

# RUTGERS

New Jersey Agricultural  
Experiment Station



Don Knezik



Rutgers Cooperative Extension



Curtis Helm

## New Jersey Stormwater Regulations: How Rain Gardens Fit the Bill

Rain Garden Training Program  
Trenton, New Jersey  
October 19-20, 2011

- What's a watershed?
- Where does precipitation go?
- Land Use/ Land Cover Changes
- Rain Gardens
- Stormwater Regulations:
  - Municipal “Phase II” NJPDES Stormwater Regulations N.J.A.C. 7:14a
  - Watershed Management Stormwater Regulations N.J.A.C. 7:8
- State and Local Regulatory Initiatives
- Regional Stormwater Management Plans



- [\*Click here to watch video\*](#)

- An area of land that water flows across, through, or under on its way to a stream, river, lake, ocean or other body of water.
- A watershed is like one big bathtub...





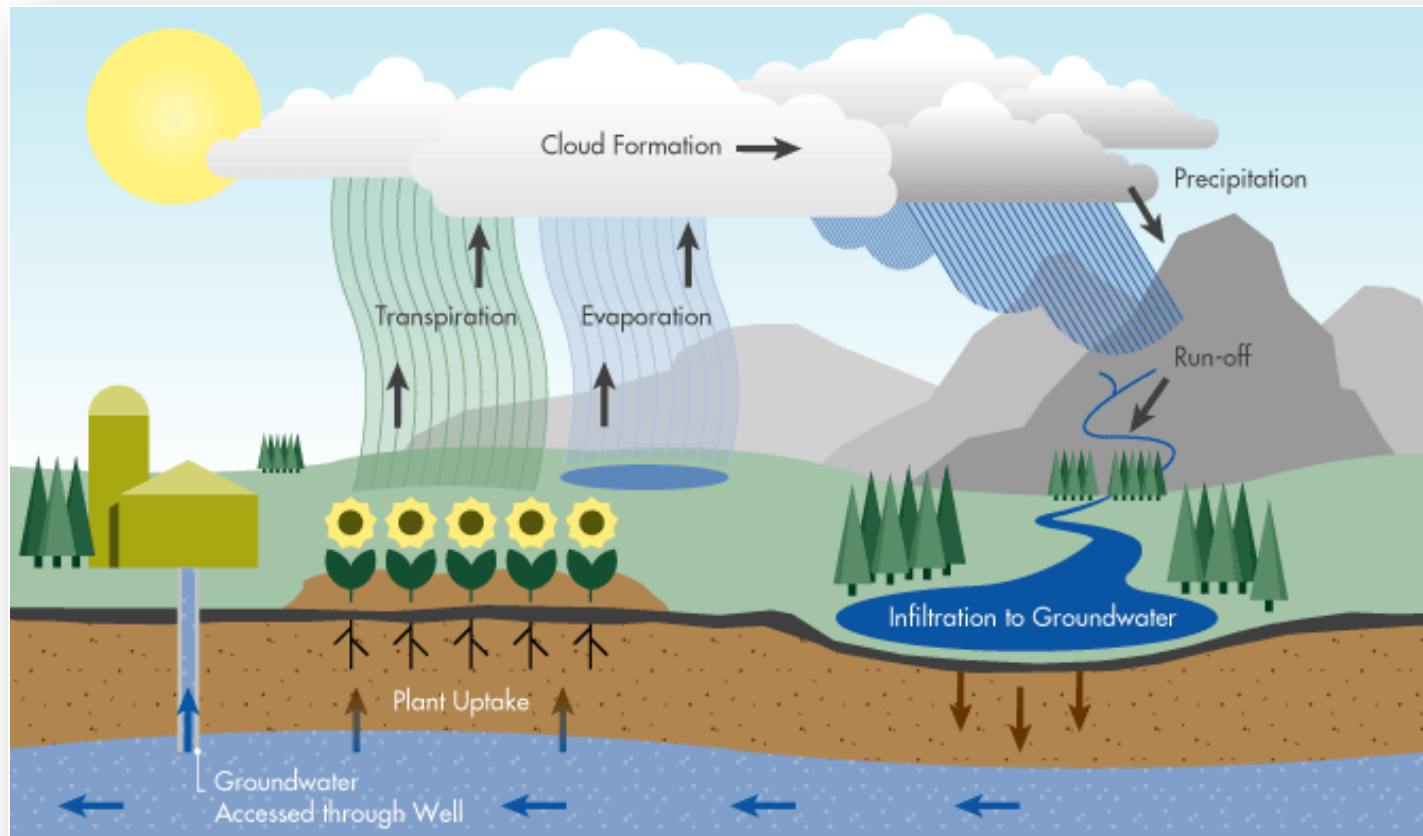
## 1. It can *run off*



2. It can be *absorbed* by plants and used for photosynthesis and other biological processes



3. It can *infiltrate* through the soil surface and percolate downward to groundwater *aquifers*





## 4. It can *evaporate*



## □ Land use

How land is used by humans:

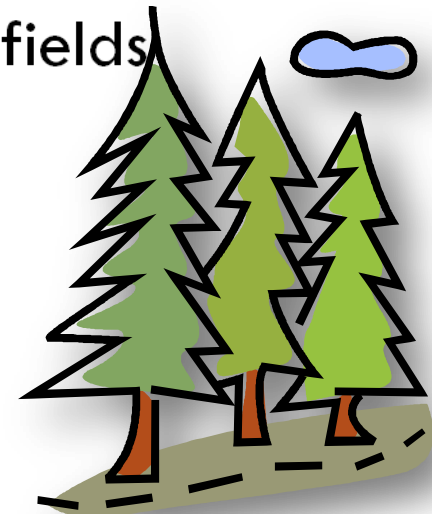
- Agriculture
- Industry
- Urban
- Residential
- Recreation

