Welcome
Stormwater Management Design Review Course

https://www.njstormwater.org/smdrc_training.html

Course Materials
Stormwater Management Design Review Course
### Module 1

<table>
<thead>
<tr>
<th>No.</th>
<th>Subject, Presenter</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Intro and Federal Background, Minneh</td>
<td>15 minutes</td>
</tr>
</tbody>
</table>
|     | Goal One: Understand the basics of the federal NPDES program and how it relates to stormwater management.  
Goal Two: Understand how the post-construction requirements fit into the NPDES program. |          |
| 2   | Stormwater Overview, Anthony | 15 minutes |
|     | Goal One: Understand the effects of development on the hydrologic cycle.  
Goal Two: Understand the design and performance standards. |          |
| 3   | Understanding flow, Richard | 15 minutes |
|     | Goal One: Understand the importance of long-term BMP implementation.  
Goal Two: Understand the municipality’s responsibility for performing/maintaining BMPs.  
Goal Three: Understand the required elements of a maintenance plan. |          |
| 4   | Quiz 1 – Presentations 2, 3 & 4, Jim | 10 minutes |
|     | Goal One: Review the key points covered in the previous presentations. |          |
| 5   | Mapping, Tim | 10 minutes |
|     | Goal One: Understand the mapping requirements.  
Goal Two: Learn about the LID mapping tool. |          |
| 6   | Review Quiz 1, Jim | 15 minutes |
|     | Goal One: Review the key points covered in the previous presentations. |          |
| 7   | New Rule Overview & Questions, Jim | 15 minutes |

### Module 2

<table>
<thead>
<tr>
<th>No.</th>
<th>Subject, Presenter</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Stormwater Calculations, Lisa</td>
<td>15 minutes</td>
</tr>
</tbody>
</table>
|     | Goal One: Understand the concepts and methods outlined in N.J.A.C. 7:10.  
Goal Two: Use the NRCS Runoff Equation to calculate 60% Runoff of Parshall Flume.  
Goal Three: Calculate the Time of Concentration (Tc) |          |
|     | Goal Four: Use the ACOE Two-Step Method for an unconfined flow in a pipe or culvert. |          |
| 2   | Soil Testing, Brian | 15 minutes |
|     | Goal One: Understand the effects of development on the hydrologic cycle.  
Goal Two: Understand the design and performance standards. |          |
| 3   | Quiz 2 – Presentations 1 & 2 & Mapping, Jim | 10 minutes |
| 4   | Review Quiz 2, Jim | 15 minutes |
Module 3

Agenda:

<table>
<thead>
<tr>
<th>Module 3</th>
<th>(1:00)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>Subject / Presenter</td>
</tr>
<tr>
<td>1.</td>
<td>How to Review a Project</td>
</tr>
<tr>
<td>2.</td>
<td>Design Example 1, Brian</td>
</tr>
<tr>
<td>3.</td>
<td>Design Example 2, Chong</td>
</tr>
<tr>
<td>4.</td>
<td>Design Example 3, Brian</td>
</tr>
<tr>
<td>5.</td>
<td>Design Example 4, Chong</td>
</tr>
<tr>
<td>6.</td>
<td>Design Example 5, Minho</td>
</tr>
<tr>
<td>7.</td>
<td>Program Update &amp; Closing Comments, Jim</td>
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Module 4

Agenda:

<table>
<thead>
<tr>
<th>Module 4</th>
<th>(1:00)</th>
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<tbody>
<tr>
<td>No.</td>
<td>Subject / Presenter</td>
</tr>
<tr>
<td>1.</td>
<td>Design Example 6, Brian</td>
</tr>
<tr>
<td>2.</td>
<td>Design Example 7, Chong</td>
</tr>
<tr>
<td>3.</td>
<td>Design Example 8, Minho</td>
</tr>
<tr>
<td>4.</td>
<td>Program Update &amp; Closing Comments, Jim</td>
</tr>
</tbody>
</table>
Federal Background & Intro:

MS4

POST-CONSTRUCTION PROGRAM

Minesh Patel
NJDEP Division of Water Quality
SWMDR Training Module 1
August 25, 2020

Stormwater Control

Ordinances

Post-Construction Program

Stormwater Management

Clean Water Act

Program Phase II

NPDES

MS4

NJPDES

Stormwater Management Plan

Tiers A

Stormwater Control Ordinances

Wake Up Call: Death of a River

Cuyahoga River, Cleveland, Ohio
Sunday, June 22, 1969

Lake Erie
MS4 Permit Origin

Federal:

- Created the EPA

Amendments to FWPCA (1972)
- “Clean Water Act”
- Section 402 created National Pollution Discharge Elimination System, “NPDES”
  - Authorized EPA to regulate discharges
  - Prohibits discharges except as specified by permit

MS4 Permit Origin

Federal: NPDES

Authorized states to implement program

NPDES Implementation
- April 1982 - Federal authorization
- August 1983 – Publication Date in the NJ Register

MS4 Permit Origin

Federal: Clean Water Act & Rules

Water Quality Act (1987)

National Pollution Discharge Elimination System (NPDES) – 40 CFR §§ 122-124
- Phase I (1990) – stormwater discharge provisions
- Phase II (1999) – various stormwater provisions
  - Municipal Separate Storm Sewer Systems (MS4s)
    - Municipalities
    - Public Complexes
    - Highway Agencies
    - Combined Sewer Overflows
    - Industrial Stormwater Discharges
MS4 Permit Origin

