

The Watershed Institute Enhanced Model Stormwater Management

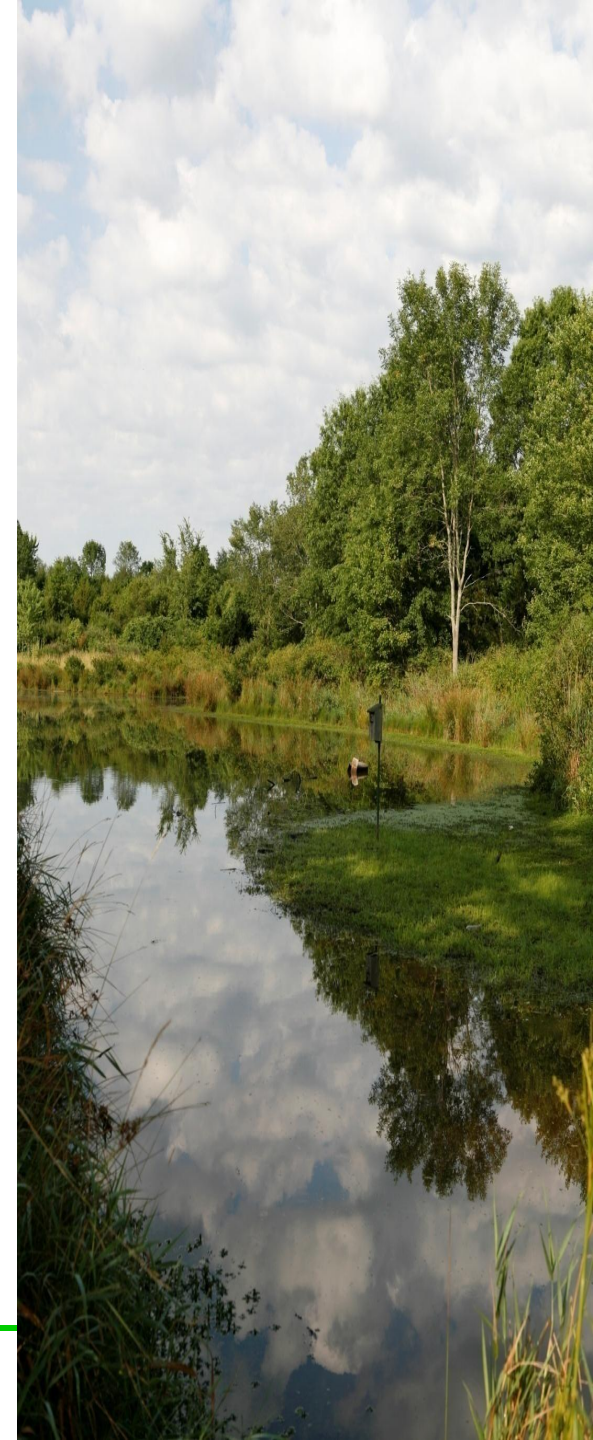
Green Infrastructure Champions Program

Feb. 26, 2021

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Policy Director



Your water. Your environment. Your voice.





Keeping water clean, safe and healthy is the heart of our mission.

We work to protect and restore our water and natural environment in central New Jersey through conservation, advocacy, science and education.

We also administer several state-wide programs in NJ.



Our Strategies

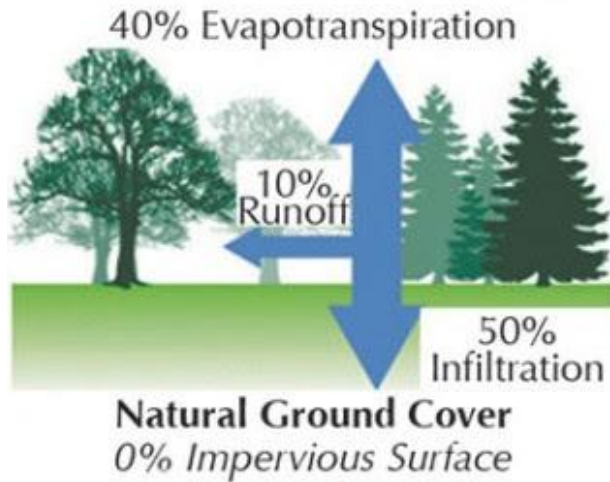
- Scientific investigation & monitoring
- Advocacy for protection and restoration of water & watersheds
- Environmental education
- Modelling best stewardship practices at our Watershed Center and 950-acre Watershed Reserve

Why Enhance?

