Stormwater Management: New Rule and Enhancements

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The Watershed Institute

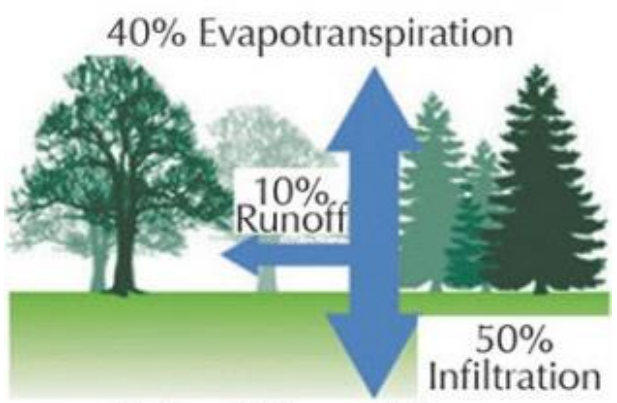
Your water. Your environment. Your voice.

Presentation Outline

I. Context
II. NJDEP's Green Infrastructure Rule- Clay Emerson, Princeton Hydro
III. Recommendations for Enhanced Stormwater Management- Mike Pisauro
IV. Princeton Experience- David Cohen, Council President.
V. Next Steps
VI. Resources

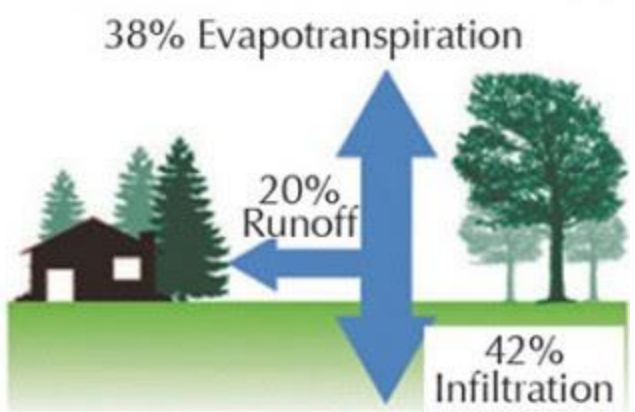
The Water Cycle has been altered

"Natural" Watershed



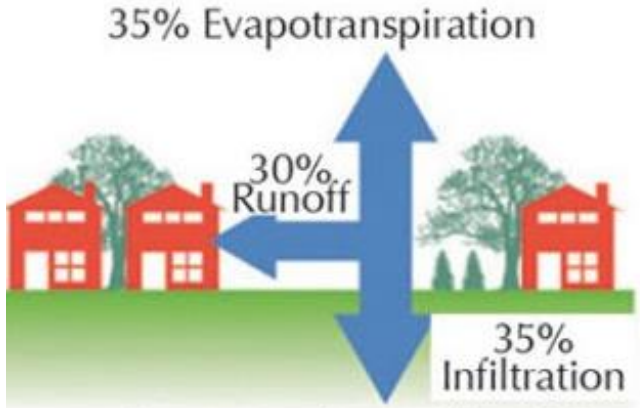
Natural Ground Cover
0% Impervious Surface

Low Density Residential



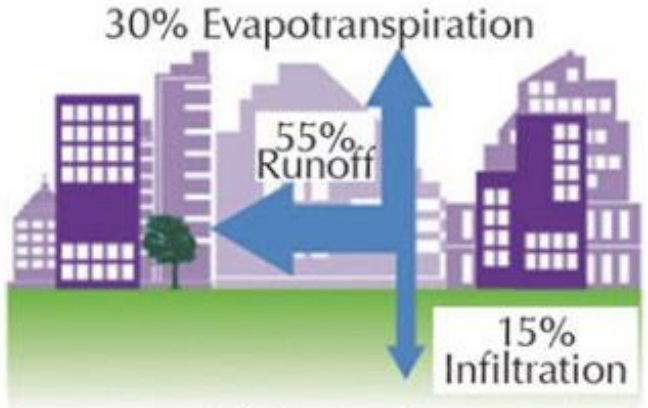
Low Density Residential (e.g. rural)
10–20% Impervious Surface

