

# Understanding the MS4 Program

Sam Carroll, PE  
Harshman CE Group



The logo for Harshman CE Group, LLC, featuring a stylized lowercase 'h' in a blue circle above the text 'harshman CE GROUP, LLC'.

1

## A Roadmap to Understanding the MS4

- What is it?
- Why is it?
- What does the MS4 Require?
- Where are we now?
- What's Next?

2



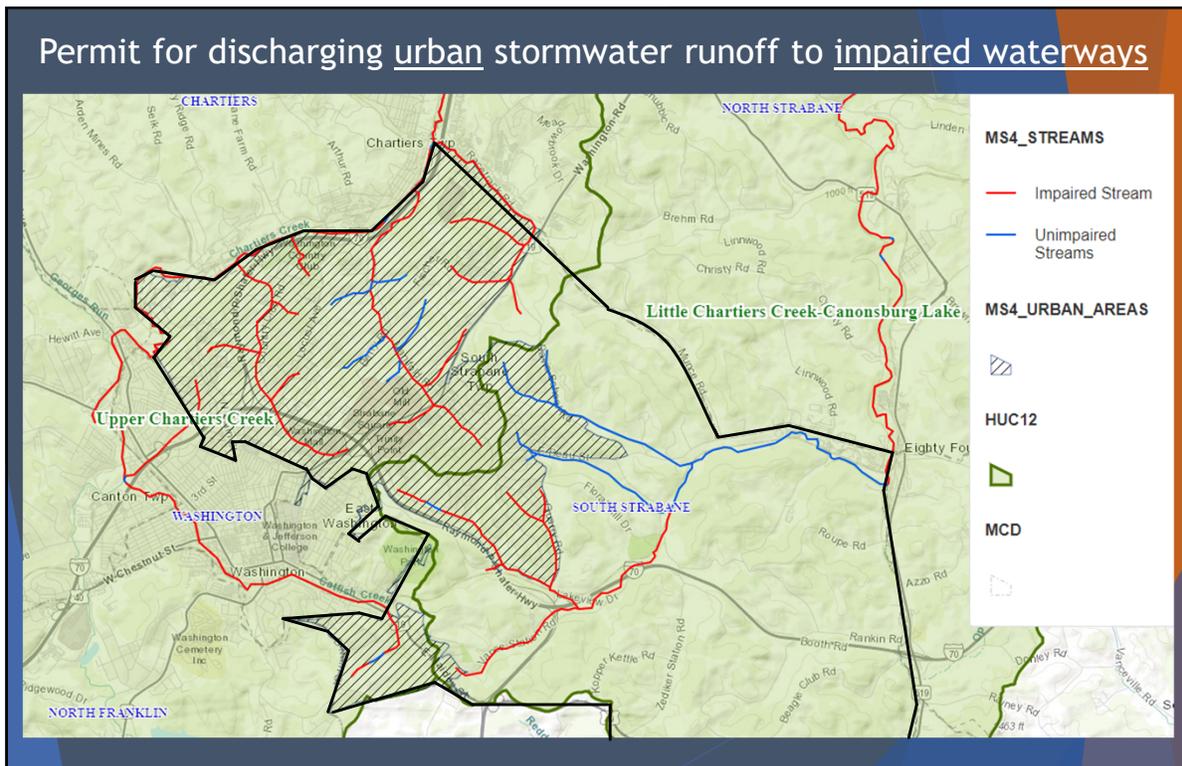
# What is MS4?

Municipal Separate Storm Sewer System

Permit through PA DEP for discharging urban stormwater runoff to impaired waterways.

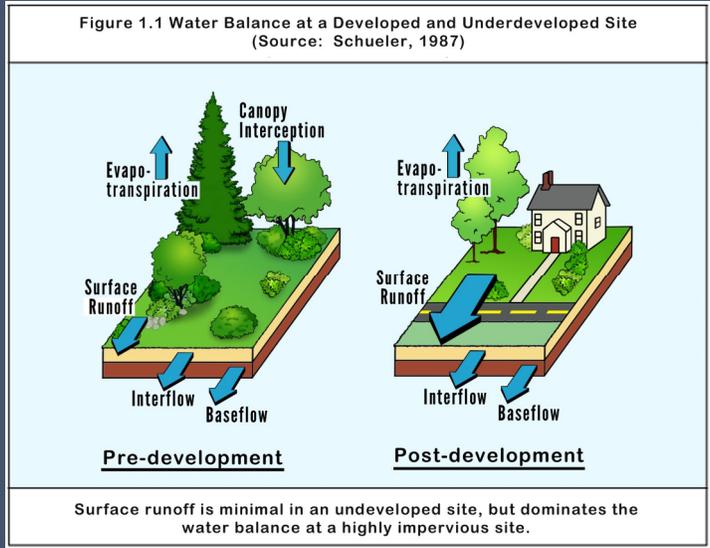
The goal: minimize pollution to streams from the storm sewer system.

