100.00%	0.9500	0.0045435	198	186	265.6	274	

Disturbed Area = 5000 SF or Less			AG 3/3/7		Bioretention Assumptions		Rock Sump Assumptions	Porous Pavement Assumptions		
Determination of SWM Facility Sizing					k = 0.5 ft/day for silt loam df = filter bed depth = 4' hf = half of ponding depth = 0.25' tf = filter drain time = 2 days		Assume 4' Sump Depth	n = porosity of gravel = 0.32 d = gravel depth = 2' k = percolation = 0.5 in/hour T = fill time = 2 hours		
Note: Disturbed area is all area that is to be stripped of natural vegetation and converted to lawn, roof, pavement, sidewalk or driveway.										
1			2					3	4	5
Area Impervious (Square Feet)	Area Impervious (acre)	Disturbed Area (acre)	Disturbed Area (Square Feet)	Percent Impervious (%)	Volumetric Runoff Coefficient (Rv)	Water Quality Volume (acre - feet)	Water Quality Volume (cubic feet)	Bioretention Surface Area (Square Feet)	Rock Sump Surface Foot Print (Square Feet)	Porous Pavement Surface Area (Square Feet)
250	0.005739	0.11478421	5000	5.00%	0.0950	0.0009087	40	37	NA	55
300	0.006887	0.11478421	5000	6.00%	0.1040	0.0009948	43	41	NA	60
400	0.009183	0.11478421	5000	8.00%	0.1220	0.0011670	51	48	42.5	70
500	0.011478	0.11478421	5000	10.00%	0.1400	0.0013391	58	55	53.1	81
600	0.013774	0.11478421	5000	12.00%	0.1580	0.0015113	66	62	63.8	91
700	0.016070	0.11478421	5000	14.00%	0.1760	0.0016835	73	69	74.4	101
800	0.018365	0.11478421	5000	16.00%	0.1940	0.0018557	81	76	85.0	112
900	0.020661	0.11478421	5000	18.00%	0.2120	0.0020279	88	83	95.6	122
1000	0.022957	0.11478421	5000	20.00%	0.2300	0.0022000	96	90	106.3	132
1100	0.025253	0.11478421	5000	22.00%	0.2480	0.0023722	103	97	116.9	143
1200	0.027548	0.11478421	5000	24.00%	0.2660	0.0025444	111	104	127.5	153
1300	0.029844	0.11478421	5000	26.00%	0.2840	0.0027166	118	111	138.1	164
1400	0.032140	0.11478421	5000	28.00%	0.3020	0.0028887	126	118	148.8	174
1500	0.034435	0.11478421	5000	30.00%	0.3200	0.0030609	133	125	159.4	184
1600	0.036731	0.11478421	5000	32.00%	0.3380	0.0032331	141	133	170.0	195
1700	0.039027	0.11478421	5000	34.00%	0.3560	0.0034053	148	140	180.6	205
1800	0.041322	0.11478421	5000	36.00%	0.3740	0.0035774	156	147	191.3	215
1900	0.043618	0.11478421	5000	38.00%	0.3920	0.0037496	163	154	201.9	226
2000	0.045914	0.11478421	5000	40.00%	0.4100	0.0039218	171	161	212.5	236
2100	0.048209	0.11478421	5000	42.00%	0.4280	0.0040940	178	168	223.1	247
2200	0.050505	0.11478421	5000	44.00%	0.4460	0.0042661	186	175	233.8	257
2300	0.052801	0.11478421	5000	46.00%	0.4640	0.0044383	193	182	244.4	267
2400	0.055096	0.11478421	5000	48.00%	0.4820	0.0046105	201	189	255.0	278
2500	0.057392	0.11478421	5000	50.00%	0.5000	0.0047827	208	196	265.6	288
2600	0.059688	0.11478421	5000	52.00%	0.5180	0.0049549	216	203	276.3	298
2800	0.064279	0.11478421	5000	56.00%	0.5540	0.0052992	231	217	297.5	319
3000	0.068871	0.11478421	5000	60.00%	0.5900	0.0056436	246	231	318.8	340
3250	0.074610	0.11478421	5000	65.00%	0.6350	0.0060740	265	249	345.3	366
3500	0.080349	0.11478421	5000	70.00%	0.6800	0.0065044	283	267	371.9	392
3750	0.086088	0.11478421	5000	75.00%	0.7250	0.0069349	302	284	398.4	418
4000	0.091827	0.11478421	5000	80.00%	0.7700	0.0073653	321	302	425.0	444
4250	0.097567	0.11478421	5000	85.00%	0.8150	0.0077958	340	320	451.6	469
4500	0.103306	0.11478421	5000	90.00%	0.8600	0.0082262	358	337	478.1	495
4750	0.109045	0.11478421	5000	95.00%	0.9050	0.0086566	377	355	504.7	521
5000	0.114784	0.11478421	5000	100.00%	0.9500	0.0090871	396	373	531.3	547

Disturbed Area = 10,000 SF or Less						AG 3/3/7		Bioretention Assumptions		Rock Sump Assumptions	Pourous Pavement Assumptions
Determination of SWM Facility Sizing								k = 0.5 ft/day for silt loam df = filter bed depth = 4' hf = half of ponding depth = 0.25' tf = filter drain time = 2 days		Assume 4' Sump Depth	n = porosity of gravel = 0.32 d = gravel depth = 2' k = percolation = 0.5 in/hour T = fill time = 2 hours
Note: Disturbed area is all area that is to be stripped of natural vegetation and converted to lawn, roof, pavement, sidewalk or driveway.											
1			2					3	4	5	
Area Impervious (Square Feet)	Area Impervious (acre)	Disturbed Area (acre)	Disturbed Area (Square Feet)	Percent Impervious (%)	Volumetric Runoff Coefficient (Rv)	Water Quality Volume (acre - feet)	Water Quality Volume (cubic feet)	Bioretention Surface Area (Square Feet)	Rock Sump Surface Foot Print (Square Feet)	Pourous Pavement Surface Area (Square Feet)	
250	0.005739	0.22956841	10,000	2.50%	0.0725	0.0013870	60	57	NA	84	
300	0.006887	0.22956841	10,000	3.00%	0.0770	0.0014731	64	60	NA	89	
400	0.009183	0.22956841	10,000	4.00%	0.0860	0.0016452	72	67	42.5	99	
500	0.011478	0.22956841	10,000	5.00%	0.0950	0.0018174	79	75	53.1	109	
600	0.013774	0.22956841	10,000	6.00%	0.1040	0.0019896	87	82	63.8	120	
700	0.016070	0.22956841	10,000	7.00%	0.1130	0.0021618	94	89	74.4	130	
800	0.018365	0.22956841	10,000	8.00%	0.1220	0.0023339	102	96	85.0	141	
900	0.020661	0.22956841	10,000	9.00%	0.1310	0.0025061	109	103	95.6	151	
1000	0.022957	0.22956841	10,000	10.00%	0.1400	0.0026783	117	110	106.3	161	
1100	0.025253	0.22956841	10,000	11.00%	0.1490	0.0028505	124	117	116.9	172	
1200	0.027548	0.22956841	10,000	12.00%	0.1580	0.0030227	132	124	127.5	182	
1300	0.029844	0.22956841	10,000	13.00%	0.1670	0.0031948	139	131	138.1	192	
1400	0.032140	0.22956841	10,000	14.00%	0.1760	0.0033670	147	138	148.8	203	
1500	0.034435	0.22956841	10,000	15.00%	0.1850	0.0035392	154	145	159.4	213	
1600	0.036731	0.22956841	10,000	16.00%	0.1940	0.0037114	162	152	170.0	224	
1700	0.039027	0.22956841	10,000	17.00%	0.2030	0.0038835	169	159	180.6	234	
1800	0.041322	0.22956841	10,000	18.00%	0.2120	0.0040557	177	166	191.3	244	
1900	0.043618	0.22956841	10,000	19.00%	0.2210	0.0042279	184	173	201.9	255	
2000	0.045914	0.22956841	10,000	20.00%	0.2300	0.0044001	192	180	212.5	265	
2100	0.048209	0.22956841	10,000	21.00%	0.2390	0.0045722	199	187	223.1	275	
2200	0.050505	0.22956841	10,000	22.00%	0.2480	0.0047444	207	195	233.8	286	
2300	0.052801	0.22956841	10,000	23.00%	0.2570	0.0049166	214	202	244.4	296	
2400	0.055096	0.22956841	10,000	24.00%	0.2660	0.0050888	222	209	255.0	306	
2500	0.057392	0.22956841	10,000	25.00%	0.2750	0.0052609	229	216	265.6	317	
2600	0.059688	0.22956841	10,000	26.00%	0.2840	0.0054331	237	223	276.3	327	
2800	0.064279	0.22956841	10,000	28.00%	0.3020	0.0057775	252	237	297.5	348	
3000	0.068871	0.22956841	10,000	30.00%	0.3200	0.0061218	267	251	318.8	369	
3250	0.074610	0.22956841	10,000	32.50%	0.3425	0.0065523	285	269	345.3	395	
3500	0.080349	0.22956841	10,000	35.00%	0.3650	0.0069827	304	286	371.9	421	
3750	0.086088	0.22956841	10,000	37.50%	0.3875	0.0074131	323	304	398.4	446	
4000	0.091827	0.22956841	10,000	40.00%	0.4100	0.0078436	342	322	425.0	472	
4250	0.097567	0.22956841	10,000	42.50%	0.4325	0.0082740	360	339	451.6	498	
4500	0.103306	0.22956841	10,000	45.00%	0.4550	0.0087045	379	357	478.1	524	
4750	0.109045	0.22956841	10,000	47.50%	0.4775	0.0091349	398	375	504.7	550	
5000	0.114784	0.22956841	10,000	50.00%	0.5000	0.0095654	417	392	531.3	576	

# Guidance Sheet - Bioretention Areas



**Description:** Shallow stormwater basin or landscaped area that utilizes engineered soils and vegetation to capture and treat runoff.

### KEY CONSIDERATIONS

**DESIGN CRITERIA:**

- Maximum contributing drainage area of 5 acres
- Often located in “landscaping islands”
- Treatment area consists of grass filter, sand bed, ponding area, organic/mulch layer, planting soil, and vegetation
- Typically requires 5 feet of head

**ADVANTAGES / BENEFITS:**

- Applicable to small drainage areas
- Good for highly impervious areas, particularly parking lots
- Good retrofit capability
- Relatively low maintenance requirements
- Can be planned as an aesthetic feature

**DISADVANTAGES / LIMITATIONS:**

- Requires extensive landscaping
- Not recommended for areas with steep slopes

**MAINTENANCE REQUIREMENTS:**

- Inspect and repair/replace treatment area components

### STORMWATER MANAGEMENT SUITABILITY

- Water Quality**
- Channel Protection**
- Extreme Flood Protection**

**Accepts Hotspot Runoff:** Yes  
(requires impermeable liner)

⊗ in certain situations

### IMPLEMENTATION CONSIDERATIONS

- M Land Requirement**
- M Capital Cost**
- L Maintenance Burden**

**Residential**

**Subdivision Use:** Yes

**High Density/Ultra-Urban:** Yes

**Drainage Area:** 5 acres max.

**Soils:** Planting soils must meet specified criteria; No restrictions on surrounding soils

**Other Considerations:**

- Use of native plants is recommended

### POLLUTANT REMOVAL

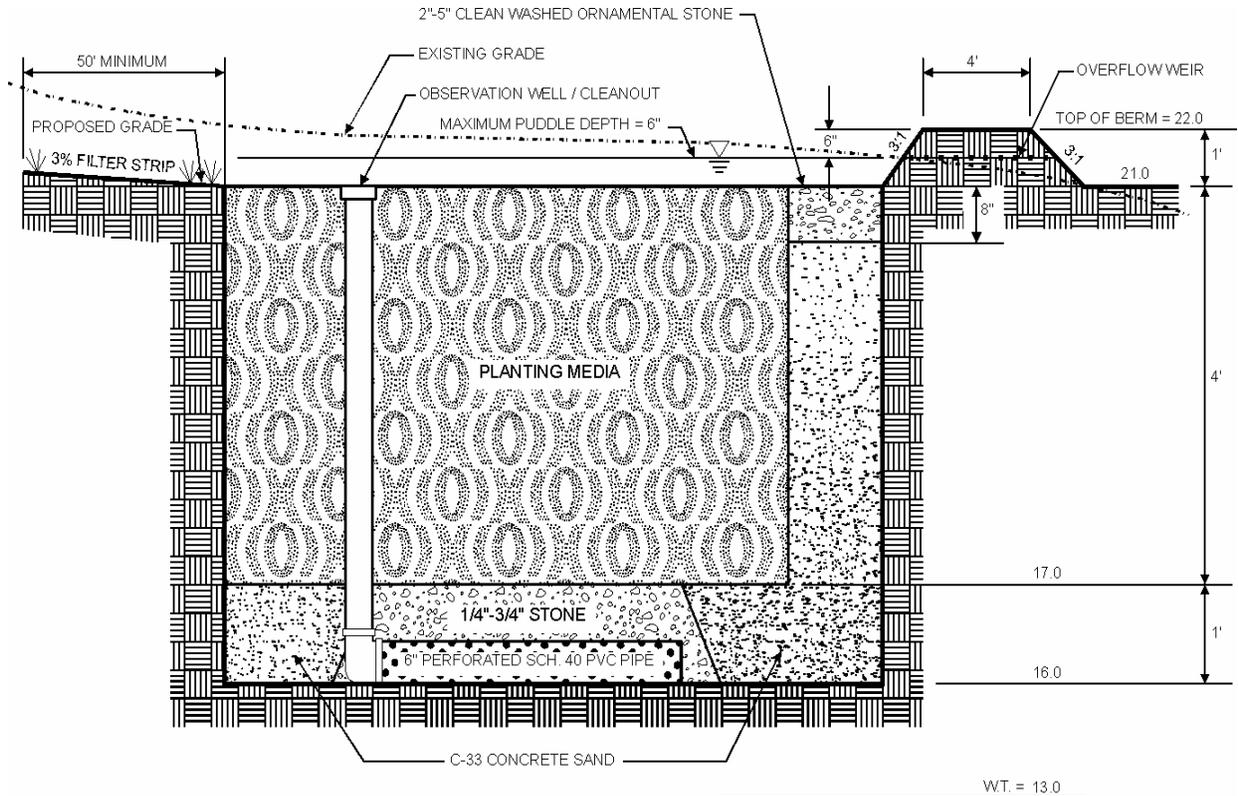
- 80%** **Total Suspended Solids**
- 60/50%** **Nutrients** - Total Phosphorus / Total Nitrogen removal
- M** **Metals** - Cadmium, Copper, Lead, and Zinc removal
- No data** **Pathogens** - Coliform, Streptococci, E.Coli removal

**L=Low M=Moderate H=High**

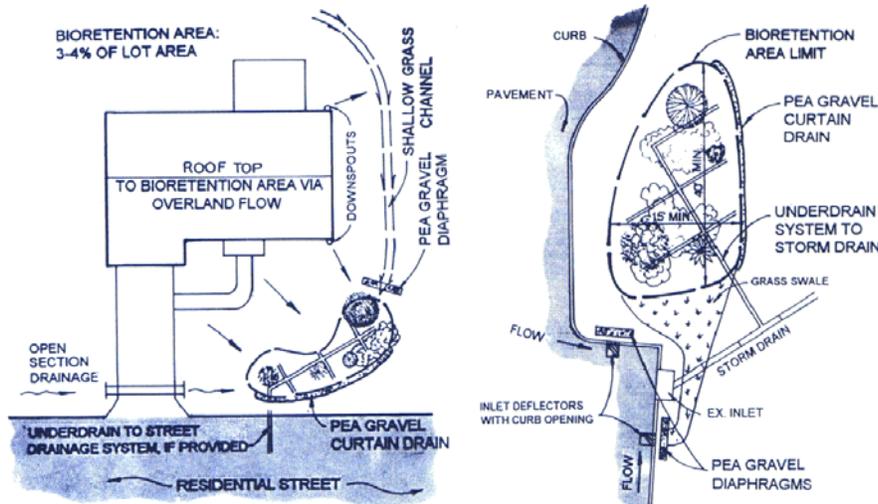
## General Description

Bioretention areas (also referred to as *bioretention filters* or *rain gardens*) are structural stormwater controls that capture and temporarily store the water quality volume (WQ<sub>v</sub>) using soils and vegetation in shallow basins or landscaped areas to remove pollutants from stormwater runoff.

Bioretention areas are engineered facilities in which runoff is conveyed as sheet flow to the “treatment area,” which consists of a grass buffer strip, ponding area, organic or mulch layer, planting soil, and vegetation. An optional sand bed can also be included in the design to provide aeration and drainage of the planting soil. The filtered runoff is typically collected and returned to the conveyance system, though it can also be exfiltrated into the surrounding soil in areas where appropriate.



Bioretention Typical Detail (Source: Georgia SWM Manual)



## Application and Site Feasibility Criteria

Bioretention areas are suitable for single-family residential lots of 1 acre or less. Because of its ability to be incorporated in landscaped areas, the use of bioretention is extremely flexible.

The following criteria should be evaluated to ensure the suitability of a bioretention area for meeting stormwater management objectives on a site or development.

### Physical Feasibility - Physical Constraints at Project Site

- Site Slope – No more than 6% slope
- Minimum Head – Elevation difference needed at a site from the inflow to the outflow: 5 feet
- Minimum Depth to Water Table – A separation distance of 2 feet recommended between the bottom of the bioretention facility and the elevation of the seasonally high water table.
- Soils – No restrictions; engineered media required

### Other Constraints / Considerations

- Aquifer Protection – Do not allow exfiltration of filtered hotspot runoff into groundwater

## Planning and Design Criteria

*The following criteria are to be considered **minimum** standards for the design of a bioretention facility **for a single family residential lot**. Consult with the local review authority to determine if there are any variations to these criteria or additional standards that must be followed.*

### A. LOCATION AND SITING

- ▶ Residential Bioretention areas should have a maximum contributing drainage area of 0.25 acres or less; multiple bioretention areas can be used.
- ▶ Bioretention systems are designed for intermittent flow and must be allowed to drain and reaerate between rainfall events. They should not be used on sites with a continuous flow from groundwater, sump pumps, or other sources.
- ▶ Bioretention area locations should be integrated into the site planning process, and aesthetic considerations should be taken into account in their siting and design. Elevations must be carefully worked out to ensure that the desired runoff flow enters the facility with no more than the maximum design depth.

### B. GENERAL DESIGN

- ▶ The Standardized bioretention area for a single residential lot consists of:
  - (1) **Grass filter strip (lawn areas) between the contributing drainage area and the ponding area should where possible be a minimum of 15' in length.**
  - (2) **Ponding area containing vegetation with a planting soil bed,**
  - (3) **Organic/mulch layer must be four (4') in depth.**
  - (4) **Gravel and perforated pipe underdrain system to collect runoff that has filtered through the soil layers (bioretention areas can optionally be designed to infiltrate into the soil).**
- ▶ A bioretention area design will also include some of the following:
  - Optional **sand filter layer** to spread flow, filter runoff, and aid in aeration and drainage of the planting soil.
  - **Stone diaphragm** at the beginning of the grass filter strip to reduce runoff velocities and spread flow into the grass filter.

### **C. PHYSICAL SPECIFICATIONS / GEOMETRY**

- ▶ The planting soil filter bed is sized using a Darcy's Law equation with a filter bed drain time of 48 hours and a coefficient of permeability (k) of 0.5 ft/day.
- ▶ The ponding depth of the bioretention areas is 6 inches.
- ▶ The planting soil bed must be at least 4 feet in depth. Planting soils should be sandy loam, loamy sand, or loam texture with a clay content ranging from 10 to 25%. The soil must have an infiltration rate of at least 0.5 inches per hour and a pH between 5.5 and 6.5. In addition, the planting soil should have a 1.5 to 3% organic content and a maximum 500 ppm concentration of soluble salts.
- ▶ Water should be directed as sheet flow over lawn area to the bioretention area.
- ▶ The mulch layer should consist of 2 to 4 inches of commercially available fine shredded hardwood mulch or shredded hardwood chips.
- ▶ The sand bed should be 12 to 18 inches thick. Sand should be clean and have less than 15% silt or clay content.
- ▶ Pea gravel for the diaphragm and curtain, where used, should be ASTM D 448 size No. 6 ( $\frac{1}{8}$ " to  $\frac{1}{4}$ ").
- ▶ The underdrain collection system is equipped with a 6-inch perforated PVC pipe (AASHTO M 252) in an 8-inch gravel layer. The pipe should have  $\frac{3}{8}$ -inch perforations, spaced at 6-inch centers, with a minimum of 4 holes per row. The pipe is spaced at a maximum of 10 feet on center and a minimum grade of 0.5% must be maintained. A permeable filter fabric is placed between the gravel layer and the planting soil bed.

### **D. PRETREATMENT**

- ▶ Adequate pretreatment is provided when all of the following are provided: (a) water flows over grass filter strip (lawn area) prior to entering the bioretention area.

### **E. OUTLET STRUCTURES**

- ▶ Outlet pipe is to be provided from the underdrain system to the facility discharge. Due to the slow rate of filtration, outlet protection is generally unnecessary.

### **F. EMERGENCY SPILLWAY**

- ▶ An overflow structure and nonerosive overflow channel must be provided to safely pass flows from the bioretention area that exceed the storage capacity to a stabilized downstream area or watercourse. If the system is located off-line, the overflow should be set above the shallow ponding limit.

### **G. MAINTENANCE ACCESS**

- ▶ Adequate access must be provided for all bioretention facilities for inspection, maintenance, and landscaping upkeep, including appropriate equipment and vehicles.

### **H. SAFETY FEATURES**

- ▶ Bioretention areas generally do not require any special safety features. Fencing of bioretention facilities is not generally desirable.

### **I. LANDSCAPING**

- ▶ Landscaping is critical to the performance and function of bioretention areas.
- ▶ A dense and vigorous vegetative cover should be established over the contributing pervious drainage areas before runoff can be accepted into the facility.

- ▶ The bioretention area should be vegetated to resemble a terrestrial forest ecosystem, with a mature tree canopy, subcanopy of understory trees, scrub layer, and herbaceous ground cover. Three species each of both trees and scrubs are recommended to be planted.
- ▶ The tree-to-shrub ratio should be 2:1 to 3:1. On average, the trees should be spaced 8 feet apart. Plants should be placed at regular intervals to replicate a natural forest. Woody vegetation should not be specified at inflow locations.
- ▶ After the trees and shrubs are established, the ground cover and mulch should be established.
- ▶ Choose plants based on factors such as whether native or not, resistance to drought and inundation, cost aesthetics, maintenance, etc. Planting recommendations for bioretention facilities are as follows:
  - Native plant species should be specified over non-native species.
  - Vegetation should be selected based on a specified zone of hydric tolerance.
  - A selection of trees with an understory of shrubs and herbaceous materials should be provided.

The following are some native plants suitable for rain gardens for the Northeast Region. They are also attractive to butterflies, birds, and other wildlife. Be sure to choose species appropriate for the degree of sun or shade on the site.