Medium Density Residential



Medium Density Residential (e.g. subdivision)
30–50% Impervious Surface

Urban Watershed



High Density Residential / Industrial / Commercial
75–100% Impervious Surface

Flooding is a major problem

Flooding is a major problem

Tim Hawk / NJ Advance Media 6/20/2019

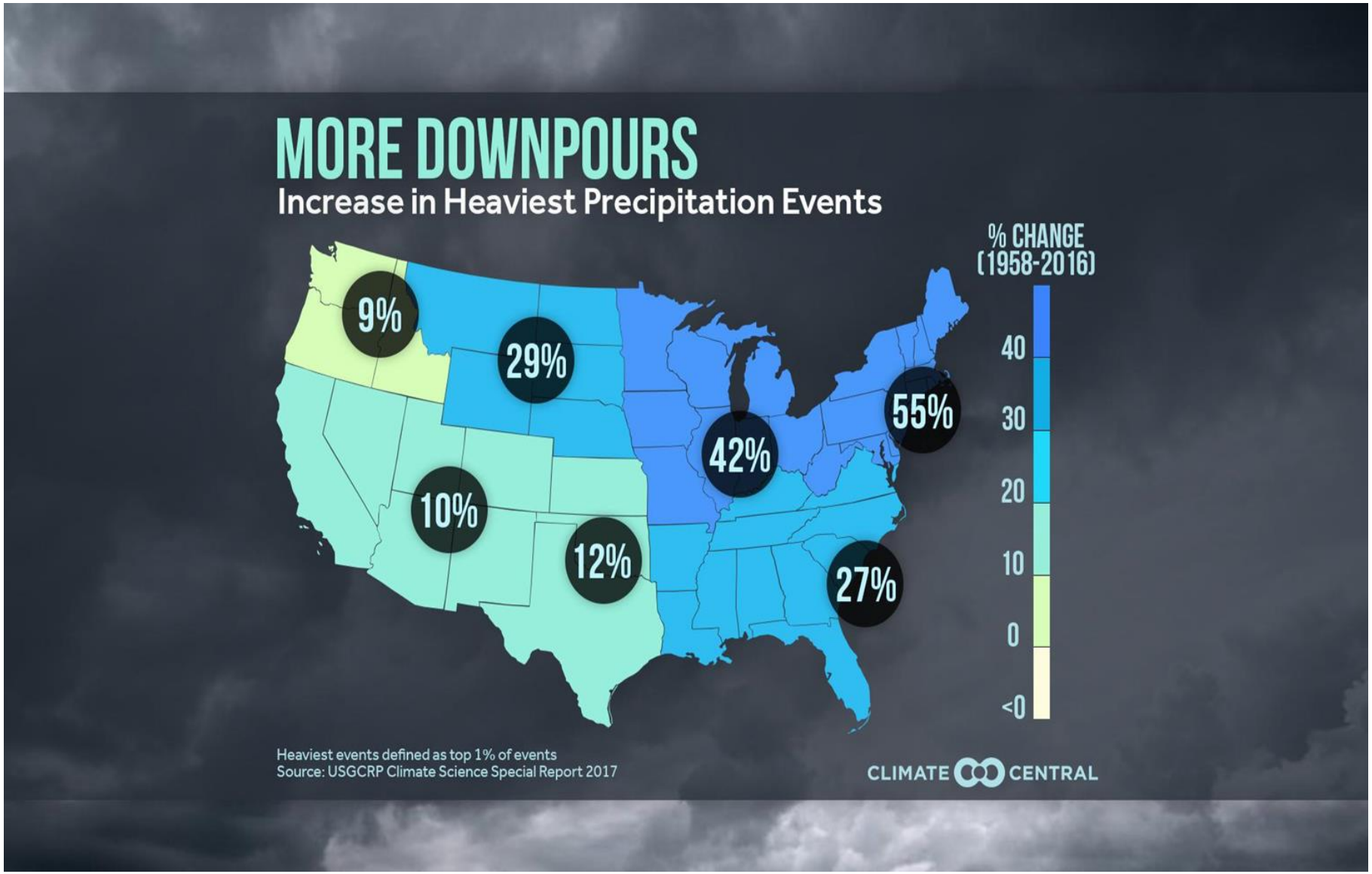
Average Annual Precipitation Has Increased

Ave. Annual Precip. for 1st 7 decades of 20th Century:	44.16”
Ave. Annual Precipitation for 21st Century:	47.62”
Ave. Annual Precipitation Increase:	3.45”

Source: Office of the NJ State Climatologist David Robinson http://climate.rutgers.edu/stateclim/