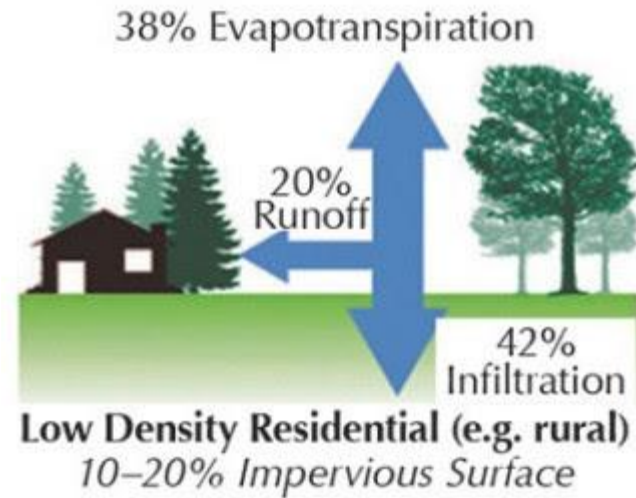


The Water Cycle has been altered

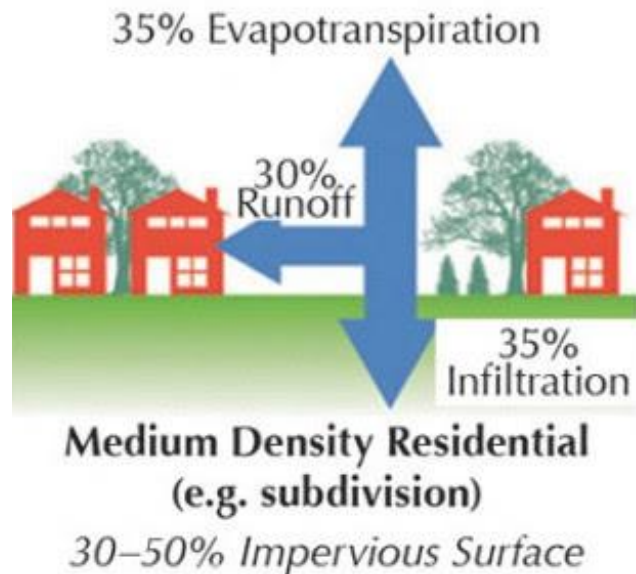
“Natural” Watershed



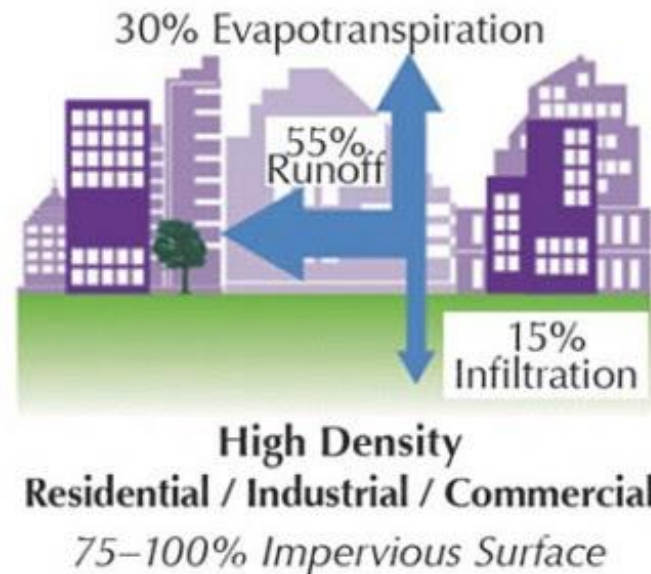
Low Density Residential



Medium Density Residential



Urban Watershed



Flooding is a major problem



Flooding is a major problem



Tim Hawk / NJ Advance Media 6/20/2019

Average Annual Precipitation Has Increased



NJ receives 46" inches of rain a year.