#### **Wildflowers, Ferns, Grasses, and Sedges:**

- *Asclepias incarnata*, Swamp milkweed
- *Chelone glabra*, White turtlehead
- *Eupatorium maculatum*, Joe-pye weed
- *Lobelia cardinalis*, Cardinal flower
- *Lobelia siphilitica*, Blue lobelia
- *Monarda didyma*, Oswego tea
- *Vernonia noveboracensis*, Common ironweed
- *Athyrium filix-femina*, Lady fern
- *Osmunda regalis*, Royal fern
- *Osmunda cinnamomea*, Cinnamon fern
- *Carex pendula*, Drooping sedge
- *Carex stipata*, Tussock sedge

#### **Trees and Shrubs:**

- *Amelanchier laevis*, Shadbush
- *Asimina triloba*, Pawpaw
- *Betula nigra*, River birch
- *Cephalanthus occidentalis*, Buttonbush
- *Clethra alnifolia*, Sweet pepperbush
- *Cornus amomum*, Silky dogwood
- *Fothergilla gardenii*, Dwarf fothergilla
- *Ilex verticillata*, Winterberry holly
- *Lindera benzoin*, Spicebush
- *Liquidambar styraciflua*, Sweet gum
- *Sambucus canadensis*, American elderberry
- *Viburnum dentatum*, Arrowwood

## Design Basis

The required planting soil filter bed area is computed using the following equation (based on Darcy's Law):

$$A_f = \frac{(WQ_v) (d_f)}{[ (k) (h_f + d_f) (t_f) ]}$$

where:

- $A_f$  = surface area of ponding area (ft<sup>2</sup>)
- $WQ_v$  = water quality volume (or total volume to be captured in CF)
- $d_f$  = filter bed depth  
(4 feet minimum)
- $k$  = coefficient of permeability of filter media (ft/day)  
(use 0.5 ft/day for silt-loam)
- $h_f$  = average height of water above filter bed (ft)  
(typically 3 inches, which is half of the 6-inch ponding depth)
- $t_f$  = design filter bed drain time (days)  
(2.0 days or 48 hours is recommended maximum)

An overflow must be provided to bypass and/or convey larger flows to the downstream drainage system or stabilized watercourse. Nonerosive velocities need to be ensured at the outlet point.

A landscaping plan for the bioretention area should be prepared to indicate how it will be established with vegetation.

## Inspection and Maintenance Requirements

### Typical Maintenance Activities for Bioretention Areas

(Source: EPA, 1999)

Activity	Schedule
<ul style="list-style-type: none"> <li>• Pruning and weeding to maintain appearance.</li> <li>• Mulch replacement when erosion is evident.</li> <li>• Remove trash and debris.</li> </ul>	As needed
<ul style="list-style-type: none"> <li>• Inspect inflow points for clogging (off-line systems). Remove any sediment.</li> <li>• Inspect filter strip/grass channel for erosion or gullyng. Re-seed or sod as necessary.</li> <li>• Trees and shrubs should be inspected to evaluate their health and remove any dead or severely diseased vegetation.</li> </ul>	Semi-annually
<ul style="list-style-type: none"> <li>• The planting soils should be tested for pH to establish acidic levels. If the pH is below 5.2, limestone should be applied. If the pH is above 7.0 to 8.0, then iron sulfate plus sulfur can be added to reduce the pH.</li> </ul>	Annually
<ul style="list-style-type: none"> <li>• Replace mulch over the entire area.</li> <li>• Replace pea gravel diaphragm if warranted.</li> </ul>	2 to 3 years

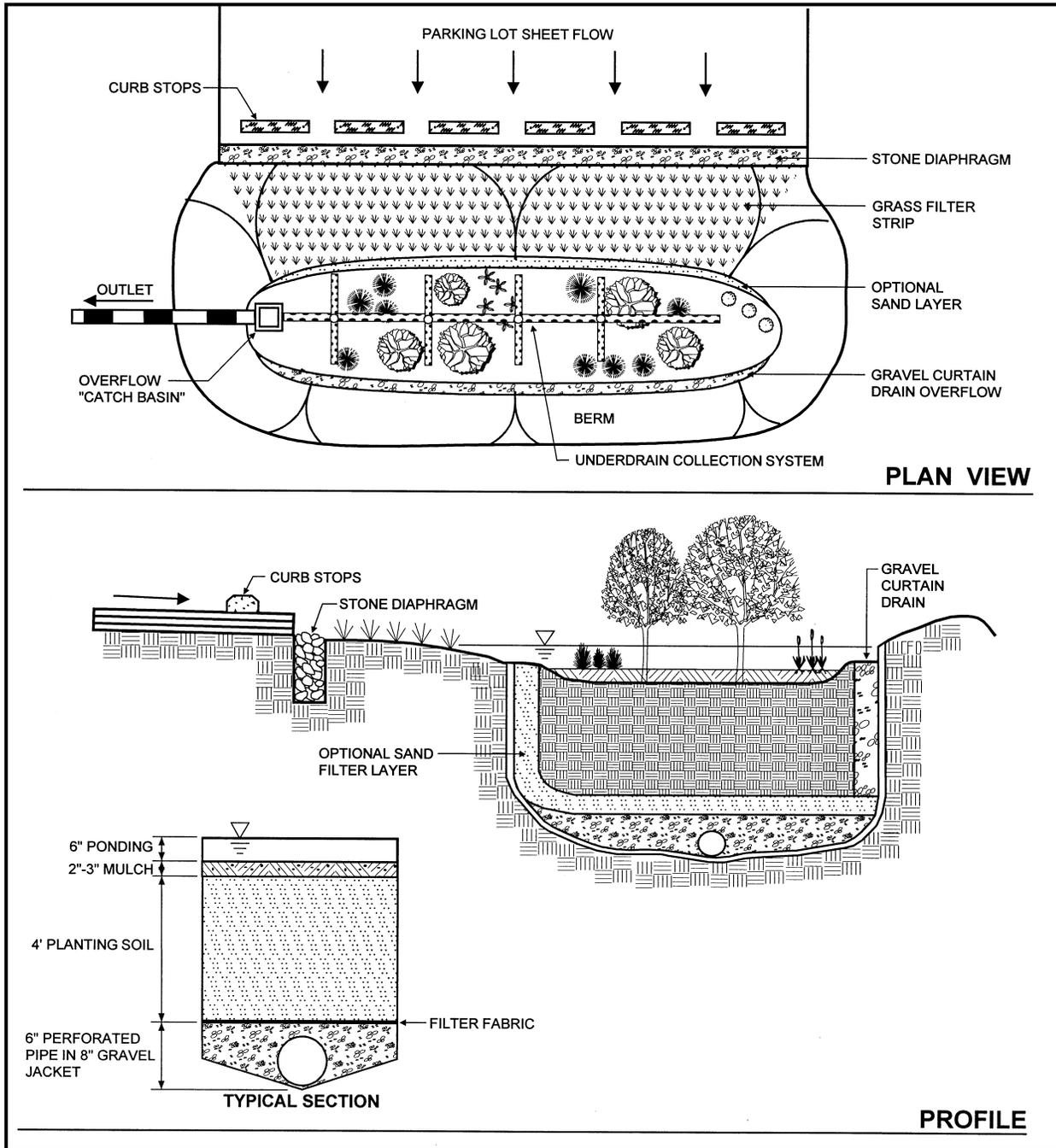
### Additional Maintenance Considerations and Requirements

- ▶ The surface of the ponding area may become clogged with fine sediment over time. Core aeration or cultivating of unvegetated areas may be required to ensure adequate filtration.



Regular inspection and maintenance is critical to the effective operation of bioretention facilities as designed. Maintenance responsibility for a bioretention area should be vested with a responsible authority by means of a legally binding and enforceable maintenance agreement that is executed as a condition of plan approval.

Example Schematic



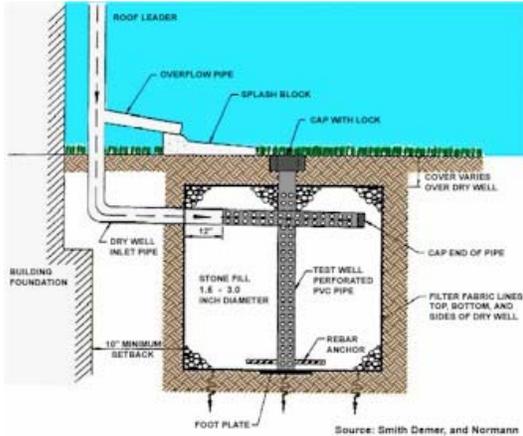
**Schematic of a Typical On-line Bioretention Area**

(Source: Claytor and Schueler, 1996)

This Guidance document is based upon information adapted from the Georgia Stormwater Manual and the Brooklyn Botanic Garden web site.

# Guidance Sheet - Rock Sumps

Standardized Residential SWM Facility For Small Projects



**Description:** A Dry Well, or Seepage Pit, is a variation on an Infiltration system that is designed to temporarily store and infiltrate rooftop runoff.

(Source: PA BMP Manual)

<h3><u>KEY CONSIDERATIONS</u></h3> <ul style="list-style-type: none"> <li>• Maintain a minimum 2-foot separation to bedrock and seasonally high water table, provide distributed infiltration area (5:1 impervious area to infiltration area - maximum), site on natural, uncompacted soils with acceptable infiltration capacity, and follow other guidelines described in Protocol 2: Infiltration Systems Guidelines</li> <li>• Maintain minimum distance from building foundation (typically 10 feet)</li> <li>• Provide adequate overflow outlet for large storms</li> <li>• Depth of Dry Well aggregate should be between 48 inches</li> <li>• At least one observation well; clean out is recommended</li> <li>• Wrap aggregate with nonwoven geotextile</li> <li>• Maximum drain-down time is 72 hours</li> </ul>	<h3><u>STORMWATER MANAGEMENT SUITABILITY</u></h3> <p><input checked="" type="checkbox"/> Water Quality</p> <p><input type="checkbox"/> Channel/Flood Protection</p> <h3><u>SPECIAL APPLICATIONS</u></h3> <p><input type="checkbox"/> Pretreatment</p> <p><input checked="" type="checkbox"/> High Density/Ultra-Urban</p> <p><input checked="" type="checkbox"/> Other: Overflow Parking, Driveways &amp; related uses</p> <p><b>Residential Subdivision Use:</b> Yes (in common areas that are maintained)</p> <p>⌘ in certain situations</p>
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## General Description

A Dry Well, sometimes called a Seepage Pit, is a subsurface storage facility that temporarily stores and infiltrates stormwater runoff from the roofs of structures. Roof leaders connect directly into the Dry Well, which may be either an excavated pit filled with uniformly graded aggregate wrapped in geotextile or a prefabricated storage chamber or pipe segment. Dry Wells discharge the stored runoff via infiltration into the surrounding soils. In the event that the Dry Well is overwhelmed in an intense storm event, an overflow mechanism (surcharge pipe, connection to larger infiltration area, etc.) will ensure that additional runoff is safely conveyed downstream.

By capturing runoff at the source, Dry Wells can dramatically reduce the increased volume of stormwater generated by the roofs of structures. Though roofs are generally not a significant source of runoff pollution, they are still one of the most important sources of new or increased runoff volume from developed areas. By decreasing the volume of stormwater runoff, Dry Wells can also reduce runoff rate and improve water quality. As with other infiltration practices, Dry Wells may not be appropriate for "hot spots" or other areas where high pollutant or sediment loading is expected without additional design considerations. Dry Wells are not recommended within a specified distance to structures or subsurface sewage disposal systems.

## Design Criteria and Specifications

The use of a single stage rock sump is one of several alternatives that may be appropriate for small project area developments. Site parameters which must be considered when determining the suitability of a sump for stormwater control include the following:

- Soil type
- Slope
- Slope Stability
- Discharge location
- Basement elevation
- Offsite stormwater conveyance systems
- Offsite detention systems

Where it is determined that a single stage rock sump is appropriate, the following procedure is designed to provide a fast, simple method to determine the rock volume and orifice size required to provide adequate stormwater control for small projects. In order to develop a practical solution for this type of design problem, several qualifying assumptions are necessary to set the limits for which the procedure is applicable. Those limits were designed to incorporate the type of situation most often encountered. In general, the following conditions must be satisfied in order for the use of single stage rock sumps to be appropriate:

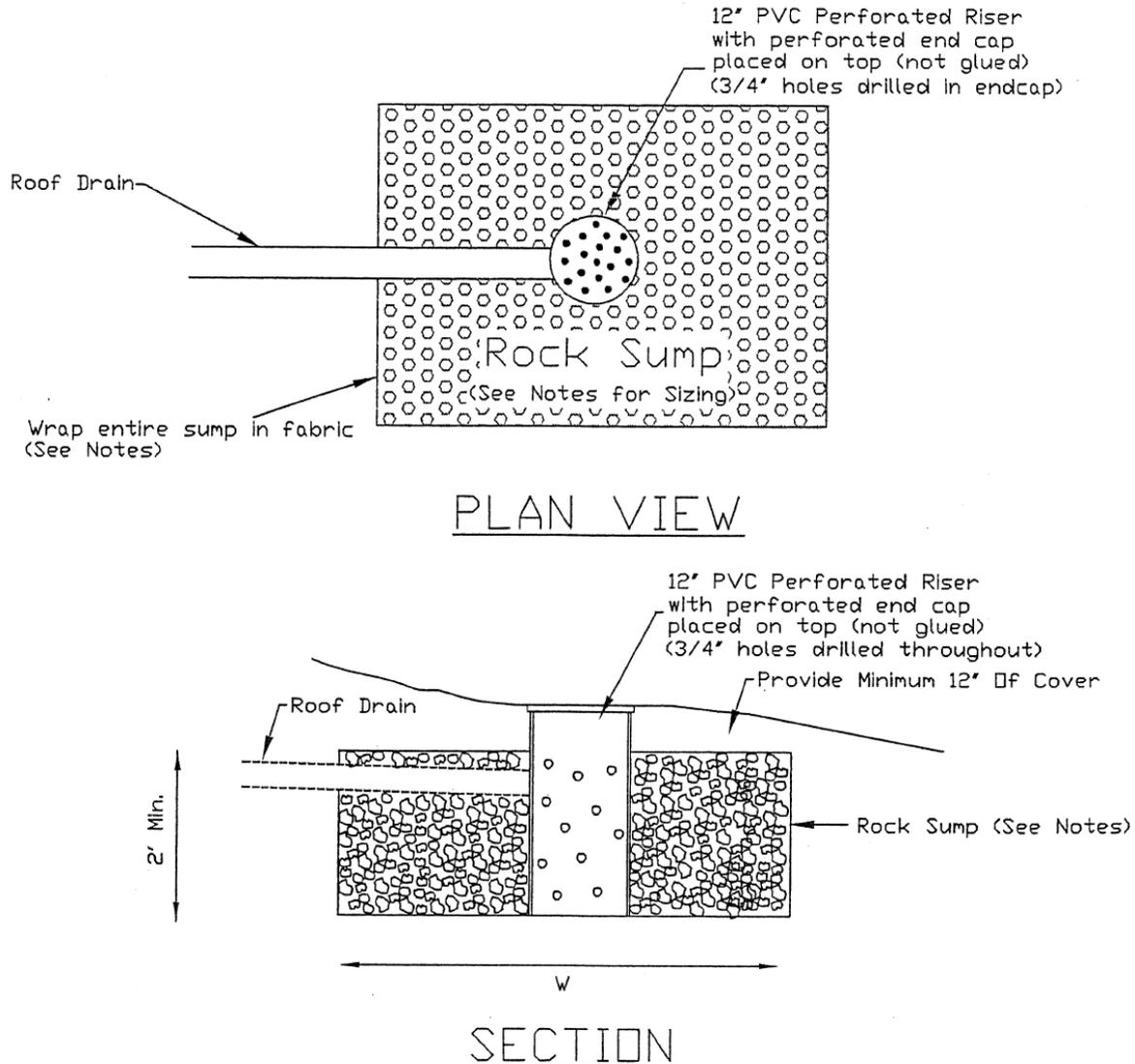
- The project area tributary to the proposed sump is less than 5000 square feet, and consists entirely of impervious (paved or roofed areas) surfaces, i.e., RCN = 98;
- To minimize the sump size, runoff from impervious surfaces may be divided and conveyed to the separate sumps. If runoff from impervious surfaces is not divided, the sump must be designed for the entire area that will be tributary to the facility;
- The pre-development area to be altered must have an existing time of concentration ( $T_c$ ) of six (6) minutes or less; and
- The single stage rock sump must be designed according to the parameters shown in the attached drawing.

Prior to using the following procedure, the designer must verify that all of the above criteria apply to the subject project. Should any of the conditions not apply, the use of the procedure outlined herein is inappropriate and may result in either the over-design or under-design of the rock sump facility.

## DESIGN SIZING

1. Determine the area of the impervious surfaces that will be collected and conveyed to the sump.
2. Enter the sizing table and determine the size of the release orifice and volume of the sump.
3. Determine the sump dimensions based on the site topography and surface features.
4. Design the sump in accordance with the parameters shown in the attached drawing.

NOTE: If the development will result in an increase in impervious surface of less than 400 square feet, the infiltration sump design (below) should be used. The sump volume should be based on 40 cubic feet of stone for each 100 square feet of impervious surface.

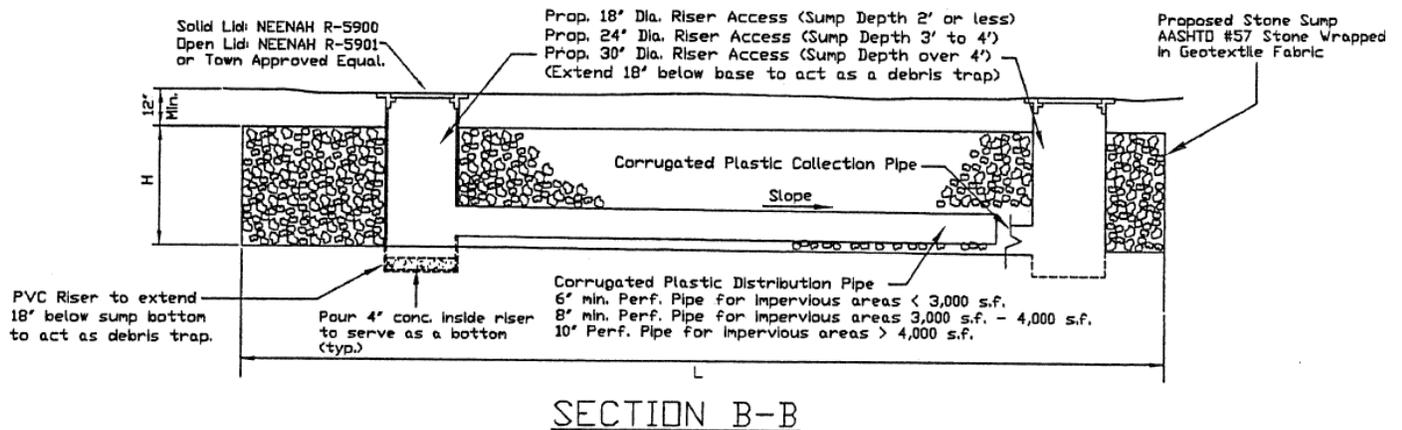
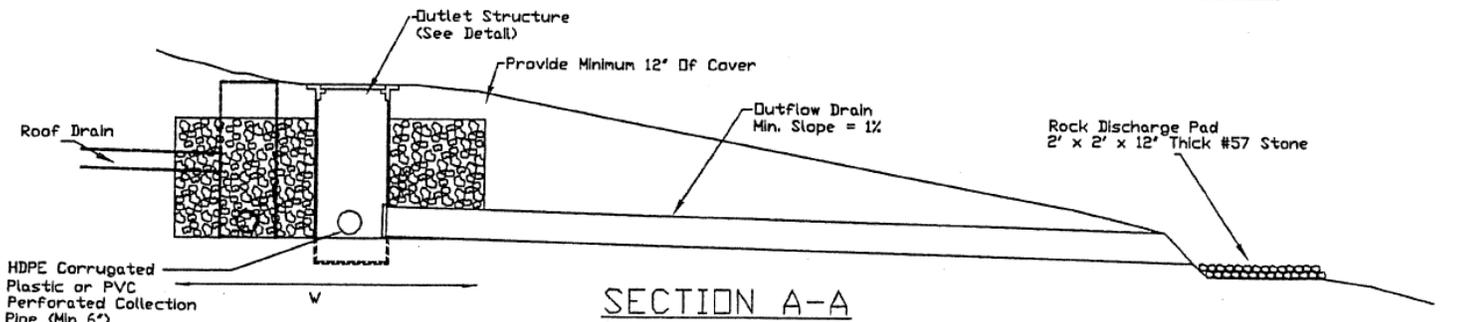
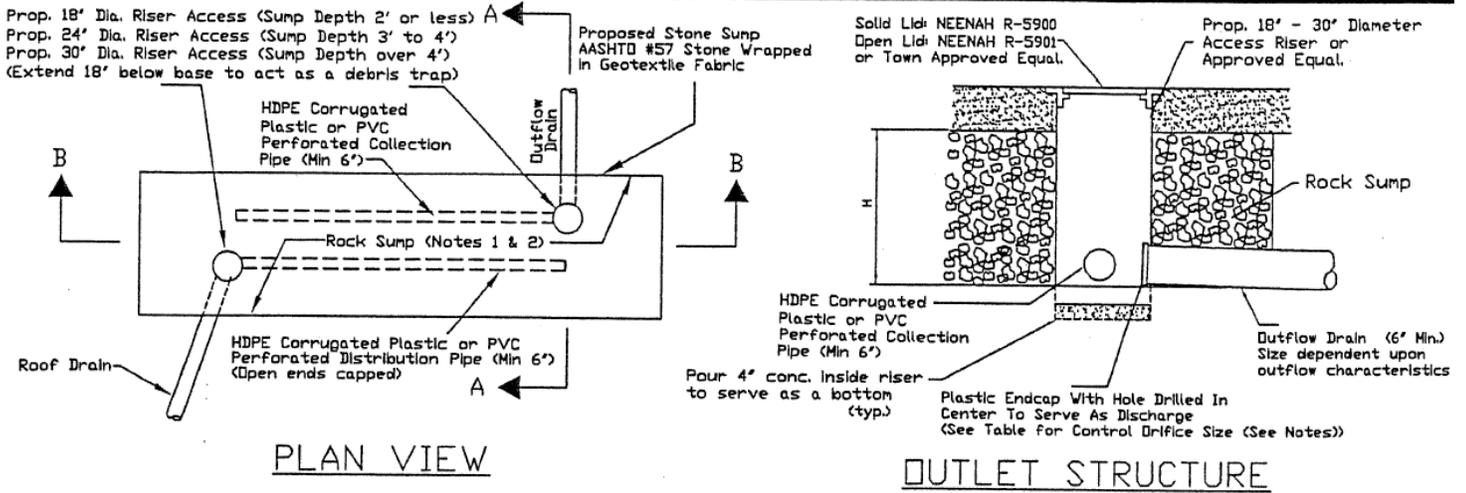


### Notes:

1. The Rock Sump shall be designed as follows:  
40 c.f. of Rock per 100 s.f. of impervious area
2. Rock Sump shall be constructed of AASHTO #57 Limestone or 2B Gravel.
3. Wrap sump on all sides with PennDOT Class 2, Type B Non-woven Geotextile Material.
4. Dimensions and ratios shall vary as per design volume required.
5. Dry sumps in fill areas not permitted.
6. Cleanouts shall be located just before any horizontal bends.
7. When feasible, the Rock Sump should be located such that the top elevation of the riser pipe is below the basement floor elevation.

