GREEN INFRASTRUCTURE IN THE STATE OF NEW JERSEY

Statutory and Regulatory Barriers to Green Infrastructure Implementation

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for
New Jersey Future

January 2013

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Acknowledgements

I am grateful to the following people and organizations, which generously contributed information, expertise, and resources to make this report possible:

- Chris Sturm, Senior Director of State Policy, New Jersey Future, who supervised this project
- The Together North Jersey planning initiative
- John A. Miller, PE, CFM, CSM, Water Resources Engineer, Princeton Hydro, LLC
- Staff of the New Jersey Department of Environmental Protection – Division of Water Quality, Stormwater Management Unit, Office of the Assistant Commissioner of Water Resource Management, and Office of the Deputy Commissioner
- Donna Drewes, Co-Director, Sustainability Institute at The College of New Jersey
- Members of the Sustainable Jersey Green Infrastructure Task Force
- Staff of the New Jersey Pinelands Commission
- Elaine Clisham, Director of Communications, New Jersey Future

Statement of Purpose

The purpose of this report is to provide background for consideration of recommendations for how to ensure broader use of green infrastructure approaches to stormwater management. The report outlines the basic stormwater management regulatory framework in New Jersey, the role of green infrastructure (GI) within that framework, and some of the statutory and regulatory barriers to the use of green infrastructure in the state.

Executive Summary

Stormwater runoff from the built environment remains one of the greatest challenges of modern water pollution control.[1] Green infrastructure (GI) has been gaining nationwide recognition as an innovative stormwater management strategy with multiple benefits for water quality, air quality, parks and community "greening" efforts. In this context, **green infrastructure can be defined as the combination of non-structural stormwater management strategies and more traditional structural stormwater management techniques that together create an integrated method of dealing with stormwater at its source rather than after it has been channeled downstream.**

Stormwater management regulation in the state of New Jersey structure is complex, with state and municipal review of development and redevelopment projects and oversight by the EPA and NJDEP. There are two parallel tracks (see section I). The first track derives from federal rules, centering on the NJDEP Municipal Stormwater Regulation Program and associated New Jersey Pollutant Discharge Elimination System (NJPDES) permits that authorize certain entities to discharge stormwater into state water bodies. The second track is driven by the state's Stormwater Management Rules (SWM Rules), which establish the regulatory framework for new development and redevelopment and include general requirements for regional and municipal stormwater management plans and stormwater control ordinances. Several other state regulations trigger stormwater reviews at the state and local levels.

Green Infrastructure is incorporated throughout the state's stormwater management regulation framework (see Section II), which calls for developers to rely first on environmentally sensitive site design strategies, intended to maintain natural vegetation and drainage, and then incorporate supplemental structural best management practices in order to create a comprehensive stormwater management strategy. The majority of the state's municipalities fall under the above regulatory framework, but Section IV highlights some special issues in for GI in areas with combined sewer systems.

While there is significant interest in green infrastructure in New Jersey, many barriers impede the actual implementation of the approaches presented in the state regulatory and guidance documents. **The most relevant *statutory and regulatory* barriers to GI in New Jersey are described in Section III:**

- Poorly implemented Municipal Stormwater Management Plan adoption and review process
- Dysfunctional program for NJDEP Regional Stormwater Management Plans
- No authorization to charge for stormwater discharge
- Lack of state and local enforcement of the stormwater management rules
- Limited regulatory jurisdiction over already-developed areas
- Splintered or incomplete state-level design guidelines for GI
- Lack of integration among local, regional and state governmental entities

Changes to laws, rules and programs are needed to ensure better stormwater management using green infrastructure**. This report's descriptions of the state's regulatory framework, and its analysis of the statutory and regulatory barriers to green infrastructure, should inform consideration of such reforms.**

[1] (Committee on Reducing Stormwater Discharge Contributions to Water Pollution, National Research Council VII)

Introduction

Stormwater runoff from the built environment remains one of the greatest challenges of modern water pollution control, according to the National Research Council.[2] Stormwater runoff is defined by the state of New Jersey as "water flow on the surface of the ground or in storm sewers, resulting from precipitation." Occurring on both natural/unimproved lands as well as developed land, stormwater runoff becomes a problem downstream of developed areas where increased runoff rate, volume and contamination due to development lead to flooding and water pollution.

The stormwater runoff that originates on our roofs, lawns, roads, parking lots, and other paved surfaces flows through our stormwater management systems to our streams, rivers and beaches. Along its journey the stormwater runoff accumulates a range of pollutants including fertilizers, bacteria, pathogens, animal waste, metals, and oils at levels that often exceed established limits for these toxins,[3] presenting a health risk to citizens. Some older urban areas have combined sewer systems (CSS), which carry stormwater and wastewater in the same pipes to treatment facilities. These facilities are routinely overwhelmed by the volume of water during storm events and, to prevent backup, discharge the combined toxic stormwater and sewage overflow directly[4] into our local water bodies.

By 2007, nearly 800 square miles of New Jersey had impervious cover, and it was increasing at a rate of almost nine football fields a day.[5] This large and growing quantity of impervious cover (which is one of the major causes of increased stormwater runoff), and the concomitant loss of forest, farmland and wetlands, have contributed to the state's water quality and flooding issues. In order to meet the goals of the 1972 Clean Water Act (CWA), we need to find a better way to manage and treat stormwater before it reaches our waters.

Green infrastructure (GI) has been gaining nationwide recognition as an innovative stormwater management strategy with multiple benefits for water quality, air quality, parks and community "greening" efforts. One U.S. Environmental Protection Agency (EPA) definition of green infrastructure is "an array of products, technologies, and practices that use natural systems – or engineered systems that mimic natural processes – to enhance overall environmental quality and provide utility services."[6] In more general terms, **green infrastructure is the combination of non-structural stormwater management strategies and more traditional structural stormwater management techniques that together create an integrated method of dealing with stormwater at its source rather than after it has been channeled downstream.**

In 2004 when New Jersey adopted its current statutory and regulatory framework for stormwater management it was ahead of the curve, calling for green infrastructure to be an integral part of any new stormwater management plan. Today, GI techniques are being piloted and tested in New Jersey, but

[2] (Committee on Reducing Stormwater Discharge Contributions to Water Pollution, National Research Council VII)
[3] (National Resources Defense Council 9)
[4] Usually termed a combined sewer overflow (CSO)
[5] (Hasse and Lathrop)
[6] (U.S. Department of Environmental Protection) There is no one definition of green infrastructure; it differs based on who's defining it and its intended use.

many barriers impede their full acceptance and implementation. Now, eight years after the framework's initial adoption, is an opportune time to re-examine New Jersey's stormwater management statutes and regulations to discover how we might ensure broader use of green infrastructure approaches.

To understand fully the place that green infrastructure has in New Jersey building and planning practices, Section I of this paper looks at the statutory and regulatory framework for stormwater management, Section II describes how GI is included in the various regulations and guidance documents, and Section III includes a brief discussion of various statutory, regulatory and programmatic barriers to the implementation of GI. These first three sections of this report focus on the stormwater management framework for the majority of the state's municipalities, populous areas with separate sewer and stormwater systems. Section IV provides a brief overview of some of the special issues in implementing GI in areas with combined sewer systems.

I. Stormwater Management Regulatory Framework in New Jersey

Stormwater management regulation in the state of New Jersey has two parallel tracks (see *Figure 1*): federal rules, which are part of the National Pollutant Discharge Elimination System (NPDES) program, and state-level Stormwater Management Rules. Both tracks predate, but owe their current incarnation to, the **EPA's NPDES Phase II** rules which were published in December of 1999.