Regional Differences

North & Central NJ- 49"

Coastal - 44"

Southern - 45"

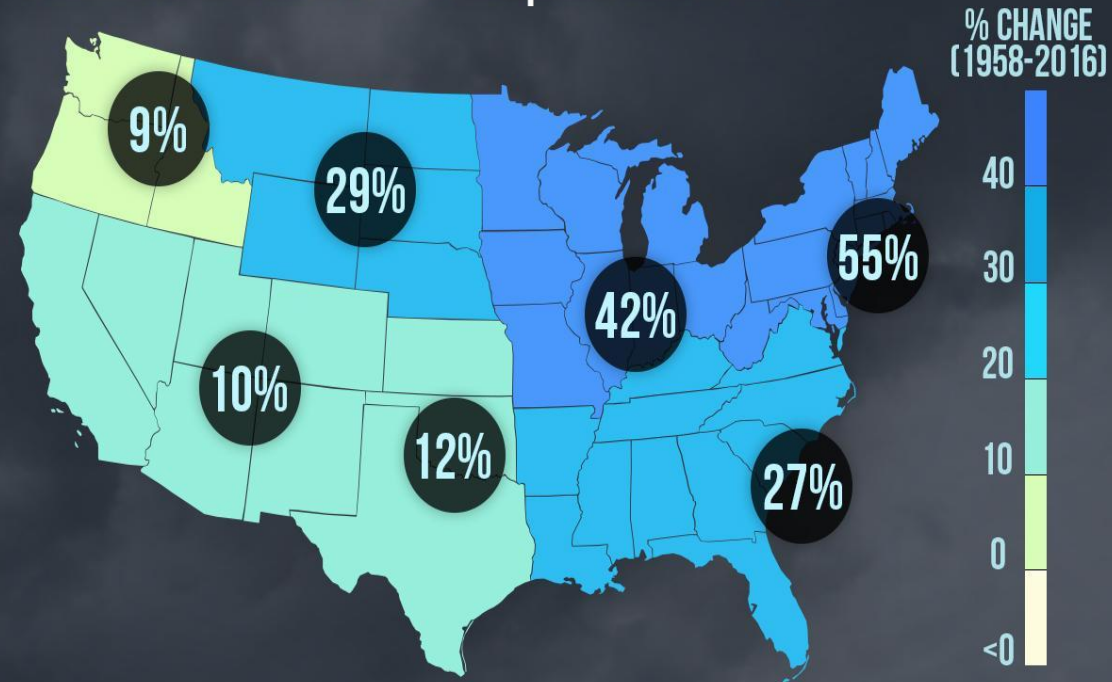
Approximately a 8% increase in annual rainfall over last 10 years compared to 125 year average.

2.3-3.5" increase in annual rainfall by 2080 or
4.9% to 7.5%

There are more heavy rain events

MORE DOWNPOURS

Increase in Heaviest Precipitation Events



Heaviest events defined as top 1% of events
Source: USGCRP Climate Science Special Report 2017