THIS DETAIL MAY BE UTILIZED FOR TOTAL IMPERVIOUS AREAS < 400 S.F.

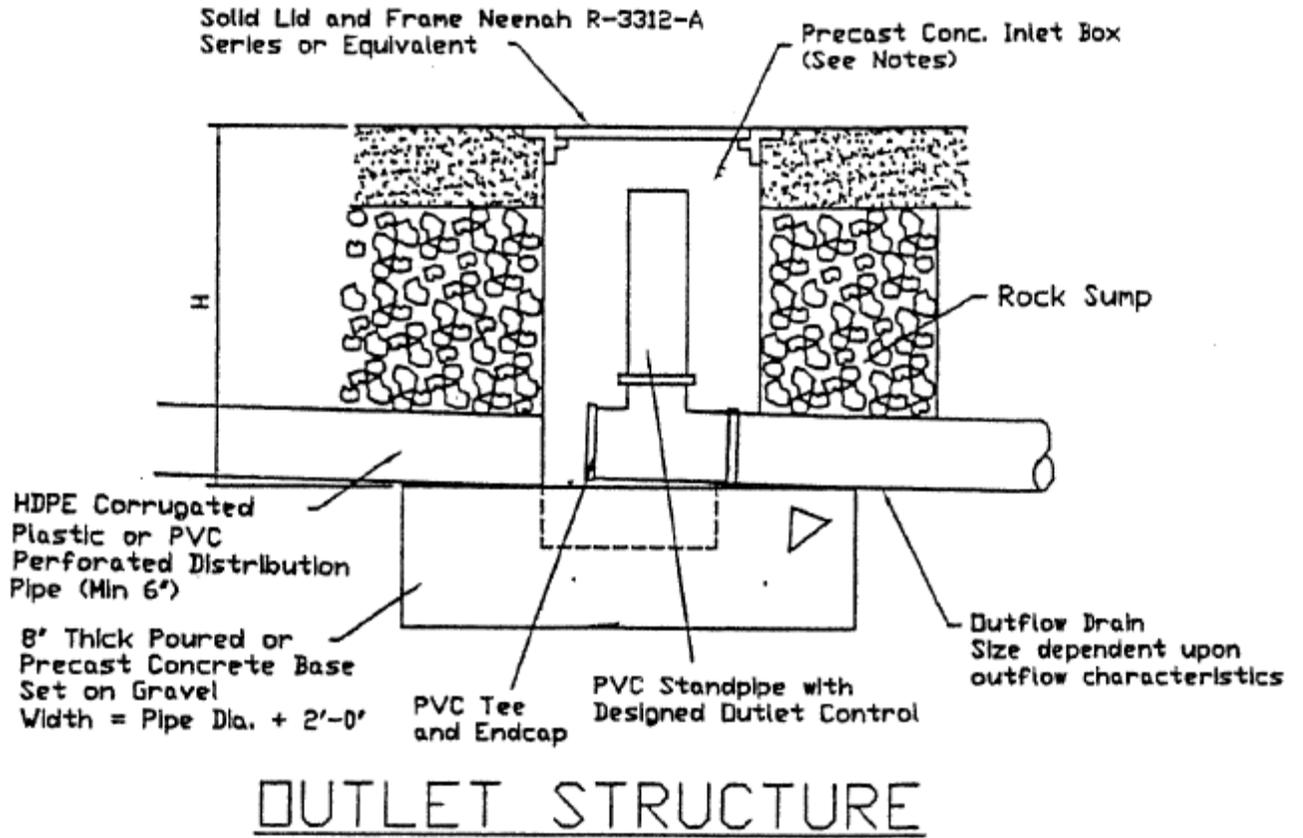
**Figure S1 - Rock Sump Detail (< 400 SF of impervious area)**  
(Detailed from Town of McCandless / Partridge Venture Engineering)



**Notes:**

1. Design Parameters ( volume and outlet control works) shall be based upon the Table of values as shown on Detail SW-5, ( 400 S.F. < Impervious Area < 5000 s.f. )
2. Rock Sump shall be constructed of AASHTO #57 Limestone or 2B Gravel.
3. Wrap sump on all sides with PennDDT Type B Non-woven Geotextile Material.
4. Dimensions and ratios of L (Length), W (Width) and H (Height) shall vary as per design volume required.
5. Minimum ratio L to W is 3:1; (ie. L = 3W).
6. Dry sumps in fill areas not permitted.
7. Dimensions L (Length) shall be oriented to be parallel to the grade contour alignment.
8. No 90° elbows permitted on cleanout installations.
9. Cleanouts shall be located just before any horizontal bends.
10. All pipe and fittings shall be ASTM D2729.
11. When feasible, the Rock Sump should be located such that the outflow elevation is below the basement floor elevation.

THIS DETAIL MAY BE UTILIZED FOR TOTAL IMPERVIOUS AREAS > 400 S.F. & < 5,000 S.F.  
**Figure S2 - Rock Sump Detail (> 400 SF & < 5000 SF of impervious area)**  
 (Detailed from Town of McCandless / Partridge Venture Engineering)



**Figure S3 – Sump Outlet Structure**  
 (Information from Town of McCandless / Partridge Venture Engineering)

## DESIGN PARAMETERS RESIDENTIAL ON-LOT SUMP

(TOTAL IMPERVIOUS AREA < 5,000 S.F.)

IMPERVIOUS AREA (SQ. FT.)	DEPTH OF SUMP (FT.)					SUMP VOLUME REQUIRED	
	1	2	3	4	5	(CU. FT.)	
	DIAMETER OF OUTLET ORIFICE (IN)					NET	ROCK
400	11/16	9/16	1/2	1/2	1/2	68	170
600	13/16	11/16	5/8	9/16	9/16	102	255
800	15/16	13/16	11/16	5/8	5/8	136	340
1000	1-1/16	7/8	13/16	3/4	11/16	170	425
1200	1-3/16	1-0	7/8	13/16	3/4	204	510
1400	1-1/4	1-1/16	15/16	7/8	13/16	238	595
1600	1-3/8	1-1/8	1-0	15/16	7/8	272	680
1800	1-7/16	1-3/16	1-1/16	1-0	15/16	306	765
2000	1-1/2	1-1/4	1-1/8	1-1/16	1-0	340	850
2200	1-9/16	1-5/16	1-3/16	1-1/8	1-1/16	374	935
2400	1-5/8	1-3/8	1-1/4	1-3/16	1-1/8	408	1020
2600	1-11/16	1-7/16	1-5/16	1-1/4	1-1/8	442	1105
2800	1-3/4	1-1/2	1-3/8	1-1/4	1-3/16	476	1190
3000	1-13/16	1-9/16	1-3/8	1-5/16	1-1/4	510	1275
3200	1-7/8	1-5/8	1-7/16	1-3/8	1-1/4	544	1360
3400	1-15/16	1-5/8	1-1/2	1-3/8	1-5/16	578	1445
3600	2-0	1-11/16	1-9/16	1-7/16	1-3/8	612	1530
3800	2-1/16	1-3/4	1-9/16	1-7/16	1-3/8	646	1615
4000	2-1/8	1-13/16	1-5/8	1-1/2	1-7/16	680	1700
4200	2-3/16	1-13/16	1-11/16	1-9/16	1-7/16	714	1785
4400	2-1/4	1-7/8	1-11/16	1-9/16	1-1/2	748	1870
4600	2-5/16	1-15/16	1-3/4	1-5/8	1-9/16	782	1955
4800	2-5/16	1-15/16	1-3/4	1-5/8	1-9/16	816	2040
5000	2-3/8	2-0	1-13/16	1-11/16	1-5/8	850	2125

**Table S1**

(Information from Town of McCandless / Partridge Venture Engineering)

## Design Basis

The sump designs are based upon documents and detail sheets provided by Partridge Venture Engineering.

Determine the square footage for the Standardized Rock Sump Foot Print from the “Determination of SWM Facility Sizing” table (Disturbed Area Table).

Note that the square footage of the “sump foot print” for the Standardized Design provided in the Disturbed Area Table is based upon an assumed sump rock depth of 4’.

Different sump rock depths may be used. These may be determined by multiplying the “sump foot print” by the assumed rock depth of four (4’) feet, to determine the cubic feet of rock required for the sump. Then use Table S1 to select determine the “diameter of the outlet orifice” need for the actual depth proposed.

To determine the sump foot print needed for the actual depth proposed, multiply the cubic feet of rock required by the actual depth of the sump proposed.

## Inspection and Maintenance Requirements

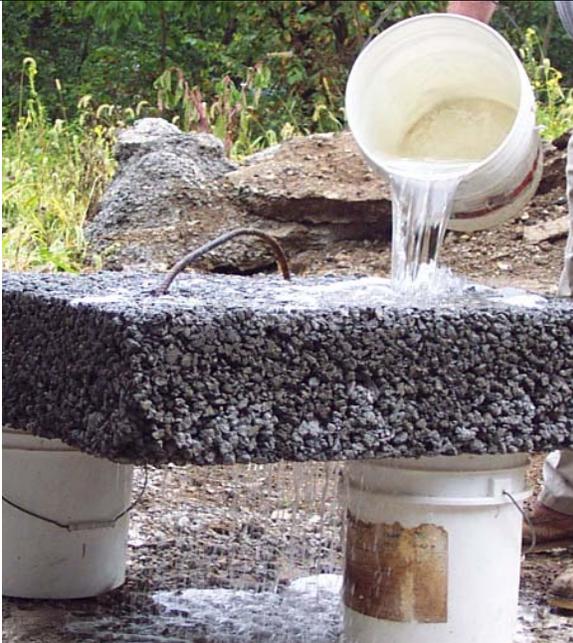
As with all infiltration practices, Dry Wells require regular and effective maintenance to ensure prolonged functioning. The following represent minimum maintenance requirements for Dry Wells:

Activity	Schedule
<ul style="list-style-type: none"> <li>Initial inspection</li> </ul>	By Building Inspector to Insure Proper Sizing
<ul style="list-style-type: none"> <li>Ensure that sediment is not directed to the sump</li> </ul>	As needed
<ul style="list-style-type: none"> <li>Regularly clean out gutters and ensure proper connections to facilitate the effectiveness of the dry well.</li> </ul>	As needed, based on inspection
<ul style="list-style-type: none"> <li>Evaluate the drain-down time of the Dry Well to ensure the maximum time of 72 hours is not being exceeded. If drain-down times are exceeding the maximum, drain the Dry Well via pumping and clean out perforated piping, if included. If slow drainage persists, the system may need replacing.</li> </ul>	As needed, based on inspection
<ul style="list-style-type: none"> <li>Reconstruct sump if its no longer functioning as originally designed</li> </ul>	As needed, based on inspection
<ul style="list-style-type: none"> <li>Replace filter screen that intercepts roof runoff as necessary. If an intermediate sump box exists, clean it out at least once per year.</li> </ul>	Annually

This Guidance document is based upon information abstracted from the Georgia Stormwater Manual, the PA SW BMP Manual and the Town of McCandless. .

# Guidance Sheet - Porous Pavements

Standardized Residential SWM  
Facility  
For Small Projects



**Description:** Porous concrete is the term for a mixture of coarse aggregate, Portland cement and water that allow for rapid infiltration of water and overlays a stone aggregate reservoir. This reservoir provides temporary storage as runoff infiltrates into underlying permeable soils and/or out through an underdrain system.

(Photograph Source: Pittsburgh Mobile Concrete)

## KEY CONSIDERATIONS

- Soil infiltration rate of 0.5 in/hr or greater required
- Pour the concrete using a volumetric (mobile) mixer
- Excavated area filled with stone media; gravel and sand filter layers with observation well
- Pre-treat runoff if sediment present
- Provides reduction in runoff volume
- Somewhat higher cost when compared to conventional pavements
- Potential for high failure rate if poorly designed, poorly constructed, not adequately maintained or used in unstabilized areas
- Potential for groundwater contamination

## STORMWATER MANAGEMENT SUITABILITY

- Water Quality**
- Channel/Flood Protection**

## SPECIAL APPLICATIONS

- Pretreatment**
- High Density/Ultra-Urban**
- Other: Overflow Parking, Driveways & related uses**

### **Residential**

**Subdivision Use:** Yes  
(in common areas that are maintained)

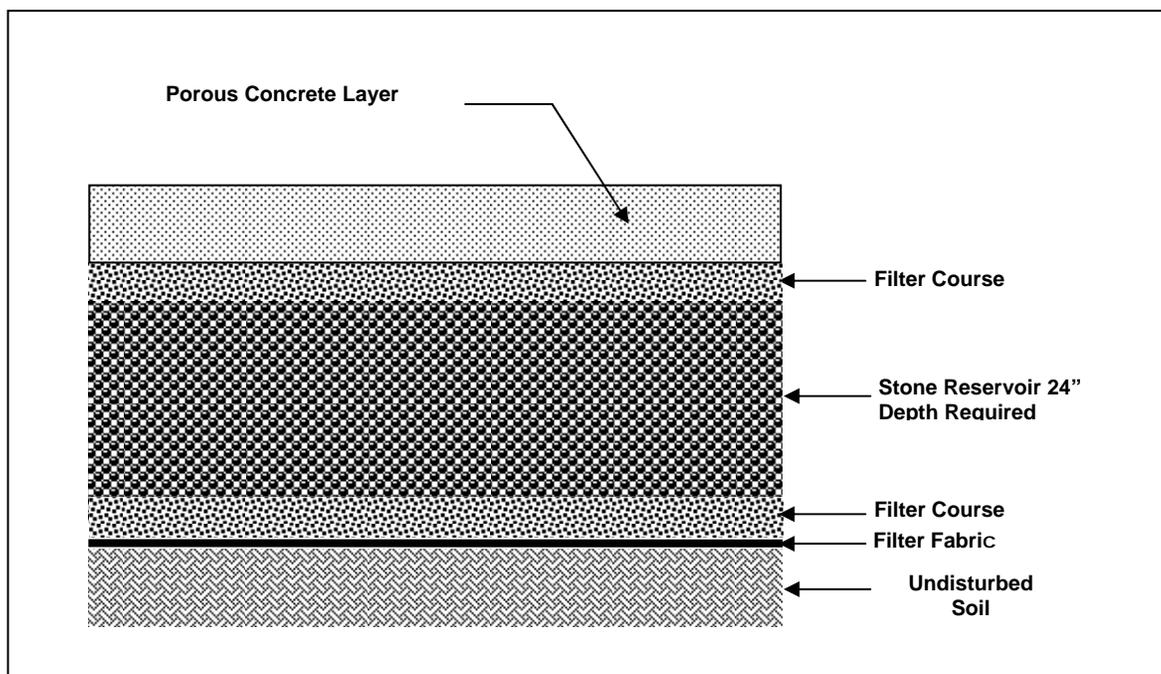
in certain situations

## General Description – Porous Concrete

Porous concrete (also referred to as *enhanced porosity concrete*, *porous concrete*, *portland cement pervious pavement* and *pervious pavement*) is a subset of a broader family of pervious pavements including porous asphalt, and various kinds of grids and paver systems. Porous concrete is thought to have a greater ability than porous asphalt to maintain its porosity in hot weather and thus is provided as a limited application control. Although, porous concrete has seen growing use, there is still very limited practical experience with this measure.

Porous concrete consists of a specially formulated mixture of Portland cement, uniform, open graded coarse aggregate, and water. The concrete layer has a high permeability often many times that of the underlying permeable soil layer, and allows rapid percolation of rainwater through the surface and into the layers beneath. The void space in porous concrete is in the 15% to 22% range compared to three to five percent for conventional pavements. The permeable surface is placed over a layer of open-graded gravel and crushed stone. The void spaces in the stone act as a storage reservoir for runoff.

Porous concrete is designed primarily for stormwater quality, i.e. the removal of stormwater pollutants. However, they can provide limited runoff quantity control, particularly for smaller storm events. For some smaller sites, trenches can be designed to capture and infiltrate the channel protection volume ( $C_{p,v}$ ) in addition to  $WQ_v$ . Porous concrete will need to be used in conjunction with another structural control to provide overbank and extreme flood protection, if required.



**Typical Detail (Source: Georgia SWM Manual)**

Modifications or additions to the standard design have been used to pass flows and volumes in excess of the water quality volume, or to increase storage capacity or treatment. These include:

- Placing a perforated pipe near the top of the crushed stone reservoir to pass excess flows after the reservoir is filled
- Providing surface detention storage in a parking lot, adjacent swale, or detention pond with suitable overflow conveyance
- Connecting the stone reservoir layer to a stone filled trench
- Adding a sand layer and perforated pipe beneath the stone layer for filtration of the water quality volume
- Placing an underground detention tank or vault system beneath the layers

The infiltration rate of the soils in the subgrade should be adequate to support drawdown of the entire runoff capture volume within 24 to 48 hours. Special care must be taken during construction to avoid undue compaction of the underlying soils which could affect the soils' infiltration capability.

Slopes should be flat or gentle to facilitate infiltration versus runoff and the seasonally high water table or bedrock should be a minimum of two feet below the bottom of the gravel layer if infiltration is to be relied on to remove the stored volume.

Porous concrete has the positive characteristics of volume reduction due to infiltration, groundwater recharge, and an ability to blend into the normal urban landscape relatively unnoticed. It also allows a

reduction in the cost of other stormwater infrastructure, a fact that may offset the greater placement cost somewhat.

A drawback is the cost and complexity of porous concrete systems compared to conventional pavements. Porous concrete systems require a very high level of construction workmanship to ensure that they function as designed. They experience a high failure rate if they are not designed, constructed and maintained properly.

## Design Criteria and Specifications

- ▶ Porous concrete systems can be used where the underlying in-situ subsoils have an infiltration rate greater than 0.5 inches per hour. Therefore, porous concrete systems are not suitable on sites with hydrologic group D and many group C soils, or soils with a high (>30%) clay content. In areas where poor infiltration is expected the gravel bed should be properly graded and an overflow provided to drain the bed so that water will not be trapped in the pervious concrete. During construction and preparation of the subgrade, special care must be taken to avoid compaction of the soils.
- ▶ Pour the concrete using volumetric (mobile) mixer.
- ▶ Porous concrete systems should typically be used in applications where the pavement receives tributary runoff only from impervious areas. Actual pervious surface area sizing will depend on achieving a 24 hour minimum and 48 hour maximum draw down time for the design storm volume.
- ▶ If runoff is coming from adjacent pervious areas, it is important that those areas be fully stabilized to reduce sediment loads and prevent clogging of the porous paver surface. Pretreatment using filter strips or vegetated swales for removal of coarse sediments is recommended. (see sections 3.3.1 and 3.3.2)
- ▶ Porous concrete systems should not be used on slopes greater than 5% with slopes of no greater than 2% recommended. For slopes greater than 1% barriers perpendicular to the direction of drainage should be installed in sub-grade material to keep it from washing away, or filter fabric should be placed at the bottom and sides of the aggregate to keep soil from migrating into the aggregate and reducing porosity.
- ▶ A minimum of four feet of clearance is recommended (may be reduced to two feet in coastal areas) between the bottom of the gravel base course and underlying bedrock or the seasonally high groundwater table.
- ▶ Porous concrete systems should be sited at least 10 feet down-gradient from buildings and 100 feet away from drinking water wells.
- ▶ To protect groundwater from potential contamination, runoff from designated hotspot land uses or activities must not be infiltrated. Porous concrete should not be used for manufacturing and industrial sites, where there is a potential for high concentrations of soluble pollutants and heavy metals. In addition, porous concrete should not be considered for areas with a high pesticide concentration. Porous concrete is also not suitable in areas with karst geology without adequate geotechnical testing by qualified individuals and in accordance with local requirements.
- ▶ Porous concrete system designs must use some method to convey larger storm event flows to the conveyance system. One option is to use storm drain inlets set slightly above the elevation of the pavement. This would allow for some ponding above the surface, but would accept bypass flows that are too large to be infiltrated by the porous concrete system, or if the surface clogs.
- ▶ For the purpose of sizing downstream conveyance and structural control system, porous concrete surface areas can be assumed to 35% impervious. In addition, credit can be taken for the runoff volume infiltrated from other impervious areas using the methodology in Section 3.1.
- ▶ For treatment control, the design volume should be, at a minimum, equal to the water quality volume. The water quality storage volume is contained in the surface layer, the aggregate reservoir, and the sub-grade above the seasonal high water table – if the sub-grade is sandy. The

storm duration (fill time) is normally short compared to the infiltration rate of the sub-grade, a duration of two hours can be used for design purposes. The total storage volume in a layer is equal to the percent of voids times the volume of the layer. Alternately storage may be created on the surface through temporary ponding, though this would tend to accelerate clogging if coarse sediment or mud settles out on the surface.

- ▶ The cross-section typically consists of four layers, as shown on the Typical Detail. The aggregate reservoir can sometimes be avoided or minimized if the sub-grade is sandy and there is adequate time to infiltrate the necessary runoff volume into the sandy soil without by-passing the water quality volume. Descriptions of each of the layers is presented below:

Porous Concrete Layer – The porous concrete layer consists of an open-graded concrete mixture usually ranging from depths of 2 to 4 inches depending on required bearing strength and pavement design requirements. Porous concrete can be assumed to contain 18 percent voids (porosity = 0.18) for design purposes. The omission of the fine aggregate provides the porosity of the porous pavement. To provide a smooth riding surface and to enhance handling and placement a coarse aggregate of 3/8 inch maximum size is normally used. Use No. 89 coarse aggregate (3/8 to No. 50) per ASTM D 448.

Top Filter Layer – Consists of a 0.5 inch diameter crushed stone to a depth of 1 to 2 inches. This layer serves to stabilize the porous asphalt layer. Can be combined with reservoir layer using suitable stone.

Reservoir Layer – The reservoir gravel base course consists of washed, bank-run gravel, 1.5 to 2.5 inches in diameter with a void space of about 40% (Clean Washed No. 2B Stone). **The depth of this layer shall be two (2') feet.** A porosity value (void space/total volume) of 0.32 was assumed.

Bottom Filter Layer – The surface of the subgrade should be an 6 inch layer of sand (ASTM C-33 concrete sand) or a 2 inch thick layer of 0.5 inch crushed stone, and be completely flat to promote infiltration across the entire surface. This layer serves to stabilize the reservoir layer, to protect the underlying soil from compaction, and act as the interface between the reservoir layer and the filter fabric covering the underlying soil.

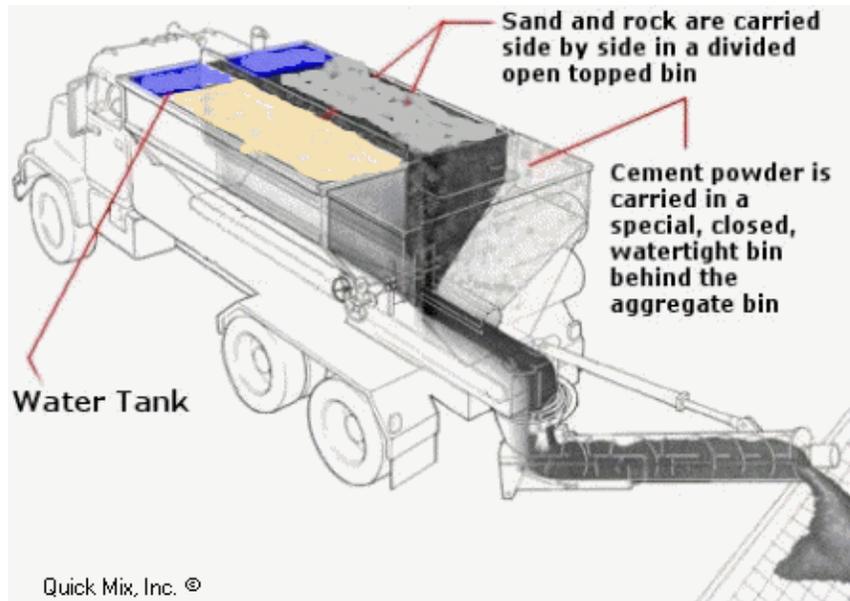
Filter Fabric – It is very important to line the entire trench area, including the sides, with filter fabric prior to placement of the aggregate. The filter fabric serves a very important function by inhibiting soil from migrating into the reservoir layer and reducing storage capacity. Fabric should be MIRFI # 14 N or equivalent.