Federal Track (NPDES)

In New Jersey the management of the federal NPDES program has been delegated to the New Jersey Department of Environmental Protection (NJDEP). Based on the NPDES Phase II rules, in 2004 the NJDEP Division of Water Quality, Bureau of Nonpoint Pollution Control enacted the **Municipal Stormwater Regulation Program** to regulate stormwater discharges. The program addresses pollutants that enter state waters from certain separate storm drainage systems owned or operated by local, county, state, interstate, or federal government agencies, equivalent to federal MS4 designation. Municipal Separate Storm Sewer Systems (MS4) – is a conveyance or system of conveyances that is: owned by a state, county, city, town, village, borough, parish, district, association 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, storm drains, pipes, ditches, manmade channels, etc.); not a combined sewer; and not part of a publicly owned treatment works (sewage treatment plant). Through the Municipal Stormwater Regulation Program, the NJDEP issues **New Jersey Pollutant Discharge Elimination System (NJPDES) permits** that authorize certain entities to discharge stormwater into state water bodies. There are four permit types issued under this program based on the size and type of applicant: Tier A, which includes municipalities with large populations; Tier B, which includes smaller municipalities; Public Complex; and Highway Agency. Most municipalities in New Jersey fall into the Tier A classification (the most common permit in New Jersey; see *Figure 2*). Municipalities with combined sewer systems (CSS) are regulated under a separate federal NPDES permit (see Section IV, CSS Special Issues). The Municipal Stormwater Regulation Program addresses runoff from new development

and redevelopment in part by requiring municipalities to adopt and enforce a stormwater management plan and ordinances in accordance with the Stormwater Management Rules (N.J.A.C. 7:8), discussed in the next section. For Tier A, Public Complex, and Highway permits, stormwater runoff from existing developed areas is addressed through broad topics including local public education, disposal of waste, solids and floatable controls, maintenance yard operations and employee training. A Tier B permit requires only local public education to address stormwater runoff from current developed areas, but it is recommended as a best management practice that municipalities adopt the same ordinances as the other three permits.

The centerpiece of the Tier A Stormwater Regulation Program is the **Stormwater Pollution Prevention Plan (SPPP)** that each municipality is required to write. The SPPP should describe how a municipality will implement each NJPDES permit requirement and provide a framework for documenting permit compliance. Compliance with permit requirements is measured through the self-reported Annual Report and Certification that is submitted to the NJDEP and an annual inspection conducted by NJDEP Division of Water and Land Use Enforcement, Water Compliance and Enforcement program.

The SPPP must address stormwater quality issues related to new development, redevelopment and existing developed areas by specifying the development and implementation of methods to meet specific permit requirements, referred to as Statewide Basic Requirements (SBRs). The SBRs are intended to create process-oriented rate and quality controls for stormwater that meet Clean Water Act (CWA) standards. There are seven SBRs included in the SPPP: Public Notice, Post-Construction Stormwater Management in New Development and Redevelopment, Local Public Education, Improper Disposal of Waste Ordinances, Solids and Floatable Controls, Maintenance Yard Operation, and Employee Training. (One of these requirements, Post-Construction Stormwater Management in New Development and Redevelopment, makes reference to the state Stormwater Management Rules, described in the next section.)

State Track (Stormwater Management Rules)

The **Stormwater Management Rules** (SWM Rules) were adopted in 2004 by the NJDEP Division of Water Quality, Bureau of Nonpoint Pollution Control. The SWM Rules establish the regulatory framework for new development and redevelopment and include general requirements for regional and municipal stormwater management plans and stormwater control ordinances, as well as content requirements and procedures for the adoption and implementation of those plans.

The SWM Rules have no permit associated with them and are *only applied when activated by other regulations* (see *Figure 3*), which include the NJPDES permit requirements, Residential Site Improvement Standards (RSIS)(N.J.A.C. 5:21), Flood Hazard Area Control Act (N.J.S.A. 58:16A-50), Freshwater Wetlands Protection Act (N.J.S.A. 13:9B-1), Costal Area Facility Review Act (CAFRA)(N.J.S.A. 13:19-1), the Waterfront and Harbor Facilities Act (N.J.S.A. 12:5-3), and The Safe Dam Act (N.J.S.A 58:4). For *all major development* and redevelopment proposals the NJPDES permit triggers a municipal review and approval process for compliance with the SWM Rules. The SWM Rules define major development as "*any* development that provides for ultimately disturbing one or more acres of land or increasing impervious

surface by one-quarter acre or more." Similarly, RSIS triggers a local review process for "major" residential development meeting the threshold written in the regulation (see later in this section for more detail). The other four land use regulations (Flood Hazard Area Act, Freshwater Wetlands Act, CAFRA, and the Waterfront Act), and the Safe Dam Act trigger a NJDEP stormwater management review process for developments of a certain threshold (which differs depending on the regulation), and require NJDEP review and approvals for development *in addition* to the review and approvals required at the municipal level.

Stormwater, like many other environmental issues, benefits from being addressed at a regional scale. The SWM Rules and the Best Management Practices Manual (BMPM) (discussed in section II) both recommend and include the standards for creating a voluntary **Regional Stormwater Management Plan (RSWMP)**. The requirements include:

- The creation of a regional stormwater management planning committee and lead planning agency, which is required to solicit participation from a variety of public and private entities within the designated region;
- Characterization and assessment of the regional stormwater management planning area, with a list of specific information and maps to be included;
- Drainage area-specific water quality, groundwater recharge and water quantity objectives;
- Drainage area-specific design and performance standards (which supersede standards set forth in the SWM Rules and RSIS for municipalities in the regional plan area);
- A selection of stormwater management measures for new and existing land uses;
- A strategy for implementing and evaluating the effectiveness of stormwater management measures.

In a special case, the **Pinelands Commission** has a role in stormwater management process, similar to that of a RSWMP. The commission certifies the stormwater management plans and ordinances for each town within the Pinelands area to make sure that they are compliant with the Pinelands Comprehensive Management Plan (CMP). The stormwater regulations and standards in the Pinelands are in many cases stricter than, and supersede, the SWM Rules; for example, the CMP has a greater groundwater recharge requirement. During the private development process a property owner must apply to the commission first before proceeding to the municipality for permits and approvals. The commission staff reviews the application (including stormwater management plans) for compliance with the CMP, and issues a Certification of Filing to the applicant so he or she can obtain the necessary local permits and approvals. The municipality is responsible for its own review of the development proposal as required under the SWM Rules. Any permits or approvals issued by the municipality or county are then subject to another review by the commission staff before they can take effect. If a permit or approval is found to be inconsistent with some aspect of the commission's regulations it cannot take effect. The commission can ultimately nullify the approval by requiring the issuing body to rescind it. All public development in the Pinelands area must be approved by the commission itself, and must also be consistent with the commission's stormwater regulations. While the Pinelands Commission has many of the powers of a RSWMP, it is not considered by the state to be one. The municipalities in the Pinelands area can be a

member in a RSWMP subject to commission approval of any implementing stormwater management plans and ordinances.