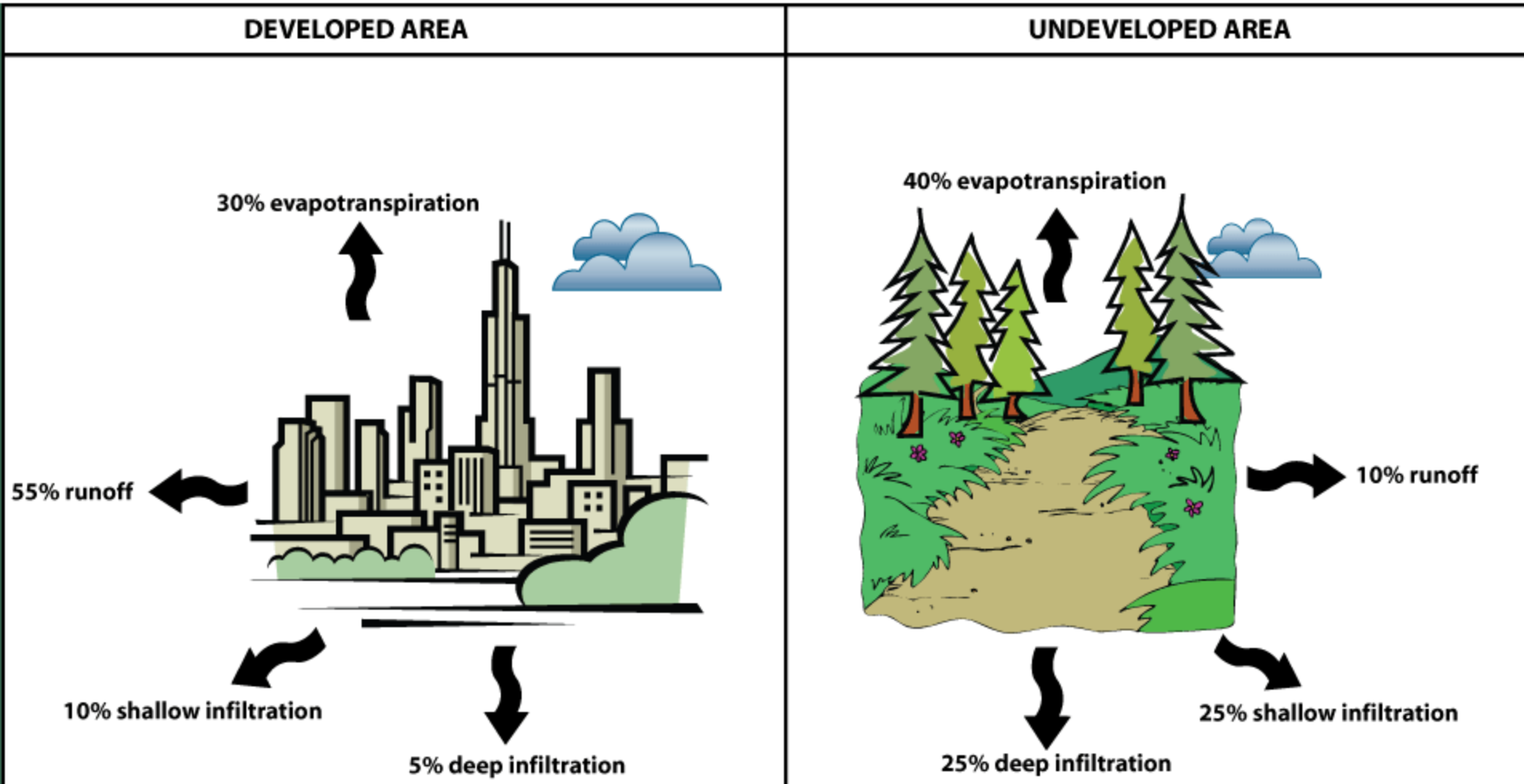


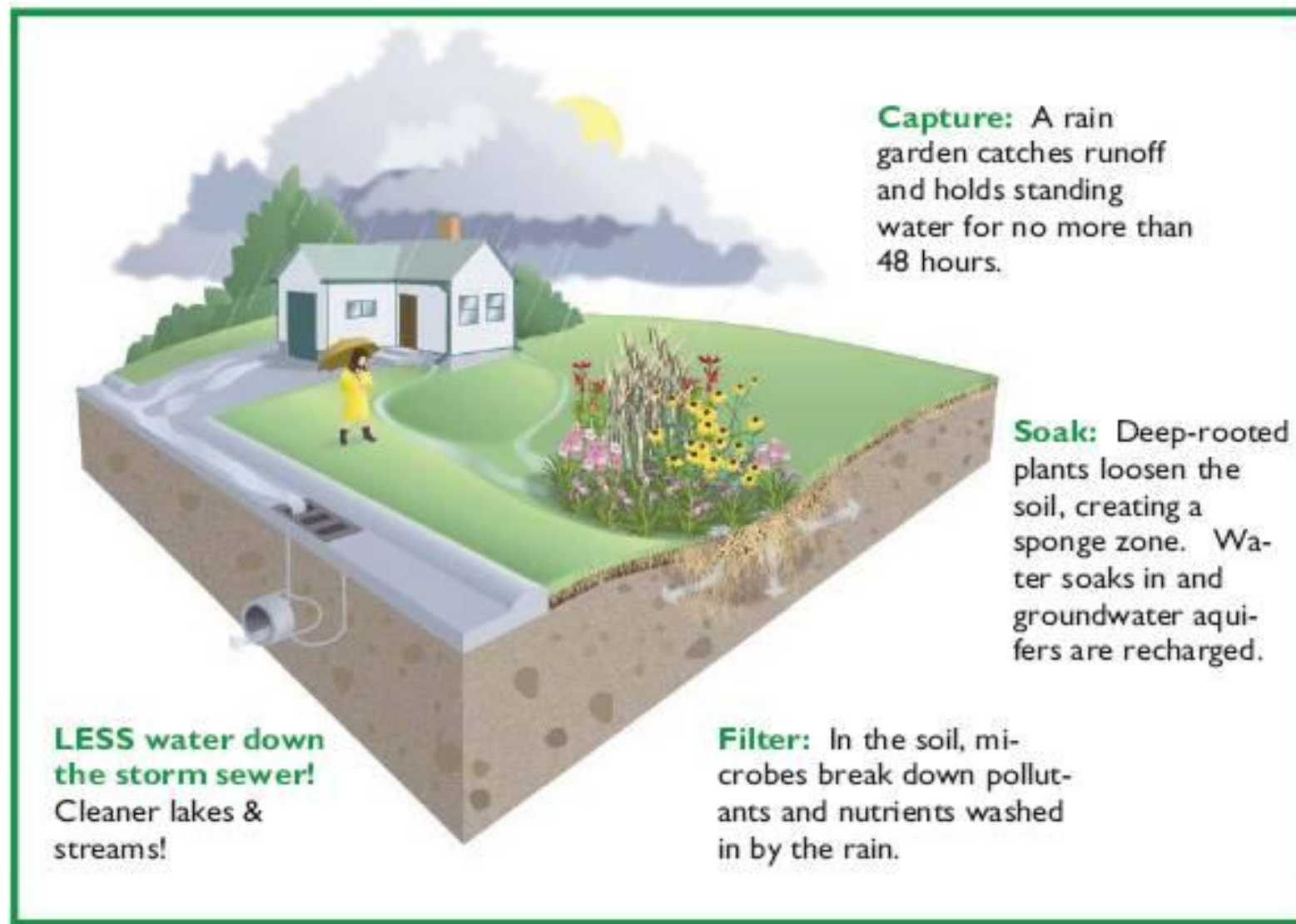
## □ Land cover

Biological or physical features of land:

- Forests
- Grasslands
- Agricultural fields
- Rivers, lakes
- Buildings, parking lots

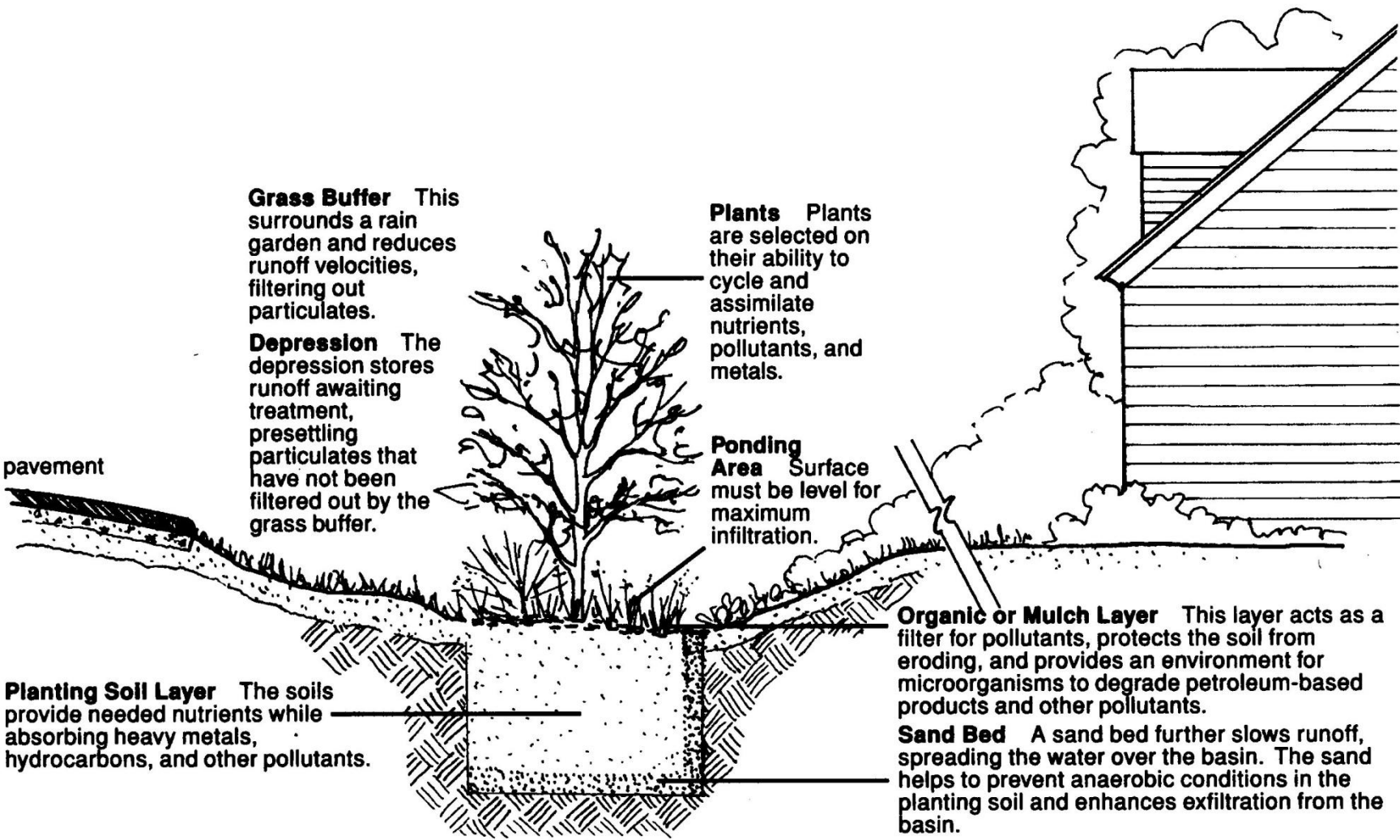




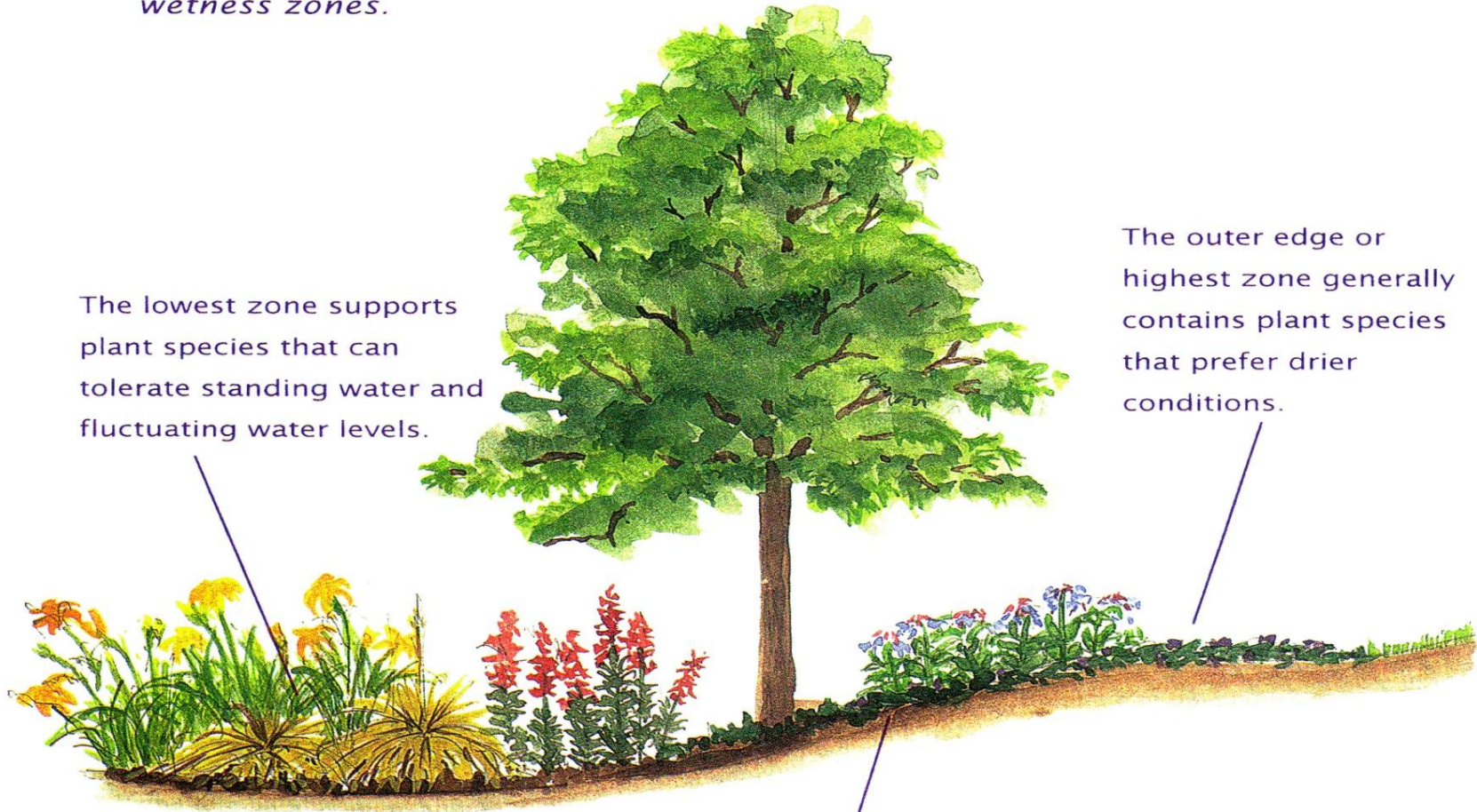


A rain garden is a landscaped, shallow depression that is designed to intercept, treat, and infiltrate stormwater at the source before it becomes runoff. The plants used in the rain garden are native to the region and help retain pollutants that could otherwise harm nearby waterways.

- Can be placed in strategic areas around the home landscape to capture rainfall and roof and impervious runoff