Underlying Soil – The underlying soil should have an infiltration capacity of at least 0.5 in/hr, but preferably greater than 0.50 in/hr.

- ▶ The pit excavation should be limited to the width and depth specified in the design. Excavated material should be placed away from the open trench as not to jeopardize the stability of the trench sidewalls. The bottom of the excavated trench should not be loaded so as to cause compaction, and should be scarified prior to placement of sand. The sides of the trench shall be trimmed of all large roots. The sidewalls shall be uniform with no voids and scarified prior to backfilling. All infiltration trench facilities should be protected during site construction, and should be constructed after upstream areas have been stabilized.
- ▶ An observation well consisting of perforated PVC pipe 4 to 6 inches in diameter may be placed at the downstream end of the facility and protected. The well should be used to determine actual infiltration rates.

## Volumetric (Mobile) Concrete Mixers

The Mobile Concrete Mixer is a combination materials transporter and mobile concrete mixing plant, mounted on a transport vehicle, usually a truck or trailer, which carries sufficient unmixed material, sand, cement, coarse aggregates, water (and any other chemicals that may be used for special mix designs) to the job to produce fresh concrete, mixed to design specifications.



(Source: Quick Mix, Inc.)

Sand and stone are accurately proportioned by adjusting gates to the correct height. The settings are based on actual calibration of the gate settings done with the specific aggregates being used.



(Source: Pittsburgh Mobile Concrete)

The three basic dry ingredients (sand, stone, and cement powder) simultaneously drop off the main conveyor into the charging end of the mixer at the rear of the unit. At this point, a predetermined metered flow of water also enters the mixer. Action of the combined auger and paddle mixer rapidly, thoroughly, and continuously mixes the ingredients and water to produce a continuous discharge of uniform quality concrete.

The materials blending action is continuous, and may proceed until the ingredient bins are empty. On the other hand, mixing and delivery may be stopped at any time and then started again at the will of the

operator. This permits production to be balanced to the demands of the placing and finishing crews and other job requirements

## General Description Modular Paver Systems

Modular porous pavers are structural units, such as concrete blocks, bricks, or reinforced plastic mats, with regularly interspersed void areas used to create a load-bearing pavement surface. The void areas are filled with pervious materials (gravel, sand, or grass turf) to create a system that allows for the infiltration of stormwater runoff. Porous paver systems provide water quality benefits in addition to groundwater recharge and a reduction in stormwater volume. The use of porous paver systems results in a reduction of the effective impervious area on a site.



There are many different types of modular porous pavers available from different manufacturers, including both pre-cast and mold in-place concrete blocks, concrete grids, interlocking bricks, and plastic mats with hollow rings or hexagonal cells

Modular porous pavers are typically placed on a gravel (stone aggregate) base course. Runoff infiltrates through the porous paver surface into the gravel base course, which acts as a storage reservoir as it exfiltrates to the underlying soil. The infiltration rate of the soils in the subgrade must be adequate to support drawdown of the entire runoff capture volume within 24 to 48 hours. Special care must be taken during construction to avoid undue compaction of the underlying soils, which could affect the soils' infiltration capability.

A drawback is the cost and complexity of modular porous paver systems compared to conventional pavements. Porous paver systems require a higher level of construction workmanship to ensure that they function as designed. In addition, there is the difficulty and cost of rehabilitating the surfaces should they become clogged.

The system must be installed based upon the manufactures recommendations. **The gravel layer required for the Standardized Single Lot Residential Facility is a minimum of two (2') feet in depth.**

## Design Basis

For the Standardized BMP for a single residential lot, the minimum surface area of the porous pavement was determined from the following equation:

$$A = WQ_v / (n_g d_g + kT/12)$$

Where:

A = Surface Area Porous Pavement (SF)

WQ<sub>v</sub> = Water Quality Volume in CF

n<sub>g</sub> = 0.32 = porosity of the gravel

d<sub>g</sub> = 2' = depth or gravel layer (feet)

k = percolation = 0.5 inches/hour assumed

T = Fill Time = 2 hours (time for the practice to fill with water), in hours

## Inspection and Maintenance Requirements

### Typical Maintenance Activities for Porous Concrete Systems

Activity	Schedule
<ul style="list-style-type: none"> <li>• Initial inspection</li> </ul>	Monthly for three months after installation
<ul style="list-style-type: none"> <li>• Ensure that the porous paver surface is free of sediment</li> </ul>	Monthly
<ul style="list-style-type: none"> <li>• Ensure that the contributing and adjacent area is stabilized and mowed, with clippings removed</li> </ul>	As needed, based on inspection
<ul style="list-style-type: none"> <li>• Vacuum sweep porous concrete surface followed by high pressure hosing to keep pores free of sediment</li> </ul>	Four times a year
<ul style="list-style-type: none"> <li>• Inspect the surface for deterioration or spalling</li> <li>• Check to make sure that the system dewateres between storms</li> </ul>	Annually
<ul style="list-style-type: none"> <li>• Spot clogging can be handled by drilling half-inch holes through the pavement every few feet</li> <li>• Rehabilitation of the porous concrete system, including the top and base course as needed</li> </ul>	Upon failure

To ensure proper maintenance of porous pavement, a carefully worded maintenance agreement is essential. It should include specific the specific requirements and establish the responsibilities of the property owner and provide for enforcement.

This Guidance document is based upon information abstracted from the Georgia Stormwater Manual and the Quick Mix, Inc. web site.

# STANDARD PROCEDURES EROSION AND SEDIMENTATION CONTROLS FOR INDIVIDUAL RESIDENTIAL LOTS

## **General**

Erosion and Sedimentation from individual residential lots can most often be controlled by silt fence along the lower perimeter of all disturbed areas and the installation of a rock construction entrance where construction traffic will enter and exit the site. Standard Construction Detail, Sheet ES-1, shows the typical erosion controls that should be placed on high and low side lots. If the scope of the work requires additional measures on the site, an individual plan must be submitted and approved by the Township of Ross. In all cases, the Contractor is responsible for complying with the provisions of PA DEP Chapter 102.

## **Temporary Erosion Controls**

Silt fence must be installed along the lower perimeter of all disturbed areas and will function as the primary control for the site. A stone construction entrance must be installed at the driveway entrance to the site to help prevent mud from being tracked out onto the roadway. When at all possible, construction vehicles should be restricted to paved surfaces.

All uncompleted disturbed areas on which activity will cease for more than twenty (20) days should be seeded and stabilized. After construction is complete and all areas are stabilized, all temporary control measures may be removed and all monitoring will cease. Stabilization is defined as the establishment of a uniform 70% perennial vegetal cover.

## **Staging Schedule**

In general, the following staging schedule should be followed for small projects"

1. Install the silt fence in accordance with the standard detail shown on Detail Sheet ES-2 along the lower perimeter of all disturbed areas.
2. Install the rock construction entrance in accordance with the standard detail shown on Detail Sheet ES-2 at the entrance to the site. The stone base for the driveway should also be installed as soon as it is graded in order to prevent erosion.
3. Grub the construction area and remove the topsoil, stockpiling it at the area designated on the plans.
4. Construct the site improvements.
5. Seed and mulch all disturbed areas.
6. Remove all E & S Controls once the site is stabilized. An area will not be considered stabilized until a uniform 70% perennial vegetal cover is established over the disturbed area.

## **Maintenance Schedule**

It shall be the sole responsibility of the contractor to execute the control of inspection, maintenance, and repair of various sediment control facilities according to the guidelines prescribed below.

All control measures must be inspected on a weekly basis, and in all cases immediately following each runoff event. All necessary repairs should be carried out immediately after their identification. Materials cleaned from the BMP's shall be disposed of by spreading them in the topsoil stockpile area.

## **Silt Fence**

Maintenance checks shall include inspecting silt fence for undercutting, tears, collapse offence, and depths of sediment accumulation. All repairs of damaged fence must be performed immediately to ensure that the fence meets design specifications. Sediment should be removed periodically, and in all cases

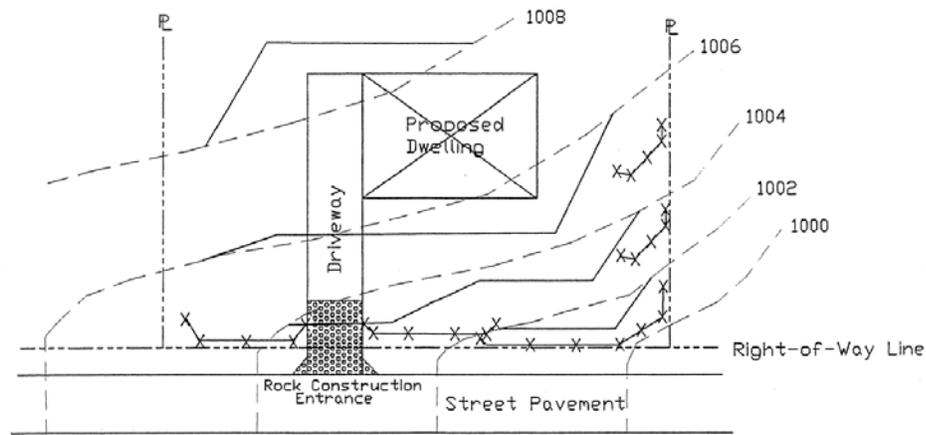
should accumulation attain depths equal to half the height of fence. Sediment deposits removed from a silt fence must be disposed of by spreading the material within the topsoil stockpile area. Undercutting of the toe shall be immediately repaired by installing a rock filter outlet.

Construction Entrance

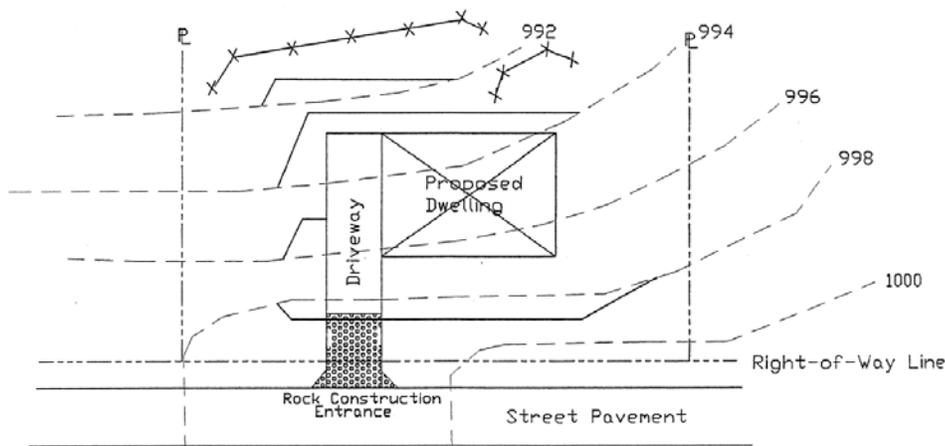
The stabilized construction entrance should be maintained so as to ensure a constant rock thickness. This will be achieved by the placement of additional rock to the specified dimension as required. A stockpile of rock must be maintained on-site for this purpose. At the completion of each work day, all sediment deposited on the public roadways must be removed and returned to the construction site. Washing of the roadway with water will be unacceptable.

Vegetation

All areas to be stabilized by vegetation should be inspected for rills and gullies, bare soil patches or accumulation of sediment at the toe of slopes. Eroded areas shall be regraded, and substandard vegetated areas shall be re-seeded and mulched as specified in the plans.



TYPICAL HIGH-SIDE ON-LOT CONTROL



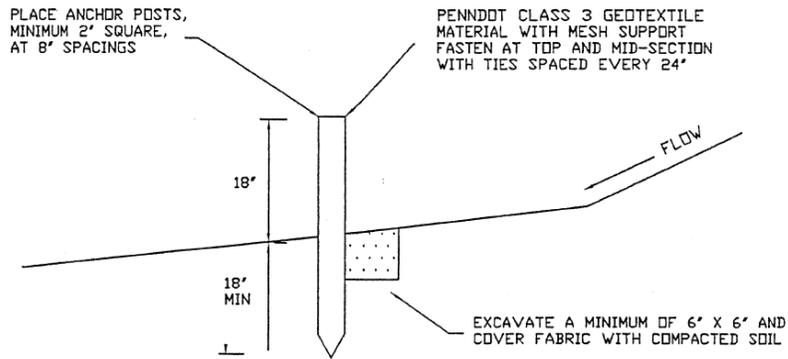
TYPICAL LOW-SIDE ON-LOT CONTROL

LEGEND

- Finished Grade
- - - - - Existing Grade
- X - X - X Silt Fence

**Detail ES-1**

(Detail from Town of McCandless / Partridge Venture Engineering)



**INSTALLATION:**

A TRENCH WILL BE PLOWED OR OTHERWISE EXCAVATED TO THE REQUIRED DEPTH WITH LITTLE, IF ANY, DISTURBANCE TO THE DOWNSLOPE SIDE OF THE TRENCH. THE BOTTOM OF THE TRENCH AND THE FENCE TOP WILL BE PLACED ON A LEVEL GRADE. WHEN IT IS NECESSARY TO CROSS SMALL DEPRESSIONS, THE TRENCH BOTTOM AND FENCE TOP EDGE MAY DEVIATE SLIGHTLY FROM LEVEL GRADE. GRADES IN SUCH SECTIONS WILL NOT EXCEED 1% NOR WILL THE DEVIATION EXTEND FOR MORE THAN 25 FEET.

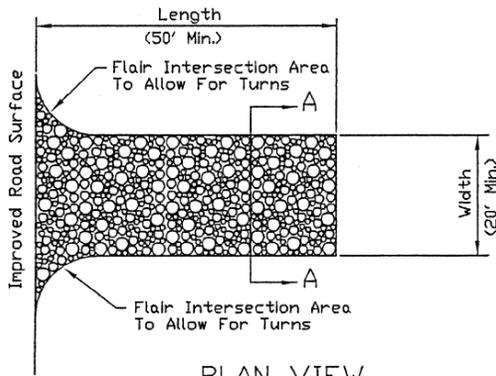
SUPPORT STAKES WILL BE DRIVEN TO THE REQUIRED DEPTH BELOW THE EXISTING GROUND SURFACE AT SPECIFIED INTERVALS AS ILLUSTRATED. STRETCH AND FASTEN FABRIC TO THE UPSLOPE SIDE OF THE SUPPORT STAKES.

WHERE ENDS OF FABRIC COME TOGETHER, THEY WILL BE OVERLAPPED, FOLDED, AND STAPLED TO PREVENT SEDIMENT BYPASS. AT THE ENDS OF EACH LINE OF SILT FENCE, OR EVERY 100 FEET, WHICHEVER IS SHORTER, EXTEND THE FENCE UPSLOPE AT A 90 DEGREE ANGLE FOR 4 FEET TO PREVENT ENDFLOW.

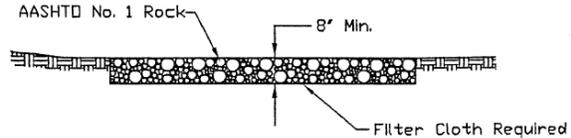
THE TDE ANCHOR WILL BE BACKFILLED AND COMPACTED TO A DENSITY EQUAL TO SURROUNDING SOILS.

**SILT FENCE**

NO SCALE



PLAN VIEW



SECTION A-A

**MAINTENANCE:** The structure's thickness will be constantly maintained to the specified dimensions by adding rock. A stockpile of rock material will be maintained on the site for this purpose. At the end of each construction day, all sediment deposited on public roadways will be removed and returned to the

**ROCK CONSTRUCTION ENTRANCE DETAIL**

NO SCALE

**Detail ES-2**

(Detail from Town of McCandless / Partridge Venture Engineering)

## APPENDIX C Small Projects

### STORMWATER BEST MANAGEMENT PRACTICES OPERATIONS AND MAINTENANCE AGREEMENT

**THIS AGREEMENT**, made and entered into this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, by and between \_\_\_\_\_, (hereinafter the “Landowner”), and \_\_\_\_\_, Allegheny County, Pennsylvania, (hereinafter “Municipality”);

**WITNESSETH**

**WHEREAS**, the Landowner is the owner of certain real property as recorded by deed in the land records of Allegheny County, Pennsylvania, Deed Book \_\_\_\_\_ at Page \_\_\_\_\_, Block and Lot No. \_\_\_\_\_, (Lot(s) \_\_\_\_ in the \_\_\_\_\_ Plan of Lots as recorded in Plan Book Volume \_\_\_\_, Page\_\_\_\_,) (hereinafter “Property”).

**WHEREAS**, the Landowner is proceeding to build and develop the Property; and

**WHEREAS**, the stormwater management BMP Operations and Maintenance Plan approved by the Municipality (hereinafter referred to as the “Plan”) for the Property, provides for management of stormwater within the confines of the Property through the use of Best Management Practices (BMPs); and

**WHEREAS**, the Municipality and the Landowner, his successors and assigns, agree that the health, safety, and welfare of the residents of the Municipality and the protection and maintenance of water quality require that on-site stormwater BMPs be constructed and maintained on the Property; and

**WHEREAS**, for the purposes of this Agreement, the following definitions shall apply:

- **BMP** – “Best Management Practice;” activities, facilities, designs, measures or procedures used to manage stormwater impacts from land development, to protect and maintain water quality and groundwater recharge and to otherwise meet the purposes of the Municipal Stormwater Management Ordinance, including, but not limited to, infiltration trenches, seepage pits, filter strips, bioretention, wet (retention) ponds, permeable paving, rain gardens, grassed swales, forested buffers, sand filters and detention basins.

- Infiltration Trench – A BMP surface structure designed, constructed, and maintained for the purpose of providing infiltration or recharge of stormwater into the soil and/or groundwater aquifer,
- Seepage Pit – An underground BMP structure designed, constructed, and maintained for the purpose of providing infiltration or recharge of stormwater into the soil and/or groundwater aquifer,
- Rain Garden – A BMP overlain with appropriate mulch and suitable vegetation designed, constructed, and maintained for the purpose of providing infiltration or recharge of stormwater into the soil and/or underground aquifer, and

**WHEREAS**, the Municipality requires, through the implementation of the Plan, that stormwater management BMPs as required by said Plan and the Municipal Stormwater Management Ordinance be constructed and adequately operated and maintained by the Landowner, his successors and assigns.

**NOW, THEREFORE**, in consideration of the foregoing and intending to be legally bound, the parties hereto agree as follows:

1. The BMPs shall be constructed by the Landowner in accordance with the plans and specifications identified in the SWM Plan.
2. The Landowner shall operate and maintain the BMPs as shown on the Plan in good working order acceptable to the Municipality and in accordance with the specific maintenance requirements noted on the Plan, if any.
3. The Landowner agrees to inspect each BMP annually and after major storm events and correct any deficiencies noted during each inspection.
4. The Landowner hereby grants permission to the Municipality, its authorized agents and employees, to enter upon the property, at reasonable times to inspect the BMPs whenever it deems necessary. Whenever possible, the Municipality shall notify the Landowner prior to entering the property.
5. In the event that the Landowner fails to operate and maintain the BMPs as shown on the Plan in good working order acceptable to the Municipality, the Municipality or its representatives may enter upon the Property and take whatever action is deemed necessary to maintain said BMPs. This provision shall not be construed to allow the Municipality to erect any permanent structure on the land of the Landowner. It is expressly understood and agreed that the Municipality is under no

obligation to maintain or repair said facilities, and in no event shall this Agreement be construed to impose any such obligation on the Municipality.

6. In the event that the Municipality, pursuant to this Agreement, performs work of any nature, or expends any funds in performance of said work for labor, use of equipment, supplies, materials, and the like, the Landowner shall reimburse the Municipality for all expenses incurred plus 10% for administrative overhead within 10 days of receipt of invoice from the Municipality.
7. The intent and purpose of this Agreement is to ensure the proper maintenance of the onsite BMPs by the Landowner; provided, however, that this Agreement shall not be deemed to create or affect any additional liability of any party for damage alleged to result from or be caused by stormwater runoff.
8. The Landowner, its executors, administrators, assigns, and other successors in interests, shall release the Municipality's employees and designated representatives from all damages, accidents, casualties, occurrences or claims which might arise or be asserted against said employees and representatives from the construction, presence, existence, or maintenance of the BMPs by the Landowner or Municipality. In the event that a claim is asserted against the Municipality, its designated representatives or employees, the Municipality shall promptly notify the Landowner and the Landowner shall defend, at his own expense, any suit based on the claim. If any judgment or claims against the Municipality's employees or designated representatives shall be allowed, the Landowner shall pay all costs and expenses regarding said judgment or claim.
9. This Agreement shall be recorded at the Office of the Recorder of Deeds of Allegheny County, Pennsylvania, and shall constitute a covenant running with the Property and/or equitable servitude, and shall be binding on the Landowner, his administrators, executors, assigns, heirs and any other successors in interests, in perpetuity.

ATTEST:

WITNESS the following signatures and seals:

(SEAL)

For the Municipality:

\_\_\_\_\_

(SEAL)

For the Landowner:

\_\_\_\_\_

ATTEST:

\_\_\_\_\_ (City, Borough, Township)

County of \_\_\_\_\_, Pennsylvania

I, \_\_\_\_\_, a Notary Public in and for the County and State aforesaid, whose commission expires on the \_\_\_\_\_ day of \_\_\_\_\_, 2\_\_\_\_, do hereby certify that \_\_\_\_\_ whose name(s) is/are signed to the foregoing Agreement bearing date of the \_\_\_\_\_ day of \_\_\_\_\_, 2\_\_\_\_, has acknowledged the same before me in my said County and State.