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

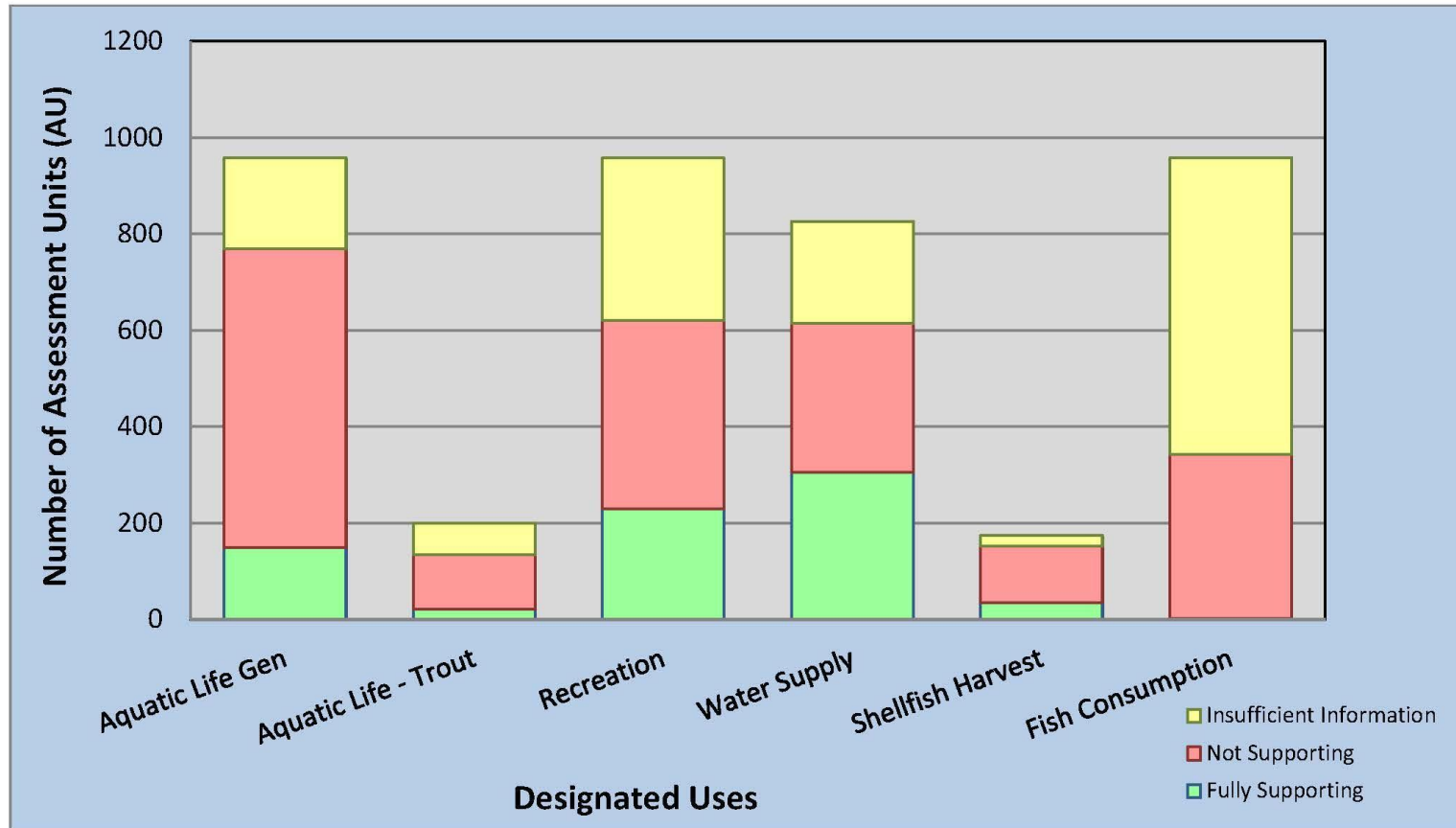
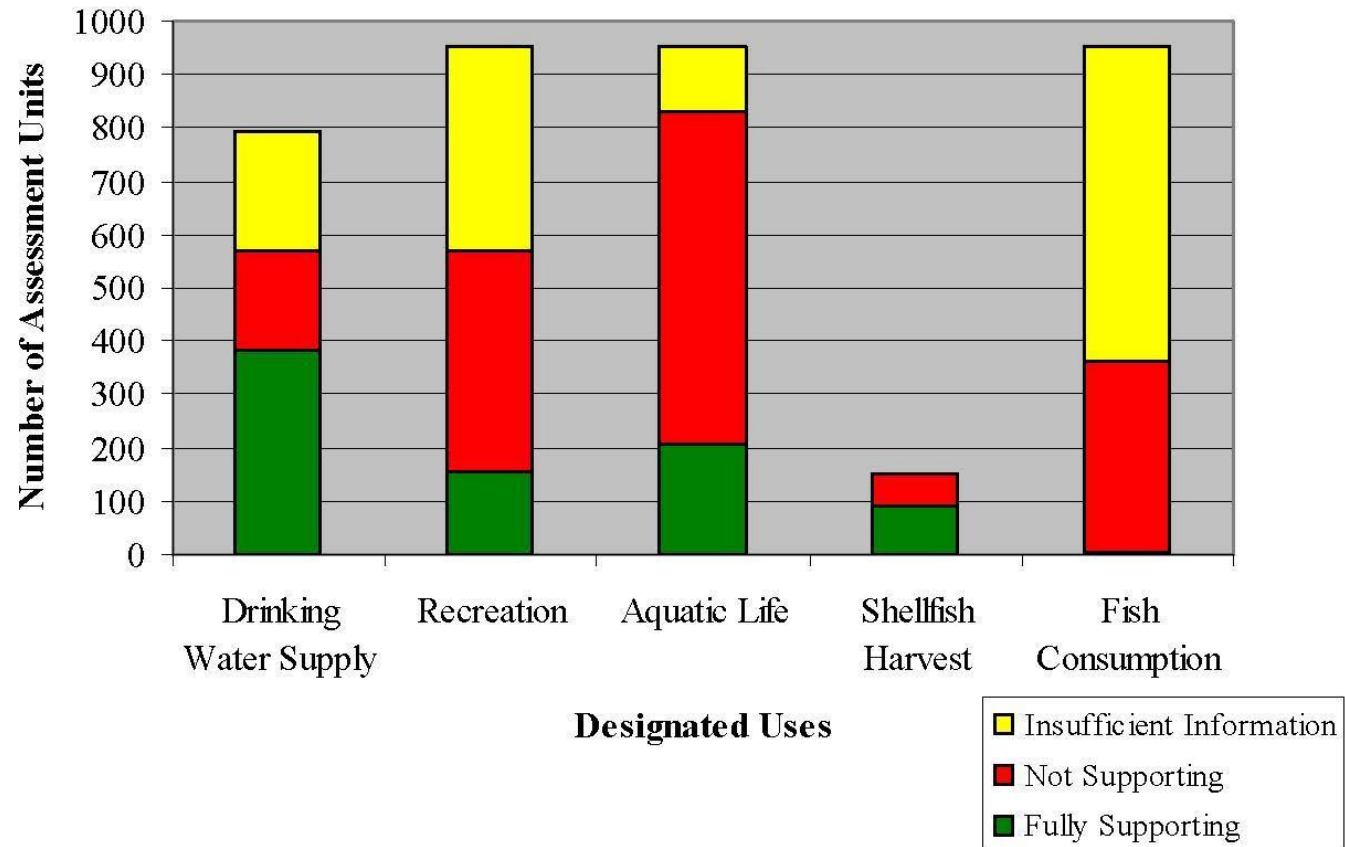