- Native plants that are water and climate tolerate are used
- Help control stormwater and nonpoint pollution while adding to the aesthetics of the landscape



*Your Rain Garden is composed of woody plants (trees and shrubs) and herbaceous species (flowers, grasses, and ground covers) planted in three wetness zones.*



The lowest zone supports plant species that can tolerate standing water and fluctuating water levels.

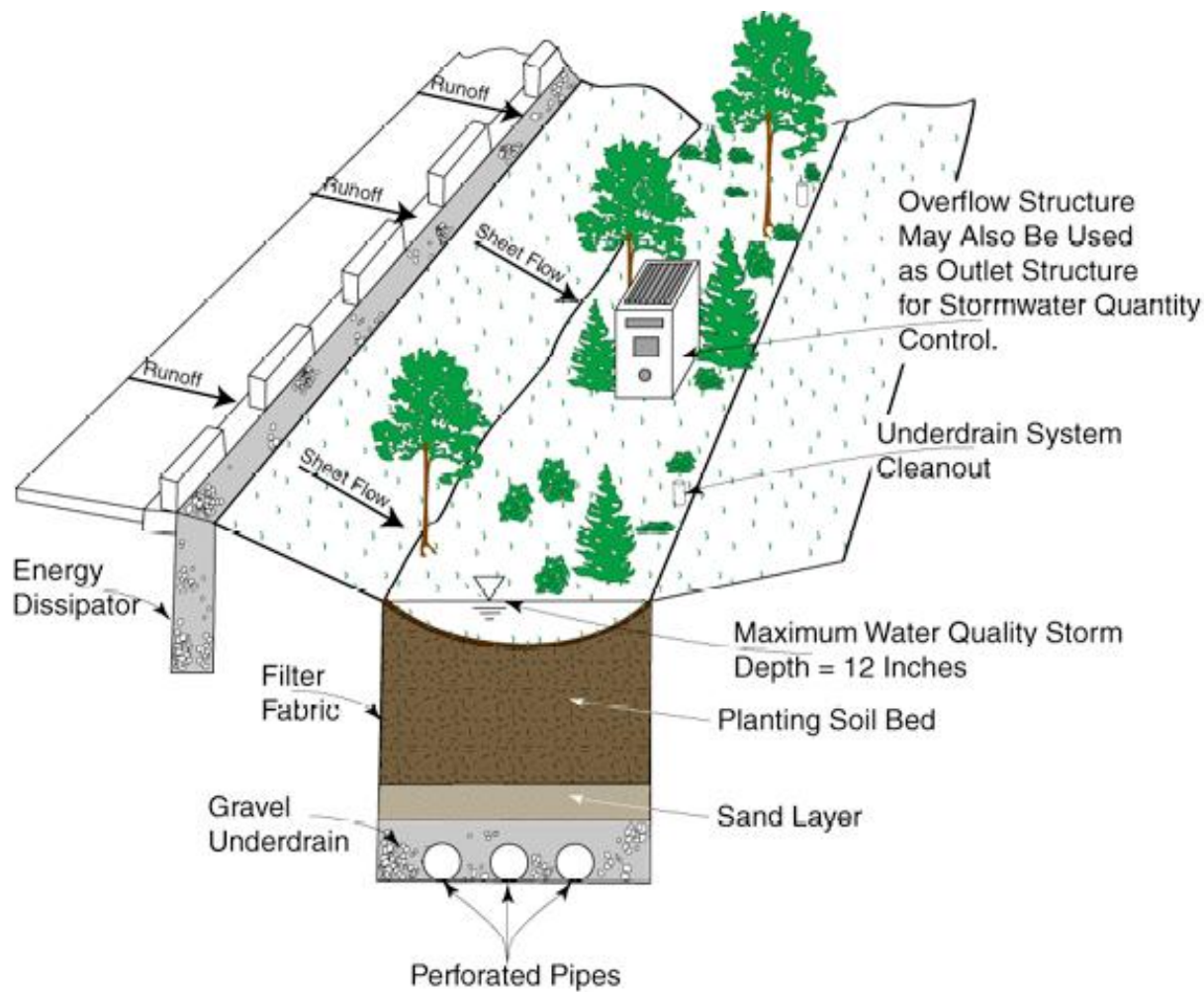
The outer edge or highest zone generally contains plant species that prefer drier conditions.