NJPDES: NJ DEP Regulatory Framework
Municipal Stormwater Program - NJAC 7:14A-25
• February 2004 – Adoption of amendments which created MS4 Permit – Tier A and Tier B
• January 2018 – renewal of permit for Tier A
• January 2019 – renewal of permit for Public Complex
• January 2020 – renewal of permit for Highway Agency

MS4 Permit Overview

Fed: Six Minimum Control Measures =
NJ: Six Statewide Basic Requirements (“SBRs”) (Part IV.B)
1. Public involvement and participation including public notice;
2. Local public education and outreach;
3. Construction site stormwater runoff (NJ - construction activity stormwater general permit):
4. Post-construction stormwater management in new development and redevelopment;
5. Pollution prevention/good housekeeping for municipal operators; and
6. MS4 outfall pipe mapping, and illicit discharge and scouring detection and control.
**MS4 Permit Overview**

**Permit Requirements:**

1. Six SBRs – Part IV B;
2. Other Control Measures – Part IV C – Minimum Standard for Stormwater Facilities Maintenance;
3. Additional Measures – Part IV D and
4. Optional Measures – Part IV E.

**MS4 Permit Overview**

**Post-Construction Stormwater Management in New and Redevelopment Areas**

**Issues**
- Development increases the types and quantity of pollutants in stormwater runoff
- Development increases the quantity of water delivered to the waterbody during storms

**Solutions**
- Planning and design of stormwater management measures to control the pollutants and water from the developments after construction.

**Municipal Implementation**

**MS4 Permit: Post-Construction Program Requirements**

<table>
<thead>
<tr>
<th>Municipal Stormwater Management Plan</th>
<th>Stormwater Control Ordinance(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NJAC 7:8-4</td>
<td>NJAC 7:8-4, 5, 6</td>
</tr>
<tr>
<td>Enforcement Stormwater Control Ordinance(s)</td>
<td>Review and Analysis Development Applications for Compliance With Stormwater Control Ordinance(s)</td>
</tr>
<tr>
<td>Audit by NJDEP</td>
<td>Long Term Operation and Maintenance of BMPs</td>
</tr>
<tr>
<td>NJAC 7:8-5</td>
<td></td>
</tr>
</tbody>
</table>
Stormwater Control Ordinance(s) NJAC 7:8 - 5 and 6
- Nonstructural strategies
- Groundwater recharge
- Quantity control
- Quality control & WQDS rainfall distribution
- Calculation methods allowed
- Standards for structural measures
- Maintenance plan requirements
- Safety standards

MS4 Permit: Post-Construction Program Requirements

Audit by NJDEP

Consequences of Noncompliance
- DEP Enforcement Actions
- EPA has audited NJ’s municipalities and other states’ MS4 permittees
  - Two- or three-day thorough audit
  - Administrative Compliance Order
  - Enforcement actions for non-compliance
  - Possible fines and penalties up to $37,500 per day
Consequences of Noncompliance

- EPA Penalties for MS4 Violation
  - Large/Medium MS4
    - $329,395 City of Rockford, Illinois
    - $3.5 Million City of Dallas, Texas
  - Small MS4
    - $6,000 Montville, New Jersey
    - $54,833 Camden County, New Jersey

Summary

- Clean Water Act
- NPDES/NJPDES
- MS4
- Post-construction program
- Stormwater Control Ordinances
- Complete reviewer training every 5 years

More Information:

Bureau of Nonpoint Pollution Control
Division of Water Quality
401 East State Street
PO Box 420, Mail Code 401-28
Trenton, NJ 08625-420
Tel: 609-633-7021
www.njstormwater.org

Minesh Patel
minesh.patel@dep.nj.gov
Presentation Goals

Overview

• Understanding the effects of development on the hydrologic cycle

• Understand the design and performance standards
What is stormwater?

“Stormwater”

Water resulting from precipitation (including rain and snow) that runs off the land’s surface, is transmitted to the subsurface, or is captured by separate storm sewers or other sewage or drainage facilities, or conveyed by snow removal equipment.

What affects stormwater?

Site Conditions:
- Density of Vegetation
- Soil
- Slope
- Surface Roughness
- Groundwater

Vegetation & Rainfall
Soils

Surface Roughness & Slope

Hydrologic Cycle
Post-Development Impacts on the Hydrologic Cycle

Summary

- Increased runoff volume and rate of stormwater
- Degraded water quality
- Depleted groundwater and stream baseflow

Understanding the design and performance standards
Definitions

• Major Development
• Infiltration & Groundwater Recharge
• Design Storms (2, 10, & 100)
• Hydrograph

Understanding the effects of development on the hydrologic cycle

Overview

• Increased runoff volume and rate of stormwater
• Degraded water quality
• Depleted groundwater and stream baseflow

Stormwater Management Rule Requirements

Runoff Quantity Control Option 1

N.J.A.C. 7:8-5.4(q)(3):
Demonstrate through hydrologic and hydraulic analysis that for stormwater leaving the site, post-construction runoff hydrographs for the 2-, 10-, and 100-year storm events do not exceed, at any point in time, the pre-construction runoff hydrographs for the same storm events;
Stormwater Management Rule Requirements

Runoff Quantity Control Option 1

Demonstrate through hydrologic and hydraulic analysis that there is no increase, as compared to the pre-construction condition, in the peak runoff rates of stormwater leaving the site for the 2-, 10-, and 100-year storm events and that the increased volume or change in timing of stormwater runoff will not increase flood damage at or downstream of the site. This analysis shall include the analysis of impacts of existing land uses and projected land uses assuming full development under existing zoning and land use ordinances in the drainage area; or
Stormwater Management Rule Requirements

Runoff Quantity Control Option 3

N.J.A.C. 7:8-5.4(a)(3):i
Design stormwater management measures so that the post-construction peak runoff rates for the 2-, 10-, and 100-year storm events are 50, 75 and 80 percent, respectively, of the pre-construction peak runoff rates. The percentages apply only to the post-construction stormwater runoff that is attributable to the portion of the site on which the proposed development or project is to be constructed.

