

# Preparing for the Storm

How you can help



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# Governmental Regulations

- National Pollution Discharge Elimination System (NPDES) Permits
  - Federal Regulations in Response to 1972 Clean Streams Act
  - Regulates Discharge from:
    - Wastewater Treatment Plants
    - Earth Disturbance/Construction Projects
    - Local Stormwater Systems

# Municipal Separate Storm Sewer System (MS-4) Permit

- Portions of Dover Township, Manchester Township and West Manchester Township are classified as urbanized areas and therefore, are required to obtain and meet the requirements of a MS-4 Permit.
  - Areas are classified by the data from the 2000 U.S. Census

# MS-4 Permit

## Minimum Control Measures

- MCM No. 1 – Public Education and Outreach
- MCM No. 2 – Public Involvement/Participation
- MCM No. 3 – Illicit Discharge Detection & Elimination
- MCM No. 4 – Construction Site Stormwater Runoff Control
- MCM No. 5 – Post-Construction Stormwater Management in New and Re-Development Activities
- MCM No. 6 – Pollution Prevention/Good Housekeeping for Municipal Operations

# Other Pennsylvania Regulations

- In Response to General Significant Floods, Pennsylvania Passed Two Pieces of Legislation in 1978
  - Floodplain Management Act
  - Stormwater Management Act

# Floodplain Management Act

- Ordinances adopted by Municipalities to regulate development in flood prone areas
- Federal Emergency Management Agency established and mapped 100-year flood plains along significant streams in urbanized areas
- Hydrologic and hydraulic studies were performed in detailed study areas
- 100-year flood elevations were established
- In non-detailed flood prone areas, approximate floodplains were established
- All new residential construction must have the lowest habitable floor elevation 18" above the floodplain elevation
- Any new residential construction in the floodplain must be constructed to withstand flood waters

# Stormwater Management Act

- Each county is required to develop a Stormwater Management Plan for the watersheds in their county
- York County adopted an Integrated Water Resource Plan in 2011, which included a Stormwater Management Plan and a Model Stormwater Management Ordinance
- Each Municipality in the county is required to adopt an ordinance, which essentially accomplishes the goals of the County's Model Ordinance



# Stormwater Management Ordinances Require Control of Two Things:

- Peak Rate of Runoff
- Volume of Runoff

# Peak Rate of Runoff

- Rational Method
- Soil Conservation Service Method

# Rational Method

- $Q = C i A$

$Q$ =Peak Rate of Flow (cfs)