Municipal Stormwater Management Plans (MSWMP), on the other hand, are *required* under both the SWM Rules and as a SPPP-based component of the federal-track Municipal Stormwater Regulation Program. A MSWMP documents the strategy, structure and process a specific municipality has developed to address stormwater-related impacts. The SWM Rules describe the required minimum MSWMP elements, including:

- Evaluation of the extent to which the municipality's entire master plan, official map and development regulations implement the principles of the SWM Rules, and preparation of a map showing projected land use and drainage areas, ***or*** documentation that the municipality has a combined total of less than one square mile of vacant or agricultural lands.
- A description of how the municipal stormwater plan incorporates design and performance standards of the SWM Rules or alternate standards as adopted by a regional stormwater management plan or water quality management plan.
- Creation of a mitigation plan to offset the deficit created by granting a variance or exemption from the standards.
- Inclusion of a copy of the recommended stormwater control implementing ordinances that require stormwater management measures.
- Description of how adequate long-term operation and preventative/corrective maintenance of the municipality's stormwater management system will be ensured.
- Description of how the plan is coordinated with the appropriate soil conservation district and any other stormwater management plans.

The municipal stormwater management plan presents a chance for local municipalities to tailor the standards presented by the SWM Rules to local conditions. At minimum the plan must meet the design and performance standards of the SWM Rules, but more stringent standards may be adopted. The plan *may* also address stormwater impacts of existing land uses in addition to the new development and redevelopment that is covered under the SWM Rules.

The SWM Rules also establish the **minimum design and performance standards**, as follows, for new development and redevelopment in order to control soil erosion, encourage groundwater recharge and control stormwater runoff quantity and quality:

- The minimum design and performance standards for **erosion control** are those established under the Soil Erosion and Sediment Control Act (N.J.S.A. 4:24-39), which are regulated and enforced by each soil conservation district in the state and by the State Soil Conservation Committee, and also enforced by the NJPDES program.
- The minimum design and performance standards for **groundwater recharge** are intended to prevent negative impacts to the water table.
- The minimum design and performance standards for **stormwater runoff rates** are intended to minimize downstream flooding.

- The minimum design and performance standards for **stormwater runoff quality** are intended to maintain the post-construction load of total suspended solids (TSS) below the specified minimum.

To maintain the design and performance standards beyond immediate post-construction, the SWM Rules also requires **maintenance plans** that include specific maintenance tasks, schedules, and costs.

New Jersey is one of only a handful of states that has set statewide standards for groundwater recharge and runoff, putting it ahead of the curve when it comes to dealing with stormwater management. The SWM Rules represent the *minimum* requirements that municipalities must adopt; however, municipalities are free to reduce the "major development" threshold to address stormwater issues on smaller sites, and to increase design and performance standards for GI strategies in order to capture and treat more stormwater.

By adopting local stormwater management ordinances and applying them during the development review process, municipalities are responsible for ensuring that development and redevelopment projects meet state stormwater requirements. For commercial and industrial uses, municipalities establish their own standards consistent with the SWM Rules. Residential development standards for most new development and redevelopment must meet but not exceed the state **Residential Site Improvement Standards (RSIS) (N.J.A.C. 5:21)**. The RSIS, which are restricted to *major residential development sites*, govern all residential development except as "otherwise required by rules or other permit requirements of the Department of Environmental Protection regarding storm water management,"[7] referring to special requirements in CSS communities or communities included in a regional plan. The intended goals of the RSIS are to streamline the residential development process by providing one set of standards, thereby reducing costs of building housing, ensuring predictability of the review and approval process, and separating the policy-making aspects from the technical determinations of development review. Stormwater management is a subchapter of the RSIS and includes the scope of stormwater management strategies (the same as included in the SWM Rules), methods for calculations of runoff, flow rate standards through various types of stormwater management systems, and specifications on construction materials.

Combined Impact of State and Federal Regulations

The regulatory framework for stormwater management in the state of New Jersey structure is complex, as depicted in Figure 4. Development and redevelopment projects may need permits from the municipality, the NJDEP or both. Municipalities must take certain actions – adoption and implementation of the Municipal Stormwater Prevention Plan, adoption of the municipal stormwater plan and ordinances, and review of development applications under those ordinances – all of which are theoretically subject to some level of oversight by the NJDEP. The NJDEP, in turn, is subject to oversight from the federal government, which delegates its authority under the federal NPDES Phase II rule.

[7] (N.J.A.C. 5:21-1.5(b))

Figure 1. How it Works: New Jersey's Stormwater Management Regulatory Framework

Reprinted with minor modifications Courtesy of Delaware Riverkeeper Network, *New Jersey Stormwater Management Implementation Report*