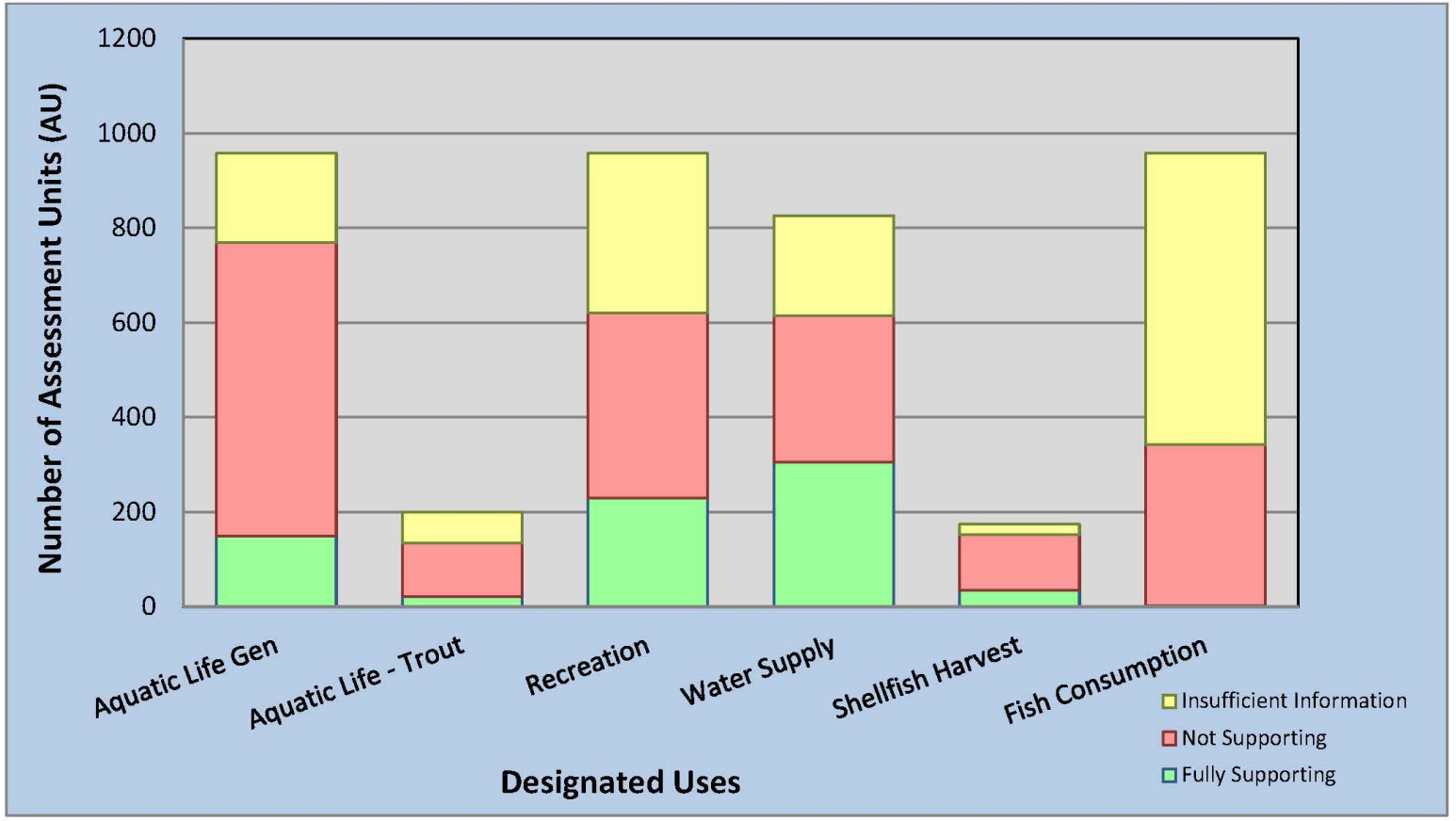
526.74 billion more gallons per year in NJ!