Runoff Quantity Control Exemption

N.J.A.C. 7:8-5.4(a)(3):iv
This requirement does not apply to projects in tidal flood hazard areas if it is clear the project will not cause downstream flooding:
- Discharges into large tidally controlled bays, watercourses, inlets, the ocean, etc.

Understanding the effects of development on the hydrologic cycle

Overview
- Increased runoff volume and rate of stormwater
- Degraded water quality
- Depleted groundwater and stream baseflow
Stormwater Management Rule Requirements

% Runoff Quality Control

Applies when a project proposes > ¼ acre of new impervious coverage

Requirements:
- Remove 80% TSS from developed site
- Remove nutrients to max. extent feasible

Stormwater Management Rule Requirements

% Runoff Quality Control

BMPs must be designed to manage the Water Quality Design Storm:

1.25” rainfall over 2 hours
Custom Distribution shown in the rules

Stormwater Management Rule Requirements

% Runoff Quality Control

This requirement does not apply to discharges that have a separate NJPDES permit with a numerical TSS effluent limitation.
Understanding the effects of development on the hydrologic cycle

Overview

- Increased runoff volume and rate of stormwater
- Degraded water quality
- Depleted groundwater and stream baseflow

Stormwater Management Rule Requirements

Groundwater Recharge Option 1

N.J.A.C. 7:8-5.4(a)(2)(i)(1):
Demonstrate through hydrologic and hydraulic analysis that the site and its stormwater management measures maintain 100 percent of the average annual preconstruction groundwater recharge volume for the site; or

Groundwater Recharge Option 2

N.J.A.C. 7:8-5.4(a)(2)(i)(2):
Demonstrate through hydrologic and hydraulic analysis that the increase of stormwater runoff volume from pre-construction to post-construction for the two-year storm is infiltrated.
Stormwater Management Rule Requirements

Groundwater Recharge Exemption

This requirement does not apply to previously developed portions of urban redevelopment areas:

Previously developed = areas cleared of woody vegetation

Nonstructural Strategies

N.J.A.C. 7:8-5.2(a):
Must use nonstructural strategies to the maximum extent practicable before any structural measures may be used.


9.5 Infiltration Basins

Infiltration basins are stormwater management systems constructed with highly permeable components designed to both maximize the removal of pollutants from stormwater and to promote groundwater recharge. Pollutants are treated through settling, filtration of the runoff through, and biological and chemical activity within, the component. The total suspended solids (TSS) removal rate is 89%.

N.J.A.C. 7:8 Stormwater Management Rules Design and Performance Standards

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Design and Performance Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macroinfiltration</td>
<td>As stated in Strategy 4L, see Page 3</td>
</tr>
<tr>
<td>Water Quantity</td>
<td>Yes, when designed as an on-line system</td>
</tr>
<tr>
<td>Groundwater Recharge</td>
<td>Yes</td>
</tr>
<tr>
<td>Water Quality</td>
<td>89% TSS Removal</td>
</tr>
</tbody>
</table>
Summary

Understand the effects of development on the hydrologic cycle
- Increased rate and volume of runoff
- Degraded water quality
- Depleted groundwater and base flow

Summary

Understand the design and performance standards
- Water Quantity Controls
- Water Quality Controls
- Groundwater Recharge
- Nonstructural Strategies

More Information:

Bureau of Nonpoint Pollution Control
Division of Water Quality
401 East State Street
PO Box 420, Mail Code 401-28
Trenton, NJ 08625-420
Tel: 609-633-7021
www.njstormwater.org

Anthony Robalik
Anthony.Robalik@dep.nj.gov
Goals

• Goal One: Understand the Importance of long-term operation and maintenance of BMPs
• Goal Two: Understand the permittee’s responsibility for performing/ensuring long-term operation and maintenance
• Goal Three: Understand the required elements of a maintenance plan

THE IMPORTANCE OF LONG-TERM OPERATION & MAINTENANCE
**Why? This is Why.**

1. **Ponding Infiltration Basin or Constructed Wetland?**
**Maintenance Issues**

Poorly maintained BMPs lead to

• Water quality issues in receiving water bodies
• Flood hazards
• Safety issues
• Soil erosion
• Mosquito breeding
• Decreases in property value

**PERMITTEE’S RESPONSIBILITY**

For performing/ensuring maintenance

- MS4 Post-construction Program
  - Ensure adequate long-term operation and maintenance of BMPs;
  - Post-construction inspection and maintenance of BMPs; and
  - Penalty provisions for the noncompliance with design, construction or operation and maintenance.
### Minimum Standards/Other Control Measures for Stormwater Facilities Maintenance – MS4

Ensure adequate long-term cleaning, operation and maintenance of stormwater management measures:

#### i. owned or operated by the Tier A Municipality

- **The permittee must develop, update and implement a program**
  - Inspection and maintenance must be performed pursuant to any plans, or more frequently, to ensure proper function and operation.
  - The Tier A municipality must maintain a log to demonstrate compliance with this section (Part IV.C.)
    - Facility information and field location - geographic coordinates
    - Inspector information
    - Inspection details
    - Maintenance performed