3



4

# Why is it this important?



5

### Doing it wrong – degrading our water

The diagram illustrates various sources of water pollution. On the left, a **supply** reservoir is shown. In the center, a **supply** reservoir is shown. On the right, a **supply** reservoir is shown. The diagram shows **Uncovered manure pile**, **Pesticide and herbicide spraying**, **Muddy storm runoff from land clearing and road building**, **Animals in stream**, **Fuel spills**, **Leachate from treated lumber**, **Failing septic field effluent rises to surface**, and **Heating oil tank leaks**.

Program seeks to reduce pollution from urban stormwater runoff.

6

**Doing it right – protecting our water**

Program seeks to reduce pollution from urban stormwater runoff.

7

## 7 Primary Requirements of the MS4 Program

- ▶ Pollution Reduction Plan (PRP)
  - ▶ Focus on reducing sediment (10%) and phosphorous (5%)
  - ▶ Reductions happen by constructing BMPs
- ▶ MCM 1: Public Education and Outreach
- ▶ MCM 2: Public Participation / Involvement
- ▶ MCM 3: Illicit Discharge Detection and Elimination
- ▶ MCM 4: Construction Site Runoff Control
- ▶ MCM 5: Post-Construction Runoff Control
- ▶ MCM 6: Pollution Prevention / Good Housekeeping