There are more heavy rain events

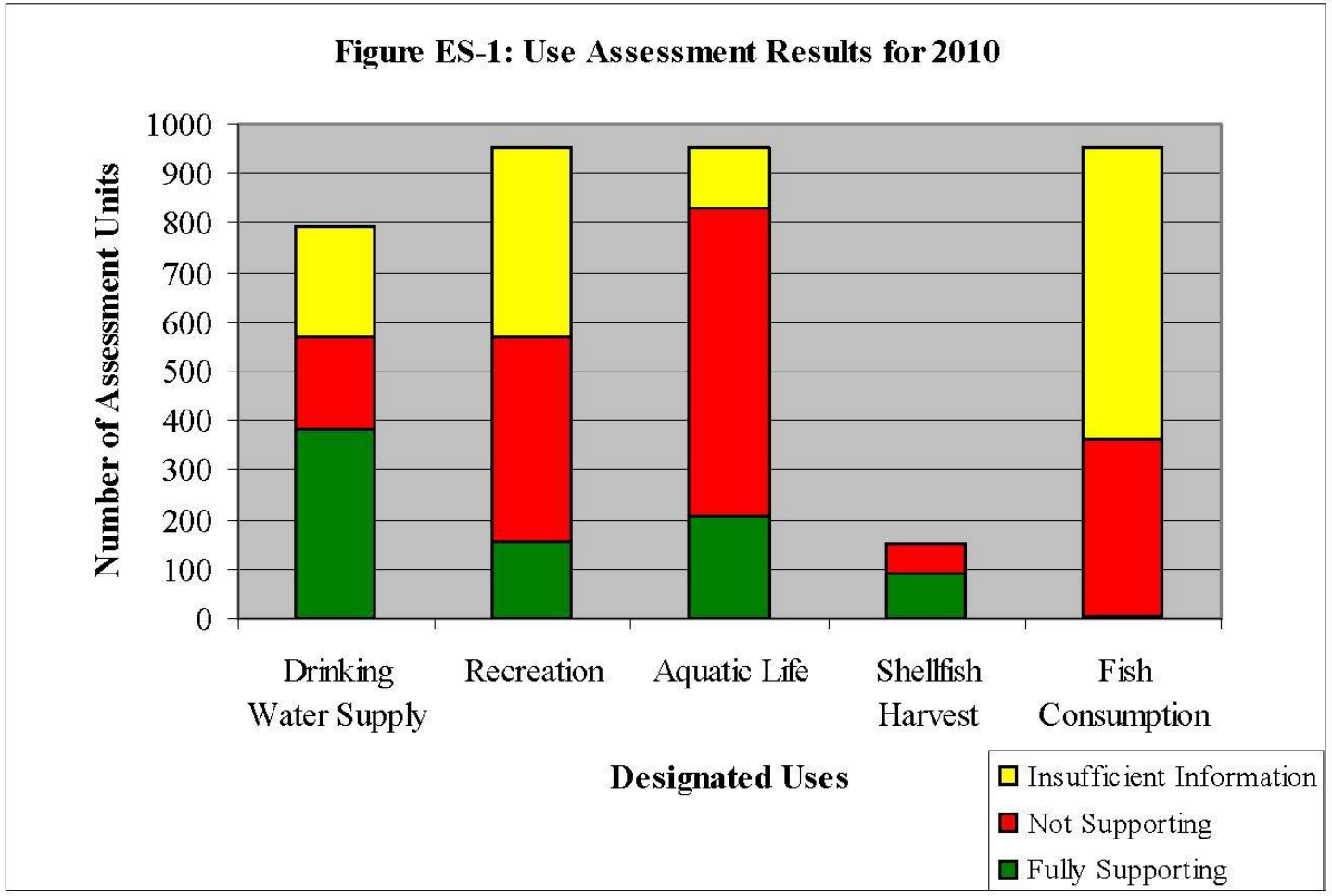


New Jersey Water Pollution Issues

Figure ES-1: Statewide Designated Use Assessment Results, 2016



New Jersey Water Pollution Issues



New Jersey Water Pollution Issues

Declining water quality trends for nitrate, total dissolved solids (TDS) and chlorides were also observed. Ammonia reduction measures implemented at waste treatment plants oxidize ammonia to form nitrate, resulting in increased nitrate concentrations over time. Runoff from urban and agricultural areas, including runoff of salt used to control ice on roadways, are the likely cause of increased TDS and chloride concentrations over time.

-2016 Draft New Jersey Integrated Water Quality Assessment Report

New Jersey Water Pollution Issues

However, there was an observable trend in the number of “Excellent” conditions and “Poor” conditions migrating toward the “Good” and “Fair” categories. **The trends also show a correlation between biological impairment and anthropogenic factors** such as land use, total urban land, increase in impervious surface, and decrease in forests and wetlands in a stream’s drainage basin. **The replacement of pervious land with impervious surfaces increases storm water and the associated impacts** such as degraded riparian zones, unstable streambanks, higher turbidity, nutrients and other chemicals.

-2016 Draft New Jersey Integrated Water Quality Assessment Report

NJDEP's New Green Infrastructure Rule-
Clay Emerson, PhD PE CFM

State Stormwater Management Challenges

- Current program may be **slowing** not stopping the rate at which the stormwater problem is getting worse.
- But only large developments are addressed.
- Program not addressing existing stormwater problems.
- *Current rules do not address volume of runoff*.

Authority for stronger Stormwater Ordinance

This sample ordinance represents the *minimum standards and expectations*, except where noted otherwise. It is the goal of stormwater management to minimize pollution caused by stormwater in order to restore, enhance and maintain the integrity of waters of the State. **Federal, as well as, State water pollution laws permit municipalities to undertake additional actions** including ordinances with standards stronger than the statewide minimum requirements. **Under New Jersey Municipal Separate Storm Sewer System Permits (MS4), the stormwater program may also include Optional Measures (OMs), that prevent or reduce the pollution of the waters of the State. A municipality may choose these stronger or additional measures in order to address local water quality and flooding conditions as well as other environmental and community needs.** For example, municipalities may choose to define "major development" with a smaller area of disturbance and/or smaller area of regulated impervious cover or regulated motor vehicle surface; apply stormwater requirements to both major and minor development; and/or require groundwater recharge, when feasible, in urban redevelopment areas.