- **The permittee shall certify annually that municipally owned or operated facilities are properly functioning.**

- **Maintenance must be documented and prioritized for facilities not functioning. A schedule for the repairs shall be maintained.** (Part IV.C.1.a.iv/IV.C.3.f/IV.C.2.f)

### Minimum Standards/Other Control Measures for Stormwater Facilities Maintenance – MS4

Ensure adequate long-term cleaning, operation and maintenance of stormwater management measures:

#### ii. not owned or operated by the Tier A Municipality

- **The Tier A municipality must develop, update and implement a program for facilities constructed after Feb. 7, 1984**
  - Ensure inspection and maintenance performed pursuant to any plans, or more frequently, to ensure proper function and operation.
  - The Tier A municipality must maintain a log to demonstrate compliance with this section (Part IV.C.1.b)
    - List actions taken to enforce compliance
    - Identify facilities requiring action and provide location information
    - Name of person(s) taking action and date of action(s)
    - Detailed findings of actions
Reviewer Responsibilities

- Failure to require a proper maintenance plan may have consequences:
  - Inadequate removal of pollutants
  - Improper or insufficient maintenance of the BMP
  - Municipality has a weaker basis to inspect and enforce maintenance
  - Permittee will violate its MS4 permit

Maintenance Review

- Checklist for Conducting Stormwater Management Review (Cont’d.)

Stormwater Facilities Maintenance

- Stormwater Facilities Maintenance Requirements
## Stormwater Facilities Maintenance

### Stormwater Facilities Maintenance Requirements (cont’d.)

<table>
<thead>
<tr>
<th>Minimum Standard</th>
<th>Measurable Goal</th>
<th>Existing Permits</th>
<th>New Permits</th>
</tr>
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<tbody>
<tr>
<td>Certify annually</td>
<td>January 1, 2018</td>
<td>$EPA + 18 Months</td>
<td>$EPA + 18 Months</td>
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### Stormwater Facilities Maintenance

<table>
<thead>
<tr>
<th>Minimum Standard</th>
<th>Measurable Goal</th>
<th>Existing Permits</th>
<th>New Permits</th>
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</thead>
<tbody>
<tr>
<td>Ensure that stormwater facility inspection and maintenance is performed pursuant to any maintenance plans, or more frequently as needed to ensure proper function and operation of each stormwater facility.</td>
<td>Certify annually</td>
<td>January 1, 2018</td>
<td>$EPA + 18 Months</td>
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<tr>
<td>Maintain 2 days sufficient to demonstrate compliance with this section, including but not limited to inspections by the municipality to ensure compliance with the long-term cleaning, operation, and maintenance program.</td>
<td>Certify annually</td>
<td>January 1, 2018</td>
<td>$EPA + 18 Months</td>
</tr>
<tr>
<td>Maintain copies of all maintenance plans for stormwater facilities approved by the municipality and made available to the Department upon request.</td>
<td>Certify annually</td>
<td>January 1, 2018</td>
<td>$EPA + 18 Months</td>
</tr>
</tbody>
</table>

### What is a review engineer's role in MS4 Permit compliance

![Diagram of Review Engineer's Role]

- **Review Engineer**
- **DFW/Facilities Office & DEP Enforcement**
- **Stormwater Program Coordinator**
- **Enforce Maintenance**
- **Assure MS4 Permit Compliance**
- **Review Maintenance Plan**

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REQUIRED ELEMENTS OF A MAINTENANCE PLAN

NJDEP Stormwater BMP Maintenance Requirements

Stormwater Management Rules at N.J.A.C. 7:8-5.8 | Municipal Stormwater Control Ordinances

Maintenance Plan

• Design engineer has to prepare a maintenance plan
  o Specific tasks and schedules;
  o Cost estimates, including estimated cost of sediment, debris, or trash removal;
  o The name, address, and telephone number of the person or persons responsible for preventative and corrective maintenance (including replacement);
Preventative and corrective maintenance shall be performed to maintain the function of the stormwater management measures.

**Corrective Tasks**
- Repairs or replacement to the structure
- Restoration of eroded areas
- Fence repair or replacement
- Restoration of vegetation
- Repair or replacement of non-vegetated linings
- Removal of sediment, debris, or trash
- Restoration of vegetation
- Snow and ice removal

**Preventative Tasks**
- Repairs or replacement to the structure
- Restoration of eroded areas
- Fence repair or replacement
- Restoration of vegetation
- Repair or replacement of non-vegetated linings
- Removal of sediment, debris, or trash
- Restoration of vegetation
- Snow and ice removal

**Inspection and Maintenance Records**
The party responsible for the BMP shall maintain a detailed log of all preventative and corrective maintenance for the structural stormwater management measures incorporated into the design of the development, including a record of all inspections and copies of all maintenance-related work orders.

**Annual Evaluation**
The responsible party shall evaluate the effectiveness of the maintenance plan at least once per year and adjust the plan and the deed as needed.

The Stormwater Management rules also refer to the BMP manual for guidelines.

**Chapter 8: Maintenance and Retrofit of Stormwater Management Measures**
- General guidelines for preparation of maintenance plan, performance of inspection and maintenance, and record keeping
- Retrofit stormwater BMPs

**Chapter 9: Structural Stormwater Management Measures**
- Specific preventative and corrective actions for each type of BMPs


Recordation Requirement

• If the person responsible for maintenance identified under (b) above is not a public agency, the maintenance plan and any future revisions based on (h) below shall be recorded upon the deed of record for each property on which the maintenance described in the maintenance plan must be undertaken.