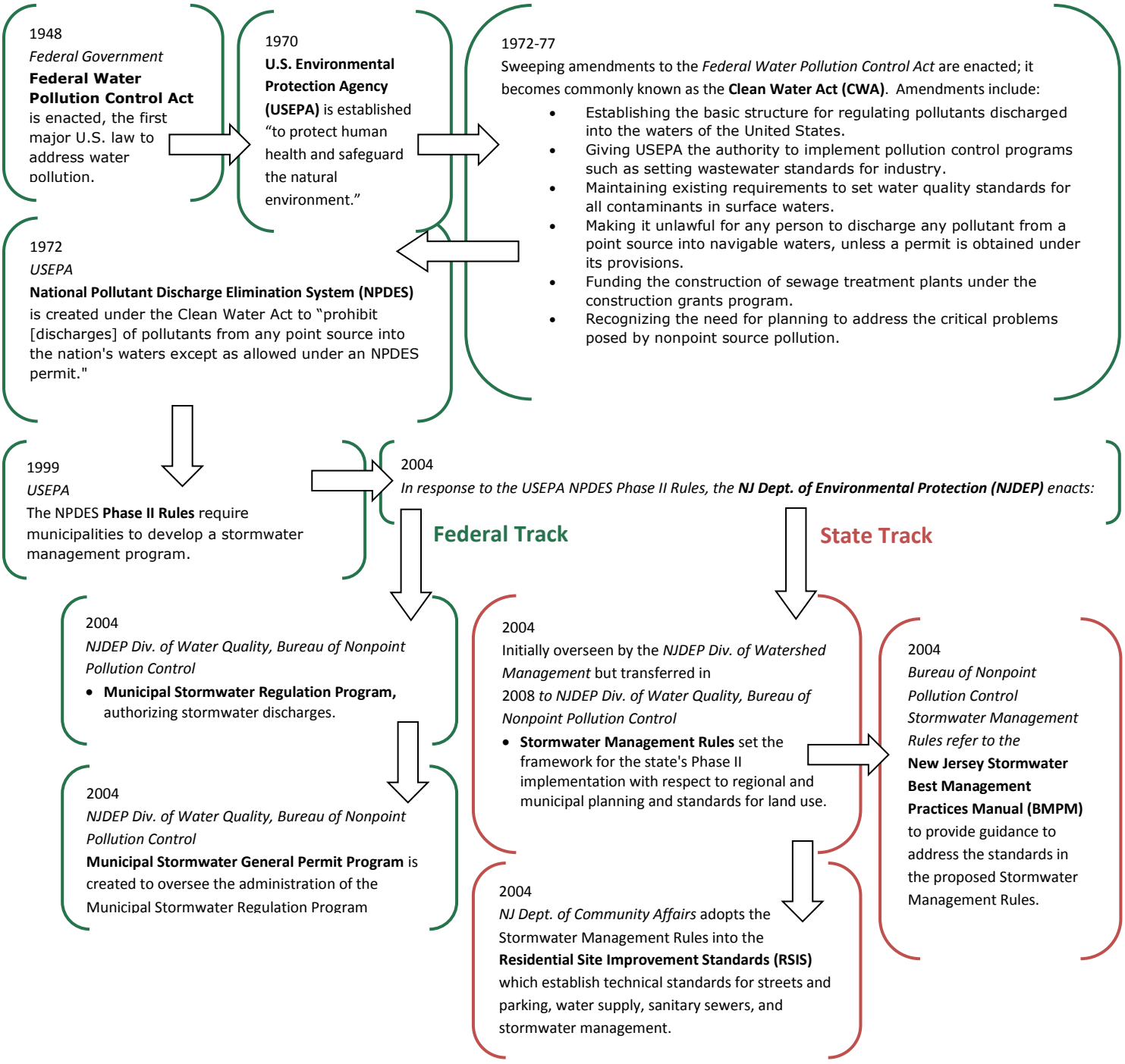
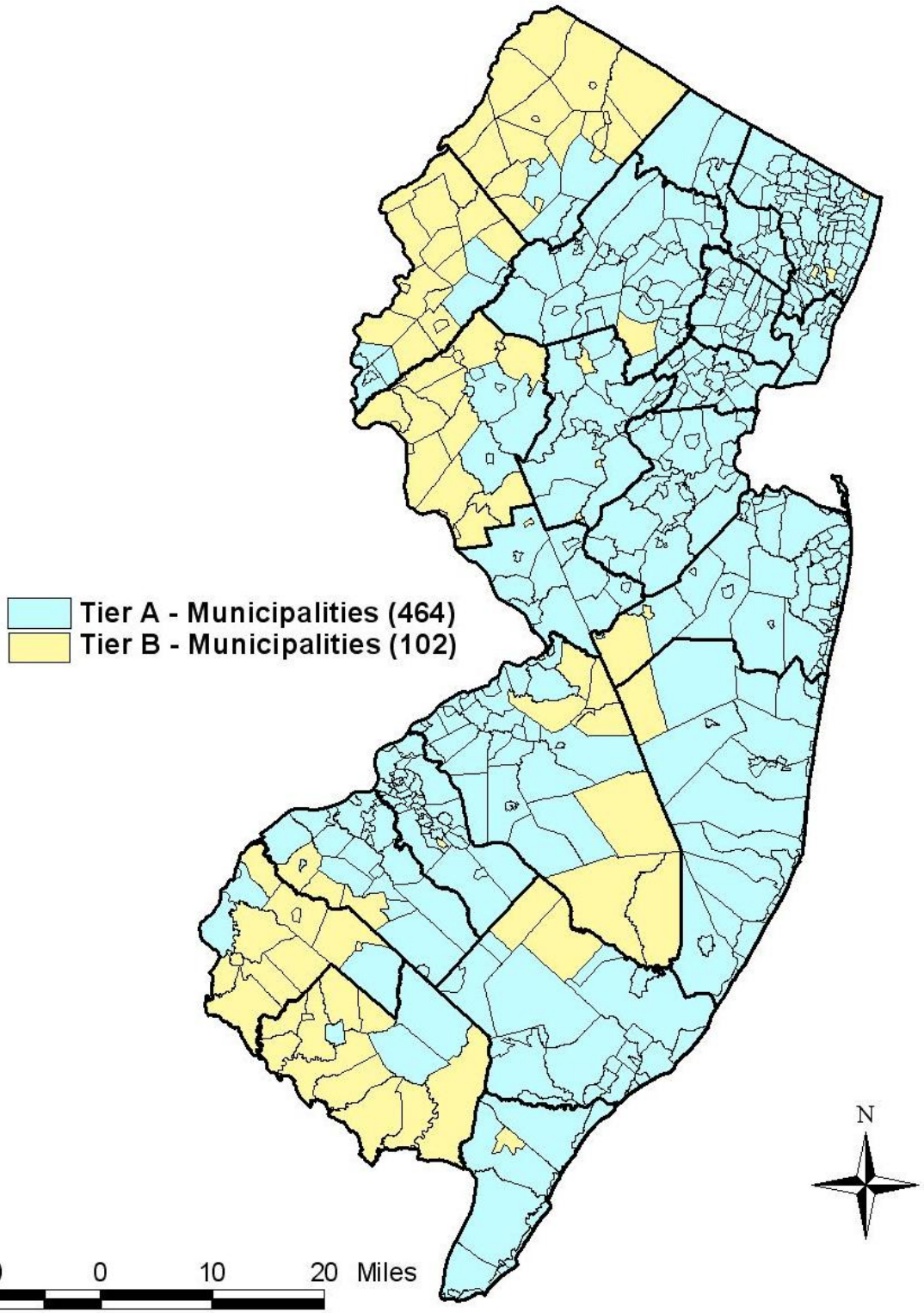