-Stormwater BMP Manual- Appendix D - DEP Model Ordinance

Authority for stronger Stormwater Ordinance

RSIS's purpose is to "reduce the multiplicity of standards for residential subdivision and site improvements . . . in order to eliminate unnecessary increases in the cost of housing where there are noncommensurate gains in the protection of public health or safety." N.J.S.A 5: 21-1.3(a)(1)

Enhanced Model Stormwater Ordinance-Components

- Redefine Major Development
- Address smaller developments
- Address Redevelopment
- Capture and treated stormwater onsite
- Enhanced analysis of environmental impacts from development
- Permitting and Reporting Requirements

Enhanced Model Stormwater Ordinance

Trigger for Stormwater Management

- Any major or minor development (Regardless of whether or not a site plan or subdivision is required)
- Address redevelopment for both major and minor projects

Major Development

- Reduce trigger to 1/2 acre of soil disturbance (21,780 SF) or
- 5,000 square feet of impervious cover
- Include redevelopment
- Retain onsite the 95% rain event

Enhanced Model Stormwater Ordinance

Minor Development

- Define as 250 SF or more of impervious surface
- Treat 2 gallons of stormwater per square feet of impervious surface
- Retain on site 95% rain event
- Include Redevelopment
- Require mitigation fee to secure waiver of requirements

Minor Development Conditions

Examples of Triggers:

- 200 ft^2 for construction or alteration of any structure requiring building permit or 500 ft^2 of land disturbance
- 400 ft^2 of new impervious cover
- 500 ft^2 of new impervious or 1,250 ft^2 of disturbance
- 1,000 ft^2 or more of new impervious surface or more than 2,500 ft^2 of soil disturbance

Minor Development Conditions

Examples of Required Treatment:

- Seepage pits or other infiltration measures providing three inches of runoff capacity for each square foot of new impervious area. (Edison, Franklin, Bernardsville, etc.)
- Residential development- sliding scale (ex. 200 ft^3 for 700 ft^2) (Cranford)
- 2 gallons per square foot of impervious cover (Princeton)

Variance/Waiver Fee

- A Waiver fee is possible for Minor development.
- *A Waiver Fee is not possible for Major Development*
- *Waiver of all or part of the minor development requirements under certain circumstances:*
  - *The applicant demonstrates that it is technically impracticable to meet any one or more of the design and performance standards on-site. For the purposes of this analysis, technical impracticability exists only when the design and performance standard cannot be met for engineering, environmental, or safety reasons*
- *Fee should be uniformed and based upon the cost to implement the stormwater management.*

Rain Gardens

Impervious Surface Area`	Rain Garden Size CLAY SOIL*	Rain Garden Size SILTY SOIL	Rain Garden Size SANDY SOIL
500 ft^2	200 ft^2	100 ft^2	75 ft^2
750 ft^2	350 ft^2	150 ft^2	112 ft^2
1,000 ft^2	400 ft^2	200 ft^2	149 ft2
1,500 ft^2	600 ft^2	300 ft^2	224 ft^2
2,000 ft^2	800 ft^2	400 ft^2	299 ft^2

(Source: Rain Garden Manual of New Jersey, Rutgers Water Resources Program)

Cost: $3-5/ ft^2 for do-it-yourself rain garden construction
$10-15/ ft^2 for project using landscaper

(Source: Rain Garden Alliance raingardenalliance.org)

