



Updating Maine's Stormwater Management Standards

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Bureau of Land Resources

MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION

Protecting Maine's Air, Land and Water

Presenter Bios

- **Kerem Gungor (DEP Senior Environmental Engineer)**
 - +25 years of experience in environmental field
 - +9 years of experience in stormwater management
 - Supervises DEP Land Bureau Stormwater Engineering Team (SET)
 - Leads Chapter 500 rulemaking project

- **Cody Obropta (DEP Environmental Engineer)**
 - 10 years stormwater management experience, 7 of which were in design and private engineering consulting
 - Green Infrastructure Champion
 - Pizza enthusiast 🍕



Warm Up Poll



Raise your hand if you are familiar with:

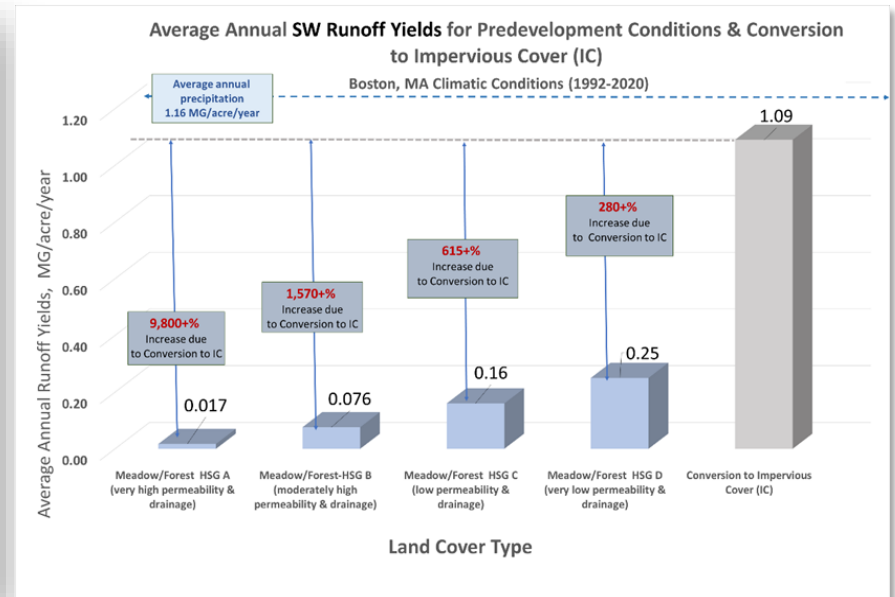
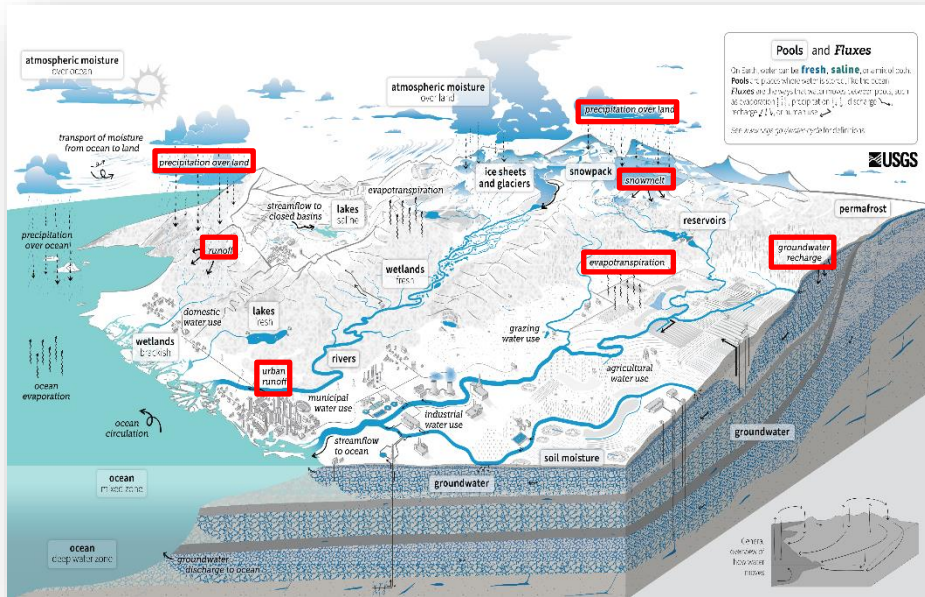
- Maine’s stormwater regulations,
- Stormwater treatment
 - Quality treatment
 - Quantity treatment
 - Low Impact Development (LID)
 - Green infrastructure



Outline

1. Stormwater Management Overview
2. Existing Stormwater Standards & Chapter 500
3. New Chapter 500 Goals and Standards
4. Rule Implementation
5. Stakeholder Input & Next Steps
6. Wrap up