Figure 2: Municipal Tier Assignments

Under the NJPDES Municipal Stormwater Regulation Program



Tier Assignments.apr-Page Tier Assignments2, 6/09/04 lc

Figure 3. Regulatory Triggers of SWM Rules in Tier A MS4 Municipalities

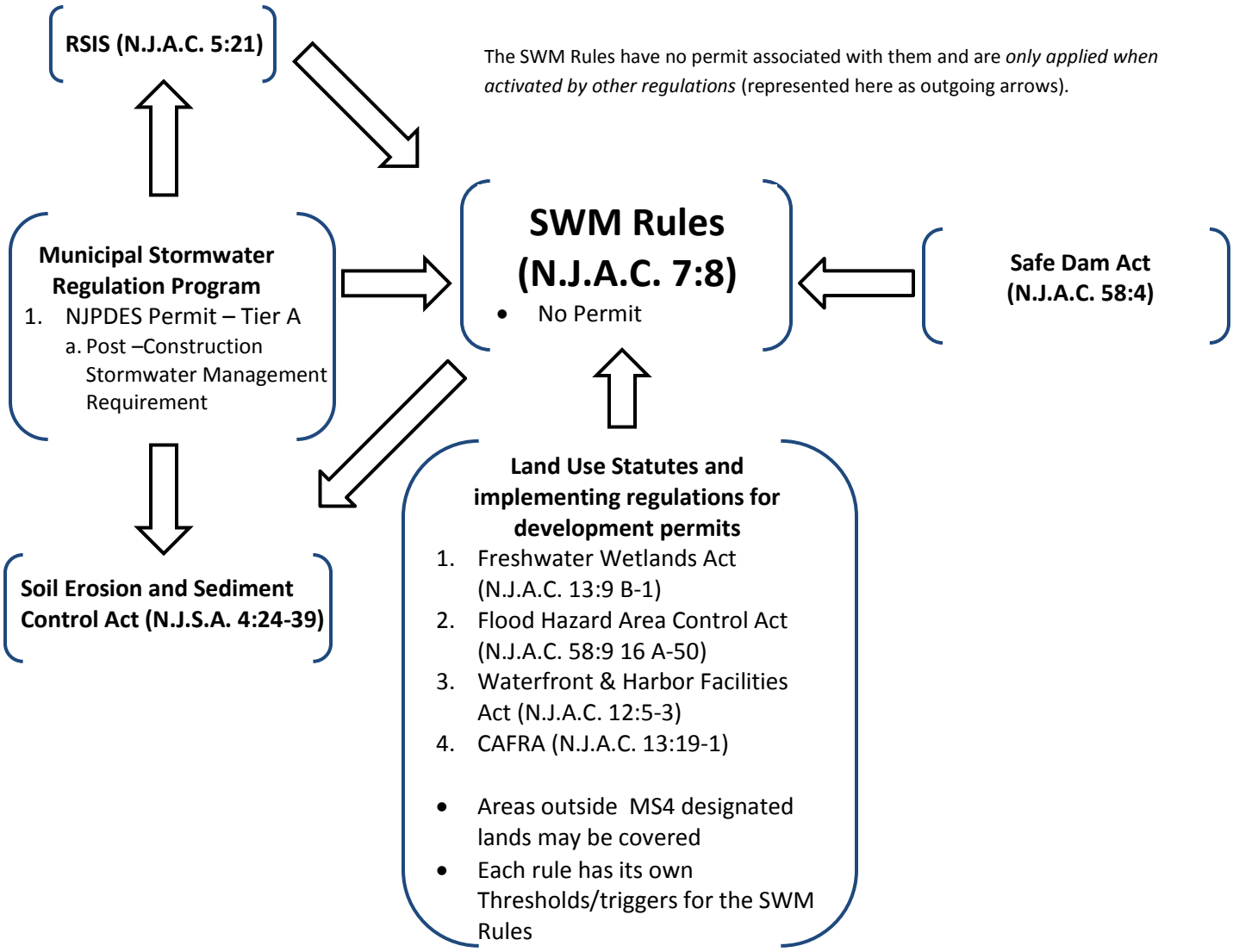
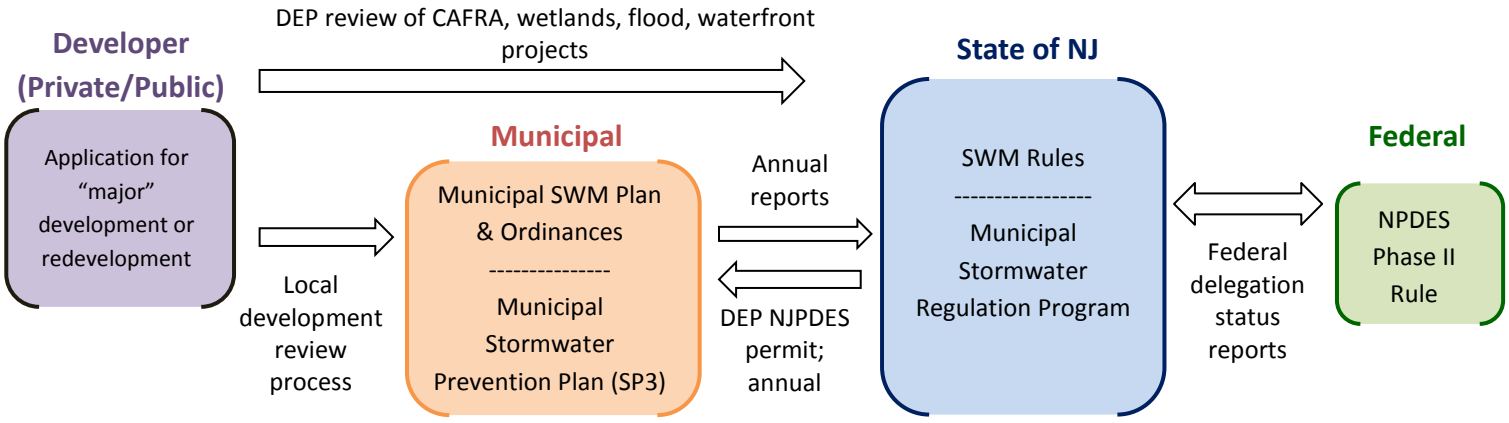


Figure 4. What the SWM Rules Mean for Developers and Municipalities



II. Role of Green infrastructure in New Jersey's Stormwater Regulations

In New Jersey's regulatory framework, green infrastructure is composed of two parts: **non-structural** stormwater management strategies, and **structural** stormwater management techniques. The Stormwater Management Rules (SWM Rules) establish a hierarchy for implementation of stormwater management measures. Initial reliance is placed on environmentally sensitive site design strategies (non-structural), intended to maintain natural vegetation and drainage, and then incorporating supplemental structural best management practices in order to create a comprehensive stormwater management strategy. The combination of non-structural strategies and structural techniques that preserve or closely mimic the natural or pre-development runoff characteristics of a site is known as **low-impact development (LID)**. Non-structural strategies are required by the SWM Rules, the Residential Site Improvement Standards (RSIS), and local municipal ordinances to be included in the design of developments to the "maximum extent practicable." If an applicant contends that for engineering, environmental or safety reasons it is not feasible to include *any* non-structural strategies he or she must provide a basis for that contention.

Nine non-structural stormwater management objectives are identified in the SWM Rules, and repeated in the RSIs, but neither includes any required objective measurements for compliance:

1. Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss;
2. Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces;
3. Maximize the protection of natural drainage features and vegetation;
4. Minimize the decrease in the "time of concentration"[8] from pre-construction to post-construction;
5. Minimize land disturbance, including clearing and grading;
6. Minimize soil compaction;
7. Provide low-maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers and pesticides;
8. Provide vegetated open-channel conveyance systems discharging into and through stable vegetated areas; and
9. Provide other source controls to prevent or minimize the use or exposure of pollutants at the site in order to prevent or minimize the release of those pollutants into stormwater runoff. These source controls include, but are not limited to:
    i. Site design features that help to prevent accumulation of trash and debris in drainage systems;
    ii. Site design features that help to prevent discharge of trash and debris from drainage systems;

[8] "Time of concentration" is defined as the time it takes for runoff to travel from the hydraulically most distant point of the drainage area to the point of interest in the watershed (see the Rational Method equation in N.J.A.C. 5:21-7.2(c)2)

iii. Site design features that help to prevent and/or contain spills or other harmful accumulations of pollutants at industrial or commercial developments; and

iv. When establishing vegetation after land disturbance, application of fertilizer in accordance with the requirements established under the Soil Erosion and Sediment Control Act, N.J.S.A. 4:24-39 *et seq.*, and implementing rules.

The **New Jersey Stormwater Best Management Practices Manual's (BMPM)** Low-Impact Development (LID) Techniques chapter, referred to in the SWM Rules, the RSIS, and local municipal ordinances, organizes and expands upon these nine non-structural strategies. The BMPM groups the strategies into four general categories, each with several specific non-structural LID-Best Management Practices (BMPs):

1. Vegetation and landscaping;
    a. Preservation of natural areas
    b. Native ground cover
    c. Vegetative filters and buffers
2. Minimizing site disturbance
3. Impervious area management; and
    a. [Minimization of] streets and sidewalks
    b. [Minimization of]parking and driveway areas
    c. Pervious paving materials
    d. Unconnected impervious areas
    e. Vegetated roofs
4. Time of concentration modifications
    a. Surface roughness changes
    b. Slope reduction
    c. Vegetated conveyance

Further details and design and performance standards for most non-structural LID-BMPs are included in either additional chapters of the BMPM, the RSIS, or in the New Jersey Department of Agriculture's Soil Erosion and Sediment Control Standards.[9]

In addition to the nine non-structural LID-BMPs, the BMPM also includes several *structural* stormwater management techniques with accompanying design and performance standards. **These structural techniques differ from more traditional stormwater systems by being dispersed throughout the site and located closer to the runoff source.** Where traditional "gray"[10] stormwater management techniques mostly seek to control and direct the flow of stormwater most efficiently to the nearest body

[9] Any activity that disturbs land for the purposes of development or construction is generally required to prepare a site plan for the control of soil erosion during construction. The plan must be designed in accordance with the Standards for Soil Erosion and Sediment Control, which are administered by each soil conservation district. These standards include BMPs that generally seek to reduce soil erosion from stormwater runoff by minimizing the amount of land disturbed by construction, and direct how soils should be prepared following construction for landscaping.