$C$ =Runoff Factor

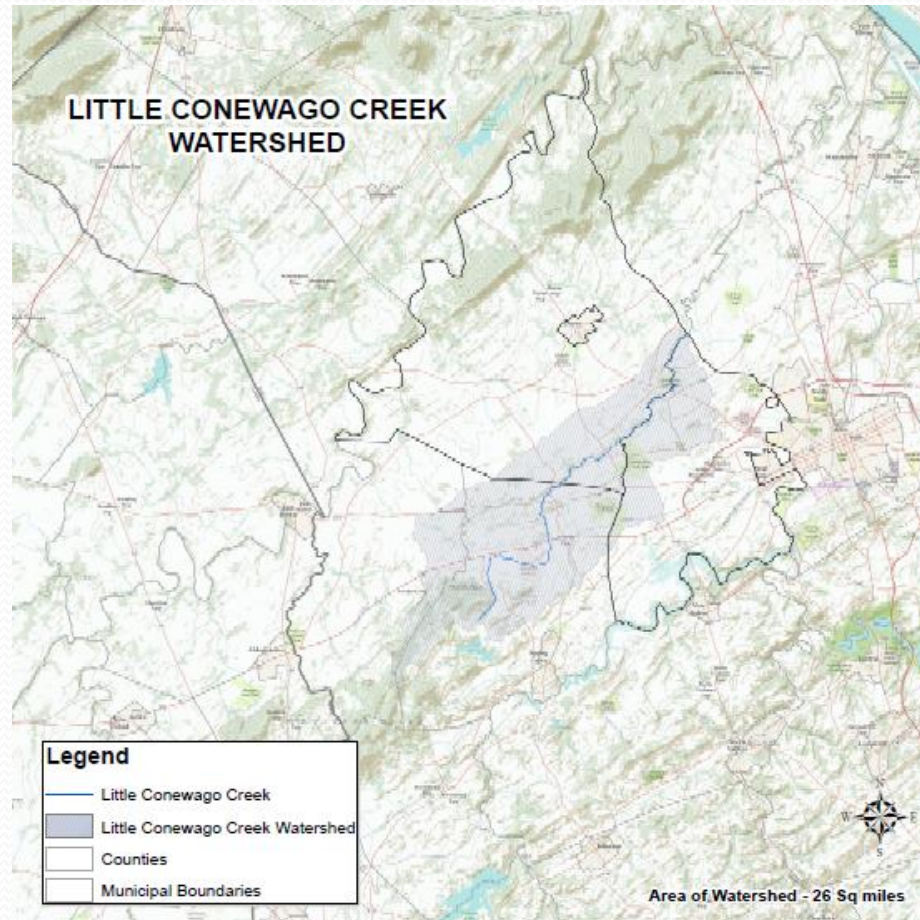
$i$ =Rainfall Intensity (in/hr)

$A$ =Area (acres)