**GIVEN UNDER MY HAND THIS** \_\_\_\_\_ day of \_\_\_\_\_, 2\_\_\_\_.

\_\_\_\_\_

\_\_\_\_\_

**NOTARY PUBLIC**

**(SEAL)**

*(Source: This appendix was developed from, Guidance on MS4 Ordinance Provisions, Document Number 392-0300-003, by the Pennsylvania Department of Environmental Protection, dated August 2, 2003.)*

Attachment

for

MCM #5 Post-Construction Storm Water Management in New  
Development and Redevelopment

Projects in Marshall Township, Allegheny County for 2011-2015  
 Information Provided by the Allegheny County Conservation District

Name	Submission		Address	Parcel Number	Latitude	Longitude	Total Plan	
	Date	Land Use Type					Acres	Receiving Stream Name
Sunny Hill Road Grading Location	10/16/2014	Government/Public	150 SUNNYHILL RD	1497N00003000000	-80	46	9.39	
Fairmont Square	05/02/2014	Residential-Subdivision	Fowler Road	1999K00009000000	40.64958	-80.07345	22.6	UNT to Brush Creek
Neely School Road Timber Harvest	09/19/2014	Harvest	120 NEELY SCHOOL RD	1497C00002000000	40.62618	-80.09376	49.4	
Park at Marshall	10/31/2013	Residential-Subdivision	Northgate Drive	2181R00003000000	40.65815	-80.08888	17.8	Brush Creek
Copper Creek	08/01/2013	Residential-Subdivision	COPPER CREEK LN	1996A00075000000	40.65643	-80.13075	93	Big Sewickley Creek
112 VIP Drive Land Development	01/24/2014	Commercial/Industrial	112 VIP DR	1497P00002000000	40.61873	-80.0929	1.5	
Pleasant Hill Place	02/06/2014	Residential-Subdivision	0 THORN HILL RD	2179L00010000000	40.65986	-80.12237	20.7	
Thorn Hill Hotel and Recreation Complex	11/17/2014	Commercial/Industrial	BRUSH CREEK RD	2180H00001000000	40.6624	-80.09787	21.1	Brush Creek
Innovation Ridge	10/29/2014	Commercial/Industrial	0 TECH 21 DR	1997C00012000000	40.65465	-80.1055	38.17	UNT to Brush Creek - WWF
Rohrich Bentley of Pittsburgh	02/09/2012	Commercial/Industrial	15025 PERRY HWY	1824C00009000000	40.6467	-80.07424	7.55	Brush Creek
Village at Marshall Ridge	06/14/2012	Residential-Subdivision	0 TECH 21 DR	1997C00032000000	40.65789	-80.10781	224	UNT Brush Creek
Chapel Hill Estates	01/27/2012	Residential-Subdivision	0 MALBEC LN	1822H00001000000	40.64303	-80.10416	19.9	UNT Brush Creek
The Villas at Altrmyer Fields	12/27/2013	Residential-Subdivision	SR910 and Cole Road	1498L00007000000	40.62131	-80.07137	16.3	
Warrendale Pointe	05/02/2013	Residential-Subdivision	1 WILLIAMSBURG PL	1998C00004000000	40.65322	-80.08864	21	UNT Brush Creek
Finished Water Transmission Line	11/26/2014	Encroachment 105 Permit	1645 PLEASANT HILL RD	2178D00001000000	40.66248	-80.13623	0.08	UNT to Big Sewickley Creek
GetGo #3245	10/11/2013	Commercial/Industrial	112 VIP DR	1497P00002000000	40.61873	-80.0929	1.99	
Woodland Road Flex Space	01/09/2013	Residential-Subdivision	0 WOODLAND RD	2370H00008000000	40.44268	-80.10143	5.08	UNT to Brush Creek
Venango Trails	04/11/2007	Residential-Subdivision	400 VENANGO TRL	2372L00551000000	40.6713	-80.08988	324.6	UNT to Brush Creek
Islamic Center of North Pittsburgh	03/11/2014	Commercial/Industrial	0 WARRENDALE BAYNE RD	1997S00007000000	40.64937	-80.10128	4.41	Brush Creek
Bitz Property Mitigation Plan	04/07/2014	Private Road Construction	1640 PLEASANT HILL RD	2178C00001000000	40.66536	-80.14121	27.6	Big Sewickley Creek
Ericsson Drive Office Complex Improvements	10/01/2014	Commercial/Industrial	0 BRUSH CREEK RD Warrendale-Bayne Road/Brush Creek Road/I-79 Ramps/S.R.0019/Brush Creek Road	2181P00001000000	40.65919	-80.09458	101	Brush Creek
Tech 21 Innovation Ridge	08/02/2011	PennDOT			40.65432	-80.09167		
Paragon Foods Land Development	02/02/2015	Commercial/Industrial	THORN HILL RD	2371K00002000000	40.67222	-80.10887	9.4	Brush Creek
Pinewood Corporate Park	02/09/2015	Commercial/Industrial	99 HARMONY RD	1999J00017000000	40.64987	-80.08397	6.9	Shenot Run and UNT to Brush Creek
The Municipal Authority of the Borough of West View Sunny Hill Road Grading Location	02/19/2015	Borrow/Disposal Site	0 SUNNY HILL RD	1346A00001000000	40.61661	-80.09897	9.38	East Branch of Big Sewickley Creek
Regional Learning Alliance Parking Lot	05/06/2015	Commercial/Industrial					0.98	UNT to Brush Creek
State Gamelands #203 Rifle Range		Government/Public	State Game Lands		40.37	-80.07	3.3	East Branch Big Sewickley Creek

# STORMWATER MANAGEMENT AGREEMENT AND DECLARATION OF EASEMENT

This Stormwater Management Agreement and Declaration of Easement (this "Agreement") is made and entered into this \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_,

BY AND BETWEEN:

**THE TOWNSHIP OF MARSHALL** (hereinafter referred to as the "Township"), a Second Class Township and political subdivision of the Commonwealth of Pennsylvania, situated in the County of Allegheny, with its principal office located at 525 Pleasant Hill Road, Suite 100, Wexford, PA 15090, by and through the Board of Supervisors of the Township;

AND

**[DEVELOPER]**, a Pennsylvania \_\_\_\_\_, with its office located at \_\_\_\_\_, (hereinafter referred to as the "Developer").

WITNESSETH:

WHEREAS, the Developer is the legal owner of the real property which is and shall be held, transferred, sold, conveyed, developed and occupied subject to this Agreement and which is located at \_\_\_\_\_ in the Township, currently designated as Block/Lot No. \_\_\_\_\_ by the Deed Registry Office of Allegheny County (the "Property"); and

WHEREAS, the Developer has submitted plans to the Township for the \_\_\_\_\_, and said plans were approved by the Township Board of Supervisors on \_\_\_\_\_ (the "Plans"); and

WHEREAS, pursuant to Chapter 174 of the Marshall Township Code of Ordinances, Subdivision and Land Development, as amended, (the "Township Subdivision and Land Development Ordinance"), the Developer is required to apply for and obtain Township approval of a stormwater management plan for the Property including, without limitation, an operation and maintenance plan prior to commencing any development on the Property; and

WHEREAS, the Developer submitted a \_\_\_\_\_ prepared by \_\_\_\_\_ on \_\_\_\_\_ and revised on \_\_\_\_\_ (the "Study"), relevant excerpts of which are attached hereto as Exhibit "A" and incorporated herein by reference; and

WHEREAS, the purpose of this Agreement is to impose the maintenance responsibilities for the stormwater management facilities which will be installed on the Property upon Developer, its successors and assigns, and upon any successor owners of the Property and to give the Township certain rights relating thereto.

NOW THEREFORE, intending to be legally bound hereby, and as a condition of receiving approval of the Study and/or Plans from the Township Board of Supervisors, the Developer declares that the Property is and shall be held, transferred, sold, conveyed, developed and occupied subject to the covenants, restrictions, and easements hereinafter set forth.

1. **Recitals.** The above recitals are incorporated herein as if set forth at length.
2. **Ownership.** All Stormwater Management Facilities (as defined herein) shall at all times be owned by the owner of the Property, currently the Developer.

3. **Developer Obligations.**

- a. The Developer shall be responsible for the installation, operation, maintenance, repair, replacement and renewal of all stormwater management facilities located within the Property, including, without limitation, any and all drainage courses, streams, drainage ways, swales, inlets or catch basins, pipes, conduits, detention basins, infiltration devices, best management practices (“BMP”) facilities and erosion and sedimentation control facilities (hereinafter all such facilities collectively referred to as “Stormwater Management Facilities”) in accordance with the Study, that certain development agreement between the Developer and the Township relating to the Property (the “Development Agreement”), and all applicable federal, state, and local laws, orders, rules, regulations, ordinances and resolutions. The Stormwater Management Facilities shall be kept and maintained at all times in design condition.

- b. Promptly upon installation of the Stormwater Management Facilities, the Developer shall submit an actual “as built” plan to the Township for the Stormwater Management Facilities required by the approved Plan. The “as built” plan shall show all final design specifications for all permanent Stormwater Management Facilities and shall be based on an actual field survey performed by a professional land surveyor licensed as such by the Commonwealth of Pennsylvania. The surveyor shall certify as to the accuracy of the “as built” plan, and it shall be submitted to the Township for review and approval by the Township Engineer. The “as built” plan(s) shall be submitted to the Township in a digital format approved by the Township.

- c. All Stormwater Management Facilities are permanent and are not to be removed or modified without the prior written consent of the Township. The Developer shall perpetually maintain the Stormwater Management Facilities and repair, replace and/or renew (as appropriate) any defects in the Stormwater Management Facilities.

- d. The Developer shall maintain any and all drainage easements in a grassed or otherwise improved condition in accordance with the grades and designs shown on the erosion control plan, attached hereto as Exhibit “B”. The Developer shall keep all easements free of all obstructions, including but not limited to, obstructions such as fill, temporary or permanent structures, and plants (other than grass). Drainage easements shall allow passage of stormwater in underground storm sewer piping and associated structures and/or allow passage of stormwater over the surface of the ground and shall allow access across the area for purposes of maintenance of the

storm conveyance systems.

4. **Declaration of Easement.** The Developer hereby imposes on the Property for the benefit of the Township and all present and future owners of the Property or any portion thereof the perpetual nonexclusive right, privilege and easement for the draining of stormwater in and through the Stormwater Management Facilities now or hereafter installed on or constructed upon the Property. The easement herein granted shall also provide the Township with the right of ingress and egress over and upon the Property for the purpose of gaining access to all Stormwater Management Facilities and for the purpose of performing any maintenance, repair, replacement and/or renewal work permitted hereunder.

5. **Maintenance Security.**

a. Pursuant to Section 8 of the Development Agreement, the release of that portion of the Performance Security (as such term is defined in the Development Agreement) relating to the Stormwater Management Facilities is conditioned upon the Developer delivering the maintenance security required hereunder to the Township. Accordingly, prior to the Developer requesting the release of any portion of the Performance Security that is related to the Stormwater Management Facilities, the Developer shall furnish financial security (“Maintenance Security”) to the Township in an amount equal to \_\_\_\_\_ Dollars (\$\_\_\_\_\_); subject to adjustment in accordance with **Section 5(b)** hereof. **[Note – Equal to full estimated cost of Stormwater Management Facilities]**

b. The Township shall have the right, but not the obligation to adjust the amount of the Maintenance Security required hereunder upon the occurrence of any of the following (i) the Maintenance Security (if it is of such a type that may expire or terminate) is not automatically renewed at least thirty (30) days prior to any scheduled expiration or termination; (ii) in the event that the Township draws on all or any portion of the Maintenance Security pursuant to **Section 6(b)** hereof; or (iii) the Developer assigns its interest in this Agreement. Any such adjustment of the Maintenance Security required hereunder shall not exceed the estimated full replacement cost of the Stormwater Management Facilities, as of the date of such adjustment, as estimated by the Township Engineer.

c. The Maintenance Security shall remain in place for the life of the Stormwater Management Facilities and shall be in a form acceptable to the Township Solicitor. **[Note – security should either be perpetual or for a term of at least 2 years with unlimited, automatic renewals unless and until financial institution provides at least 90 days prior written notice to the Township of its intention to not renew]**

6. **Township Rights.**

a. The Township shall have the right, but not the obligation, at any time and from time to time, by its designated representatives, to enter upon the Property to inspect the Stormwater Management Facilities. The Township, itself or through its designated representative(s), shall have the right, but not the obligation, to enter upon the Property (i) to inspect the Stormwater

Management Facilities, and (ii) to maintain, repair, replace and/or renew the Stormwater Management Facilities if the Developer is in breach of any provision of this Agreement. The costs of all such maintenance, repair, replacement, and/or renewal shall be the sole responsibility of the Developer.

b. The Township shall have the right, but not the obligation, to draw on the Maintenance Security at any time if: (i) any defects exist or arise in the Stormwater Management Facilities; (ii) any operational difficulties occur in the Stormwater Management Facilities; (iii) the Developer fails to maintain, repair, replace, and/or renew the Stormwater Management Facilities in accordance with this Agreement; (iv) the Developer fails to fully comply with all of the terms, conditions, covenants and obligations of this Agreement; or (v) the Maintenance Security is scheduled to expire or the Township has been made aware that the Maintenance Security will not be renewed. If the Township draws on the Maintenance Security pursuant to **Section 6(b)(v)** hereof, the amount withdrawn shall be held by the Township and shall be deemed to be the Maintenance Security hereunder (or a portion thereof if less than the required amount) unless and until the Developer provides replacement Maintenance Security which satisfies the provisions of this Agreement.

c. Except for funds drawn pursuant to **Section 6(b)(v)**, the Township shall use funds drawn from the Maintenance Security to pay for (or for the reimbursement of) any costs and expenses associated with maintenance, repair, replacement and/or renewal of the Stormwater Management Facilities (including, without limitation, engineering fees) and/or any costs and expenses associated with the enforcement of this Agreement (including, without limitation, attorneys' fees and court costs). In lieu of (or, if the Maintenance Security is insufficient, in addition to) drawing on the Maintenance Security, the Township may cause a municipal lien to be imposed upon the Property for the cost of such maintenance, repair, replacement, renewal and/or enforcement including applicable engineering and/or attorneys' fees. Notwithstanding the foregoing, the Township's draw or draws on the Maintenance Security and/or the Township's performance of any maintenance, repair, replacement and/or renewal of the Stormwater Management Facilities shall in no way release the Developer from any obligations hereunder, and the Developer shall remain solely and completely responsible and liable therefor.

d. In the event the Township makes a draw on the Maintenance Security, the Developer shall be obligated to provide additional Maintenance Security within fifteen (15) days of said draw in order to ensure that the amount of the financial security held by the Township is not less than the amount required by the Township pursuant to **Section 5** hereof.

e. The Township is not responsible for the maintenance, repair, restoration or renewal of any areas on the Property, including without limitation the Stormwater Management Facilities, and this Agreement shall not be construed to impose any such obligations on the Township.

7. **Recordation; Duration and Amendment.** This Agreement shall be recorded by the Township, and the Developer shall reimburse the Township for the full cost thereof. The obligations, covenants, restrictions and easements contained in this Agreement shall run with and

bind the land, and shall inure to the benefit of and be enforceable by the Township against the Developer, or the subsequent owner of the Property, their respective legal representatives, heirs, successors and assigns perpetually. This Agreement may be amended only by a written document duly executed by both parties. Any such amendment shall be recorded with the Allegheny County Department of Real Estate.

8. **Notices.** Any notice or communication required or permitted by this Agreement shall be in writing and shall be sent certified mail, postage paid, return receipt requested, to the address, as appropriate, listed below.

Township: Mr. Neil McFadden  
Township Manager  
Marshall Township  
525 Pleasant Hill Road, Suite 100  
Wexford, PA 15090

Developer: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Any party may change its address by written notice to the other. All notices and other communication shall be deemed to have been received two days after mailing, whether or not the correspondence is actually claimed by the party receiving the notice or other communication.

9. **Enforcement.** Any violation of this Agreement by the Developer or its agents, servants, employees, heirs, administrators, successors and assigns shall be considered a violation of the Township Subdivision and Land Development Ordinance and/or the Township Stormwater Management Ordinance. In addition to all other remedies provided herein and by law, all such violations shall be cause for the Township's initiation of enforcement proceedings, including actions at law or in equity, authorized by the ordinances of the Township, the Pennsylvania Municipalities Planning Code, the Stormwater Management Act and/or any other applicable federal, state or local laws.

10. **Indemnification and Release.** The Developer shall protect, indemnify and save harmless the Township and its elected and appointed officials, employees, attorneys and agents against and from any and all liabilities, suits, actions, claims, demands, losses, expenses and costs of every kind and nature, including reasonable attorneys' fees, in contract, tort, statutory or otherwise incurred by, or asserted or imposed against, the Township and its elected and appointed officials, employees, attorneys and agents, or any of them, by reason of any accident, injury (including death) or damage to person or property, however caused, resulting from, connected with or growing out of any act or omission of the Township, the Developer or any of its directors, officers, agents, contractors, subcontractors, employees, beneficiaries or any design, use, non-use, installation, operation, maintenance, repair, replacement, renewal or management of, or in connection with, the Stormwater Management Facilities or the Property, or any part thereof or this Agreement. The

Developer acknowledges and agrees that the Township shall not be liable for any damage or injury to the persons or property of the Developer or any of its directors, officers, agents, contractors, subcontractors, employees, beneficiaries, or any other person or entity who or which may be upon the Property. The Township shall give the Developer timely notice and shall forward to the Developer every demand, notice, summons or other process received with respect to any claim or legal proceeding within the purview hereof, but the failure of the Township to give such notice shall not affect any right to indemnification hereunder. The Developer's obligations under this **Section 10** shall survive any termination of this Agreement.

11. **Successors and Assigns.** This Agreement shall inure to the benefit of and shall be binding upon the Developer, its agents, officers, representatives, successors and assigns. Provided, however, this Agreement shall not be assigned by the Developer without the prior written consent of the Township, said consent not to be unreasonably withheld. Any assignment by the Developer shall require the assignee to agree in writing to accept all of the Developer's obligations hereunder, and for financial security required by this Agreement to remain in full force and effect. As used herein, the term "Developer" shall be construed to mean the Developer and its successors and assigns. For purposes of this Agreement, the change in control of fifty percent (50%) or more of the ownership interests in Developer (whether by equity sale or merger) shall constitute an assignment hereof.

12. **Severability.** Invalidation of any one of these covenants or restrictions by judgment or court order shall in no way affect the validity of any other provisions, which shall remain in full force and effect.

**[remainder of page intentionally blank]**

IN WITNESS WHEREOF, the Developer and the Township have caused this Agreement to be duly executed as of the day and year written above.

ATTEST:

**TOWNSHIP OF MARSHALL**

\_\_\_\_\_  
Township Manager/Secretary

By: \_\_\_\_\_  
Chair, Board of Supervisors

(SEAL)

COMMONWEALTH OF PENNSYLVANIA )

) SS:

COUNTY OF ALLEGHENY )

On this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, before me a Notary Public, the undersigned officer, personally appeared Thomas Madigan, the Chairman of the Board of Supervisors of Marshall Township, a Township of the Second Class, known to me (or satisfactorily proven) to be the person whose name is subscribed to the within instrument and acknowledged that he executed the same with the authority of Marshall Township, and for the purposes therein contained.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

My commission expires:

\_\_\_\_\_  
NOTARY PUBLIC

**[remainder of page intentionally blank]**

WITNESS:

**[DEVELOPER]**

\_\_\_\_\_

By: \_\_\_\_\_(SEAL)

Name: \_\_\_\_\_

Title: \_\_\_\_\_

(SEAL)

COMMONWEALTH OF PENNSYLVANIA )

) SS:

COUNTY OF \_\_\_\_\_ )

On this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, before me a Notary Public, the undersigned officer, personally appeared \_\_\_\_\_, the \_\_\_\_\_ of \_\_\_\_\_, a Pennsylvania \_\_\_\_\_, known to me (or satisfactorily proven) to be the person whose name is subscribed to the within instrument and acknowledged that he/she executed the same with the authority of \_\_\_\_\_, and for the purposes therein contained.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

My commission expires:

\_\_\_\_\_  
NOTARY PUBLIC

**[remainder of page intentionally blank]**

## **EXHIBIT LIST**

A - Stormwater Management Plan

B - Erosion Control Plan

**[remainder of page intentionally blank]**





Attachment

for

MCM #6 Pollution Prevention/Good Housekeeping

# MARSHALL TOWNSHIP - MS4 PROGRAM

## Standard Operating Procedures

### Pollution Prevention / Good Housekeeping Program

#### Purpose

Marshall Township is working jointly with the Pennsylvania Department of Environmental Protection (PADEP) to reduce the quantity of stormwater and increase the quality of stormwater runoff. The Township is located within US Environmental Protection Agency (EPA) designated urbanized areas, therefore, the Township is required to have a Small Municipal Separate Storm Sewer System (MS4) permit. As required under the National Pollutant Discharge Elimination System (NPDES) Phase II regulations, the Township is to develop stormwater management programs. This program requires that each MS4 permittee develop a *Pollution Prevention / Good Housekeeping Program (PPGHP)* which is detailed below. The purpose of the plan is to prevent any runoff from Township facilities and activities from adversely impacting the storm sewer system or the environment.

#### Types of Township Facilities

Marshall Township owns and maintains municipal roads, parks, storm sewers and several buildings in Allegheny County, Pennsylvania. The facilities consist of:

- Roads and driveways, not including County or State roads,
- Administrative, public works and recreational buildings,
- Parking lots including pervious and impervious,
- Open space including lawns, athletic fields and wooded areas,
- Garage operation areas,
- Maintenance and Grounds shops,
- Chemical storage areas,
- Stormwater facilities including conveyance and BMPs, and
- Active construction areas.

#### Types of Township Operations

The following activities are performed by the Township and have the potential for generating stormwater pollution:

- Pesticide and herbicide use for operations,
- Landscape operations including fertilizers,
- Street sweeping,
- Snow removal and deicing,
- Utility construction, maintenance, and repair,
- Waste recycling,
- Vehicle washing and maintenance,
- Storm sewer system and post construction SWM basin maintenance/repairs,
- Building maintenance and,
- New construction and land disturbances.

**Related Programs**

The Township has developed policies and programs related to pollution prevention and good housekeeping. These components include Township roads, parking lots, or other paved areas, storm sewer inlets, piping and outfalls, swales, ditches or other storm water conveyance facilities, and detention/retention basins or other stormwater management structures. The following are the specific plans.

- 1) Stormwater Facilities Inspection Policy (Appendix A to this plan),
- 2) Stormwater Facilities Maintenance Policy (Appendix B to this plan),
- 3) Stormwater Detention Facilities – Operation, Maintenance and Inspection Program (Appendix C to this plan),
- 4) Spill Prevention & Control Plan (Appendix D to this plan),
- 5) Illicit Discharge, Detection and Elimination Program,
- 6) Construction Site Stormwater Runoff Control Standards,
- 7) Post Construction Stormwater Management Requirements.

**Training Areas of Responsibility**

The Public Works Department is responsible for the overall pollution prevention and good housekeeping policy of the Township. However, because of the size of the Township, the number of employees, and the scope of activities at the Township, different people have direct day to day responsibility for specific areas, including training activities for responsible staff. These are:

**Buildings and Grounds:**

Landscape Maintenance	Parks & Recreation Director
Snow Removal and Deicing	Public Works Director
Vehicle Fueling/Garage	Public Works Director
Recycling	Township Manager
Stormwater systems	Public Works Director
Utility line breaks	Public Works Director, MTMSA
Chemical Storage and Disposal	Public Works Director
Spill Prevention and Cleanup	Public Works Director
New Construction Activities	Public Works Director, Allegheny County Conservation District & Township Engineer
Erosion and Sediment Control	Public Works Director, Allegheny County Conservation District, Building Inspection Department & Township Engineer
Athletic Facilities Maintenance	Parks & Recreation Director

**Fleet / Vehicle Services:**

Fleet	Public Works Director
-------	-----------------------

**Training**

The Public Works Director will meet with the maintenance, grounds and construction staff at least annually and report changes and/or updates in MS4 policies and program requirements to the supervisors. Additional training is available upon request.

General training aids will also be posted on the Townships website.

**Sources of Additional Training Materials**

EPA Municipal Training and Education Website:

[http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=factsheet\\_results&view=specific&bmp=129](http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=factsheet_results&view=specific&bmp=129)

EPA Pollution Prevention/Good Housekeeping for Municipal Operations Website:

[http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=min\\_measure&min\\_measure\\_id=6](http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=min_measure&min_measure_id=6)

**Pollutants of Concern**

The tables on the following page provide lists of general facilities and activities, and what potential pollutants may be associated with them. This table is also available at the link below.