Enhanced analysis of environmental impacts from development

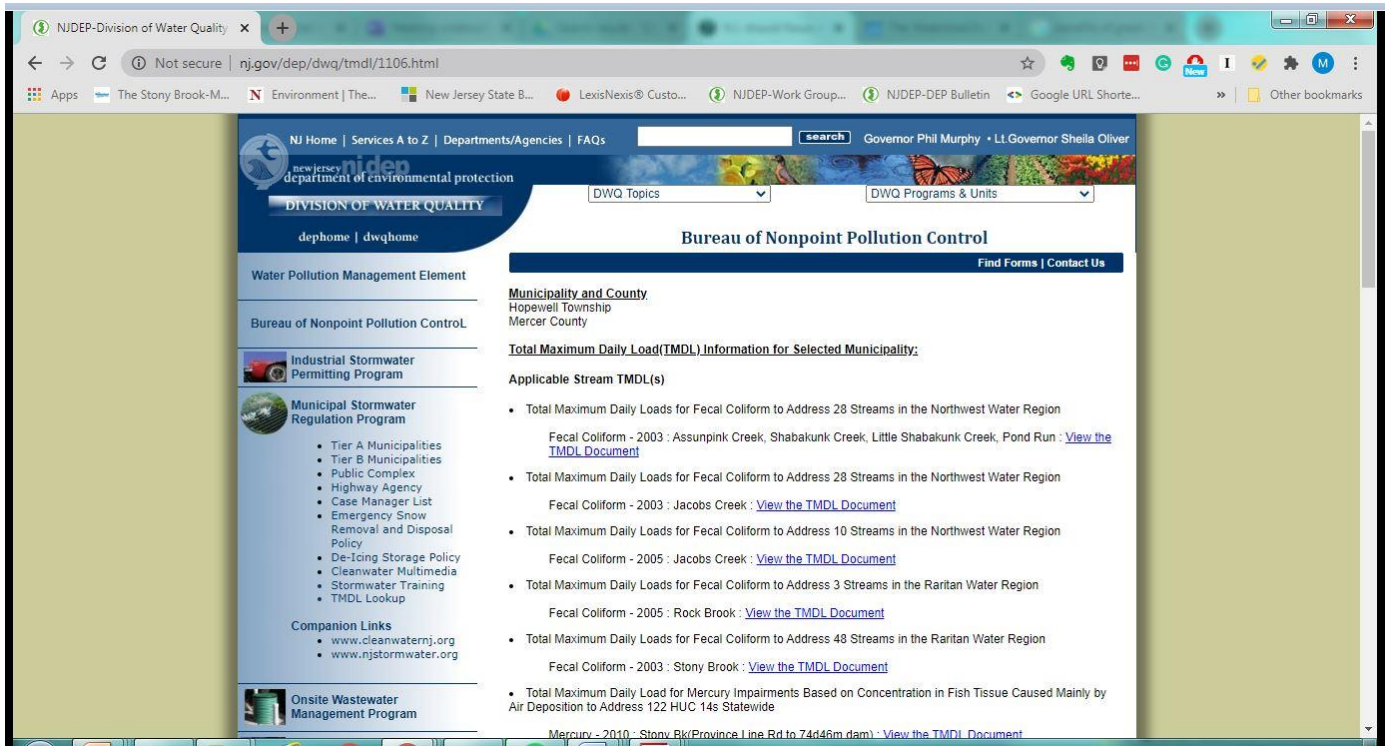
- Map onsite and adjacent environmental features including forests, core forests
- Examine the short and long term impacts on environmental features. Example, maintaining sufficient water supply for wetlands.
- Examine impacts to adjacent property owners.

- Provide quality treatment for all runoff not just some.
- Continue use of nonstructural or low impact design requirements.

Implementing TMDLs

"Total Maximum Daily Loads" (TMDL)
of pollutants determined above which clean water standards will be exceeded.

Pollution ("waste loads") are allocated between sources



Implementing TMDLs

Table 6. Distribution of TP WLAs and LAs among source categories for parts of the Carnegie Lake watershed

Long Term Average Daily Load (kg/d TP)	Upper Millstone River Watershed			Stony Brook Watershed			Carnegie Lake Direct Watershed		
	Existing Condition	TMDL Allocation	Percent Reduction	Existing Condition	TMDL Allocation	Percent Reduction	Existing Condition	TMDL Allocation	Percent Reduction
Sum of Wasteload Allocations (WLAs)	27.8	5.5	80.2%	20.9	2.3	89.0%	2.7	0.4	84.0%
Treated Effluent from WWTP Dischargers	15.9	3.6	77.4%	10.1	0.6	94.4%	0.0	0.0	0.0%
Stormwater from Residential Land Cover Areas	6.6	1.1	84.0%	8.1	1.3	84.0%	1.4	0.2	84.0%
Stormwater from Other Urban Land Cover Areas	5.2	0.8	84.0%	2.7	0.4	84.0%	1.2	0.2	84.0%
Sum of Load Allocations (LAs)	22.9	16.1	29.8%	14.8	6.1	58.9%	0.5	0.3	45.7%
Boundary Inputs	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0%
Tributary Baseflow	14.9	11.0	25.9%	3.2	1.0	69.2%	0.3	0.1	62.1%
Stormwater from Agricultural Land Cover Areas	3.5	0.6	84.0%	7.7	1.2	84.0%	0.1	0.0	84.0%
Stormwater from Forest and Barren Land Cover Areas	0.1	0.1	0.0%	1.5	1.5	0.0%	0.0	0.0	0.0%
Stormwater from Wetlands Land Cover Areas	4.3	4.3	0.0%	2.4	2.4	0.0%	0.1	0.1	0.0%
Air Deposition onto Water Land Cover Areas	0.02	0.02	0.0%	0.02	0.02	0.0%	0.02	0.02	0.0%
Total Margin of Safety (% of LC)	n/a	1.0	4.4%	n/a	1.0	10.2%	n/		
WWTP MOS		0.4	1.7%		0.1	0.7%			
Stormwater and NPS MOS		0.6	2.7%		0.9	9.5%			
Reserve Capacity (% of WWTP load)	n/a	0.5*	14.2%	n/a	0.05	8.8%	n/		
Loading Capacity (LC)	50.6	23.1	54.4%	35.7	9.4	73.8%	3.2		

* NJDPES facility NJ004243 in the Kleinfelder/Omni report and this TMDL report was recently revoked. The TMDL allocated lo