MCM: Minimum Control Measure

8

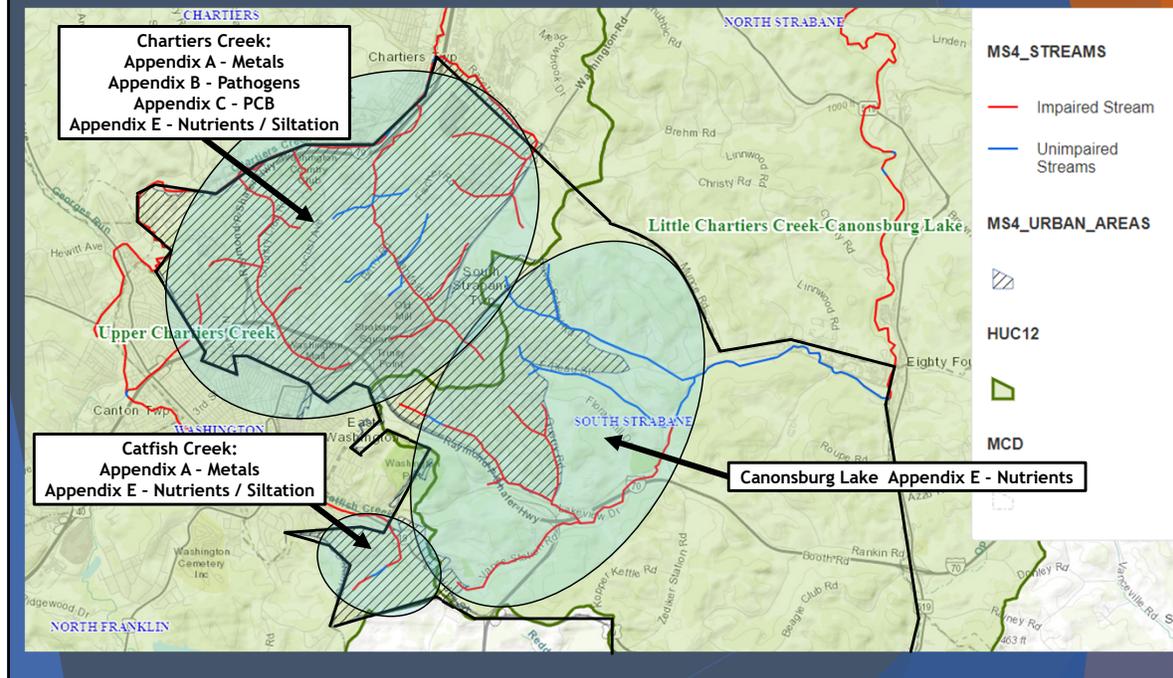
# MS4 Requirements Table

MS4 Name	NPDES ID	Individual Permit Required?	Reason	Impaired Downstream Waters or Applicable TMDL Name	Requirement(s)	Other Cause(s) of Impairment
<b>Washington County</b>						
SOUTH STRABANE TWP	PAI136118	Yes	SP, IP	Canonsburg Lake	Appendix E-Nutrients (4a)	
				Catfish Creek	Appendix A-Metals (4a), Appendix E-Suspended Solids (4a), Appendix E-Nutrients, Organic Enrichment/Low D.O., Siltation (5)	
				Chartiers Creek	Appendix A-Metals (4a), Appendix C-PCB (4a), Appendix E-Suspended Solids (4a), Appendix B-Pathogens (5), Appendix E-Nutrients, Organic Enrichment/Low D.O., Siltation (5)	Turbidity (5)
				<del>Chartiers Run</del>	<del>Appendix A-Metals (4a), Appendix E-Suspended Solids (4a), Appendix B-Pathogens (5), Appendix E-Nutrients, Organic Enrichment/Low D.O., Siltation (5)</del>	<del>Turbidity (5)</del>
				<del>Plum Run</del>	<del>Appendix E-Nutrients, Organic Enrichment/Low D.O., Siltation (4a)</del>	<del>Other Habitat Alterations (4c)</del>
				Unnamed Tributaries to Chartiers Creek		Other Habitat Alterations (4c)

Siltation and Nutrient impairments require Pollution Reduction Plan (PRP) that shows a 10% reduction in Sediment and a 5% reduction in Phosphorous

9

## Permit for discharging urban stormwater runoff to impaired waterways



10

## We can reduce sediment and nutrient pollution by using Best Management Practices (BMPs)



11

3800-PM-BCW0100m 5/2016  
BMP Effectiveness Values

BMP Name	BMP Effectiveness Values			BMP Description
	TN	TP	Sediment	
Stream Restoration	0.075 lbs/ft/yr	0.068 lbs/ft/yr	44.88 lbs/ft/yr	An annual mass nutrient and sediment reduction credit for qualifying stream restoration practices that prevent channel or bank erosion that otherwise would be delivered downstream from an actively enlarging or incising urban stream. Applies to 0 to 3rd order streams that are not tidally influenced. If one of the protocols is cited and pounds are reported, then the mass reduction is received for the protocol.
Forest Buffers	25%	50%	50%	An area of trees at least 35 feet wide on one side of a stream, usually accompanied by trees, shrubs and other vegetation that is adjacent to a body of water. The riparian area is managed to maintain the integrity of stream channels and shorelines, to reduce the impacts of upland sources of pollution by trapping, filtering, and converting sediments, nutrients, and other chemicals. (Note – the values represent pollutant load reductions from stormwater draining through buffers).
Tree Planting	10%	15%	20%	The BMP effectiveness values for tree planting are estimated by DEP. DEP estimates that 100 fully mature trees of mixed species (both deciduous and non-deciduous) provide pollutant load reductions for the equivalent of one acre (i.e., one mature tree = 0.01 acre). The BMP effectiveness values given are based on immature trees (seedlings or saplings); the effectiveness values are expected to increase as the trees mature. To determine the amount of pollutant load reduction that can be credited for tree planting efforts: 1) multiply the number of trees planted by 0.01; 2) multiply the acreage determined in step 1 by the pollutant loading rate for the land prior to planting the trees (in lbs/acre/year); and 3) multiply the result of step 2 by the BMP effectiveness values given.
Filtering Practices	40%	60%	80%	Practices that capture and temporarily store runoff and pass it through a filter bed of either sand or an organic media. There are various sand filter designs, such as above ground, below ground, perimeter, etc. An organic media filter uses another medium besides sand to enhance pollutant removal for many compounds due to the increased cation exchange capacity achieved by increasing the organic matter. These systems require yearly inspection and maintenance to receive pollutant reduction credit.