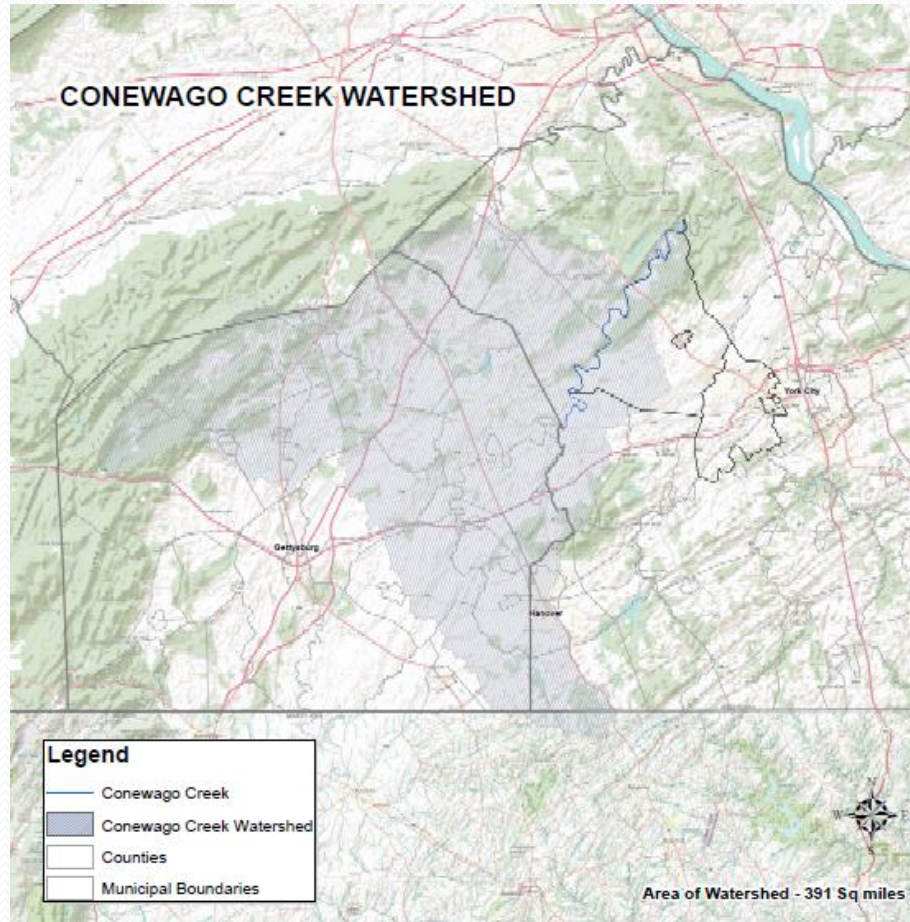
# Drainage Area

- All of the upstream area that contributes flow/runoff to the point of interest

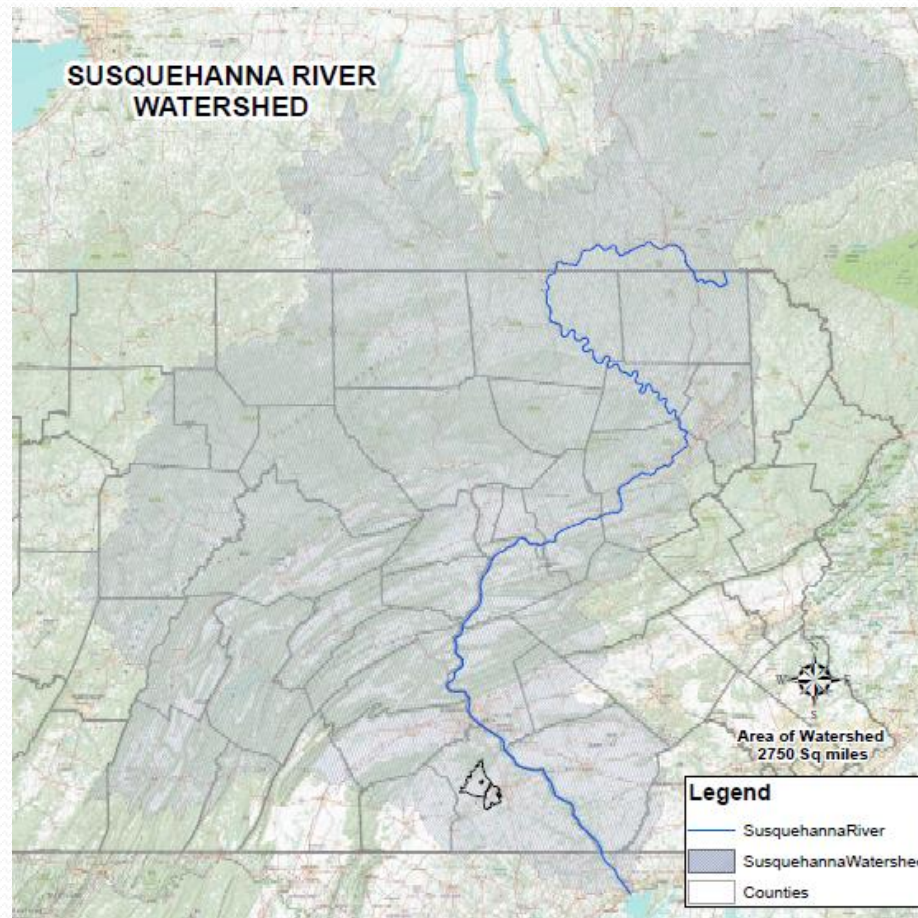
# Little Conewago Creek



# Big Conewago Creek



# Susquehanna River



# C=Runoff Factor

- Grass/Lawns:  $C=0.25$
- Paving/Impervious:  $C=0.95$

## Effecting the Runoff Factor

- Ground Cover
- Soil Types
- Slopes



# i=Rainfall Intensity

- Inches/hour
- Based on Recorded History and Frequency of Storms

# Storm Return Period vs. Probability

- 1-Year Storm      100%
- 2-Year Storm      50%
- 5-Year Storm      20%
- 10-Year Storm     10%
- 25-Year Storm     4%
- 50-Year Storm     2%
- 100-Year Storm    1%

This is the percentage of chance that this storm will occur within any one-year time frame.