• The Maintenance Plan must be recorded with the parcel where the stormwater management measure is located.

• If the maintenance plan was initially recorded under the developer’s name, the township needs to make sure that, after the completion of the construction, the plan is recorded again to show the subsequent responsible party, such as HOA or owner.

Bad Example: The 1-Page Plan

Bad Example: The 55-Page Plan

This is a maintenance plan for a Standard Constructed Wetland, but not a single phrase mentions what it is.
### Maintenance Plan Components:

<table>
<thead>
<tr>
<th>Information</th>
<th>Planning</th>
<th>Education</th>
</tr>
</thead>
</table>
| Inventory of the Stormwater BMPs:  
  - Type and locations of BMPs  
  - Information about the Stormwater BMPs  
  - Design Information of BMPs | Planning of Preventative & Corrective Maintenance Actions  
  - Establish schedule of tasks  
  - Planning Logistics  
  - Maintenance Equipment, Tools, & Supplies | Safety Measures & Procedures  
  - Staff Training |
| Maintenance Disposal Method  
  - Destination and Conveyance for removed vegetation & sediment  
  - Planning the Cost | Planning Logistics  
  - Maintenance Personnel  
  - Equipment, Tools, & Supplies | |

#### Maintenance Plan Components:

- **Information**
  - Inventory of the Stormwater BMPs
  - Type of BMPs
  - Location of BMPs
  - Location of outfalls
  - Information about the Stormwater BMPs
    - Design information of BMPs
    - Documentation of BMPs
    - Site plans, reports, manuals, warranties, etc.

#### Maintenance Plan Components:

- **Planning**
  - Planning of Preventative & Corrective Maintenance Actions
    - Itemize required tasks
    - Establish schedule of tasks
  - Planning Logistics
    - Maintenance Personnel
    - Equipment, Tools, & Supplies
Maintenance Plan Components:

Planning
• Planning Disposal Method
  • Conveyance for removed vegetation & sediment
  • Destination
• Planning the Cost
  • Itemized by task
  • Annualized costs

Maintenance Plan Components:

Education
• Safety Measures & Procedures
• Staff Training
  • Inspection
  • Preventative & Corrective Actions
  • Operation of Tools & Equipment
  • Records

Roles and Responsibilities

Responsible Party
• Developer of the development
• Public entity for publicly owned and operated BMPs
• Entities other than the developer
  • (transferred under agreement or assignment by ordinances/regulations)
  • Public agency
  • Homeowners' association
  • Owner/ Tenant of an individual property in a nonresidential development
  • Owner/ Tenant of an individual property in a residential development (only if the individual owns the ENTIRE residential development)
Subdivision Projects

**Development -** "means the division of a parcel of land into two or more parcels, the construction, reconstruction, conversion, structural alteration, relocation or enlargement of any building or structure, any mining excavation or landfill, and any use or change in the use of any building or other structure, or land or extension of use of land, for which permission is required under the Municipal Land Use Law, N.J.S.A. 40:55D-1 et seq."

Subdivision Projects

"7:8-1.6 Applicability to major development
(a) Except as provided in (b) below, all major development shall comply with the requirements of this chapter."

If disturbance in a project = major development threshold, the project must comply with the SCO
- Design and performance standards
- Nonstructural strategies
- Maintenance plan requirements
  - Responsible party
  - Deed recording

NJDEP Maintenance Guidance
Maintenance Plan Template Information

Field Manual Components
- BMP Overview
- Basic Design Information
- Visual Aid for Stormwater Basin Inspection
- Reference Documents
- Inspection Checklist / Maintenance Actions
- Preventative Maintenance Record
- Corrective Maintenance Record

Inspection Checklist / Maintenance Actions
Tailored to each type of BMPs
Summary

- Long-term operation and maintenance of BMPs is important and is required under the permit
- The permittee is responsible for performing/ensuring long-term operation and maintenance
- The reviewer should ascertain the required elements in a maintenance plan are included prior to approval

More Information

Bureau of Nonpoint Pollution Control
Division of Water Quality
401 East State Street
PO Box 420, Mail Code 401-28
Trenton, NJ 08625-420
Tel: 609-633-7021
www.njstormwater.org
Minesh Patel
minesh.patel@dep.nj.gov

Stormwater QUIZ 1

https://www.njstormwater.org/smdrc_training.html

NJ DEP Division of Water Quality
Online Stormwater Management Design Review Course
MS4 Stormwater Mapping
Requirements and Tools Overview

MS4 Permit Required Mapping
Tier A Municipalities:
- Part IV.B.6.a of the Tier A MS4 permit requires municipalities to develop, update and maintain an outfall pipe map
  - Submitted to the Department by January 1, 2019
  - Submitted to the Department in an electronic format by December 21, 2020
    - Acceptable electronic formats are submission through the ArcGIS Online application, ESRI Geodatabase files, ESRI Shapefiles, or AutoCAD files.

MS4 Permit Required Mapping
Tier A Municipalities:
- Part IV.C.1.a.ii of the Tier A MS4 permit requires municipalities maintain a log including the location information of the facility inspected (location information must be specific enough to locate and identify the stormwater facility in the field; e.g. geographic coordinates)
  - Not submitted to the Department but will be subject to review during inspections and audits
MS4 Permit Required Mapping

Tier B Municipalities:
- No outfall pipe mapping is currently required, however, Tier B municipalities are encouraged to maintain an outfall pipe map.