The middle zone is slightly drier, but also supports plant species that can tolerate fluctuating water levels.





*A rain garden is the residential version of a “bioretention system.”*



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## Bioretention System



- NJDEP – Stormwater Management Rules
- NJDEP – Municipal Separate Storm Sewer System (MS4) Permitting Rules
- Municipal stormwater management plans and ordinances
- Regional Stormwater Management Plans
- Total Maximum Daily Loads (TMDLs)

# Stormwater Regulations



- Municipal “Phase II” NJPDES Stormwater Regulations N.J.A.C. 7:14a
- Watershed Management Stormwater Regulations N.J.A.C. 7:8

# Municipal “Phase II” NJPDES Stormwater Regulations N.J.A.C. 7:14a



- Amends N.J.A.C. 7:14A
- Proposes 4 general permits to implement stormwater program
  - Tier A Municipal
  - Tier B Municipal
  - Public Complexes
  - Highways





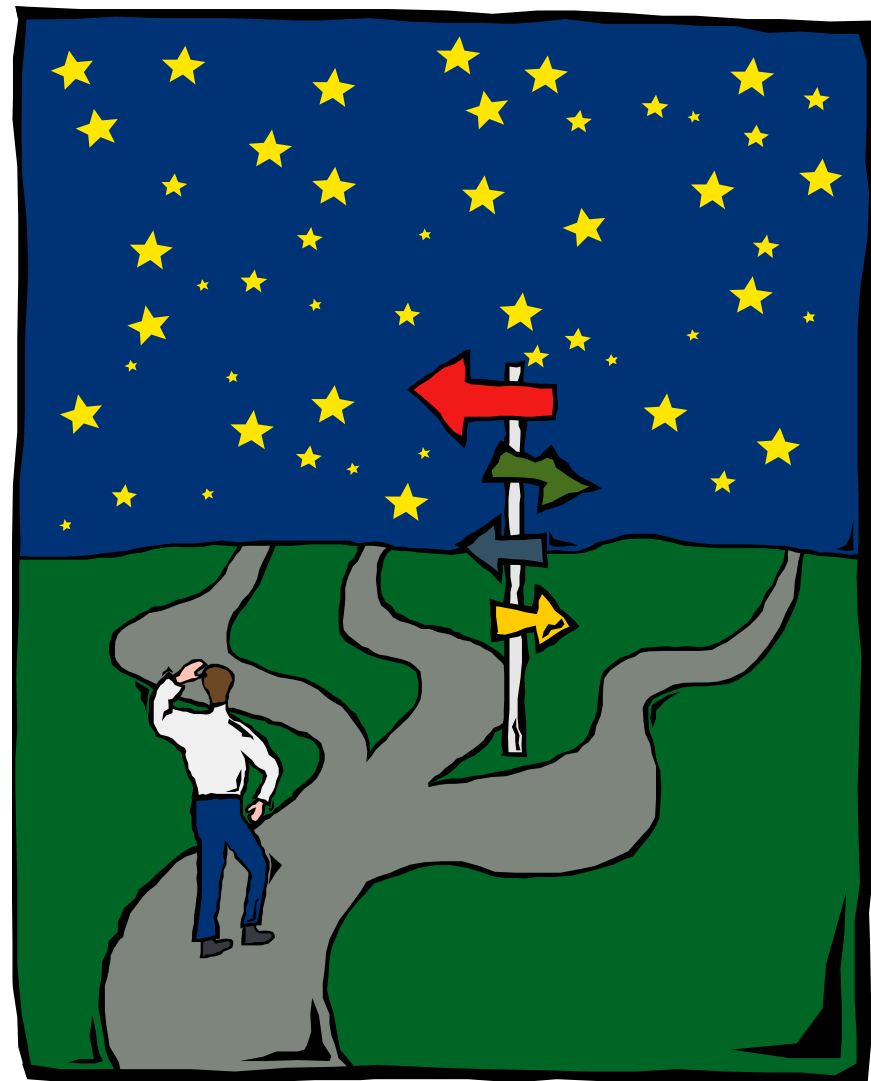
- Rule Proposed: January 6, 2003
- Rule Adoption: January 2004
- Apply for Permit: Within 30 days after rule adoption
- Fully Implement Program: 2008

- Those with Municipal Separate Storm Sewer Systems (MS4s)
  - Tier A (467 Municipalities)
    - Population > 10,000
    - Density > 1,000/square mile
  - Tier B (99 Municipalities)
    - Smaller/less populated

- **Prepare Stormwater Pollution Prevention Plan (SPPP)**  
[within 1 year of permit authorization]
- **Comply with Statewide Basic Requirements (SBRs)** [within 1 year of permit authorization, unless otherwise noted]
  1. Public involvement and participation
  2. Construction site storm water runoff control
  3. Post-construction storm water management in new development and re-development
  4. Public education on storm water impacts
  5. Prohibit improper disposal of waste
  6. Control of floatable and solid materials
  7. Maintenance Yards and Highway Service Area Program
  8. Employee Training

- Comply with 2 of the Statewide Basic Requirements (SBRs)  
[within 1 year of permit authorization, unless otherwise noted]
  - SBR #3: Post-construction storm water management in new development and re-development
  - SBR #4: Public education on storm water impacts

A report that describes the municipality's stormwater program, including details for implementing SBRs.



Comply with applicable State and local public notice requirements when providing for public participation.