# Rainfall Regions

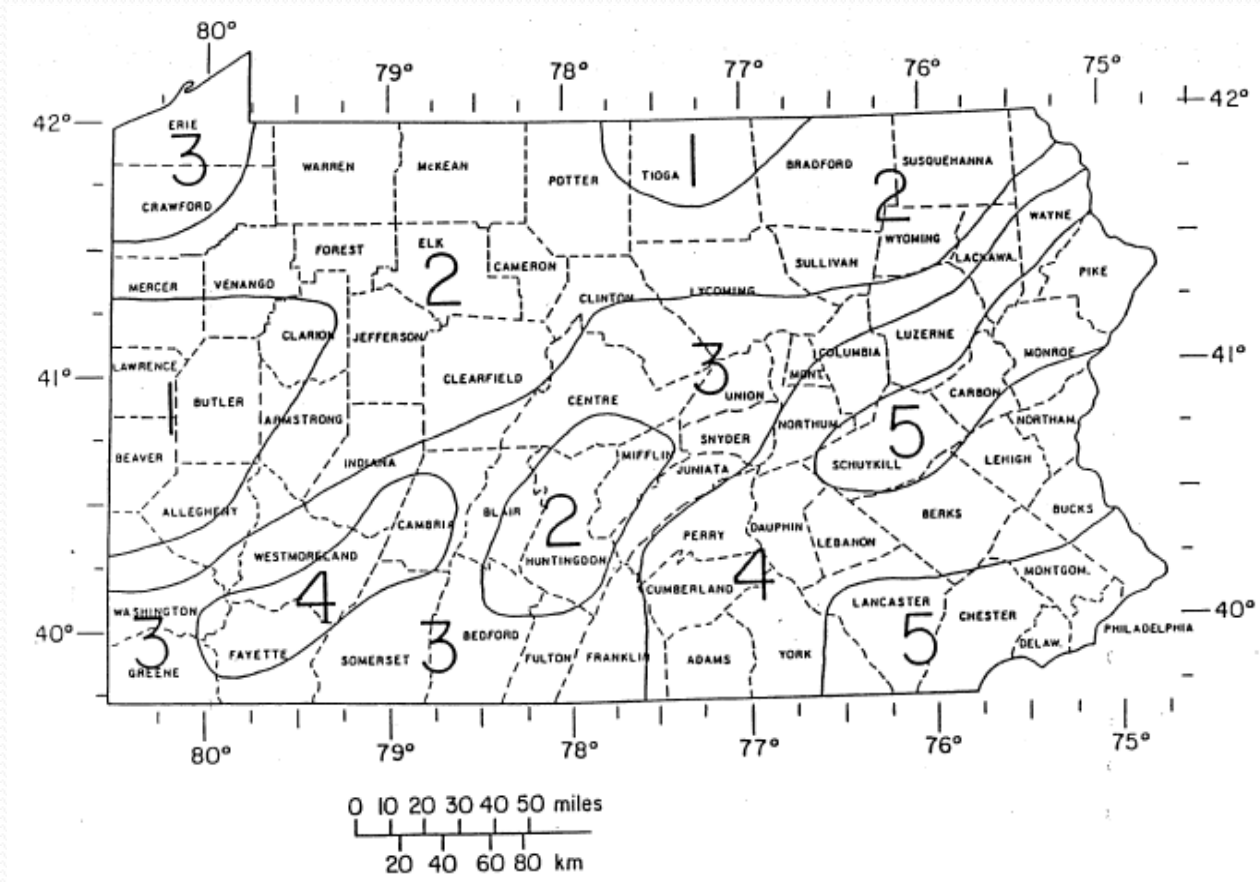
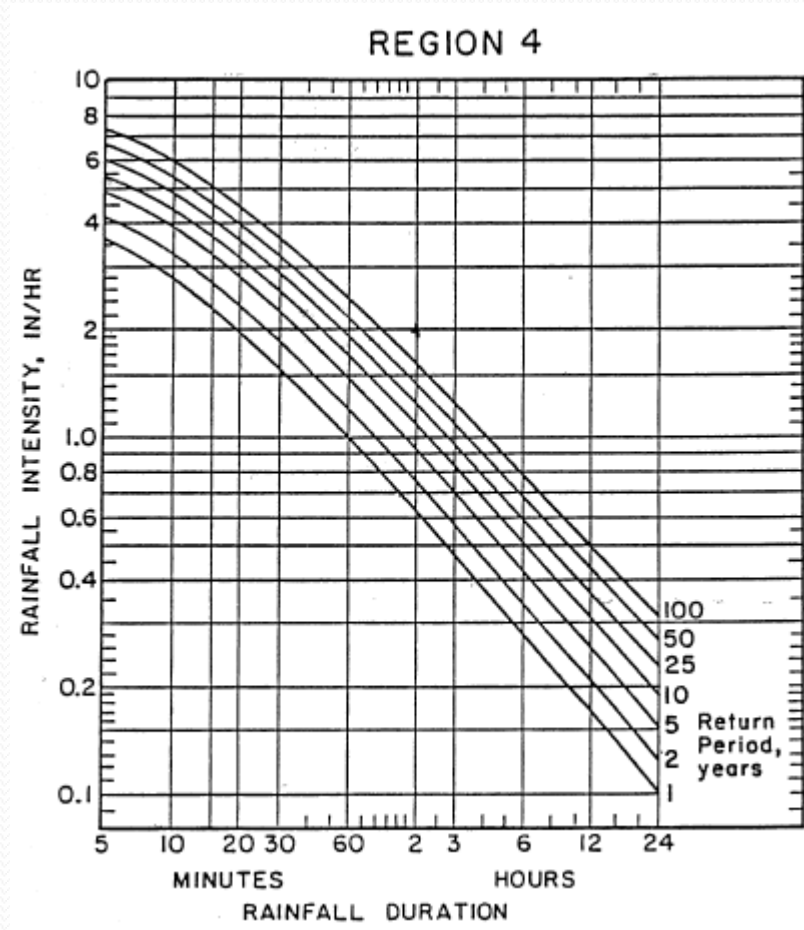