MS4 Permit Required Mapping

Public Complexes:
- Part IV.B.6.a of the Public Complex permit requires public complexes to develop, update and maintain an outfall pipe map:
  - Submitted to the Department by January 1, 2020
  - Submitted to the Department in an electronic format by December 21, 2020
    - Acceptable electronic formats are submission through the ArcGIS Online application, ESRI Geodatabase files, ESRI Shapefiles, or AutoCAD files.

Public Complexes:
- Part IV.C.1.a of the Public Complex permit requires public complexes to develop, update and maintain an inventory and map of the following:
  - Storm drain inlets
  - Stormwater management basins
  - Subsurface infiltration/detention systems
  - Culverts
  - Manufactured treatment devices (MTDs)
  - Green Infrastructure
MS4 Permit Required Mapping

Public Complexes:
- Part IV.C.1.a of the Public Complex permit requires public complexes to develop, update and maintain an inventory of all stormwater facilities;
  - Submitted to the Department by January 1, 2020
  - Be populated and maintained in electronic format provided by the Department
  - Acceptable electronic formats are submission through the ArcGIS Online application, ESRI Geodatabase files, ESRI Shapefiles, or AutoCAD files.

MS4 Permit Required Mapping

Highway Agencies:
- Part IV.B.6.a of the Highway Agency permit requires highway agencies to develop, update and maintain an outfall pipe map
  - Submitted to the Department in an electronic format by December 21, 2020
  - Acceptable electronic formats are submission through the ArcGIS Online application, ESRI Geodatabase files, ESRI Shapefiles, or AutoCAD files.

MS4 Permit Required Mapping

Highway Agencies:
- Part IV.C.1.a of the Highway Agency permit requires highway agencies to develop, update and maintain an inventory and map of the following:
  - Storm drain inlets
  - Stormwater management basins
  - Subsurface infiltration/detention systems
  - Culverts
  - Manufactured treatment devices (MTDs)
  - Green Infrastructure
MS4 Permit Required Mapping

Highway Agencies:
- Part IV.C.1.a of the Highway Agency permit requires highway agencies to develop, update and maintain an inventory of all stormwater facilities;
  - Submitted to the Department by January 1, 2023
  - Be populated and maintained in electronic format provided by the Department
    - Acceptable electronic formats are submission through the ArcGIS Online application, ESRI Geodatabase files, ESRI Shapefiles, or AutoCAD files.

Requirements Aided By Mapping

Stream Scouring:
- Stream scouring is the erosion or removal of streambed or bank material by the physical action of flowing water and the sediment that it carries.
- Stream scouring can damage stream banks, outfall pipes, bridge abutments, and other physical structures in or adjacent to a water body.
### Requirements Aided By Mapping

#### Stream Scouring:
- Tier A Municipalities are required to inspect outfall pipes once every 5 years for stream scouring.
- Public Complexes are required to inspect outfall pipes once per year for stream scouring.
- Highway Agencies are required to inspect all outfalls once annually for stream scouring.

#### Illicit Discharge Detection and Elimination:
- Any physical or non-physical connection that discharges non-stormwater to a municipal separate storm sewer system:
  - Sewage
  - Non-contact cooling water, process wastewater, or other industrial waste
  - Any discharge that the MS4 permittee identifies as a source or significant contributor of pollutants.
Requirements Aided By Mapping

Illicit Discharge Detection and Elimination:

- Tier A Municipalities are required to inspect outfall pipes once every 5 years for illicit discharges
- Public Complexes are required to inspect outfall pipes once annually for illicit discharges
- Highway Agencies are required to inspect all outfalls once every 5 years for illicit discharges

Requirements Aided By Mapping

Stormwater Facilities Maintenance:

- [Image of stormwater facility]

Requirements Aided By Mapping

Stormwater Facilities Maintenance:

- [Image of stormwater facility]
Requirements Aided By Mapping

Stormwater Facilities Maintenance:

- All MS4 permittees are required to develop, update, and implement a program to ensure the adequate long-term cleaning, operation, and maintenance of all permittee owned or operated stormwater facilities.
- Municipalities are required to ensure the adequate long-term cleaning, operation, and maintenance of all stormwater facilities not owned or operated by the municipality but located within its borders.

NJDEP Mapping & Inventory Assistance

- NJDEP created a geodatabase template and associated data dictionary for the 7 stormwater infrastructure features required to be mapped/inventoried by MS4 permittees.

NJDEP Mapping & Inventory Assistance

- Outfall Pipes
- Stormwater Management Basins
- Subsurface Infiltration Detention
- Manufactured Treatment Devices
- Green Infrastructure
- Storm Drain Inlets
NJDEP created a geodatabase template and associated data dictionary for the 7 stormwater infrastructure features required to be mapped/inventoried by MS4 permittees.

The geodatabase template had to be made available over a number of different collection methodologies to suit the needs of all permittees.

NJDEP Mapping & Inventory Assistance: ArcGIS Online Tool

NJDEP Mapping & Inventory Assistance: Collector App
NJDEP created a database and data dictionary for the 7 stormwater infrastructure features required to be mapped/inventoried by MS4 permittees.

The data dictionary had to be made available over a number of different collection methodologies to suit the needs of all permittees.