The Water Cycle & Budget



$$\text{Precipitation} = \text{Runoff} + \text{Evapotranspiration} + \text{Groundwater Recharge}$$

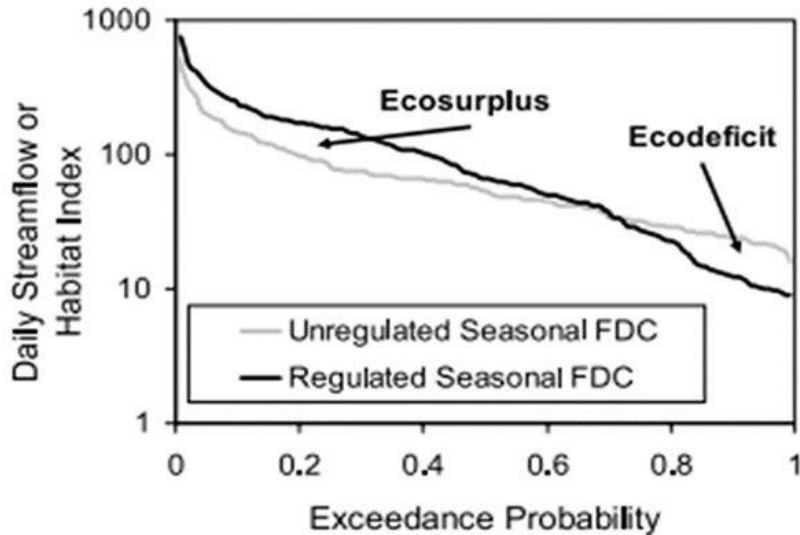
$$\text{Runoff} = \text{Precipitation} - \text{Evapotranspiration} - \text{Groundwater Recharge}$$

Reference: USGS. The Water Cycle Diagram: [Water Cycle Diagrams | U.S. Geological Survey \(usgs.gov\)](https://www.usgs.gov/water-cycle-diagrams)



Pre- versus Post-development Hydrology

In-stream Flow Duration Curve (FDC):

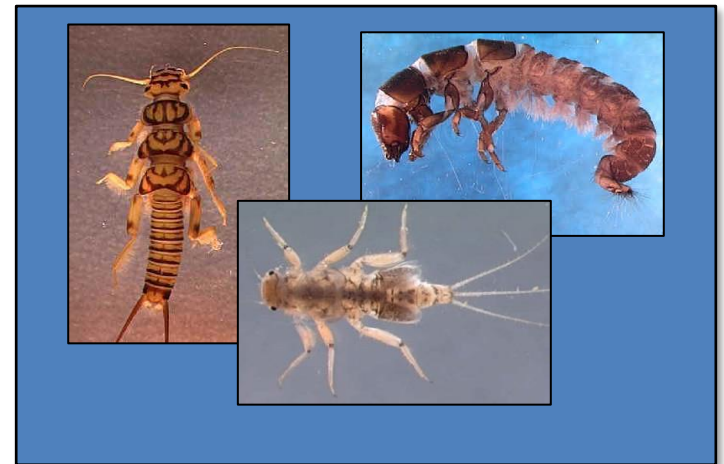


Unregulated Seasonal FDC: Undeveloped watershed FDC

Regulated Seasonal FDC: Developed watershed FDC

- **Ecosurplus:** Increased probability of high in-stream flows → flooding, negative impact on stream channel and aquatic biota
- **Ecodeficit:** Increased probability of low in-stream flows → drought, negative impact on aquatic biota

Reference: [Holistic Watershed Management for Existing and Future Land Use Development Activities: Opportunities for Action for Local Decision Makers: Modeling and Development of Flow Duration Curves \(FDC 1 and 2 Projects\) | US EPA](#)



Stormwater Pollutants & Water Quality



Stormwater Programs: State vs. Federally Delegated

Bureau of Land Resources ←

Bureau of Water Quality

State Laws



Rules

- **Chapter 500:** Stormwater Management Rules
- **Chapter 501:** Stormwater Compensation Fees and Mitigation Credit
- **Chapter 502:** Direct Watersheds of Lakes Most at Risk from New Development and Urban Impaired Streams

Acronyms: Stormwater Management Law (SML); Site Location of Development Act (SLODA); Erosion and Sedimentation Control Law (ESCL); Natural Resources Protection Act (NRPA) ; Clean Water Act (CWA)



National Pollutant Discharge Elimination System

- **Municipal Separate Storm Sewer System (MS4):** Municipal, Transportation, State or Federally Owned General Permits
- **Multi-sector General Permit (MSGP)**
 - **Post-construction Discharge of Stormwater in the Long Creek Watershed:** General Permit under EPA's residual designation authority
- **Maine Construction General Permit (MCGP)**