12

## South Strabane's current PRP recommends a combination of Stream Bank Restorations & vegetative open channels



13

## Through new mapping methods and claiming existing stormwater ponds we can reduce the regulatory obligations of the Township

	Current pollutant load from storm sewer system:	3,626,308 lbs of sediment
OPTION	Required pollution reduction (%):	<u>x 10% sediment pollution</u>
<b>A</b>	Required pollutant reduction (lbs):	<b>362,630 lbs of sediment</b>
	Current estimated market costs \$4-\$12per lb:	<b>\$1,450,000 - \$4,350,000</b>

	Current pollutant load from storm sewer system:	3,626,308 lbs of sediment
OPTION	Existing stormwater ponds capture:	<u>- Up to 60% of incoming sediment</u>
<b>B</b>	Remaining sediment pollution load:	To be determined
	Required pollution reduction:	10% of remaining sediment

14



## 7 Primary Requirements of the MS4 Program

- ▶ Pollution Reduction Plan (PRP)
  - ▶ Focus on reducing sediment (10%) and phosphorous (5%)
  - ▶ Reductions happen by constructing BMPs
- ▶ MCM 1: Public Education and Outreach
- ▶ MCM 2: Public Participation / Involvement
- ▶ MCM 3: Illicit Discharge Detection and Elimination
- ▶ MCM 4: Construction Site Runoff Control
- ▶ MCM 5: Post-Construction Runoff Control
- ▶ MCM 6: Pollution Prevention / Good Housekeeping

MCM: Minimum Control Measure

15

## MCM #1 Public Education and Outreach Plan (PEOP)

-  BMP #1: Develop, implement, and maintain Public Education and Outreach Program ✓
-  BMP #2: Develop Target Audience List ✓
-  BMP #3: Annually publish stormwater educational material. ✓
-  BMP #4: Distribute educational material by at least 2 media methods. ✓

16

## MCM #2 Public Involvement and Participation Plan (PIPP)

-  **BMP #1:** Develop, implement, and maintain Public Involvement and Participation Plan ✓
-  **BMP #2:** Publicly advertise and solicit public Input ✓
-  **BMP #3:** Regularly solicit public input and participation including reporting illicit discharges ✓

17

## MCM #3 Illicit Discharge Detection & Elimination (IDD&E)

-  **BMP #1:** Develop, implement, and enforce a program to detect and eliminate illicit discharges. ✓
-  **BMP #2:** Develop maps of urbanized area, outfalls, observation points, and receiving waters. ✓
-  **BMP #3:** add to maps including inlets, piping, swales, basins, etc. ✓
-  **BMP #4:** dry weather screen 20% of outfalls per year. Follow up on any observed discharges ✓
-  **BMP #5:** Enact Stormwater Ordinance Consistent with Model 2022 Ordinance ✓
-  **BMP #6:** Provide education to public employees, businesses, and general public on IDD&E ○

**Illicit Discharge:** anything entering the storm sewer system that isn't stormwater. i.e. Sediment, Sewage, Commercial and Residential Toxins, Oil, Grease, etc.

18

## MCM #4 Construction Stormwater Management

-  BMP #1: Before issuing any permits permit for projects proposing earth disturbances >1 acre, require proof of valid NPDES permit
-  BMP #2: Notify Conservation District within 5 days upon receiving a permit proposing earth disturbance
-  BMP #3: Enact and enforce and ordinance which requires implementation and maintenance of E&S BMPs.

19

## MCM #5 Post Construction Stormwater Management Plan

-  BMP #1: Enact & enforce ordinance requiring PCSM from new development and redevelopment
-  BMP #2: Encourage the use of Low Impact Development
-  BMP #3: Develop an inventory of all PCSM BMPs built since 2003, inspect them, and ensure they're maintained.