<http://epa.gov/npdes/pubs/potmunpoll.pdf>

**Potential pollutants likely associated with specific *municipal facilities***

Municipality Facility Activity	Potential Pollutants								
	Sediment	Nutrients	Trash	Metals	Bacteria	Oil & Grease	Organics	Pesticides	Oxygen Demanding Substances
Building and Grounds Maintenance and Repair	X	X	X	X	X	X	X	X	X
Parking/Storage Area Maintenance	X	X	X	X	X	X	X		X
Waste Handling and Disposal	X	X	X	X	X	X	X	X	X
Vehicle and Equipment Fueling			X	X		X	X		
Vehicle and Equipment Maintenance and Repair				X		X	X		
Vehicle and Equipment Washing and Steam Cleaning	X	X	X	X		X	X		
Outdoor Loading and Unloading of Materials	X	X	X	X		X	X	X	X
Outdoor Container Storage of Liquids		X		X		X	X	X	X
Outdoor Storage of Raw Materials	X	X	X			X	X	X	X
Outdoor Process Equipment	X		X	X		X	X		
Overwater Activities			X	X	X	X	X	X	X
Landscape Maintenance	X	X	X		X			X	X

*Source: California Stormwater BMP Handbook (<http://www.cabmphandbooks.com/>)(slightly modified)*

**Potential pollutants likely associated with *municipal activities***

Municipal Program	Activities	Potential Pollutants								
		Sediment	Nutrients	Trash	Metals	Bacteria	Oil & Grease	Organics	Pesticides	Oxygen Demanding Substances
Roads, Streets, and Highways Operation and Maintenance	Sweeping and Cleaning	X		X	X		X			X
	Street Repair, Maintenance, and Striping/Painting	X		X	X		X	X		
	Bridge and Structure Maintenance	X		X	X		X	X		
Plaza, Sidewalk, and Parking Lot Maintenance and Cleaning	Surface Cleaning	X	X			X	X			X
	Graffiti Cleaning	X	X		X			X		
	Sidewalk Repair	X		X						
	Controlling Litter	X		X		X	X			X
Fountains, Pools, Lakes, and Lagoons Maintenance	Fountain and Pool Draining		X					X		
	Lake and Lagoon Maintenance	X	X	X		X			X	X
Landscape Maintenance	Mowing/Trimming/Planting	X	X	X		X			X	X
	Fertilizer & Pesticide Management	X	X						X	
	Managing Landscape Wastes			X					X	X
	Erosion Control	X	X							
Drainage System Operation and Maintenance	Inspection and Cleaning of Stormwater Conveyance Structures	X	X	X		X		X		X
	Controlling Illicit Connections and Discharges	X	X	X	X	X	X	X	X	X
	Controlling Illegal Dumping	X	X	X	X	X	X	X	X	X
	Maintenance of Inlet and Outlet Structures	X		X	X		X			X
Waste Handling and Disposal	Solid Waste Collection		X	X	X	X	X	X		X
	Waste Reduction and Recycling			X	X					X
	Household Hazardous Waste Collection			X	X		X	X	X	
	Controlling Litter			X	X	X		X		X
	Controlling Illegal Dumping	X		X		X	X		X	X
Water and Sewer Utility Operation and Maintenance	Water Line Maintenance	X				X	X			
	Sanitary Sewer Maintenance	X				X	X			X
	Spill/Leak/Overflow Control, Response, and Containment	X	X			X		X		X

*Source: California Stormwater BMP Handbook (<http://www.cabmphandbooks.com/>)*

## Appendix A – Storm Water Facility Inspection

1. Inspections will be conducted to evaluate the performance of stormwater facilities and to determine the potential or amounts of pollutants, trash and debris entering and discharging from the stormwater collection system.
2. Inspection frequencies of stormwater facilities at the Township Public Works, Parks and Administrative Building are to be established by the Township or its designated design professional and will depend on the following factors: (1) the type, size and design of the stormwater facility, (2) the size of the drainage area (3) the amount of impervious cover and (4) the type of activities that occur within the drainage area. More frequent inspections would be warranted in construction or high vehicle use areas, or in any area that is known or suspected to be at an increased risk for pollution. Severe weather conditions such as heavy rains will usually require follow up inspections to determine the impact to and the performance of stormwater facilities.
3. All inspection activities, results and recommendations are to be documented in writing.
4. The overall condition and cleanliness of Township parking lots will be evaluated during routine travel by Township staff. Those areas with excessive staining, trash or sediment are to be investigated or scheduled for cleaning. Appropriate corrective actions are to be considered for any areas exhibiting flooding or poor drainage patterns.
5. All storm sewer inlets/catch basins are to be inspected at least every four years to determine the sediment load and overall condition of the structure. Cleaning is required if the depth of deposits is greater than or equal to one-third the depth from the basin bottom to the invert of the lowest pipe or opening into or out of the basin. Catch basins that accumulate deposits quickly are to be inspected more frequently and the drainage area evaluated to determine possible causes. Inlet grates will be inspected for trash or debris that may prevent stormwater from entering the storm sewer system, especially before forecasted heavy rains.
6. Storm sewer easements and rights-of-way are to be inspected at least annually to check for obstructions or any other conditions that might affect the integrity of the system.
7. Township detention/retention basins are to be inspected to check for sediment accumulation and overall basin conditions. Sediment exceeding 10% of the designed basin depth requires sediment removal to the original basin shape and depth. The basin is to be inspected for the presence of yard waste or other non-degradable materials. Basin dikes, berms and spillways are to be examined for structural integrity. The basin outlet structure is to be checked to determine if the trash rack is missing or plugged.
8. Other Township stormwater conveyance facilities, such as swales, pipes, and ditches are to be inspected periodically to check for trash, vegetation, sediment, and erosion conditions.
9. Other types of Township stormwater BMP (i.e. wet pond, vegetated swale, infiltration facility, etc.) are to be inspected according to guidelines contained within the *Pennsylvania Stormwater Best Management Practices Manual*.

## Appendix B – Storm Water Facility Maintenance

1. Township roads and parking lots are to be cleaned on a regular basis. Those areas identified by inspections as being more prone to debris should be prioritized and cleaned. Roadway cleaning is necessary after the winter deicing season is over in order to remove accumulated materials. Roadway cleaning may also be necessary under non-deicing conditions when oil spill clean-up materials such as sand or oil dry are applied to prevent oil contaminated materials from being washed into the storm sewer system.
2. The storage and application of materials used for roadway deicing or traction control is to be in a manner that reduces the impact to the storm sewer system and the environment. All storage is to be protected from precipitation. Any spillage of materials is to be cleaned up to prevent storm water run-off contamination. Low hazard materials are to be used in environmentally sensitive or protected areas.
3. Storm sewer inlets/catch basins are to be cleaned when inspections reveal an excessive accumulation of sediment or debris. Storm sewer inlet grates are to also be cleaned when blocked by debris. Structural repairs to any part of the storm sewer inlet/catch basins and storm sewer pipes will be performed as necessary. Excessive debris or sediment in storm sewer pipe is to be removed. Damaged piping is to be replaced.
4. Free flow of water from outfalls is to be maintained by removal of debris and obstructions. Outlet protection/aprons at outfalls are to be maintained or replaced as necessary.
5. Detention basin sediment removal is to occur when the basin is completely dry. Disturbed areas are to be immediately stabilized and re-vegetated. Yard waste or non-degradable waste in a basin is to be removed. Spillways and overflows are to be maintained to allow for uninterrupted flow. Mowing and/or trimming of vegetation are to occur as needed to sustain the basin and all detritus is to be removed. Vegetative basin cover is to be maintained at 95%. Areas of bare or sparse vegetation is to be addressed by soil aerating, conditioning, seeding and mulching (as necessary) to restore a proper vegetative cover. Potential mosquito problems from unwanted standing water will be addressed by introduction of mosquito predators or by implementation of a pesticide plan.
6. Any planned herbicide or pesticide application in a basin or any part of the storm sewer collection system is to be reviewed by qualified persons in order to comply with applicable regulations and to prevent adverse water quality impacts. The use of herbicides and pesticides is to be limited as much as possible.
7. Other types of Township storm water BMP (i.e. wet pond, vegetated swale, infiltration facility, etc.) are to be maintained according to guidelines contained in the *Pennsylvania Stormwater Best Management Practices Manual*.
8. Materials recovered from the storm sewer collection or treatment system are to be handled and disposed of in accordance with applicable state and federal waste management regulations.
9. All maintenance activities are to be documented in writing. Pictures are to be taken of various storm sewer system components to document pre- and post- maintenance conditions.

## **Appendix C**

# **MARSHALL TOWNSHIP STORM WATER DETENTION FACILITIES**

## **OPERATION, MAINTENANCE AND INSPECTION PROGRAM**

MARCH 2005  
(REVISED JUNE 2015)

## Marshall Township – Stormwater Detention Facilities Operation, Maintenance and Inspection Program

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### GENERAL

Marshall Township owns, operates and maintains a stormwater collection and conveyance system, which transports stormwater runoff from Township owned streets and properties. The Township also owns, operates and maintains a number of stormwater detention facilities, collecting and discharging stormwater runoff from Township owned and maintained streets. This report and program details the operation, maintenance and inspection of the stormwater detention facilities only.

### STORM WATER DETENTION FACILITIES

Existing Township owned stormwater detention facilities are listed in the attached Appendix A. With the exception of one of the Village at Marshall Ridge Facilities, all stormwater detention facilities are open basins. The list of stormwater detention facilities should be reviewed annually and updated, as needed.

### INSPECTION

Township Public Works personnel and/ or the Township Engineer, should perform a visual inspection of each stormwater facility at a minimum once during each five year period. Problematic detention facilities will need to be inspected on a more frequent basis. Inspection should be staggered such that annually, approximately one-fifth of the facilities are inspected. Personnel conducting the inspections should complete the inspection report form attached as Appendix B. Follow-up work conducted after the inspection to remedy problems discovered should be noted on the inspection form.

### OPERATION AND MAINTENANCE

Based on the results of each inspection, operational changes or maintenance may be required at the facilities. All repairs should be made in a timely fashion to allow for the proper operation of the facilities.

Marshall Township – Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program

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**APPENDIX A**

Marshall Township, Allegheny County  
Stormwater Detention Facilities  
June 2015

<b>DEVELOPMENT/AREA</b>	<b>QUANTITY</b>	<b>LOCATION</b>
Allegheny Drive	1	East of cul-de-sac
Blueberry Hills	1	Southeast of Blueberry Lane Cul-de-sac
Buckingham Ridge Phase I	1	North of Buckingham Drive approximately at mid point of road
Buckingham Ridge Phase II	1	North of Claridon Drive (access from Cranberry Township)
Burry Woods	1	West of Burry Avenue Cul-de-sac
Cambridge Manor	2	South of Quincy Lane adjacent to Mingo Road West of Rockport Place near mid point of road
Colefield Heights	1	East of Ash Court Cul-de-sac
Crossings of Wexford	2	South of Laurel Crest Drive South of Clematis Drive adjacent to Wexford Run Road
Global View Drive	1	Northeast of cul-de-sac
Greenbriar Phase I	2	East of Pine Grove Court Cul-de-sac South of Searight Drive Cul-de-sac
Greenbriar Phases II and III	4	West of Greenbriar Drive Cul-de-sac near sewage pump station Southwest of intersection of Greenbriar Drive and McKean Drive West of McKean Drive West of intersection of Greenbriar Drive and McKean Drive

Marshall Township – Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program  
Page - 2

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Highpoint	2	North of Summit Drive near Wexford Run Road North of Hillcrest Drive near mid point between Peak Drive and Highland Court
Innovation Drive	3	North of Innovation Drive near the Red Belt North of Innovation Drive near intersection with Global View Drive. West of Innovation Drive near Knob Road
Marshall Drive	2	East of Turnaround North of Commonwealth Manor Buildings
Marshall Woods	2	North of Arbordale Lane just past intersection with Highlander Circle South of Arbordale Lane Cul-de-sac
Marshall Heights	2	East of Carvine Court adjacent to the Red Belt East of Marshall Heights Drive adjacent to Mingo Road
Oakview	1	South of Guckert Lane between Colleen Court and Oak View Court
Quail Crossing	2	Between Quail Court and Aviary Court East of Aviary Court Cul-de-sac
Rolling Ridge	2	North of Country Oak Drive adjacent to Wexford Run Road East of Royal Oak Drive Cul-de-sac
Providence Pointe	1	East of Providence Drive adjacent to the Red Belt
Seasons	1	South of Seasons Drive near mid point of road

Sewickley Farms	3	North of Merriman Court Cul-de-sac behind Windsor Manor East of Sewickley Farms Circle mid of Merriman Court and and Foxridge Court Northeast of Shady Oak Court near sewage pump station
Shadow Wood	2	West of Ciderberry Drive North of Mulberry Court Cul-de-sac
Sterling Woods	1	Southwest of Victoria Lane Cul-de-sac (access Wexford Run Road)
Stonegate Drive	1	South of Stonegate Drive near mid point of road
Summit Plan	1	West of Archberry Drive near mid point of road
The Registry	1	East of Registry Lane
Thorn Hill Dr/Keystone Dr	1	Middle of the loop formed by Keystone/Thorn Hill Drives
Timber Creek Farms	1	North of intersection of Buckthorn Road and Registry Lane
Tyburn Woods	1	East of Tyburn Drive near mid point of road
Venango Trail Basin #2	1	West of Intersection of Venango Trail and Wahkeena Drives
Wagner Farms	1	North of Cottonwood Lane Cul-de-sac
Windsor Manor	2	Along Woodland Road east of Worthington Drive East of Worthington Road near intersection with Maitland Court
Woodhurst	1	West of Woodhurst Terrace
Williamsburg Place	1	East of Williamsburg Place adjacent to the Red Belt

Marshall Township – Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program  
Page – 4

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Wheatland Pointe	2	West of Bridle Path Cul-de-sac South of Bridle Path Drive near intersection with Harvest Ridge Drive
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**APPENDIX B**

Stormwater Detention Facilities  
Inspection Form  
September 2012

FACILITY NAME: \_\_\_\_\_ Date: \_\_\_\_\_

Date of Last Precipitation Event: \_\_\_\_\_

DISCHARGES INTO DETENTION FACILITY

Number of Discharge Pipes Into Facility: \_\_\_\_\_

Condition of Endwall(s): \_\_\_\_\_

Silt or Debris at Endwalls? Yes \_\_\_ No \_\_\_ Cleanup Needed? Yes \_\_\_ No \_\_\_

INTERIOR OF FACILITY

Condition of Facility Floor

Excessive Vegetation? Yes \_\_\_ No \_\_\_ Clearing Needed? Yes \_\_\_ No \_\_\_

Excessive Ponding of Water? Yes \_\_\_ No \_\_\_

Condition of Interior Side Walls: \_\_\_\_\_

Erosion Rutting Present? Yes \_\_\_ No \_\_\_

Condition of Low Flow Channel: \_\_\_\_\_

OUTLET STRUCTURE

Overall Condition: \_\_\_\_\_

Silt or Debris? Yes \_\_\_ No \_\_\_

Condition of Orifices and/or Weirs: \_\_\_\_\_

DAM

Overall Condition: \_\_\_\_\_

Excessive Vegetation? Yes\_\_\_\_ No\_\_\_\_

Erosion Rutting Present? Yes\_\_\_\_ No\_\_\_\_

Animal Burrow Holes in Dam? Yes\_\_\_\_ No\_\_\_\_

DISCHARGE PIPE AND SPILLWAY

Condition of Endwall: \_\_\_\_\_

Silt or Debris at Endwall? Yes\_\_\_\_ No\_\_\_\_ Cleanup Needed? Yes\_\_\_\_ No\_\_\_\_

Condition of Spillway: \_\_\_\_\_

Rutting at Spillway? Yes\_\_\_\_ No\_\_\_\_ Repair Needed? Yes\_\_\_\_ No\_\_\_\_

Inspector Name: \_\_\_\_\_

Print Name

Signature

FOLLOWUP REMEDIAL WORK

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

Action Taken: \_\_\_\_\_

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Marshall Township - Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program

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**APPENDIX B**

Stormwater Detention Facilities  
Inspection Form  
March 2005

FACILITY NAME: High Point Date: 2013

Date of Last Precipitation Event: UNKNOWN

DISCHARGES INTO DETENTION FACILITY

Number of Discharge Pipes Into Facility: 6

Condition of Endwall(s): Good

Silt or Debris at Endwalls?  Yes  No Cleanup Needed?  Yes  No

INTERIOR OF FACILITY

Condition of Facility Floor: Silt sediment build up

Excessive Vegetation?  Yes  No Clearing Needed?  Yes  No

Excessive Ponding of Water?  Yes  No

Condition of Interior Side Walls: Good

Erosion Rutting Present?  Yes  No Repair Needed?  Yes  No

Condition of Low Flow Channel: needs ATTN

OUTLET STRUCTURE

Overall Condition: Good

Silt or Debris?  Yes  No Cleanup Needed?  Yes  No

Condition of Orifices and/or Weirs: Good

Marshall Township - Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program

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DAM

Overall Condition: Good

Excessive Vegetation?  Yes  No Clearing Needed?  Yes  No

Erosion Rutting Present?  Yes  No Repair Needed?  Yes  No

Animal Burrow Holes in Dam?  Yes  No

DISCHARGE PIPE AND SPILLWAY

Condition of Endwall: Good

Silt or Debris at Endwall?  Yes  No Cleanup Needed?  Yes  No

Condition of Spillway: Good

Rutting at Spillway?  Yes  No Repair Needed?  Yes  No

Inspector Name: Bruce Dickson *Bruce Dickson*  
Print Name Signature

FOLLOWUP REMEDIAL WORK

Date: 2013

Action Taken: Clean Low Flow Channel  
Remove brush/small trees

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Marshall Township - Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program

**APPENDIX B**

Stormwater Detention Facilities  
Inspection Form  
March 2005

FACILITY NAME: Woodhurst Date: May 2014

Date of Last Precipitation Event: 10 days

DISCHARGES INTO DETENTION FACILITY

Number of Discharge Pipes Into Facility: 1

Condition of Endwall(s): Good

Silt or Debris at Endwalls?  Yes  No Cleanup Needed?  Yes  No

INTERIOR OF FACILITY

Condition of Facility Floor: SILT sediment build-up

Excessive Vegetation?  Yes  No Clearing Needed?  Yes  No

Excessive Ponding of Water?  Yes  No

Condition of Interior Side Walls: Good

Erosion Rutting Present?  Yes  No Repair Needed?  Yes  No

Condition of Low Flow Channel: Good

OUTLET STRUCTURE

Overall Condition: Good

Silt or Debris?  Yes  No Cleanup Needed?  Yes  No

Condition of Orifices and/or Weirs: Good

Marshall Township - Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program

DAM

Overall Condition: Good

Excessive Vegetation?  Yes  No Clearing Needed?  Yes  No

Erosion Rutting Present?  Yes  No Repair Needed?  Yes  No

Animal Burrow Holes in Dam?  Yes  No

DISCHARGE PIPE AND SPILLWAY

Condition of Endwall: Good

Silt or Debris at Endwall?  Yes  No Cleanup Needed?  Yes  No

Condition of Spillway: Good

Rutting at Spillway?  Yes  No Repair Needed?  Yes  No

Inspector Name: Bruce Dickson Bruce Dickson  
Print Name Signature

FOLLOWUP REMEDIAL WORK

Date: MAY 11 2014

Action Taken: Cleaned AROUND outlet pipe  
Remove silt sediment branches  
sticks

Marshall Township - Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program

**APPENDIX B**  
Stormwater Detention Facilities  
Inspection Form  
March 2005

FACILITY NAME: Country OAK Date: MAY 15 - 14

Date of Last Precipitation Event: 4 days

DISCHARGES INTO DETENTION FACILITY

Number of Discharge Pipes Into Facility: 1

Condition of Endwall(s): Good

Silt or Debris at Endwalls?  Yes  No Cleanup Needed?  Yes  No

INTERIOR OF FACILITY

Condition of Facility Floor: Cattails

Excessive Vegetation?  Yes  No Clearing Needed?  Yes  No

Excessive Ponding of Water?  Yes  No

Condition of Interior Side Walls: Good

Erosion Rutting Present?  Yes  No Repair Needed?  Yes  No

Condition of Low Flow Channel: Good

OUTLET STRUCTURE

Overall Condition: Fair

Silt or Debris?  Yes  No Cleanup Needed?  Yes  No

Condition of Orifices and/or Weirs: Good

Marshall Township - Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program

DAM

Overall Condition: Good

Excessive Vegetation?  Yes  No Clearing Needed?  Yes  No

Erosion Rutting Present?  Yes  No Repair Needed?  Yes  No

Animal Burrow Holes in Dam?  Yes  No

DISCHARGE PIPE AND SPILLWAY

Condition of Endwall: Good

Silt or Debris at Endwall?  Yes  No Cleanup Needed?  Yes  No

Condition of Spillway: Fair

Rutting at Spillway?  Yes  No Repair Needed?  Yes  No

Inspector Name: Bruce Dickson Bruce Dickson  
Print Name Signature

FOLLOWUP REMEDIAL WORK

Date: MAY 15-14

Action Taken: Brush ALL Sides

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Marshall Township - Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program

**APPENDIX B**

Stormwater Detention Facilities  
Inspection Form  
March 2005

FACILITY NAME: Copper Creek I Date: May 14

Date of Last Precipitation Event: 8 days

DISCHARGES INTO DETENTION FACILITY

Number of Discharge Pipes Into Facility: 1

Condition of Endwall(s): Good

Silt or Debris at Endwalls?  Yes  No Cleanup Needed?  Yes  No

INTERIOR OF FACILITY

Condition of Facility Floor: Good

Excessive Vegetation?  Yes  No Clearing Needed?  Yes  No

Excessive Ponding of Water?  Yes  No

Condition of Interior Side Walls: Good

Erosion Rutting Present?  Yes  No Repair Needed?  Yes  No

Condition of Low Flow Channel: Good

OUTLET STRUCTURE

Overall Condition: Good

Silt or Debris?  Yes  No Cleanup Needed?  Yes  No

Condition of Orifices and/or Weirs: Good

Marshall Township - Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program

DAM

Overall Condition: Good

Excessive Vegetation?  Yes  No Clearing Needed?  Yes  No

Erosion Rutting Present?  Yes  No Repair Needed?  Yes  No

Animal Burrow Holes in Dam?  Yes  No

DISCHARGE PIPE AND SPILLWAY

Condition of Endwall: Good

Silt or Debris at Endwall?  Yes  No Cleanup Needed?  Yes  No

Condition of Spillway: Good

Rutting at Spillway?  Yes  No Repair Needed?  Yes  No

Inspector Name: Bruce Dickson Bruce Dickson  
Print Name Signature

FOLLOWUP REMEDIAL WORK

Date: MAY 14

Action Taken: Brush all sides of the pond

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Marshall Township - Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program