Figure 2.10.4.1 Delineated regions with uniform rainfall

# Region 4 Curve



# Time of Concentration - $t_c$

- Time it takes for runoff from the most remote point of the drainage area to reach the Point of Interest
- $t_c$  is utilized as the Rainfall duration

# Rainfall Distribution

- Total Rainfall, Peak Intensity, and Distribution Storm Event

# Hydrographs

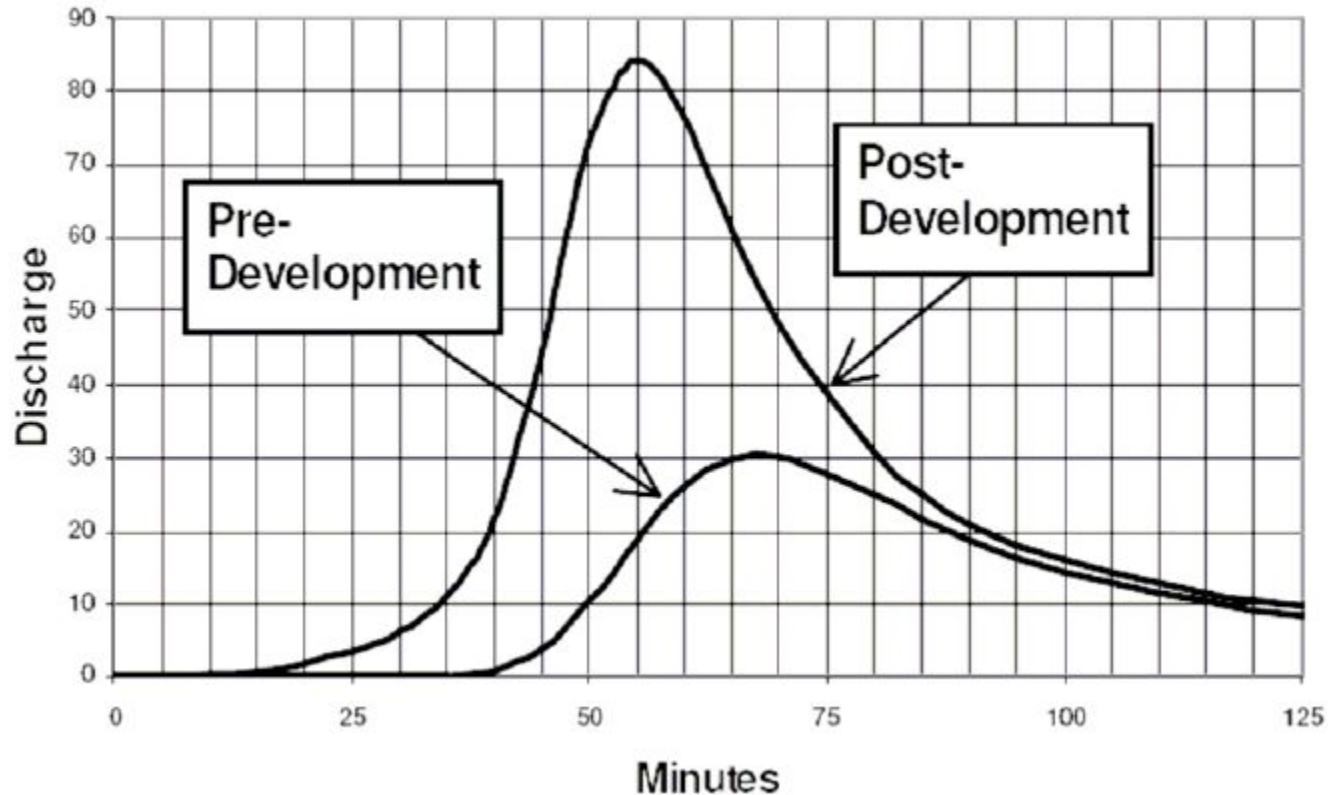
- Represent flow rates over the duration of the storm at a given location

# SWM Ordinances

- They require post-development runoff rates to be less than pre-development rates, for 2 through 100 year storms.



# How is that Accomplished



Same Storm – Same Rainfall Distribution

# How is that Accomplished

- Change in Ground Cover (Grass vs. Paving)
  - Increases Rate and Amount of Runoff
- Above Ground Stormwater Basins
  - Capture and Control Release
- Below Ground Stormwater Basins
  - Capture and Control Release
- Infiltration Pits
  - Capture, Retain, and Infiltrate
- Rain Gardens
  - Capture, Retain, and Infiltrate
- Rain Barrels
  - Capture and Retain

# Stormwater Management Ordinances

- Also require no increase in volume for 2-year storm.
  - Capture and Retain 1” Rainfall Event

# How is that Accomplished

- Infiltration Pits
- Rain Gardens
- Rain Barrels

# Stormwater Water Management Ordinance

- Regulated Activity – “Any earth disturbance activities or any activities that involve the alteration or development of land in a manner that may effect stormwater runoff”
- Stormwater Management Site Plan required unless exempted
- Activities less than 1,000 square feet and are disconnected impervious areas (DIAs) or equivalent DIAs are exempt from rate control. Volume control is required. Simplified method may be utilized. No Township review is required.

# Stormwater Water Management Ordinance

- Activities between 1,000 square feet and 5,000 square feet and are DIAs or Equivalent DIAs are exempt from peak rate controls. Volume control and modified Stormwater Management Site Plans are required. Township review will be performed and a determination of additional requirements will be made.
- Activities greater than 5,000 square feet – Stormwater Management Site Plan is required. Consult a qualified professional.

Questions?