20

# MCM #6 Good Housekeeping Plan



**BMP #1:** Identify and document all operations owned or operated by the Township or it's contractors.





**BMP #2:** Develop a written Operation and Maintenance program for all facilities.

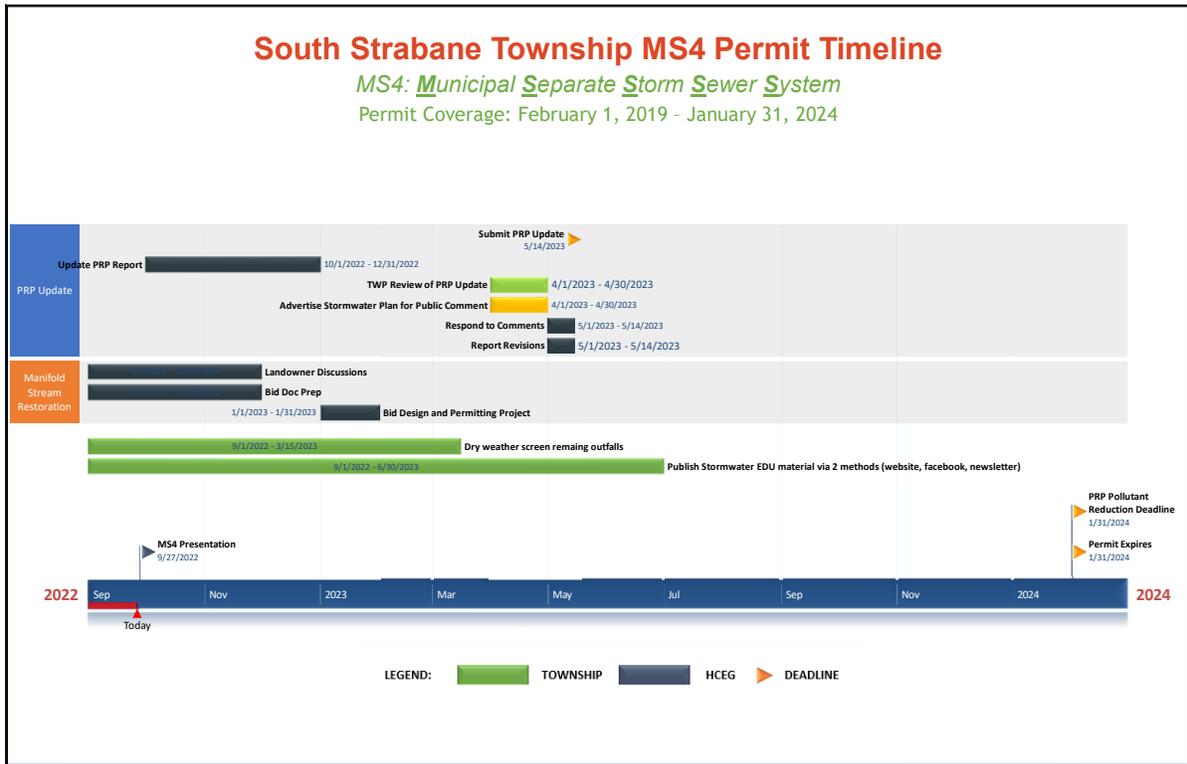




**BMP #3:** Develop and implement employee training for all personnel associated with the Township.



21



22

## Storm Sewer Pollution Reduction Plan

- ▶ PRP is an approved plan that provides the information relating specifically to South Strabane Township
  - ▶ Urbanized Area and Storm Sewer System = 5,378.6 acres
  - ▶ 1,398.4 Impervious Surface Acres; 3,980.2 Pervious Surface Acres
  - ▶ 3,626,308.1 lbs/year of sediment load per DEP loading rates
  - ▶ 10% sediment reduction required by Appendix E
    - ▶ Reduce 362,630.8 lb/year by 2024 Renewal Date
- ▶ Six (6) Approved Reduction Locations & Methods
  - ▶ Stream Bank Restorations
    - ▶ Along Oak Spring Road
    - ▶ Along Country Club Road
    - ▶ Along Lakeview Drive
    - ▶ Behind homes along Ashmore Drive
    - ▶ Along Manifold Drive
  - ▶ Vegetative Open Channel
    - ▶ Behind homes along Verona Drive

23

## Storm Sewer Acronyms

- ▶ Municipal Separate Storm Sewer System (MS4)
- ▶ Department of Environmental Protection (DEP)
- ▶ Minimum Control Measures (MCMs)
- ▶ Best Management Practices (BMPs)
- ▶ Pollution Reduction Plan (PRP)
- ▶ Storm Water Management Ordinance (SWMO)
- ▶ Washington County Conservation District (WCCD)
- ▶ Department of Conservation and Natural Resources (DCNR)
- ▶ Department of Community and Economic Development (DCED)

24

## **Storm Sewer** **Definitions**

- ▶ **Storm Water** - Water that comes from Rain or Snow Events
- ▶ **Runoff** - Storm Water that cannot be absorbed into the ground
- ▶ **Flooding** - Excessive water that exceeds its normal conveyance methods
- ▶ **MS4** - Storm sewer system comprise of inlets, catch basins, pipes, headwalls, swale ditches, channels and outfalls.
- ▶ **Outfall** - Where a point source discharges to surface waters (not swales or conveyance of surface waters)
- ▶ **Impaired Stream** - waterway that the current nutrients or sediment loading exceeds an acceptable level as designed by the EPA