Table 9. Distribution of TSS WLAs and LAs among source categories for parts of the Carnegie Lake Watershed

Long Term Average Daily Load (kg/d TSS)	Upper Millstone River Watershed			Stony Brook Watershed			Carnegie Lake Direct Watershed		
	Existing Condition	TMDL Allocation	Percent Reduction	Existing Condition	TMDL Allocation	Percent Reduction	Existing Condition	TMDL Allocation	Percent Reduction
Sum of Wasteload Allocations (WLAs)	3,961	1,506	62.0%	2,286	401	82.5%	602	96	84.0%
Treated Effluent from WWTP Discharges[#]	502	953	-89.6%	20	38	-89.6%	0	0	0%
Stormwater from Residential Land Cover Areas	1,615	258	84.0%	1,529	245	84.0%	272	44	84.0%
Stormwater from Other Urban Land Cover Areas	1,843	295	84.0%	737	118	84.0%	329	53	84.0%
Sum of Load Allocations (LAs)	2,775	2,060	25.8%	2,624	1,328	49.4%	58	49	14.9%
Boundary Inputs	0	0	0.0%	0	0	0.0%	0	0	0.0%
Tributary Baseflow	1,267	1,267	0.0%	297	297	0.0%	29	29	0.0%
Stormwater from Agricultural Land Cover Areas	851	136	84.0%	1,543	247	84.0%	10	2	84.0%
Stormwater from Forest and Barren Land Cover Areas	51	51	0.0%	525	525	0.0%	6	6	0.0%
Stormwater from Wetlands Land Cover Areas	605	605	0.0%	260	260	0.0%	13	13	0.0%
Total Margin of Safety (% of LC)	n/a	172	4.5%	n/a	152	8.0%	n/a	24	14.4%
Reserve Capacity (% of WWTP load)	n/a	103	10.8%	n/a	25	66.5%	n/a	0	n/a
Loading Capacity (LC)	6,735	3,841	43.0%	4,909	1,906	61.2%	660	170	74.2%

Enhanced Model Stormwater Ordinance

Require inspection of all stormwater management features

- Annual stormwater permit
- Quarterly reports submitted by property owners
- Inspections by municipality auditing compliance with maintenance requirement
- Fee paid by property owners for inspection program
- Assists municipality in complying with MS4 requirements.