[10] Referring to the heavy reliance on concrete of these stormwater management techniques

of water, and sometimes to slow down the flow of runoff to prevent flooding, the LID-BMP structural strategies, such as infiltration basins and constructed stormwater wetlands, also attempt (to varying degrees) to reduce the amount of pollution reaching waterways, decrease the peak flows of runoff, and maintain the groundwater recharge of a site.

III. Statutory and Regulatory Barriers to Green infrastructure in New Jersey

While there is significant interest in green infrastructure in New Jersey, many barriers impede the actual implementation of the various strategies and techniques outlined in the Stormwater Management Rules (SWM Rules), the Residential Site Improvement Standards (RSIS), the Best Management Practices Manual (BMPM), and local municipal ordinances. Several barriers to GI use in New Jersey were identified by professionals in the field at a July 31, 2012, meeting convened by the Sustainable Jersey organization that focused on green infrastructure, and in reports written at the state and national levels. The barriers can be grouped into several broad categories: statutory/regulatory, technical, financial, and educational.

Below is an overview of some of the *statutory and regulatory* barriers to GI in New Jersey. (Although all of the barriers relate to the statutory and regulatory framework explained in Section I, many also have aspects related to technical, financial and educational issues.) There is some debate as to whether each of the barriers included here is a **real or perceived barrier**; however, they are all included in the interest of robust discussion. They are organized here into seven categories:

1. Poorly implemented Municipal Stormwater Management Plan adoption and review process
2. Dysfunctional program for NJDEP Regional Stormwater Management Plans
3. No authorization to charge for stormwater discharge
4. Lack of state and local enforcement of the stormwater management rules
5. Limited regulatory jurisdiction over already-developed areas
6. Splintered or incomplete state-level design guidelines for GI
7. Lack of integration among local, regional and state governmental entities

1. Poorly implemented Municipal Stormwater Management Plan (MSWMP) adoption and review process

The MSWMPs were intended to be a chance for municipalities to tailor the standards presented by the SWM Rules to local conditions. At minimum the plans must meet the design and performance standards of the SWM Rules, but *more stringent standards could be adopted*. A sample MSWMP and model stormwater control ordinances for municipalities are included in the BMPM, to be used as a beginning point for a municipality to craft its own plan. **However, many municipalities appear to have adopted the minimum standards, thereby meeting the legal requirements. For at least some of these municipalities this is a missed opportunity for self-evaluation that could lead to a customized and possibly more successful MSWMP**. The required periodic review of the MSWMP seems either not to

happen or to be done in a very cursory manner, again missing an opportunity for better stormwater management. Possible reasons for these missed opportunities include:

a. MSWMP element 7:8-4.2 (c)10 loophole. The element states that, "at the option of the municipality, document that it has a combined total of less than one square mile of vacant or agricultural lands rather than provide the information required in (c)8 and 9 above." (Element (c)8 requires the municipality to "evaluate the extent to which the municipality's entire master plan (including the land use plan element), official map and development regulations (including the zoning ordinance) implement the principles expressed in N.J.A.C. 7:8-5.3(b) [Nonstructural stormwater management strategies].") New Jersey has many small mature municipalities with less than one square mile of vacant or agricultural lands (excluding preserved farmland and environmentally constrained land), and the alternative of (c)10 allows all these municipalities to adopt MSWMPs and ordinances *without* evaluating them for internal consistency with their current plans and ordinances.
b. Planning Board v. Zoning Board of Adjustment. Many municipalities may have simply adopted the model ordinances without any integration with other municipal ordinances. Many also seem to have adopted the MSWMP through the planning board without consultation with the zoning board, even though the zoning board must often consider requests for variances to the ordinance. This has left many municipalities with plans and ordinances that may conflict, and present developers with large loopholes to exploit when designing stormwater management strategies.
c. MSWMP review and re-examination. County review and approval is required within a year of the adoption of a MSWMP and its ordinance(s). County review and approval is also required for amendments and re-examinations of the MSWMP. The MSWMP is an integral element of a municipality's master plan, and as such it should be re-examined along with the rest of the master plan at least every 10 years.[11] The review and re-examination report, however, only requires the municipality to look at "major problems and objectives" relating to land development. In many communities stormwater may not be a major issue and thus may only receive cursory examination. This represents another missed opportunity to examine comprehensively the extent to which a municipality's entire master plan, official map and development regulations implement the principles of the SWM Rules.

2. Dysfunctional program for NJDEP Regional Stormwater Management Plans (RSWMP)

Since the SWM Rules were adopted in 2004, there have been no applications for certification as a NJDEP RSWMP. During this time approximately a dozen watershed restoration plans were submitted to and approved by NJDEP as satisfying *federal* criteria to receive federal funds as regional stormwater management plan. However, none of the federally approved regional plans satisfies the *state's* criteria for RSWMPs, as set out in the SWM Rules. While the specific reason that no entities have sought approval as a state RSWMP is not known, there are some general issues with the program.

[11] (N.J.S.A. 40:55D-89)

a. Lack of strong encouragement at the NJDEP. There are limited funds and staff power dedicated to encouraging the development of these complex regional plans, and priority is placed on approving the many hundreds of individual NJPDES permits needed to comply with the Clean Water Act (CWA). Without strong incentives to create RSWMPs, there is very little motivation for regional bodies to begin the process.
b. Federally approved regional stormwater management plans failed to meet NJDEP requirements. In some cases the submissions for the federal watershed plan funding did not meet NJDEP requirements as a RSWMP under the SWM Rules. A RSWMP requires a binding set of agreements by the municipalities included within the established region that establishes a long-term plan for dealing with stormwater in a comprehensive manner. The federally approved regional stormwater management plans, which are more similar to watershed restoration plans, often fell short in several ways:
    i. The plan did not cover a large enough area or did not include agreements from all (or most) of municipalities in the affected area.
    ii. The plan did not set concrete standards. Often a federally approved regional stormwater management plan did not have agreement from all members of the delineated region on a definite set of comprehensive stormwater management standards different than those in the SWM Rules that would be applied throughout the area.
    iii. The plan lacked longevity. The RSWMPs were intended to be long-term process-oriented regulatory structures that could deal with stormwater management into the future, even as conditions changed. Some of the federally approved regional stormwater management plans were written more as project-oriented plans to rectify specific flooding issues.

3. No authorization to charge for stormwater generation

New stormwater infrastructure investments, whether green or gray, cost money. Stormwater infrastructure faces a special barrier in New Jersey because municipal and regional entities are not authorized by state law to charge landowners a fee based on the amount of stormwater they produce. One common way to enable this is to authorize the establishment of stormwater utilities; another is to authorize wastewater utilities to impose fees for stormwater in addition to wastewater. In either case, rates may be based on the amount of impervious surface coverage and revenues are dedicated to managing stormwater. The fee also serves as an incentive for landowners to reduce runoff, typically through GI strategies. Charging for stormwater directly improves equity, shifting the burden from water consumers (including residences and businesses) to stormwater generators, which include surface parking lots and other land uses that don't consume large amounts of water but produce lots of runoff.

The inability to generate a steady stream of funding for stormwater improvements was repeatedly mentioned as a barrier to the implementation of GI at the Sustainable Jersey Green infrastructure meeting. It is also the subject of Recommendations for Stormwater Utility Implementation in New Jersey, a 2005 report prepared by CDM (a consulting and engineering firm) for the Morris County

Planning Board. Legislation (S1815) authorizing the creation of stormwater utilities in Ocean County was passed in 2011, but vetoed by the governor. Another bill (A2641/S1557) that authorizes the creation of stormwater utilities statewide has passed the Assembly and is working its way through the Senate, although if passed it too faces an uncertain fate on the governor's desk.