Existing data can be made available upon request.
NJDEP Mapping & Inventory Assistance: H&H Database

NJDEP Mapping & Inventory Assistance

• NJDEP created a database and data dictionary for the 7 stormwater infrastructure features required to be mapped/inventoried by MS4 permittees
• The data dictionary had to be made available over a number of different collection methodologies to suit the needs of all permittees
• Existing data can be made available upon request
• Training and assistance is available

More Information

Tim Ebersberger
NJDEP – Bureau of Nonpoint Pollution Control
Timothy.Ebersberger@dep.nj.gov
609-633-7021
NEW RULES

OVERVIEW and QUESTIONS

Topics

• Updated Stormwater Management rules under N.J.A.C. 7:8
• NJDEP’s Ongoing Stormwater Initiatives

Amendments to Stormwater Management Rules

• Dec. 3, 2018: NJDEP proposed amendments to the Stormwater Management rules.
• Jan. 8, 2019: Public Hearing
• Feb. 1, 2019: Close of 60-day public comment period
• Dec. 3, 2019: NJDEP filed adoption package to OAL
• March 2, 2020: Adoption of Rules
  • One year delayed operative date, effective 3-2-2021
  • Current rules are in effect until 3-1-2021
  • Same timeframe municipalities have to update ordinances in accordance with MS4 permits
### Rules Layout – As Adopted

**SUBCHAPTER 5. DESIGN AND PERFORMANCE STANDARDS FOR STORMWATER MANAGEMENT MEASURES**

- 7:8-5.1 Scope
- 7:8-5.2 Stormwater management measures for major development
- 7:8-5.3 Green infrastructure
- 7:8-5.4 Groundwater recharge standards
- 7:8-5.5 Stormwater runoff quality standards
- 7:8-5.6 Stormwater runoff quantity standards
- 7:8-5.7 Calculation of stormwater runoff and groundwater recharge
- 7:8-5.8 Maintenance requirements
- 7:8-5.9 Sources for technical guidance

### Green Infrastructure Definition

**N.J.A.C. 7:8-1.2**

GI means a stormwater management measure that manages stormwater close to its source by:

1. Treating stormwater runoff through infiltration into subsoil;
2. Treating stormwater runoff through filtration by vegetation or soil; or
3. Storing stormwater runoff for reuse.

### Green Infrastructure Standard

**N.J.A.C. 7:8-5.3**

- GI BMPs must be used to satisfy recharge, quantity, and quality
- 3 Tables identifying the performance of each BMP in meeting the standards
  - Table 5-1: Recharge, Quality, and Quantity Control
  - Table 5-2: Quantity Control
  - Table 5-3: Recharge, Quality, and Quantity Control ONLY with Waiver or Variance
- Maximum Contributory Drainage Area Limitations specified
- Maintain existing ability to propose an alternative stormwater design. Alternative design must meet GI definition and must meet drainage area limitation if similar to BMP with limit.
### Table 5-1: BMPs for recharge, quantity, and quality

<table>
<thead>
<tr>
<th>Best Management Practice</th>
<th>Quality TSS removal rate (percent)</th>
<th>Quantity Recharge</th>
<th>Minimum separation from seasonal high water table (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cisterns</td>
<td>0</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Dry Wells</td>
<td>0</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Grass Swales</td>
<td>50 or less</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Green Roofs</td>
<td>0</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Manufactured Treatment Device (MTDs)</td>
<td>50 or 80</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Permeable Paving Systems</td>
<td>80</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Small-scale Bioretention Systems</td>
<td>80 or 90</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Small-scale Infiltration Basins</td>
<td>80</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Small-scale Sand Filters</td>
<td>80</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Table 5-1 includes MTDs that meet the definition of GI.

Drainage area limitation applies to: dry wells, MTDs, pervious paving systems, and small-scale bioretention, infiltration, and sand filters.

### Table 5-2: BMPs may only be used for quantity

<table>
<thead>
<tr>
<th>Best Management Practice</th>
<th>Quality TSS removal rate (percent)</th>
<th>Quantity Recharge</th>
<th>Minimum separation from seasonal high water table (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bioretention Systems</td>
<td>80 or 90</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Infiltration Basins</td>
<td>80</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Sand Filter</td>
<td>80</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Standard Constructed Wetlands</td>
<td>90</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Wet Ponds</td>
<td>50-90</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

Wet ponds used under Table 2 must be designed to have native vegetation and a reuse component.

### Table 5-3: BMPs that may only be used if a waiver or variance is granted

<table>
<thead>
<tr>
<th>Best Management Practice</th>
<th>Quality TSS removal rate (percent)</th>
<th>Quantity</th>
<th>Recharge</th>
<th>Minimum separation from seasonal high water table (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue Roofs</td>
<td>0</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
</tr>
<tr>
<td>Extended Detention Basins</td>
<td>40-40</td>
<td>Yes</td>
<td>No</td>
<td>1</td>
</tr>
<tr>
<td>Manufactured Treatment Device</td>
<td>50 or 80</td>
<td>No</td>
<td>No</td>
<td>Dependent upon the device</td>
</tr>
<tr>
<td>Sand Filters</td>
<td>80</td>
<td>Yes</td>
<td>No</td>
<td>1</td>
</tr>
<tr>
<td>Subsurface Gravel Wetlands</td>
<td>90</td>
<td>No</td>
<td>No</td>
<td>1</td>
</tr>
<tr>
<td>Wet ponds</td>
<td>50-90</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Water Quality – Motor Vehicle Surface

- The water quality standard applies to motor vehicle surface instead of impervious surface
  - Rule text does not require roofs or sidewalks to be treated – consistent with current implementation
  - Requires pervious motor vehicle surfaces to be treated – consistent with scientific studies
  - Included in definition of major development