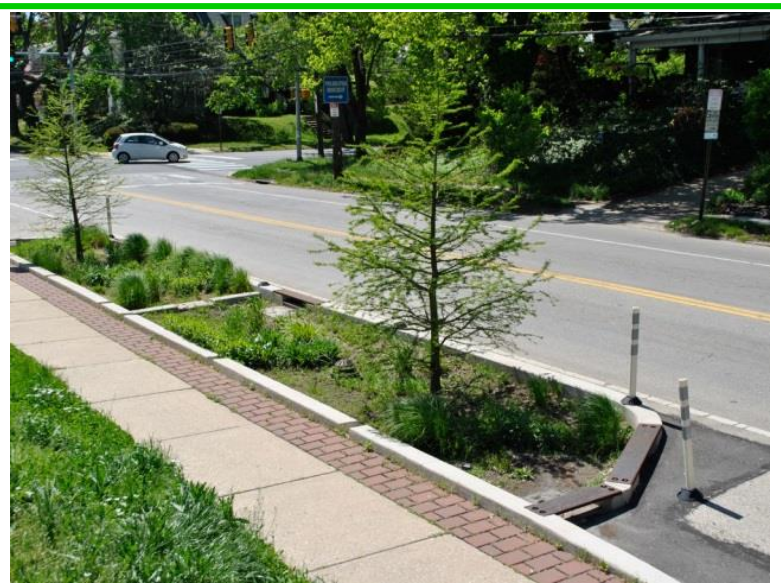
Example of Green Infrastructure

The Watershed Institute

Options for Stormwater Management

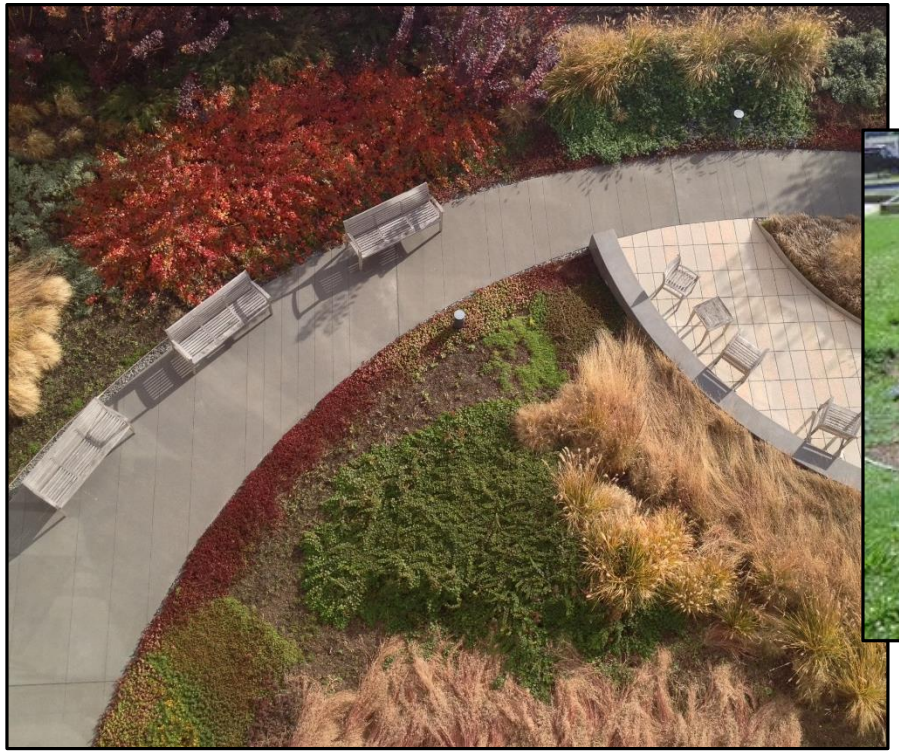
Pervious Pavement

Green Stormwater Infrastructure



Green Streets

Green Stormwater Infrastructure - New Jersey



Capital Health-Fall Season

Camden-Summer Season

Hillsborough Municipal Building-Early Winter Season

Princeton’s Experience
David Cohen, Princeton Council President

Next Steps

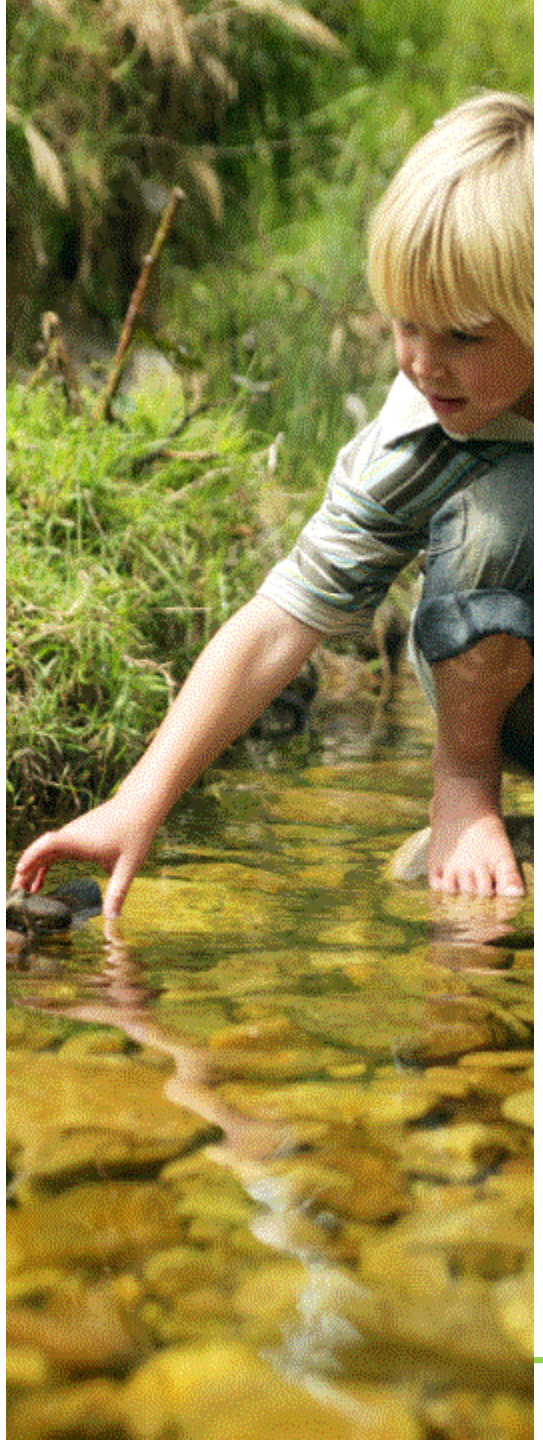
- Discuss recommendations for developing a strong stormwater management ordinance with governing body.
  - New ordinance must be in effect by March 2021

- Green Infrastructure education for municipal employees, engineers, landscape architects and the public:
  - Watershed Institute Green Infrastructure Certification Court
    - Feb. 4&5
  - Green Infrastructure Maintenance Training- Feb. 26, 2020

- Identify potential sites for public and private green infrastructure projects

Resources

- Green Infrastructure Rule Webinar-April 23, 2020
- The Watershed Institute's Enhanced Model Ordinance
- The Watershed Institute Green Infrastructure Certification
- NJ Future Green Infrastructure Tool Kit



Thank You

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