4. Lack of state and local enforcement of the Stormwater Management Rules

The enforcement of the Stormwater Management Rules has been cited as a particularly troubling issue among New Jersey municipalities. In a 2010 Delaware Riverkeepers Network (DRN) report that initially attempted to examine 22 projects in Hamilton Township on their compliance with the Stormwater Management Program, 10 were unable to be evaluated because the township's necessary documentation wasn't available. Upon further review, the DRN found that of 12 Hamilton Township projects the overall compliance grade with the SWM Rules was an F. The set of issues that led to the failing grade in Hamilton Township were felt by the DRN to be common problems that could be found in many municipalities in the state.[12] The DRN report calls into question the accuracy of the state's Annual Report and Certification which, in reviewing the state's overall compliance with the NPDES Program, said that the state's compliance was "nearly flawless"[13] during the same time period as these projects were being completed.

The lack of enforcement of the current rules is likely due to several factors identified during the Sustainable Jersey green infrastructure meeting and in the DRN report:

a. Confusion over jurisdiction. Many local municipalities are confused over who has final approval of stormwater management designs for development projects. **Under the SWM Rules, municipalities must review and approve stormwater designs.** The NJDEP also reviews development projects for compliance with state stormwater standards when required by other rules, such as flood hazard or CAFRA. (See section II of this report.) In such a situation, a project would need to receive both a DEP approval *and* a local approval. However, the DRN report documents cases where developers have obtained written statements from the NJDEP approving the stormwater provisions of a development application, which have then been presented to the local municipality as a substitute for local review[14] and accepted.
b. Inadequate review of project proposals at the municipal level. Some approving authorities (such as the local planning board) do not review rigorously the proposed stormwater management plans for compliance with the SWM Rules. For example, in multiple resolutions of memorialization for project approvals, Hamilton Township stated that the "applicant shall comply with all requirements of the Stormwater regulations," with no further specifications for

[12] There has been some indication from NJDEP staff that they have been asked to intervene in other cases where municipal enforcement has been found inadequate by members of the public. Further research could be done to identify some of the common issues and possible solutions.
[13] (Delaware Riverkeeper Network 8)
[14] (Delaware Riverkeeper Network 11)

review and no mechanism to assure compliance.[15] Often this inadequate review is an outcome of the confusion surrounding jurisdiction (see above), or is due to a lack of education on stormwater issues (see below).

c. Lack of understanding by municipal and county engineers and local authorities. Engineers and local authorities often a lack an understanding of the larger impacts of stormwater and the benefits of GI over traditional stormwater strategies. Even when local decision-makers understand how GI might be preferable to traditional gray techniques, their level of knowledge may not be detailed enough to implement a successful GI stormwater management plan. Many municipalities adopt the model codes and ordinances provided by the NJDEP in the BMPM with few or no revisions. This often means that little thought was put in at the municipal level into how the ordinances will affect local development. These shortcomings make local engineers either less likely to approve GI designs, or likely to approve poor designs – based on incorrect calculations, for example. (There are other technical barriers, such as uncertainty regarding how well specific GI approaches handle stormwater, which are not addressed here.)

d. Lack of clear standards defining "maximum extent practical"[16] as used in the SWM Rules. One major issue that has been identified is a lack of compliance with the intent of the SWM Rules, mainly to include *non-structural LID BMPs* at the municipal level where possible. The Stormwater Management Rules as they are currently written require that non-structural LID BMPs be considered as part of any stormwater management design, but allow developers to dismiss the non-structural strategies as "not feasible for engineering, environmental or safety reasons"[17] and work only with more traditional gray infrastructure. Unless municipalities elect to make the local ordinances more stringent than the SWM Rules there are no standards on what constitutes "maximum extent practical" and "not feasible," making it relatively easy for developers and municipalities to ignore the intent of the SWM Rules.

e. No verification by NJDEP of municipal compliance. Currently compliance with the Stormwater Regulation Program is based on self-reporting by each municipality. Each municipality reports to the NJDEP regarding its compliance with the program by answering a series of questions online, and then these individual Annual Report and Certification documents are compiled and sent to the EPA to indicate the state's overall compliance with the NPDES Program. While the NJDEP reserves the right to audit each municipality to ensure compliance with the rules, the audits do not include reviews for compliance of approved projects, and there is no verification that the municipal staff has interpreted correctly and upheld the rules.

5. Limited regulatory jurisdiction over already-developed areas

New Jersey is a highly developed state; much of our developable land has already been built on for one purpose or another. In many of the state's older cities and suburbs there has been a movement to redevelop valuable underutilized land. The SWM Rules have limited applicability to currently developed land, as the exceptions described below indicate.

[15] (Delaware Riverkeeper Network 15)
[16] N.J.A.C. 7:8-5.3 (a)
[17] N.J.A.C. 7:8-5.3 (a)

a. Redevelopment. The rule provides numerous exceptions for redevelopment sites. Exceptions for runoff quantity and groundwater recharge often mean GI offers no net benefit for redevelopment projects:
   i. The state wide runoff quantity standard[18] limits the post-construction runoff volume to the level of pre-construction runoff volume. For areas where the land was open space or agricultural lands before development, this standard helps minimize flooding by requiring some form of stormwater management to control runoff. In the case of redevelopment sites where considerable impervious surface coverage already exists (in some cases 100%), there will be little or no required reduction in the quantity of runoff from the newly redeveloped site; as a result, little or nothing will be done to reduce flooding.
   ii. The minimum design and performance standards for groundwater recharge are waived for sites located within the "urban redevelopment area," or in areas with high pollutant loading, areas where industrial stormwater is exposed to "source material," or areas where the recharge would be inconsistent with a remedial action plan.[19] In all these areas there is a concern groundwater recharge could introduce polluted water to the watershed. While this waiver of the standards is consistent with the overall goal of protecting the state's natural resources, there are other types of standards that could be applied to redevelopment areas that would help reduce stormwater runoff.

   These exceptions cover a large percentage of sites in New Jersey where redevelopment could occur, especially in urban areas that have significant flooding issues.

b. Existing Land Uses. There are two ways in which the Municipal Stormwater Regulation Program addresses stormwater in existing land uses. The first is under the SPPP (as described on p. 5) where three of the seven State Basic Requirements (SBRs) (Improper Disposal of Waste ordinances, Solids and Floatable Controls, and Maintenance Yard Operation) deal with municipalities' current conditions. These SBRs are process-based, and require municipalities to adopt ordinances and practices designed to improve stormwater runoff quality, but provide no method to verify the results. The second, the Municipal Stormwater Management Planning subchapter (7:8-4.2) of the Stormwater Management Rules, states that a municipal stormwater management plan "*may*" also address stormwater impacts of existing land uses. **In neither of these regulatory documents are performance-based stormwater standards or incentives established that would lead to retrofits of municipal stormwater systems, public streets, parks and other facilities or individual private structures.**

6. Splintered or incomplete state-level design guidelines for GI

The lack of a central state-level information hub for clear and comprehensive design guidelines creates both a real and perceived barrier to the implementation of GI in New Jersey. Many engineers and developers are hesitant to include GI strategies in their designs when they cannot easily find complete

[18] N.J.A.C. 7:8-5.4(a)3
[19] N.J.A.C. 7:8-5.4(a)2.iii

information on how to design and construct some of the newer GI techniques, and cannot locate other similar projects that have been approved.