**APPENDIX B**

Stormwater Detention Facilities  
Inspection Form  
March 2005

FACILITY NAME: Copper Creek II Date: May 14

Date of Last Precipitation Event: UNKNOWN

DISCHARGES INTO DETENTION FACILITY

Number of Discharge Pipes Into Facility: 1

Condition of Endwall(s): Good

Silt or Debris at Endwalls?  Yes  No Cleanup Needed?  Yes  No

INTERIOR OF FACILITY

Condition of Facility Floor: Good

Excessive Vegetation?  Yes  No Clearing Needed?  Yes  No

Excessive Ponding of Water?  Yes  No

Condition of Interior Side Walls: Good High Grass / Weeds

Erosion Rutting Present?  Yes  No Repair Needed?  Yes  No

Condition of Low Flow Channel: Good

OUTLET STRUCTURE

Overall Condition: Good

Silt or Debris?  Yes  No Cleanup Needed?  Yes  No

Condition of Orifices and/or Weirs: Good

Marshall Township - Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program

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DAM

Overall Condition: Good

Excessive Vegetation?  Yes  No Clearing Needed?  Yes  No

Erosion Rutting Present?  Yes  No Repair Needed?  Yes  No

Animal Burrow Holes in Dam?  Yes  No

DISCHARGE PIPE AND SPILLWAY

Condition of Endwall: Good

Silt or Debris at Endwall?  Yes  No Cleanup Needed?  Yes  No

Condition of Spillway: Good

Rutting at Spillway?  Yes  No Repair Needed?  Yes  No

Inspector Name: Bruce Dickson  
Print Name

Bruce Dickson  
Signature

FOLLOWUP REMEDIAL WORK

Date: MAY 14

Action Taken: Clean ALL sides of pond

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Marshall Township - Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program

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**APPENDIX B**

Stormwater Detention Facilities  
Inspection Form  
March 2005

FACILITY NAME: Cardinal Dr Date: MAY 14

Date of Last Precipitation Event: 10 days

DISCHARGES INTO DETENTION FACILITY

Number of Discharge Pipes Into Facility: 1

Condition of Endwall(s): Good

Silt or Debris at Endwalls?  Yes  No Cleanup Needed?  Yes  No

INTERIOR OF FACILITY

Condition of Facility Floor: Good

Excessive Vegetation?  Yes  No Clearing Needed?  Yes  No

Excessive Ponding of Water?  Yes  No

Condition of Interior Side Walls: Good

Erosion Rutting Present?  Yes  No Repair Needed?  Yes  No

Condition of Low Flow Channel: Good

OUTLET STRUCTURE

Overall Condition: Good

Silt or Debris?  Yes  No Cleanup Needed?  Yes  No

Condition of Orifices and/or Weirs: Good

Marshall Township - Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program

DAM

Overall Condition: Good

Excessive Vegetation?  Yes  No Clearing Needed?  Yes  No

Erosion Rutting Present?  Yes  No Repair Needed?  Yes  No

Animal Burrow Holes in Dam?  Yes  No

DISCHARGE PIPE AND SPILLWAY

Condition of Endwall: \_\_\_\_\_

Silt or Debris at Endwall?  Yes  No Cleanup Needed?  Yes  No

Condition of Spillway: Good

Rutting at Spillway?  Yes  No Repair Needed?  Yes  No

Inspector Name: Bruce Dickson  
Print Name

Bruce Dickson  
Signature

FOLLOWUP REMEDIAL WORK

Date: MAY 14

Action Taken: Mow All sides of det pond

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\_\_\_\_\_  
\_\_\_\_\_

Marshall Township - Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program

**APPENDIX B**

Stormwater Detention Facilities  
Inspection Form  
March 2005

FACILITY NAME: Registry Date: Oct 22 2014

Date of Last Precipitation Event: 7 days

DISCHARGES INTO DETENTION FACILITY

Number of Discharge Pipes Into Facility: 1

Condition of Endwall(s): Good

Silt or Debris at Endwalls?  Yes  No Cleanup Needed?  Yes  No

INTERIOR OF FACILITY

Condition of Facility Floor: grass cut tails

Excessive Vegetation?  Yes  No Clearing Needed?  Yes  No

Excessive Ponding of Water?  Yes  No

Condition of Interior Side Walls: Good

Erosion Rutting Present?  Yes  No Repair Needed?  Yes  No

Condition of Low Flow Channel: \_\_\_\_\_

OUTLET STRUCTURE

Overall Condition: Good minor clean up use brushwater

Silt or Debris?  Yes  No Cleanup Needed?  Yes  No

Condition of Orifices and/or Weirs: good

Marshall Township - Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program

DAM

Overall Condition: \_\_\_\_\_

Excessive Vegetation?  Yes  No Clearing Needed?  Yes  No  
Erosion Rutting Present?  Yes  No Repair Needed?  Yes  No  
Animal Burrow Holes in Dam?  Yes  No

DISCHARGE PIPE AND SPILLWAY

Condition of Endwall: \_\_\_\_\_

Silt or Debris at Endwall?  Yes  No Cleanup Needed?  Yes  No

Condition of Spillway: \_\_\_\_\_

Rutting at Spillway?  Yes  No Repair Needed?  Yes  No

Inspector Name: Bruce Dickson  
Print Name

Bruce Dickson  
Signature

FOLLOWUP REMEDIAL WORK

Date: Nov 8 2014

Action Taken: Oct 28 2014 boom mow  
Remove small trees General clean up

Marshall Township - Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program

**APPENDIX B**  
Stormwater Detention Facilities  
Inspection Form  
March 2005

FACILITY NAME: Blueberry Hills Date: Aug 12-20 14

Date of Last Precipitation Event: UNKNOWN

DISCHARGES INTO DETENTION FACILITY

Number of Discharge Pipes Into Facility: 1

Condition of Endwall(s): Good

Silt or Debris at Endwalls?  Yes  No Cleanup Needed?  Yes  No

INTERIOR OF FACILITY

Condition of Facility Floor: Good

Excessive Vegetation?  Yes  No Clearing Needed?  Yes  No

Excessive Ponding of Water?  Yes  No

Condition of Interior Side Walls: Good

Erosion Rutting Present?  Yes  No Repair Needed?  Yes  No

Condition of Low Flow Channel: Good

OUTLET STRUCTURE

Overall Condition: \_\_\_\_\_

Silt or Debris?  Yes  No Cleanup Needed?  Yes  No

Condition of Orifices and/or Weirs: Good

Marshall Township - Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program

DAM

Overall Condition: \_\_\_\_\_  
Excessive Vegetation?  Yes  No Clearing Needed?  Yes  No  
Erosion Rutting Present?  Yes  No Repair Needed?  Yes  No  
Animal Burrow Holes in Dam?  Yes  No

DISCHARGE PIPE AND SPILLWAY

Condition of Endwall: End wall needed Re-set  
Silt or Debris at Endwall?  Yes  No Cleanup Needed?  Yes  No  
Condition of Spillway: built of material  
Rutting at Spillway?  Yes  No Repair Needed?  Yes  No

Inspector Name: Bruce Dickson Bruce Dickson  
Print Name Signature

FOLLOWUP REMEDIAL WORK

Date: Sept 8 2014  
Action Taken: Reset concrete end wall  
Remove built up of material around  
end wall

Marshall Township - Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program

**APPENDIX B**  
Stormwater Detention Facilities  
Inspection Form  
March 2005

FACILITY NAME: Buckingham Ridge Date: Sept 18 - 2014

Date of Last Precipitation Event: \_\_\_\_\_

DISCHARGES INTO DETENTION FACILITY

Number of Discharge Pipes Into Facility: 1

Condition of Endwall(s): Good

Silt or Debris at Endwalls?  Yes  No Cleanup Needed?  Yes  No

INTERIOR OF FACILITY

Condition of Facility Floor: Remove silt build up

Excessive Vegetation?  Yes  No Clearing Needed?  Yes  No

Excessive Ponding of Water?  Yes  No

Condition of Interior Side Walls: Good

Erosion Rutting Present?  Yes  No Repair Needed?  Yes  No

Condition of Low Flow Channel: Needed clean

OUTLET STRUCTURE

Overall Condition: Good

Silt or Debris?  Yes  No Cleanup Needed?  Yes  No

Condition of Orifices and/or Weirs: Good

Marshall Township - Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program

DAM

Overall Condition: Good

Excessive Vegetation?  Yes  No Clearing Needed?  Yes  No

Erosion Rutting Present?  Yes  No Repair Needed?  Yes  No

Animal Burrow Holes in Dam?  Yes  No

DISCHARGE PIPE AND SPILLWAY

Condition of Endwall: Good

Silt or Debris at Endwall?  Yes  No Cleanup Needed?  Yes  No

Condition of Spillway: Good

Rutting at Spillway?  Yes  No Repair Needed?  Yes  No

Inspector Name: Bruce Dickson Bruce Dickson  
Print Name Signature

FOLLOWUP REMEDIAL WORK

Date: Sept 30 2014

Action Taken: Small tree<sup>s</sup> Removal of  
clean Flow channel

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Marshall Township - Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program

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**APPENDIX B**

Stormwater Detention Facilities  
Inspection Form  
March 2005

FACILITY NAME: Berry Woods Date: June 1 2014

Date of Last Precipitation Event: \_\_\_\_\_

DISCHARGES INTO DETENTION FACILITY

Number of Discharge Pipes Into Facility: 1

Condition of Endwall(s): Good

Silt or Debris at Endwalls?  Yes  No Cleanup Needed?  Yes  No

INTERIOR OF FACILITY

Condition of Facility Floor: Good

Excessive Vegetation?  Yes  No Clearing Needed?  Yes  No

Excessive Ponding of Water?  Yes  No

Condition of Interior Side Walls: Good

Erosion Rutting Present?  Yes  No Repair Needed?  Yes  No

Condition of Low Flow Channel: Good

OUTLET STRUCTURE

Overall Condition: Good

Silt or Debris?  Yes  No Cleanup Needed?  Yes  No

Condition of Orifices and/or Weirs: Outlet pipe & cleaned

Marshall Township - Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program

DAM

Overall Condition: Good

Excessive Vegetation?  Yes  No Clearing Needed?  Yes  No

Erosion Rutting Present?  Yes  No Repair Needed?  Yes  No

Animal Burrow Holes in Dam?  Yes  No

DISCHARGE PIPE AND SPILLWAY

Condition of Endwall: Good

Silt or Debris at Endwall?  Yes  No Cleanup Needed?  Yes  No

Condition of Spillway: Good

Rutting at Spillway?  Yes  No Repair Needed?  Yes  No

Inspector Name: Bruce Dickson Bruce Dickson  
Print Name Signature

FOLLOWUP REMEDIAL WORK

Date: June 10 2014

Action Taken: Cleaned out let pipe  
high pressure jetter

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Marshall Township - Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program

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**APPENDIX B**

Stormwater Detention Facilities  
Inspection Form  
March 2005

FACILITY NAME: Cambridge Manor Date: Sept 18 2014

Date of Last Precipitation Event: \_\_\_\_\_

DISCHARGES INTO DETENTION FACILITY

Number of Discharge Pipes Into Facility: 1

Condition of Endwall(s): Good

Silt or Debris at Endwalls?  Yes  No Cleanup Needed?  Yes  No

INTERIOR OF FACILITY

Condition of Facility Floor: Good

Excessive Vegetation?  Yes  No Clearing Needed?  Yes  No

Excessive Ponding of Water?  Yes  No

Condition of Interior Side Walls: Small slide on 1 side wall

Erosion Rutting Present?  Yes  No Repair Needed?  Yes  No

Condition of Low Flow Channel: needed cleaned

OUTLET STRUCTURE

Overall Condition: needed attention

Silt or Debris?  Yes  No Cleanup Needed?  Yes  No

Condition of Orifices and/or Weirs: Good

Marshall Township - Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program

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DAM

Overall Condition: Needed work

Excessive Vegetation?  Yes  No Clearing Needed?  Yes  No

Erosion Rutting Present?  Yes  No Repair Needed?  Yes  No

Animal Burrow Holes in Dam?  Yes  No

DISCHARGE PIPE AND SPILLWAY

Condition of Endwall: Good

Silt or Debris at Endwall?  Yes  No Cleanup Needed?  Yes  No

Condition of Spillway: Good

Rutting at Spillway?  Yes  No Repair Needed?  Yes  No

Inspector Name: Bruce Dickson Bruce Dickson  
Print Name Signature

FOLLOWUP REMEDIAL WORK

Date: Oct 14 2014

Action Taken: contractor brought in  
to repair slide pond is in excellent  
condition

Marshall Township - Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program

**APPENDIX B**

Stormwater Detention Facilities  
Inspection Form  
March 2005

FACILITY NAME: Marshall Dr Date: Oct 20 2014

Date of Last Precipitation Event: 7 days

DISCHARGES INTO DETENTION FACILITY

Number of Discharge Pipes Into Facility: 1

Condition of Endwall(s): Good

Silt or Debris at Endwalls?  Yes  No Cleanup Needed?  Yes  No

INTERIOR OF FACILITY

Condition of Facility Floor: heavy CAT tails

Excessive Vegetation?  Yes  No Clearing Needed?  Yes  No

Excessive Ponding of Water?  Yes  No

Condition of Interior Side Walls: Good

Erosion Rutting Present?  Yes  No Repair Needed?  Yes  No

Condition of Low Flow Channel: Good

OUTLET STRUCTURE

Overall Condition: Good

Silt or Debris?  Yes  No Cleanup Needed?  Yes  No

Condition of Orifices and/or Weirs: Good

Marshall Township - Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program

DAM

Overall Condition: Good

Excessive Vegetation?  Yes  No Clearing Needed?  Yes  No

Erosion Rutting Present?  Yes  No Repair Needed?  Yes  No

Animal Burrow Holes in Dam?  Yes  No

DISCHARGE PIPE AND SPILLWAY

Condition of Endwall: Good

Silt or Debris at Endwall?  Yes  No Cleanup Needed?  Yes  No

Condition of Spillway: Good

Rutting at Spillway?  Yes  No Repair Needed?  Yes  No

Inspector Name: Bruce Dickson Bruce Dickson  
Print Name Signature

FOLLOWUP REMEDIAL WORK

Date: Oct 20 2014

Action Taken: Beem mow sides of det. pond

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Marshall Township - Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program

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**APPENDIX B**

Stormwater Detention Facilities  
Inspection Form  
March 2005

FACILITY NAME: OAKVIEW Date: JUNE 10 2015

Date of Last Precipitation Event: UNKNOWN

DISCHARGES INTO DETENTION FACILITY

Number of Discharge Pipes Into Facility: 1

Condition of Endwall(s): Good

Silt or Debris at Endwalls?  Yes  No Cleanup Needed?  Yes  No

INTERIOR OF FACILITY

Condition of Facility Floor: Good

Excessive Vegetation?  Yes  No Clearing Needed?  Yes  No

Excessive Ponding of Water?  Yes  No

Condition of Interior Side Walls: Good

Erosion Rutting Present?  Yes  No Repair Needed?  Yes  No

Condition of Low Flow Channel: Good

OUTLET STRUCTURE

Overall Condition: Good

Silt or Debris?  Yes  No Cleanup Needed?  Yes  No

Condition of Orifices and/or Weirs: Good

Marshall Township - Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program

DAM

Overall Condition: Good

Excessive Vegetation?  Yes  No Clearing Needed?  Yes  No

Erosion Rutting Present?  Yes  No Repair Needed?  Yes  No

Animal Burrow Holes in Dam?  Yes  No

DISCHARGE PIPE AND SPILLWAY

Condition of Endwall: Good

Silt or Debris at Endwall?  Yes  No Cleanup Needed?  Yes  No

Condition of Spillway: Good

Rutting at Spillway?  Yes  No Repair Needed?  Yes  No

Inspector Name: Bruce Dickson  
Print Name

Bruce Dickson  
Signature

FOLLOWUP REMEDIAL WORK

Date: JUNE 10 2015

Action Taken: general clean-up

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Marshall Township - Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program

**APPENDIX B**

Stormwater Detention Facilities  
Inspection Form  
March 2005

FACILITY NAME: Season's Date: March 8 2015

Date of Last Precipitation Event: 5 days

DISCHARGES INTO DETENTION FACILITY

Number of Discharge Pipes Into Facility: 1

Condition of Endwall(s): Good

Silt or Debris at Endwalls?  Yes  No Cleanup Needed?  Yes  No

INTERIOR OF FACILITY

Condition of Facility Floor: Good

Excessive Vegetation?  Yes  No Clearing Needed?  Yes  No

Excessive Ponding of Water?  Yes  No

Condition of Interior Side Walls: Good

Erosion Rutting Present?  Yes  No Repair Needed?  Yes  No

Condition of Low Flow Channel: Needed cleaned

OUTLET STRUCTURE

Overall Condition: Good

Silt or Debris?  Yes  No Cleanup Needed?  Yes  No

Condition of Orifices and/or Weirs: Good

Marshall Township - Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program

DAM

Overall Condition: Good

Excessive Vegetation?  Yes  No Clearing Needed?  Yes  No  
Erosion Rutting Present?  Yes  No Repair Needed?  Yes  No  
Animal Burrow Holes in Dam?  Yes  No

DISCHARGE PIPE AND SPILLWAY

Condition of Endwall: Good

Silt or Debris at Endwall?  Yes  No Cleanup Needed?  Yes  No

Condition of Spillway: Good

Rutting at Spillway?  Yes  No Repair Needed?  Yes  No

Inspector Name: Bruce Dickson Bruce Dickson  
Print Name Signature

FOLLOWUP REMEDIAL WORK

Date: MAR 8 2015  
Action Taken: Remove fallen trees clean-up  
AROUND outlet structure

Marshall Township - Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program

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**APPENDIX B**

Stormwater Detention Facilities  
Inspection Form  
March 2005

FACILITY NAME: Tyburn Woods Date: June 2014

Date of Last Precipitation Event: 10

DISCHARGES INTO DETENTION FACILITY

Number of Discharge Pipes Into Facility: 1

Condition of Endwall(s): Good

Silt or Debris at Endwalls?  Yes  No Cleanup Needed?  Yes  No

INTERIOR OF FACILITY

Condition of Facility Floor: heavy silt

Excessive Vegetation?  Yes  No Clearing Needed?  Yes  No

Excessive Ponding of Water?  Yes  No

Condition of Interior Side Walls: \_\_\_\_\_

Erosion Rutting Present?  Yes  No Repair Needed?  Yes  No

Condition of Low Flow Channel: Good

OUTLET STRUCTURE

Overall Condition: Good

Silt or Debris?  Yes  No Cleanup Needed?  Yes  No

Condition of Orifices and/or Weirs: Good

Marshall Township - Stormwater Detention Facilities  
Operation, Maintenance and Inspection Program

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DAM

Overall Condition: Good

Excessive Vegetation?  Yes  No Clearing Needed?  Yes  No

Erosion Rutting Present?  Yes  No Repair Needed?  Yes  No

Animal Burrow Holes in Dam?  Yes  No

DISCHARGE PIPE AND SPILLWAY

Condition of Endwall: Good

Silt or Debris at Endwall?  Yes  No Cleanup Needed?  Yes  No

Condition of Spillway: Good

Rutting at Spillway?  Yes  No Repair Needed?  Yes  No

Inspector Name: Bruce Dickson Bruce Dickson  
Print Name Signature

FOLLOWUP REMEDIAL WORK

Date: JUNE 2014

Action Taken: Remove excessive vegetation  
Remove branches

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## Appendix D

### Marshall Township, Allegheny County Spill Prevention & Control Plan

#### 1. Conduct routine cleaning, inspections, and maintenance.

- Sweep and clean storage areas consistently at a designated frequency (e.g. weekly, monthly). **DO NOT** hose down areas to storm drains.
- Place drip pans or absorbent materials beneath all mounted taps, and at all potential drip and spill locations during filling and unloading of tanks. Reuse, recycle, or properly dispose of any collected liquids or soiled absorbent materials.
- Check tanks (and any containment sumps) frequently for leaks and spills. Replace tanks that are leaking, corroded, or otherwise deteriorating with tanks in good condition. Collect all spilled liquids and properly dispose of them.
- Check for external corrosion of material containers, structural failures, spills and overfills due to operator error, failure of piping system, etc.
- Inspect tank foundations, connections, coatings, and tank walls and piping system.

#### 2. Properly store and handle chemical materials.

- Designate a secure material storage area that is paved with Portland cement concrete, free of cracks and gaps, and impervious in order to contain leaks and spills.
- Do not store chemicals, drums, or bagged materials directly on the ground. Place these items in secondary containers.
- Keep chemicals in their original containers, if feasible.
- Keep containers well labeled according to their contents (e.g., solvent, gasoline).
- Label hazardous substances regarding the potential hazard (corrosive, radioactive, flammable, explosive, and poisonous).
- Prominently display required labels on transported hazardous and toxic materials (per US DOT regulations).

#### 3. Utilize secondary containment systems for liquid materials.

- Surround storage tanks with a berm or other secondary containment system.
- Slope the area inside the berm to a drain.
- Drain liquids to the sanitary sewer if available. **DO NOT** discharge wash water to sanitary sewer until contacting the local sewer authority to find out if pretreatment is required
- Pass accumulated stormwater in petroleum storage areas through an oil/water separator.
- Use catch basin filtration inserts.

- If the liquid is oil, gas, or other material that separates from and floats on water, install a spill control device (such as a tee section) in the catch basins that collect runoff from the storage tank area. The material should then be pumped out and disposed of properly.

#### **4. Protect materials stored outside from stormwater run on.**

Construct a berm around the perimeter of the material storage area to prevent the run on of uncontaminated stormwater from adjacent areas as well as runoff of stormwater from the material.

#### **5. Secure drums stored in an area where unauthorized persons may gain access to prevent accidental spillage, pilferage, or any unauthorized use.**

#### **6. Identify key spill response personnel.**

#### **7. Clean up leaks and spills immediately.**

- Place a stockpile of spill cleanup materials where they will be readily accessible (e.g. near storage and maintenance areas).
- Utilize dry cleaning methods to clean up spills to minimize the use of water. Use a rag for small spills, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste. Physical methods for the cleanup of dry chemicals include the use brooms, shovels, sweepers, or plows.
- Never hose down or bury dry material spills. Sweep up the material and dispose of properly.
- Clean up chemical materials with absorbents, gels, and foams. Use adsorbent materials on small spills rather than hosing down the spill. Remove the adsorbent materials promptly and dispose of properly.
- For larger spills, a private spill cleanup company or Hazmat team may be necessary.

### **8. Reporting**

**1. Report spills that pose an immediate threat to human health or the environment to local agencies, such as the fire department, the **PA DEP at 412-442-4000** and the Allegheny County Health Department at 412-687-2243.**

**2. Establish a system for tracking incidents. The system should be designed to identify the following:**

- Types and quantities (in some cases) of wastes
- Patterns in time of occurrence (time of day/night, month, or year)

- Mode of dumping (abandoned containers, “midnight dumping” from moving vehicles, direct dumping of materials, accidents/spills)
- Responsible parties

**3. Federal regulations require that any oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hour).**

## **Training**

**1. Educate employees about spill prevention and cleanup.**

- Establish training that provides employees with the proper tools and knowledge to immediately begin cleaning up a spill.
- Educate employees on aboveground storage tank requirements.
- Train all employees upon hiring and conduct annual refresher training.

**2. Train employees responsible for aboveground storage tanks and liquid transfers on the Spill Prevention Control and Countermeasure Plan.**

## Municipal Separate Storm Sewer Systems (MS4) Training

### Pollution Prevention & Good Housekeeping for Municipal Operations & Maintenance

Prepared by Art Gazdik, P.E.