Figure ES-1: Use Assessment Results for 2010



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

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



Remember:

“It is the national goal that wherever attainable, an interim goal of *water quality* which provides for the *protection and propagation of fish*, shellfish, and wildlife and *provides for recreation* in and on the water be achieved *by July 1, 1983.*” CWA 33 U.S.C. 1251(a)(2)

“It is the policy of this State *to restore, enhance and maintain* the chemical, physical, and biological integrity of its waters, to protect public health, to safeguard fish and aquatic life and scenic and ecological values, and to enhance the domestic, municipal, recreational, industrial and other uses of water.” NJ Water Pollution Control Act. N.J.S.A. 58:10A-2

NJ municipalities must adopt stormwater ordinances that address stormwater from “major developments”

Defined as projects that:

- Disturb 1 acre or more of land (43,560 sq. feet) and/or
- Add ¼ acre of impervious cover (10,890 square feet)

Management actions are required for major developments to:

- Quantity: Reduce post development **peak flows** for the 2, 10 and 100-year storms by 50%, 75% and 80%
- Quality: Reduce total suspended solids by 80% and reduce nutrients to the “maximum extent possible” in post-construction runoff
- Recharge: Retain 100% of pre-development groundwater on-site the annual recharge volume or infiltrate the increase volume for the 2-year storm

- 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.*

What the Rule Does Not Do:

It does not change any of the standards:

Quality: 80% TSS

Quantity (rate) 50%, 75%, 80% reductions

Recharge- predevelopment

Only Major Developments

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.

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

Model Ordinance:

<https://thewatershed.org/green-infrastructure-for-development-in-new-jersey/>

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

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

- 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.*

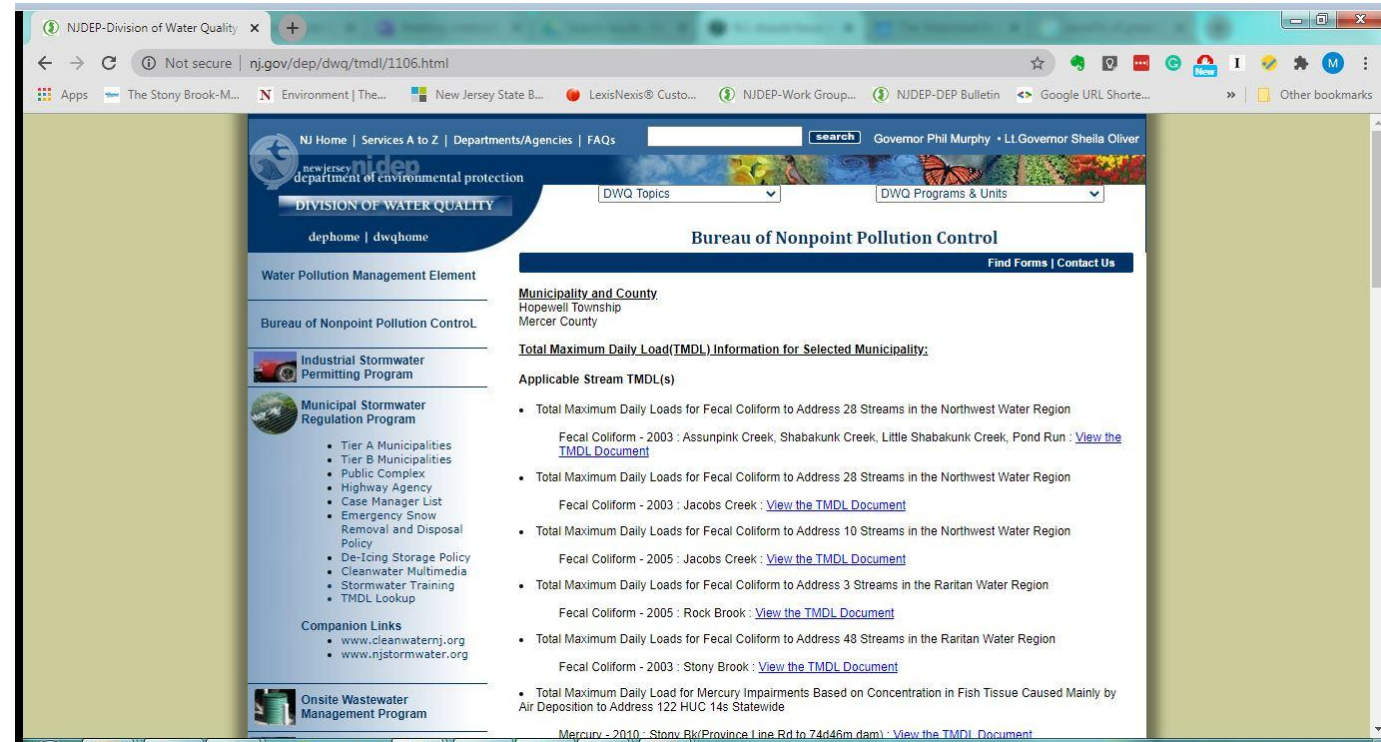
Enhanced analysis of environmental impacts from development

- 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.

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

Pollution (“waste loads”) are allocated between sources



The screenshot shows the NJDEP Division of Water Quality website. The page is titled "Bureau of Nonpoint Pollution Control" and displays "Total Maximum Daily Load (TMDL) Information for Selected Municipality: Hopewell Township, Mercer County". The page lists several applicable stream TMDLs, including:

- Total Maximum Daily Loads for Fecal Coliform to Address 28 Streams in the Northwest Water Region
Fecal Coliform - 2003 : Assumpink Creek, Shabakunk Creek, Little Shabakunk Creek, Pond Run : [View the TMDL Document](#)
- Total Maximum Daily Loads for Fecal Coliform to Address 28 Streams in the Northwest Water Region
Fecal Coliform - 2003 : Jacobs Creek : [View the TMDL Document](#)
- Total Maximum Daily Loads for Fecal Coliform to Address 10 Streams in the Northwest Water Region
Fecal Coliform - 2005 : Jacobs Creek : [View the TMDL Document](#)
- Total Maximum Daily Loads for Fecal Coliform to Address 3 Streams in the Raritan Water Region
Fecal Coliform - 2005 : Rock Brook : [View the TMDL Document](#)
- Total Maximum Daily Loads for Fecal Coliform to Address 48 Streams in the Raritan Water Region
Fecal Coliform - 2003 : Stony Brook : [View the TMDL Document](#)
- Total Maximum Daily Load for Mercury Impairments Based on Concentration in Fish Tissue Caused Mainly by Air Deposition to Address 122 HUC 14s Statewide
Mercury - 2010 : Stony Bk(Province Line Rd to 74446m dam) : [View the TMDL Document](#)

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)		1.0	4.4%		1.0	10.2%			
WWTP MOS	n/a	0.4	1.7%	n/a	0.1	0.7%	n/a		
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/a		
Loading Capacity (LC)	50.6	23.1	54.4%	35.7	9.4	73.8%	3.2		

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

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%

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.



Thank You

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