a. Splintered Information. There are some guidelines and standards for all of the non-structural and structural stormwater strategies mentioned in the SWM Rules and the BMPM. However, the standards/specs are often spread out in bits and pieces through several documents, from different governmental departments. For example, if the objective is to build a pervious-pavement parking lot (as is recommended in the BMPM), the specs for the design of a *residential* parking lot can be found in the RSIS, while specs for the design of *mixed-use* and *non-residential* parking lots are found in the municipality or county's ordinances. The specs for the depth of the road bed is included in the NJDEP's BMPM, and the specs for the pavement mix itself (referred to as modified open-graded friction course [MOGFC]) is included in the New Jersey Department of Transportation's Standard Specifications for Road and Bridge Construction 2007 document. A developer/engineer would have to be very motivated to include GI strategies in his or her plan to seek out all of the necessary design standards and specs.
b. No guidance on how "best" to incorporate non-structural and structural strategies together. While the SWM Rules set standards for groundwater recharge and runoff quantity standards, and the RSIS provides detailed methods for calculating the pre-development runoff rate for a site, neither document provides design guidance for the non-structural strategies they list. Rather, both refer to the BMPM for further details. The manual states clearly that non-structural strategies should be given priority over structural strategies; however, there is a lack of clear technical design guidance for the recommended strategies and there is no guidance on how "best" to incorporate the strategies into a comprehensive stormwater management system. NJDEP has developed the Nonstructural Point System to help developers identify and use non-structural strategies for their projects, but it is not a requirement. A lack of clear technical guidance discourages applicants from incorporating GI into their designs as they do not know what will be approved by the relevant authority.

7. Lack of integration among local, regional and state governmental entities

The lack of integration among local, regional and state entities is often cited as a major stumbling block to designing and implementing a GI project. This lack of integration can predicate, among other things, the need for additional approvals, longer approval times, uncertainty of approvals and a higher perceived level of risk, all of which discourage GI implementation. The lack of integration can be parsed out into two types:

a. Integration among various levels of government. While the state or a regional entity might promote GI, local regulations and ordinances often prevent the implementation of certain LID-BMPs. For example, local land-use ordinances that require larger setbacks for new development produce longer driveways, which in turn create more impervious surface and make the "minimization of land disturbance" (a LID-BMP) very difficult. On the other hand, a municipality may call for the use of GI techniques such as stormwater "bump-outs" in

street redesigns, but the county may not approve their use on roads that they control, making a comprehensive stormwater management strategy hard to implement.

b. Internal coordination among agencies at the same level of government. This lack of internal coordination and dialogue occurs at all levels of government. At the municipal level, for example, a city planning agency might promote the approval of GI strategies but the board engineer and public works department might refuse to approve any new street designs that include GI out of a lack of familiarity with the technologies, uncertainty about their effectiveness, or uncertainty of receiving state-level approvals.

IV. Combined Sewer Systems (CSS) Special Issues

The majority of municipalities in New Jersey fall under the MS4 designation; i.e., they have separate systems for stormwater and wastewater and are the main focus of this report. However, according to the NJDEP, there are 21 municipalities that have Combined Sewer Systems (CSS) that collect and treat together both sanitary wastewater and stormwater runoff. Threats of enforcement by the EPA and a lawsuit in New Jersey have made the implementation of stormwater management strategies and plans in these CSS communities more imperative than in MS4 communities.

The municipalities where these CSS permits are held are typically older urban areas with a great need for investment in updated water infrastructure. During storm events the volume of water traveling through the CSS often exceeds the capacity of the treatment plants, causing the combined stormwater and wastewater to overflow through 217 outfalls directly into rivers and ultimately into the Delaware River, the Hudson and Raritan bays, and the Atlantic coast.

Combined Sewer Overflow (CSO) events are treated as point-source pollution and regulated under a separate federal permit administered by the NJDEP. The CSO permit must be consistent with the national EPA Combined Sewer Overflow Control Policy, which has three objectives: ensure that if CSOs occur, they are only a result of wet weather; bring all wet-weather CSO discharge points into compliance with the technology- and water quality-based requirements of the Clean Water Act (CWA); and minimize the impacts of CSOs on water quality. The policy identifies nine technology-based control criteria:

1. Proper operation and regular maintenance programs of the sewer systems and CSOs
2. Maximum use of the collection system for storage
3. Review and modification of pretreatment requirements to assure CSO impacts are minimized
4. Maximization of flow to the publicly owned treatment works for treatment
5. Elimination of CSOs during dry weather
6. Control of solid and floatable materials in CSOs
7. Pollution prevention
8. Adequate public notification of CSO occurrences and CSO impacts
9. Monitoring to characterize accurately the impacts of CSOs and the efficacy of CSO controls

The CSO permit also requires that permit holders develop a Long-Term Control Plan (LTCP) that evaluates alternatives for compliance with the CWA, using the nine technology-based control criteria, and a timeline for implementation.

Nationally there has been mixed success with the implementation of the LTCPs; many permit holders have developed plans but have not done much to implement them. In recent years the EPA has begun to crack down on lax enforcement of the permit requirements, something that has led to consent decrees in cities like Philadelphia, which is now taking concrete steps to meet its obligations over the next 25 years. The CSS communities have begun looking to GI as a less expensive alternative to traditional gray-infrastructure approaches to separating stormwater and wastewater. Jurisdictions across the country, including Philadelphia and New York, have created extensive green-infrastructure plans in recent years to deal with their CSOs, leveraging public and private funds to "green" their cities, reduce impervious surface cover and manage runoff.[20]

In New Jersey the NY/NJ Baykeeper and the Hackensack Riverkeeper organizations are currently suing the NJDEP to revoke the CSO general permits, claiming they allow continued overflows in violation of the CWA, thereby endangering human health.

Many of the barriers to implementation of GI in CSS communities are the same as those listed above for MS4 communities, although they are often much greater in scale. **Funding for infrastructure upgrades is often the largest barrier in these communities.**

CSS Watersheds

The issue of CSS watersheds, unique to these communities, merits further discussion here. Because water is a natural resource that does not stop at municipal boundaries, it is often discussed in terms of "watersheds" – natural drainage areas that exist on a variety of scales from sub-municipal to areas larger than states. CSS communities are often older, and situated at the "downstream" end of local watersheds, close to rivers or the shore. The MS4 municipalities "upstream" in the same watersheds are more recently developed, and often their increased impervious cover has exacerbated stormwater and flooding issues in the CSS communities. In addition, some of the MS4 communities may have with or without authorization tapped into the CSS pipes, sending their untreated stormwater downstream to be treated at the CSS communities' wastewater treatment plants, further stressing their systems.

While there is increased urgency to deal with CSO events in CSS communities, these communities are often poorer, older urban areas that do not have the funds to upgrade their systems. Their MS4 neighbors, on the other hand, have no incentive under current conditions to reduce their stormwater runoff quantity or improve its quality before sending it downstream. This situation creates an equity issue, since certain municipalities are dealing with (and paying for) situations that they are not alone in creating.

[20] (National Resources Defense Council)

Conclusion

Flooding and water pollution are significant issues in the State of New Jersey, and improved stormwater management is part of the solution. Green Infrastructure is incorporated throughout the state's stormwater management regulation framework, but many barriers impede the actual implementation of the various strategies and techniques presented in the state's regulatory and guidance documents. This report is intended help inform efforts to streamline processes and remove barriers, with the ultimate objective of increasing the utilization of green infrastructure to manage the state's stormwaters more effectively and sustainably.

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