## What is a “Regulated Municipal Separate Stormsewer (MS4)?”

An MS4 is a conveyance or system of conveyances that is:

Owned by the state, a municipality, or other public entity that discharges to waters of the U.S.;

Designed or used to collect or convey stormwater (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains, etc.);

Not a combined sewer; and  
Not part of a Publicly Owned Treatment Works (sewage treatment plant).

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## MS4 Permit Renewal

### 2011 Notice of Nine-Month Extension of NPDES Phase II MS4 General Permit (PAG-13)

DEP has **administratively extended** the expiration of the current NPDES Phase II MS4 general permit (PAG-13) by nine (9) months to midnight, **March 15, 2013**. The **Notice of Extension** was published in the *PA Bulletin* on September 17, 2011. If you are using PAG-13, you do not need to file an application for the extension at this time. It is anticipated that your coverage has been automatically extended.

### Renewal NPDES Phase II MS4 General Permit (PAG-13)

The renewal for PAG-13 was **announced** in the September 17, 2011 *PA Bulletin*. The term of the renewal PAG-13 is from March 16, 2013 and continues for five (5) years to midnight on March 15, 2018. To renew PAG-13, **NOIs must be submitted to DEP no later than September 14, 2012**, a minimum of 180 days prior to the expiration date of the current PAG-13, March 15, 2013. Forms may be found at the following link.

<http://www.elibrary.dep.state.pa.us/dsweb/View/Collection-9457>

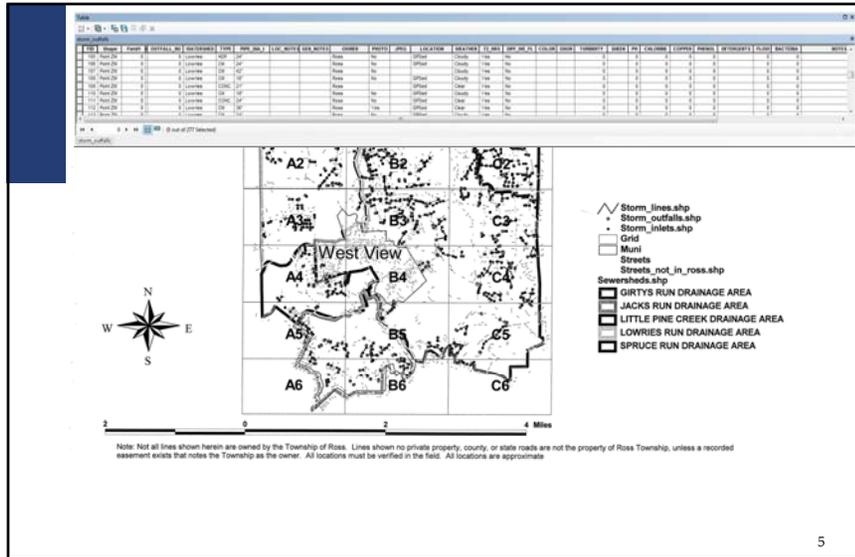
3

## Required Attachments

The following attachments must be filed with the NOI:

1. Notice of Intent filing fee (\$500.00).
2. Map: A USGS topographical quadrangle, or equivalent, map showing the boundaries of your municipality and the boundaries of the urbanized areas that contain your regulated small MS4s.
3. A map of your regulated small MS4s, their outfalls, and the names of the waters that receive discharges from the outfalls. If the maps are available only electronically, then you must provide instructions on how the public (and DEP) can access your maps.
4. If your regulated small MS4s discharge to any portion of waters with applicable wasteload allocations in the approved TMDLs, then you must include an MS4 TMDL Plan with your NOI (see Part C of the Authorization to Discharge for more information on MS4 TMDL Requirements).

4



5

## Minimum Control Measures (MCMs)

The federal regulations establish six Minimum Control Measures (MCMs) that must be implemented by permittees. The six MCM's in the federal regulations are:

1. Public Education and Outreach,
2. Public Participation and Involvement,
3. Illicit Discharge Detection and Elimination,
4. Construction Site Runoff Control,
5. Post-Construction Stormwater Management in New Development and Redevelopment, and
6. **Pollution Prevention and Good Housekeeping for Municipal Operations and Maintenance**

6

## EPA fines city, counties for pollution violations

Baltimore, Arundel, Harford cited for storm-water runoff

October 29, 2010|By Timothy B. Wheeler, The Baltimore Sun

The Environmental Protection Agency has levied nearly \$250,000 in fines against Baltimore City and Anne Arundel and Harford counties for failing to adequately protect their waterways from pollution washing off streets, parking lots and lawns.

The EPA's Mid-Atlantic regional office in Philadelphia proposed fining the three local governments more than a year after inspections found they were violating permits requiring them to control storm-water pollution from government facilities, construction sites and businesses. Problems included failure to deal with illegal discharges, dumping, spills and neglecting pollution controls at government buildings, garages and maintenance yards.

## EPA cites Pennsylvania municipalities over storm-water management issues

Laura Bronckle, Patriot News 4/28/2010

The U.S. Environmental Protection Agency recently cited 79 municipalities in southcentral Pennsylvania for administrative failures in their storm-water management programs. Of those, 31 municipalities were in Dauphin, Lebanon, York and Cumberland counties.

•**Dauphin County:** Harrisburg, Dauphin County, Conewago Twp., Highspire, Londonderry Twp., Middletown, Lower Paxton Twp., Paxtang, Penbrook, Swatara Twp., West Hanover Twp., South Hanover Twp.  
 •**Cumberland County:** Camp Hill, East Pennsboro, Lemoyne, Monroe Twp., New Cumberland, Shiremansstown, Wormleysburg  
 •**Lebanon County:** Lebanon, Lebanon County, Jonestown, North Cornwall, North Lebanon, South Lebanon, Swatara Twp., West Lebanon.  
 •**York County:** York County, Fairview Twp., Franklin Twp.

Several of these PA municipalities had to enter into Consent Orders & Final Agreements with EPA that included fines in the range of \$50,000.00.

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## Pollution Prevention & Good Housekeeping for Municipal Operations & Maintenance

- The MS4 Permit requires that the municipality identify all facilities, that are **owned or operated by the permittee**, that generate stormwater runoff.

- Management practices shall be developed to reduce or eliminate the potential for runoff to convey pollutants from these facilities and/or other municipal operations.

- These practices should be contained in an Operation and Management (O&M) Plan and **documented** by the municipality.

- The O&M Plan should include training for all municipal employees involved in operations that may contribute pollutants to MS4s.

- The Permit includes **activities conducted by Contractors** for the permittee

8

- Many municipal departments are involved. For example;
  - Public Works (Spill Prevention & Cleanup, Storm Sewer Maintenance, Erosion & Sedimentation Control)
  - Building Inspection (Erosion & Sedimentation Control)
  - Police & Fire (Fuel Spills)
  - Administration & Engineering (Tracking and permit compliance issues)
- Also municipal contractors working for the permittee need to comply with the permit requirements, those include;
  - Waste Haulers
  - Paving Contractors
  - Construction Contractors, and others



9

## Fleet Maintenance

- ▣ Employees who service and repair our vehicles and equipment can help reduce water pollution by following precautions in their daily activities.
  - General Guidelines
  - Leaks and Spills
  - Disposal Methods
  - Parts Cleaning
  - Shop and Pavement Cleaning
  - Fueling
  - Washing

10

## General Guidelines

- ▣ Conduct all vehicle and equipment maintenance at designated locations, preferably inside the shop or outdoors on a paved, covered surface.
- ▣ Park damaged, leaking, or dirty vehicles under cover, if possible, to prevent exposure to rainfall.



11

## General Guidelines

- ▣ Keep maintenance areas clean by promptly disposing of trash, debris, old parts, and absorbents used on spills.
- ▣ Promptly dispose of fluids that have been collected in drip pans or other open containers.



12

## Leaks and Spills

- Regularly inspect for leaks or stains around vehicles and equipment. Use a drip pan or absorbent material to collect dripping fluids.
- Locate the source of leakage and stop further spillage by fixing the leak or draining the fluid.



13

## Leaks and Spills

- Clean up spills immediately to minimize safety hazards and deter spreading.
- Store cracked batteries in a leak proof container.
- Refer to the Materials Storage and Spill Cleanup module for more information.



Storm Water Pollution Prevention:  
*What We Can Do*

~Employee Training Series~

Materials Storage and Spill Cleanup

## Disposal Methods

- Collect all used anti-freeze, motor oil, transmission fluid, and hydraulic fluid and store them in separate containers by type.
- Make sure storage containers are properly labeled.
- Never mix different types of fluids.



15

## Disposal Methods

- Recycle used fluids, oil, transmission, and hydraulic filters, and batteries.
- Never dispose of used fluids, filters, or batteries in the trash.



16

## Parts Cleaning

- ▣ Clean parts indoors and properly dispose of fluids, grease, dirt, and other debris cleaned from parts.
- ▣ Allow parts to fully drain before removing from cleaning sink to reduce dripping of cleaning fluid to the floor.



- Keep lids closed on parts cleaning sinks when not in use.

17

## Shop and Pavement Cleaning

- ▣ Use dry methods (sweeping, wiping, absorbents) to clean work areas as much as possible.
- ▣ Dispose of mop water properly, usually by pouring down a sanitary sewer drain.



18

## Shop and Pavement Cleaning

- ▣ Don't hose down outside work areas.
- ▣ In addition to regular, periodic cleaning, clean outside work areas when rain is forecast.



19

## Fueling

- ▣ Don't top off fuel tanks to prevent spills due to overfilling.
- ▣ Be aware of the emergency pump shut-off button location.
- Keep absorbent materials on site for use in prompt cleanup of spills.



20

## Fueling

- ▣ Periodically clean fueling areas using approved methods to remove accumulated fuel and grease.
- Transport equipment to a designated fueling area rather than using mobile fueling.
- If mobile fueling is used, keep a spill kit on the fuel truck.



21

## Washing

- ▣ Wash equipment and vehicles ONLY in designated facilities where the wash water drains to the sanitary sewer system or is collected and recycled.



22

## STORE AND HANDLE MATERIALS SAFELY

## Materials Storage and Spill Cleanup

- ▣ Employees can help reduce waste and water pollution by making sure materials aren't spilled or washed into the storm drain system.
  - Store and Handle Materials Safely
  - Clean Up Spills Properly

24

## Store and Handle Materials Safely

- ▣ Read and follow label or MSDS instructions and local procedures for all materials that you use.
- ▣ Store materials in original containers if possible. If not, clearly label replacement containers.



25

## Store and Handle Materials Safely

- ▣ Make sure containers are closed or sealed except when they are being filled or emptied.
- ▣ Keep material or waste containers in good condition and replace any containers that leak.
- ▣ Regularly inspect containers for corrosion or signs of leaks.



26

## Store and Handle Materials Safely

- ▣ Store materials and containers as follows:
  - Best: Indoors in sealed containers.
  - Good: Outdoors in sealed containers, within in a covered, paved area.
  - Acceptable: Outdoors in sealed containers, on an uncovered, paved area.



27

## Store and Handle Materials Safely

- ▣ Spill trapping devices are recommended:
  - Indoors: store barrels on a spill containment base.
  - Outdoors: storage areas should be bordered by a curb or berm to contain spills.



28

## Store and Handle Materials Safely

- ❑ Store materials away from high traffic areas to prevent accidents that might cause spills or cause spilled material to be spread by traffic.
- ❑ Report large spills or spills of hazardous materials your supervisor or environmental department personnel.

29

## Clean Up Spills Properly

30

## Clean Up Spills Properly

- ❑ Follow cleanup instructions specified on the MSDS and local procedures for the spilled material.
- ❑ Contain the spill:
  - Use a drip pan or absorbent material to collect dripping fluids.
  - If a liquid spill might enter a storm drain, use a drain mat to cover the drain.

MATERIAL SAFETY DATA SHEET	
	
<b>RODEO® HERBICIDE</b>	
<b>1. ACCIDENTAL RELEASE MEASURES:</b> ACTION TO TAKE FOR SPILLS: Absorb spill with an inert absorbent material such as diatomaceous earth, sand, or soil. Report large spills to Dow AgroSciences at 800-858-8388.	<b>3. PHYSICAL AND CHEMICAL PROPERTIES:</b> APPEARANCE: Clear, pale yellow liquid DENSITY: 1.21 - 1.23 g/ml BOILING POINT: 100°C (212°F) MELTING POINT: -10°C (14°F)
<b>2. HAZARDS AND STORAGE:</b> PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Store out of reach of children. Do not breathe dust or mist. Avoid contact with eyes, skin, and clothing. Avoid contact with water. Wash thoroughly with soap and water after handling and before eating, drinking, or smoking. Use the label or packaging. Store in original container with the lid tightly closed. Store above 5°C (41°F) to keep from crystallizing.	<b>4. STABILITY AND REACTIVITY:</b> STABILITY: CONDITIONS TO AVOID: Stable under normal storage conditions. INCOMPATIBILITY: (SPECIFIC MATERIALS TO AVOID): Combustion or contact with strong oxidizing agents. Contact with strong acids may produce hydrogen gas when heated.



31

## Clean Up Spills Properly

- ❑ Locate the source of the spill and take steps to stop further spillage.
- ❑ Clean up spills immediately to minimize safety hazards and deter spreading.



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## Clean Up Spills Properly

Liquid spills:

- ▣ Use absorbent materials or mop up small liquid spills. Do not hose the spill to a storm drain.
- ▣ Remove the absorbent materials promptly and follow procedures for proper disposal.



33

## Clean Up Spills Properly

Dry material spills:

- ▣ Cover a powder spill with plastic sheeting to keep it from blowing until the spill can be cleaned up.
- ▣ Do not hose the spill to a storm drain.
- ▣ If usable, place spilled material in original or properly marked container.
- ▣ Follow procedures for disposal of spilled material that cannot be used.

34

## Clean Up Spills Properly

- ▣ Report large spills or spills of hazardous materials to your supervisor or environmental department personnel.
- ▣ Contact the PA DEP and the Allegheny County Health Department.

35

## Streets and Drainage Maintenance

- ▣ Employees who maintain and repair our streets and drainage infrastructure can help reduce water pollution by following precautions in their daily activities.
  - Pavement Repair
  - Paint Striping
  - Storm Drain Inlet Cleaning
  - Ditch Maintenance
  - Report Pollution and Illegal Dumping

36

## Pavement Repair

- ▣ Vacuum slurry and cuttings during sawcutting operations. Don't allow the slurry to enter the storm drain or to remain on pavement to dry out.
- ▣ Properly dispose of slurry in accordance with established procedures.



37

## Pavement Repair

- ▣ Require concrete trucks to wash out in a designated location where wash water will not drain to a storm drain, drainage ditch, or creek.
- ▣ Locate stockpiles of asphalt patching material on a concrete or other paved surface. Cover to prevent contact with rain.



38

## Pavement Repair

- ▣ Mix only the amount of patching material necessary to complete the repair.
- ▣ Sweep up and properly dispose of all patching material that is not compacted or is left over from the repair.



39

## Pavement Repair

- ▣ Use less harmful products rather than diesel for asphalt patching and cleanup activities.
- ▣ Clean trucks, equipment, and tools in designated equipment wash facilities where wash water will not drain to a storm drain, ditch, or creek.



40

## Pavement Repair

- ❑ If no wash facility is available, clean equipment over a layer of absorbent material spread on a paved surface and/or heavy plastic sheeting.
- ❑ Promptly sweep up absorbent and dispose in accordance with established procedures.



41

## Paint Stripping

- ❑ Don't apply paint when rain is likely or during high winds.
- ❑ Waste handling for water-based (latex) paint:
  - Pour small quantities of unused paint in open barrels and allow to dry. Dispose of dried paint in trash.
  - Contain wash water used for equipment cleaning and dispose in sanitary sewer.



42

## Paint Stripping

- ❑ Waste handling for oil-based paint:
  - Unused oil-based paint must be disposed in accordance with established procedures.
  - Dispose of solvents used for equipment cleaning in accordance with established procedures.



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## Storm Drain Inlet Cleaning

- ❑ Dispose of trash and debris removed from inlets in a sanitary landfill.
- ❑ Report suspected dumping or pollution problems to supervisory personnel.
- ❑ Apply markers with NO DUMPING message to inlets where there is evidence of dumping.



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## Ditch Maintenance

- ▣ Sample and analyze material that has been removed from ditches if it appears to be contaminated with oil or other pollutants.
- ▣ Contaminated sediments must be disposed in accordance with established procedures.



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## Ditch Maintenance

- ▣ Uncontaminated soil may be used onsite (shaped into ditch) or stockpiled and used as fill or other land application.
- ▣ Cover soil stockpiles to prevent erosion and/or install silt fence to capture sediment.



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## Ditch Maintenance

- ▣ Apply grass seed to exposed soils. A compost/mulch mixture applied with seed speeds vegetation growth and prevents erosion.
- ▣ If the channel experiences high velocities, turf reinforcement mats and/or check dams should be used to protect the channel until vegetation is established.



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## Report Pollution and Dumping

- ▣ Look for signs of pollution at the jobsite and during travel:
  - Oil sheen on water surface
  - Excess trash and debris
  - Odor
  - Colored or cloudy water
  - Dead or dying fish
- ▣ Report suspected pollution problems to supervisory personnel or to the local TCEQ office.



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## Land Disturbances

- ▣ Employees can help reduce water pollution by making sure dirt and debris aren't washed into the storm drain system.
  - Utility repairs
    - water and sanitary sewer lines
    - storm drain system
  - Street repairs
  - Sidewalk construction and repairs
  - Landscaping (parks, buildings, medians)
  - Power pole installation and replacement

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## Land Disturbances

- ▣ Note: Projects that disturb one acre or more must comply with the state's storm water permit for construction activities.
- ▣ If a permit is required, your supervisor or environmental coordinator will provide specific instructions.



CONSTRUCTION SITE NOTICE  
 ILLINOIS  
 IEPDES GENERAL PERMIT TOR000000

Contract Name and Project Location:  
 Project Description:  
 Location of Storm Water Discharge:  
 Date of Notice:

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## Land Disturbances

- ▣ All projects must be managed to prevent or reduce soil or other pollutants from being washed into storm drains, creeks, or lakes.
- ▣ In addition to soil, potential pollutants on construction sites include trash, debris, oil, grease, lime, concrete truck wash water, etc.



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## Definitions

- ▣ Erosion - the removal or wearing away of soil due to the action of water (or wind).
- ▣ Sediment - soil particles that settle out of flowing water.



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## General Principles

- ▣ Preventing erosion is more effective than trying to remove sediment from runoff.
- ▣ Minimize the amount of disturbed area.
- ▣ Divert runoff or flowing water away from disturbed areas.



## General Principles

- ▣ Locate dirt stockpiles out of the street and away from runoff or flowing water to prevent sediment from washing into storm drains.
- ▣ Cover stockpiles or provide a barrier such as an organic filter berm or silt fence around the pile.



## Best Management Practices

- ▣ Best Management Practices (BMPs) are tools used to reduce or prevent water pollution.
  - Erosion Control BMPs are used to protect disturbed soils from being washed off by rainfall and/or runoff.
  - Sediment Control BMPs are used to trap sediment carried by runoff and keep it on the construction site.
  - Waste Management BMPs are good housekeeping practices to control trash, chemicals, and debris.

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## Best Management Practices

- ▣ Erosion Control BMPs:
  - Vegetation - grasses or other plants that provide "permanent" erosion protection.
  - Mulching - a layer of straw or wood mulch.



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## Best Management Practices

- Erosion Control BMPs (continued):
  - Erosion control blankets - mesh matting made of straw, wood fiber, or plastic.
  - Plastic sheeting - may be used for short-term protection of disturbed areas or dirt stockpiles.



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## Best Management Practices

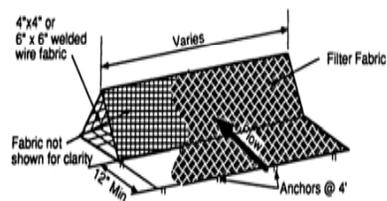
- Sediment Control BMPs:
  - Organic filter berm - a 1 to 3 foot high berm of mulch and compost placed around a disturbed area.
  - Silt fence - filter fabric trenched into the soil and attached to supporting posts.



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## Best Management Practices

- Sediment Control BMPs (continued):
  - Triangular sediment dike - filter fabric placed over welded wire shaped into a triangle.
  - Inlet protection - filter fabric or stone placed around or in front of a storm drain inlet.



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## Best Management Practices

- Waste Management BMPs:
  - Debris and trash control - use covered trash cans, bins, and/or roll-off boxes for disposing trash and debris.
  - Chemical management - follow proper material storage and spill cleanup procedures for chemicals used on construction sites.



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## Best Management Practices

- ☐ Waste Management BMPs (continued):
  - Concrete washout - use designated facilities to capture wash water from concrete truck cleaning.



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## Parks and Grounds Maintenance

- ☐ Employees who maintain our parks and landscaped areas can help reduce water pollution by following precautions in their daily activities.
  - Plant Selection
  - Watering
  - Debris Management
  - Soil Management
  - Pesticide and Herbicide Practices

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## Debris Management

- ☐ Mow grass as high as possible and leave clippings on the lawn.
- ☐ Compost leaves for use as a soil amendment or shred and add to flower beds as mulch.



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## Debris Management

- ☐ Sweep paved surfaces or blow clippings and trimmings onto grass rather than hosing down.
- ☐ Never dispose of grass clippings, leaves, or other debris in the storm drain.
- ☐ Remove accumulated litter and debris from storm drain inlets.



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## Soil Management

- ▣ Aerate and add compost to the soil to reduce fertilizer needs, improve drainage, and promote root growth.
- ▣ Have soil tested well before the application season to determine fertilizer needs.
- ▣ Limit soil erosion by planting vegetation on bare areas and using mulch or matting for landscaped areas.



## Pesticide and Herbicide Practices

- ▣ Follow safety, storage and disposal procedures for pesticides and herbicides.
- ▣ Follow label directions precisely when mixing or applying pesticides or herbicides.
- ▣ Mix pesticides and herbicides where spills will not soak into the ground or runoff into the storm drainage system.



## Pesticide and Herbicide Practices

- ▣ Use landscaping pesticides and herbicides only as needed.
- ▣ Use non-toxic substitutes for chemicals when possible.
- ▣ Carefully select the most appropriate product for the problem to be treated.
- ▣ Apply pesticides and herbicides to the problem area only, versus application over a wider area.



## Pesticide and Herbicide Practices

- ▣ Avoid stray product from being deposited on streets or other paved surfaces where it may be washed into the storm drain system.
- ▣ Don't apply chemicals near sensitive areas including streams, lakes, wetlands, or drainageways.



## Pesticide and Herbicide Practices

- ❑ Don't apply during windy conditions or when rain is predicted within 24 hours.
- ❑ Report any suspected problems regarding pesticide or herbicide applications.



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## Road Salt Application & Storage

- ❑ The amount of salt applied should be varied to reflect site-specific characteristics, such as road width and design, traffic concentration, and proximity to surface waters.
- ❑ Salt storage should be covered to prevent runoff.



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## Street Sweeping

- ❑ Track work and include your activities in your O&M Plan
- ❑ Add or increase to your existing street sweeping program



A street sweeper cleans up pollutants and sediments on the street to reduce the amount of pollutants entering receiving waters

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Questions?

Thank You



We would like to acknowledge the use of Power Point training materials developed by the North Central Texas Council of Governments. These materials were prepared in cooperation with the Texas Commission on Environmental Quality and the EPA.