- Applies in land disturbance > 1 acre
  - Implement erosion & sediment control BMPs
  - Control waste such as discarded building materials, concrete truck washout, chemicals, litter, & sanitary waste that may impact water quality.
  - If associated with “industrial activity”, implement “best achievable technology”
  - Must develop, submit for review, and implement a stormwater pollution prevention plan (SPPP)



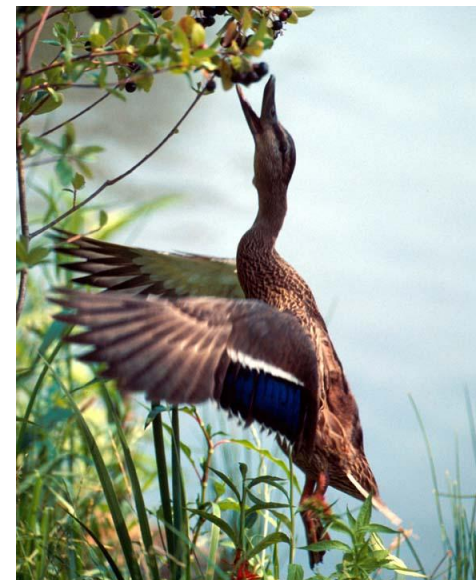
- Adopt Stormwater Management Plan
- Implement Stormwater Control Ordinances
- Ensure compliance with Residential Site Improvement Standards
- Ensure adequate long-term operation and maintenance of BMPs
- New storm drain inlets must meet design standards





- Develop public education program about:
  - the impacts of storm water discharges on surface and ground water
  - steps the public can take to reduce pollutants in stormwater
  - Informing public employees, businesses, and the public about the hazards of illicit connections and improper disposal of waste
- Additional requirements in Permit (not in regulation)
  - Distribute educational materials once per year
  - Conduct annual “event”
  - Label all storm drain inlets within 5 years

- Develop map showing all MS4 outfall pipes to a surface water body
- Develop, implement and enforce a program to detect and eliminate illicit connections (5 years)
- Prohibit improper disposal of waste into MS4
  - Enact ordinances
    - Pet waste
    - Litter
    - Improper waste disposal
    - Wildlife feeding
    - Yard waste – no closer than 10 feet from inlets, must be picked up monthly (Oct. – Dec.) and once in Spring

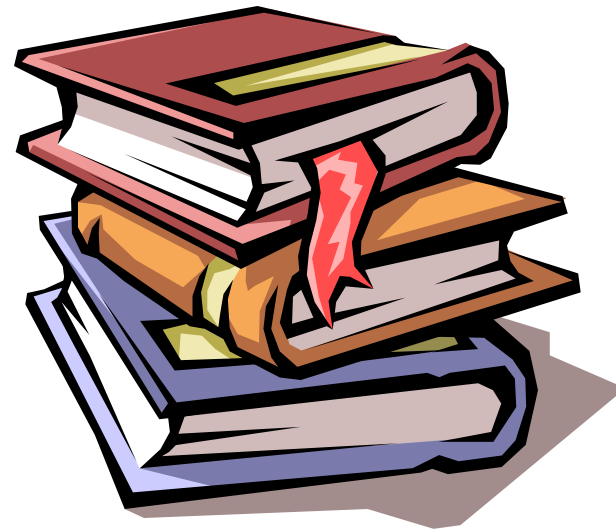


- Develop and implement an operation and maintenance program that prevents or reduces the discharge of solid and floatable materials
- Permit requires:
  - Sweep curbed streets, roads & highways (with speed limit  $\leq 35$  mph) in predominantly commercial/industrial areas monthly, and within one week of any leaf pickup or snow melt.
  - Storm drain inlet retrofitting during reconstruction
  - Annual catch basin cleaning
  - Roadside erosion control maintenance program
  - Outfall pipe scouring detection, remediation, and maintenance program



- Develop and implement an operation and maintenance program that prevents or reduces pollutant runoff
- Permit requires:
  - Construct permanent indoor storage for de-icing materials
  - Develop and implement SOPs for vehicle fueling, bulk delivery, and inspection and maintenance of storage tanks, piping, and pumps
  - Implement vehicle maintenance practices
  - No discharge of wash water without proper BMPs
  - Implement good housekeeping practices

Develop and conduct employee training program for appropriate employees that covers the required topics in SBR #1 through #7.



- AMs are non-numeric or numeric effluent limitations that are expressly required to be included in the stormwater program by an adopted areawide or Statewide Water Quality Management Plan (WQM plan).
- AMs may modify or be in addition to SBRs.
- AMs may be required by:
  - a TMDL approved or established by USEPA,
  - **a regional stormwater management plan**, or
  - other elements of adopted areawide or Statewide WQM plans.

NJDEP will notify Tier A municipalities of the adoption of an AM, and will list each adopted AM in the permit by making a minor modification to the permit.

AMs, other than numeric effluent limitations, will specify the BMPs that must be implemented and the measurable goals for each BMP.

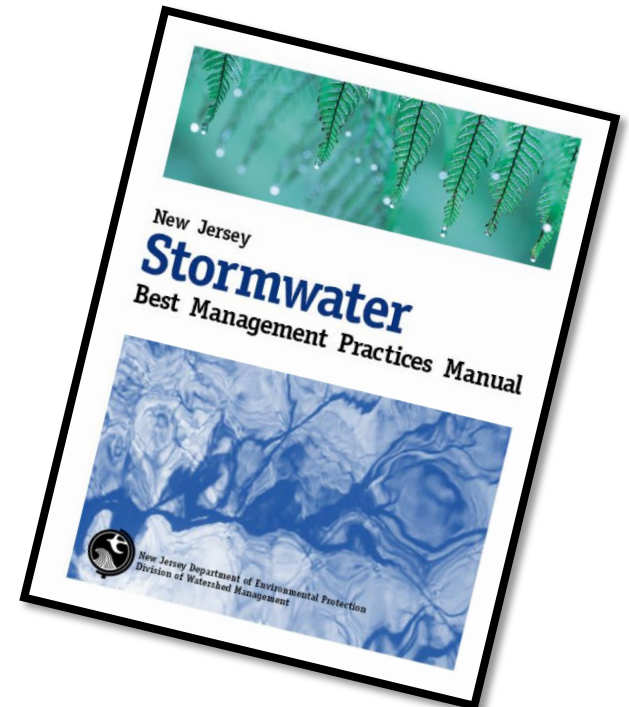
The AMs will also specify time periods for implementation.