Definitions to Clarify Applicability
N.J.A.C. 7:8-1.2

- Added definition of “regulated motor vehicle surface”
- Added definition of “regulated impervious surface”
- Changed definition of major development
  - 1 acre of disturbance; or
  - ¼ acre of regulated impervious surface; or
  - ¼ acre of regulated motor vehicle surface
- Definitions of regulated motor vehicle surface and regulated impervious surface will include FAQ 10.2 (newly collected impervious surface and changes to existing drainage systems count as “new”)

Clarification of Applicability

- Require quantity, quality, and groundwater recharge to be met in each drainage area on-site (unless they converge before leaving the property)
  - N.J.A.C. 7:8-5.2(l)
- Move mounding analysis requirement from recharge standard to apply to all infiltration BMPs
  - N.J.A.C. 7:8-5.2(h)
  - Chapter 13 of BMP Manual
Deed Notice

- Maintain existing requirement that maintenance plans be recorded on deed (new N.J.A.C. 7:8-5.2(m)) and, additionally, must now include:
  - Description of the BMP(s); and
  - Location information for the BMP(s)
- Provide a pathway for property owner to alter or replace a BMP provided review agency ensures quantity, quality, and recharge will be maintained. (new N.J.A.C. 7:8-5.2(n))

Other Rule Changes

- Clarify that water quality treatment is required for discharges into combined sewer systems
  - New N.J.A.C. 7:8-5.5(c)
- Clarify that water quantity control is required in tidal areas except discharges directly into lower reach of major tidal waterbodies
  - New N.J.A.C. 7:8-5.6(b)4
- Creates the option for a community basin to address flooding issues within CSS communities
  - Other standards must still be met on-site (including GI)
    - New N.J.A.C. 7:8-4.2(c)14

Existing Variance - N.J.A.C. 7:8-4.6

- Municipality may approve a variance or exemption if:
  - Municipal Stormwater Management Plan contains a mitigation plan:
    - that identifies what measures are necessary to offset the deficit created by granting the variance
    - ensures mitigation happens in the same drainage area and for the performance standard for which variance is granted
  - Municipality submits a written report to county review agency and DEP describing the variance or exemption and the required mitigation
Adopted Variance - N.J.A.C. 7:8-4.6

- Municipality may approve a variance if the Applicant demonstrates:
  - Technically impracticable to meet any one or more of the design and performance standards on site; and
  - The proposed design achieves maximum compliance with the design and performance standard
  - Technical impracticable exists only when the standard can not be met for engineering, environmental, or safety reasons
  - Approval of variance applies to individual drainage area and design and performance standard

Adopted Variance – Mitigation
N.J.A.C. 7:8-4.6(a)3

- Mitigation:
  - selected from municipal mitigation plan or proposed by applicant, provided it meets the criteria within the municipal mitigation plan
  - be approved no later than preliminary or final site plan approval of the major development
  - be located in the same HUC 14 as the portion of the major development that was granted the variance
  - be constructed prior to or concurrent with the major development
  - comply with the green infrastructure standards at N.J.A.C. 7:8-5.3
  - Applicant or entity assuming maintenance responsibility for the associated major development shall be responsible for maintenance, with a written agreement submitted to the review agency
  - Approved variance must be submitted to county review agency and DEP within 30 days of approval

Adopted Variance – Mitigation
N.J.A.C. 7:8-4.6(a)3

- If variance is from green infrastructure standards
  - Mitigation project must provide green infrastructure BMPs to manage an equivalent or greater area and amount of impervious surface than the area of major development granted the variance
  - Vegetative filter strips and grass swales excluded as mitigation measures
  - GI BMPs used for mitigation must be sized to manage the Water Quality Design Storm (at a minimum)
  - GI BMPs used for mitigation are subject to the specified drainage area limitations
Adopted Variance – Mitigation
N.J.A.C. 7:8-4.6(a)3

- If variance is from groundwater recharge standards
  - mitigation project must equal or exceed GW recharge deficit
- If variance is stormwater runoff quality standards
  - mitigation project must provide sufficient TSS removal to equal or exceed the deficit resulting from the variance
- If variance is stormwater runoff quantity standards
  - mitigation project must provide equivalent peak flow rate attenuation

N.J.A.C. 7:8 Rules Adoption


Notice of Rule Adoptions

Other NJDEP Stormwater Related Actions

- BMP Manual Updates
  - Chapter 5: Stormwater Management Quantity and Quality Standards and Computations – Addressing Comments
  - Chapter 12: Soil Testing Criteria – Addressing comments 5/1/20
  - Chapter 13: Groundwater Table Hydraulic Impact Assessments for Infiltration BMPs - Finalized
    - https://www.njstormwater.org/bmp_manual2.htm

- NJDEP Letters & Emails to MS4 Permittees on 3/2/20:
  - SCO must be revised and effective by 3/3/2021

- Revised/Updated Model SCO Posted on DEP web page

- On-going MS4 Audits to Review Compliance
Summary

- Updated Rules Adopted 3/2/2020
- One year delay in Operative Date to 3/2/2021
- Requirement to Use Green Infrastructure
  - Manage Stormwater Runoff close to its source
  - Drainage area limitations for GI BMPs
- Updated/Revised Definitions
- Clarifications
  - Meet Standards On-site
  - Mounding Analysis
- Deed Notice Requirements
- Mitigation
- Stormwater Control Ordinance Updates Required

Questions?

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www.njstormwater.org

Jim Murphy
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Questions?

End of Module 1

- Module 2 will begin 1:00 pm, Thursday, August 27, 2020
- Email any additional questions to presenters or to DWQ-BNPC-StormwaterManagement@dep.nj.gov

NJ DEP Division of Water Quality,
Online Stormwater Management
Design Review Course