# Watershed Management Stormwater Regulations N.J.A.C. 7:8





- Amends N.J.A.C. 7:8, 7:7A, 7:7E, 7:13, 7:15, & 7:20
- Establishes Municipal and Regional Stormwater Management Plan Requirements
- Establishes Performance Standards for New Development
- New BMP Manual



- Include maps showing:
  - water bodies on USGS quads and Soil Survey Maps
  - groundwater recharge areas and well head protection areas
  - Projected land uses at full build out
  - HUC14 drainage areas
- Include copies of stormwater ordinances

- Describe how plan:
  - Incorporates design and performance standards
  - Provides for long-term operation & maintenance of BMPs
  - Coordinates with other management plans and Township Master Plan
- Calculate:
  - Impervious surface area of each HUC14
  - NPS Pollutant Load at full build out
- Provide Mitigation Plan for situations where performance standards can't be met



- Site Design
  - 300 foot buffer on C1 Streams
    - No stormwater outfalls in buffer
    - Encroachment to 150 feet allowed if previous disturbance
      - Must provide 95% TSS Removal
  - Minimize and disconnect impervious surfaces
  - Minimize disturbance of drainage features and native vegetation
  - Minimize decrease in time of concentration
  - Minimize clearing and grading
  - Minimize impacts to wetlands with endangered species

- **Water Quantity**

- Demonstrate that post-development 2, 10, and 100-year storm event hydrographs do not exceed pre-development hydrographs

OR

- Demonstrate that hydrograph peaks will not increase and that increase in volume or change in timing won't increase flood damage downstream

OR

- Design BMPs so 2, 10, and 100-year post-development peak runoff rates are reduced to 50%, 75%, and 80% of the pre-development peak runoff rates, respectively.

- Groundwater Recharge
  - Maintain 100% of average annual groundwater recharge volume
- OR
  - Infiltrate increase in the post development runoff volume for the 2-year storm

- Water Quality
  - Install BMPs to reduce at least 80% of total suspended solids (TSS) loads
  - Install BMPs to provide nutrient removal to maximum extent feasible

## TSS Removal Rates

<u>BMP</u>	<u>Removal Rate</u>
<b>Bioretention (RAIN GARDENS)</b>	<b>90%</b>
Constructed Wetlands	90%
Manufactured Treatment Systems	See N.J.A.C 7:8-5.7(d)
Infiltration Structure	80%
Sand Filter	80%
Forested Buffers	70%
Wet Pond	60-90%
Vegetative Filter Strip	50%
Extended Detention Basin	40-60%



If a developer cannot satisfy one of the three stormwater management requirements, they have to complete a mitigation project to compensate for the deficiency.

# State and Local Regulatory Initiatives

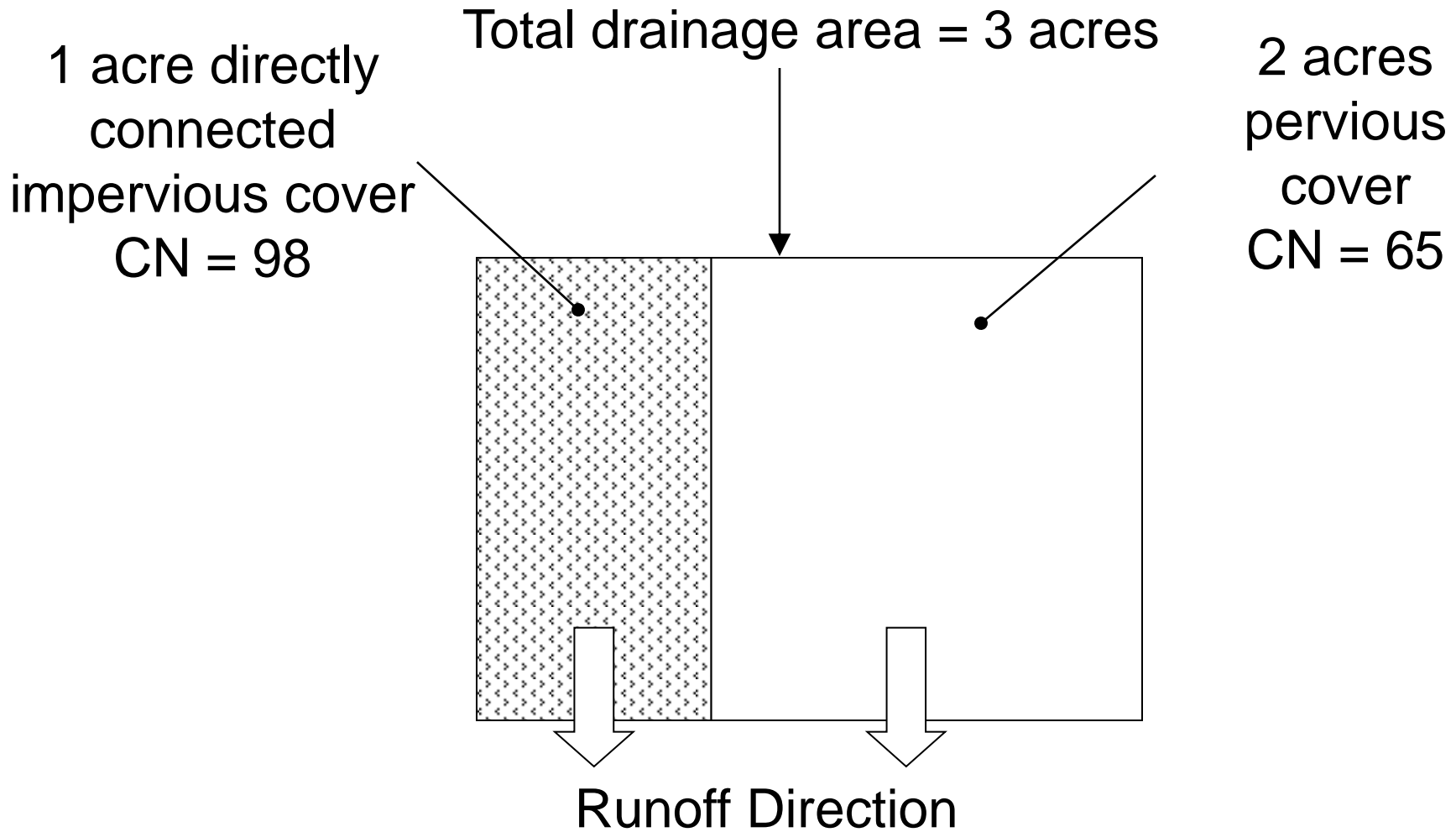


- Arbitrary limits on impervious cover at local level and at state level
- Reduces ability to install greenhouses or other controlled environments on farmland
- Restricts installation of pools, patios and additions on residential properties

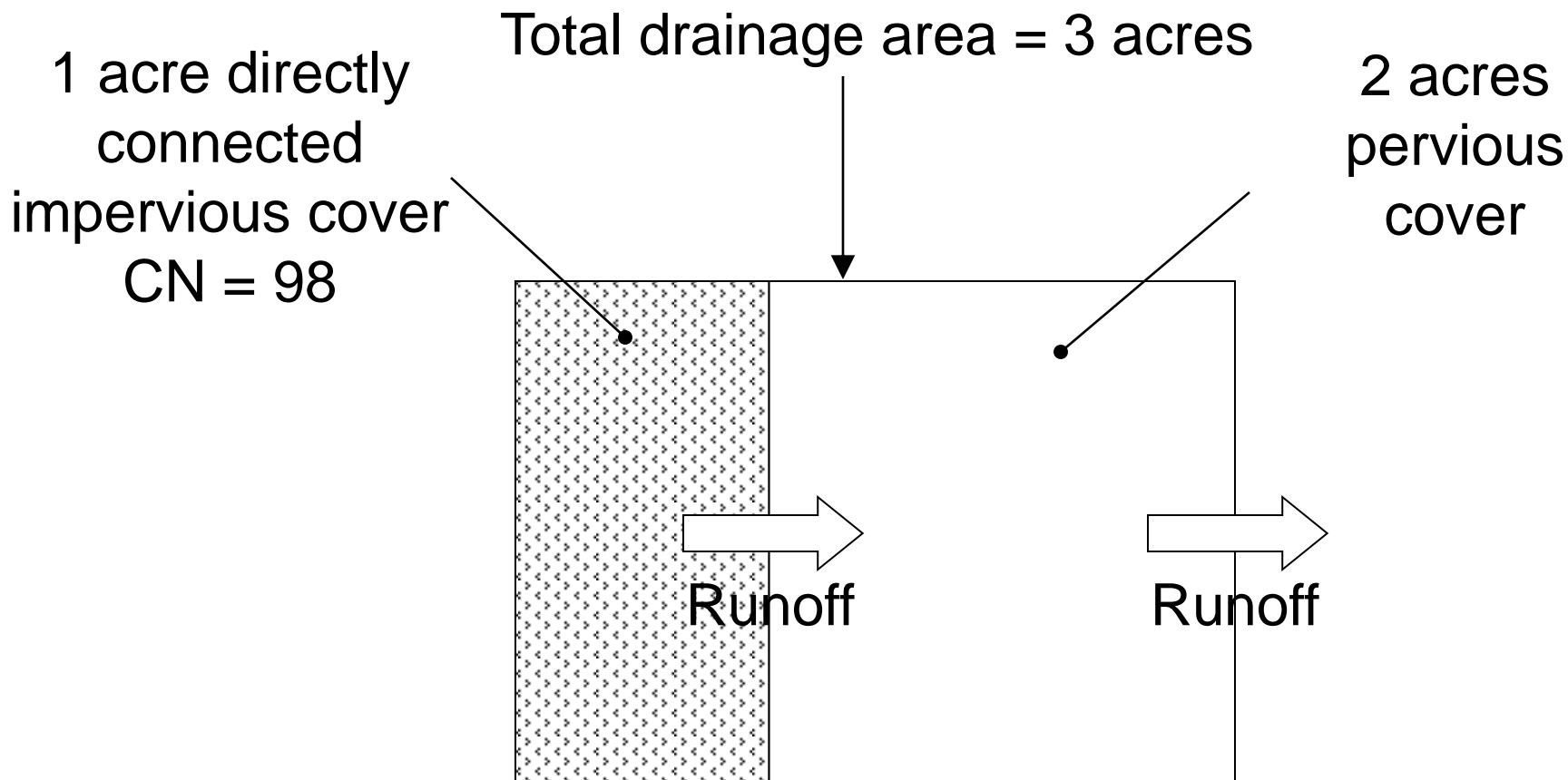


**Total Impervious Area (TIA)**  
**vs.**  
**Effective Impervious Area (EIA)**

**Connected**  
**vs.**  
**Disconnected**



For 1.25 inch storm, 3,811 cubic feet of runoff = 28,500 gallons.



For 1.25 inch storm, 581 cubic feet of runoff = 4,360 gallons.

**Comparing**  
**Connected**  
**Impervious**  
**Surfaces**  
**to**  
**Disconnected**  
**Impervious**  
**Surfaces**



Address specific water quality concerns, flooding problems, and groundwater recharges issues on a watershed basis. Allows communities to adopt more stringent ordinances to achieve a higher level of environmental protection.



1. Stormwater Management Control Ordinance
2. Low/No Phosphorus Fertilizer Ordinance
3. Coal Tar Reduction Ordinance
4. Stream Corridor Protection Ordinance
5. MS4 Permit Educational Mandate Focus
6. Terminal Catch Basin Cleaning
7. Sump Pump Ordinance and Enforcement
  - To avoid accidental spills from wastewater treatment plant, sump pumps should not discharge to sanitary sewers

## New Definition of “Major Development”

“Major development” means any “development” that provides for ultimately disturbing one-*half* or more acres of land *or increases impervious cover by 5,000 square feet*. Disturbance for the purpose of this rule is the placement of impervious surface or exposure and/or movement of soil or bedrock or clearing, cutting, or removing of vegetation, *or razing and replacement of existing structures*.

## **New Nonstructural Stormwater Management Strategies**

*Since the impact of impervious surfaces can be minimized through disconnection, twenty percent (20%) of all surfaces greater than 5,000 square feet will be required to be disconnected prior to resurfacing ...*

## **New Nonstructural Stormwater Management Strategies**

*“The two-year design storm runoff volume from these disconnected areas shall be infiltrated if the soils and geology of the area permits. Permeability testing should be performed before design of infiltration practice is complete, and options of soil replacement with an underdrain system or a capture and reuse system could provide alternatives to low infiltration areas.”*

## **More New Nonstructural Stormwater Management Strategies**

*To further minimize the impact of impervious surfaces, twenty percent (20%) of all roofs greater than 5,000 square feet will be required to be disconnected prior to resurfacing or replacement ...*

## **More New Nonstructural Stormwater Management Strategies**

*In an effort to restore some of the tree canopy in the watershed, all major development will offset their construction contributing 10 cents per square foot developed to a municipal reforestation fund. A minimum of 20 trees per new home or per 5,000 square feet of building footprint will be installed or funding provided to the municipality...*









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New Jersey Agricultural  
Experiment Station



Jeremiah Bergstrom, LLA, ASLA

Senior Project Manager

Rutgers Cooperative Extension Water Resources Program

732-932-9800 ext. 6126

[jbergstrom@envsci.rutgers.edu](mailto:jbergstrom@envsci.rutgers.edu)

<http://water.rutgers.edu>