Stormwater Management Law Summary

- Full text: [38 M.R.S. § 420-D](#)
- The law only applies to Maine's organized area
- Smaller projects eligible for faster permitting through Stormwater PBR
- Larger projects that do not trigger SLODA are required to have full Stormwater permit
- Several exemptions in subsection 7:
 - **Subsection 7(C)**: Exemption for projects in municipalities with ordinances meeting or exceeding the requirements of the Law



Stormwater Capacity

- If a project under the Stormwater Management Law jurisdiction is in a town with Stormwater Capacity:
 - No DEP permit application is required if
 - A project results in less than 3 acres of impervious area and occupies less than 20 acres.
 - No DEP notification is required,
 - Permitting is completely handled by the municipality.
- Currently, **eight** municipalities have stormwater capacity:
 - Auburn, **Bangor**, Freeport, Lewiston, Portland, Saco, Topsham, Windham



Site Location of Development

38 M.R.S. §§ 481 - 490

Common jurisdictional thresholds:

- **Structures** > 3 acres including buildings, parking lots, roads, paved areas, and areas to be stripped or graded and not revegetated
- **Subdivisions:** All lots single family residential (SFR) -
15 or more lots on >30 acres
If any lot is not SFR - **5 or more lots on >20 acres**
- Projects that **occupy 20 or more acres**



Site Law: Delegated Authority [§ 489-A]

Municipal review of development

Municipalities with this authority requested it and were granted approval by DEP Order

- Ordinances with stringent criteria
- Consistent Comp Plan
- Adequate resources
- Public notice and appeal procedures

Jurisdictional Authority

- Subdivisions on parcels < 100 acres (residential or non-residential)
- Structures >3 acres but <10 acres

Towns with Delegated Authority

- Auburn
- Bangor
- Lewiston
- Portland
- Saco
- Topsham



Site Law: Municipal Capacity [§ 488 (19)]

- Projects “**exempt** from Department review”
- No specific ordinance review; the only criteria is that municipality has a site plan ordinance and a subdivision ordinance
- The municipality has a Planning Board
- Comp plan and ordinances are consistent with Title 30-A, chapter 187
- Project must be in a **designated growth area**

Jurisdictional Authority

- Subdivisions for single family, detached residential housing with an aggregate area from 30 acres to 100 acres
- Structures from 3 acres and up to and including 10 acres.

Towns with Municipal Capacity

- Biddeford
- Brunswick
- Caribou
- Holden
- Kennebunk
- Poland
- Sanford
- Scarborough
- Skowhegan
- Wells



Land Bureau Stormwater Program

1970

Site Law

- Stormwater Quantity (Peak Flow) Control

1980

Phosphorus

- Stormwater Phosphorus Control for Lake Watersheds

1997

Stormwater Management Law

- *First Chapter 500*: Sliding scale for “Total Suspended Solids” removal

2005

Chapter 500 Revision

- Major revisions: Performance based standards replaced the sliding scale.
- No pollutant removal target except for phosphorus (i.e., phosphorus standard)
- Five-year recertification requirement was introduced.

2015

Chapter 500 Revision & New Chapter 501

- “Compensation & Mitigation Credit” removed from Chapter 500. A new stand-alone chapter, Chapter 501, was created to include the revised compensation & mitigation credit rules.
- New “General Standards” provisions increasing the flexibility for meeting the stormwater treatment requirements:
 - A new low impact development (LID) credit is introduced: eligible projects can use the credit to reduce the developed area requiring treatment by 10-20%
 - A method for calculating the treatment requirement of redevelopment projects was introduced
 - Treatment as low as 75% of the developed and 90% of the impervious area can be allowed based on the size of the proposed development with respect to the developable area,
 - A road crossing a wetland is not required to meet the general standards provided its design allows flow passage,
 - Runoff from sloped, non-asphalt roofs of non-industrial facilities need to be treated for thermal impact and for channel protection only.
- Infiltration Systems (Appendix D): The Department may require
 - Groundwater quality monitoring to determine the effectiveness of any infiltration system,
 - A “mounding analysis” demonstrating that the water table will be below the bottom of an infiltration system within 48 hours after the end of a storm event.
- Sensitive Watersheds:
 - Permittees may be required to hire a department-approved inspector to oversee construction projects in the watersheds of lakes most at risk or urban impaired streams.



BLR Stormwater Program: Major Technical Guidance Documents



Maine ESC
Practices Field
Guide for
Contractors
(Abridged ESC
Manual)



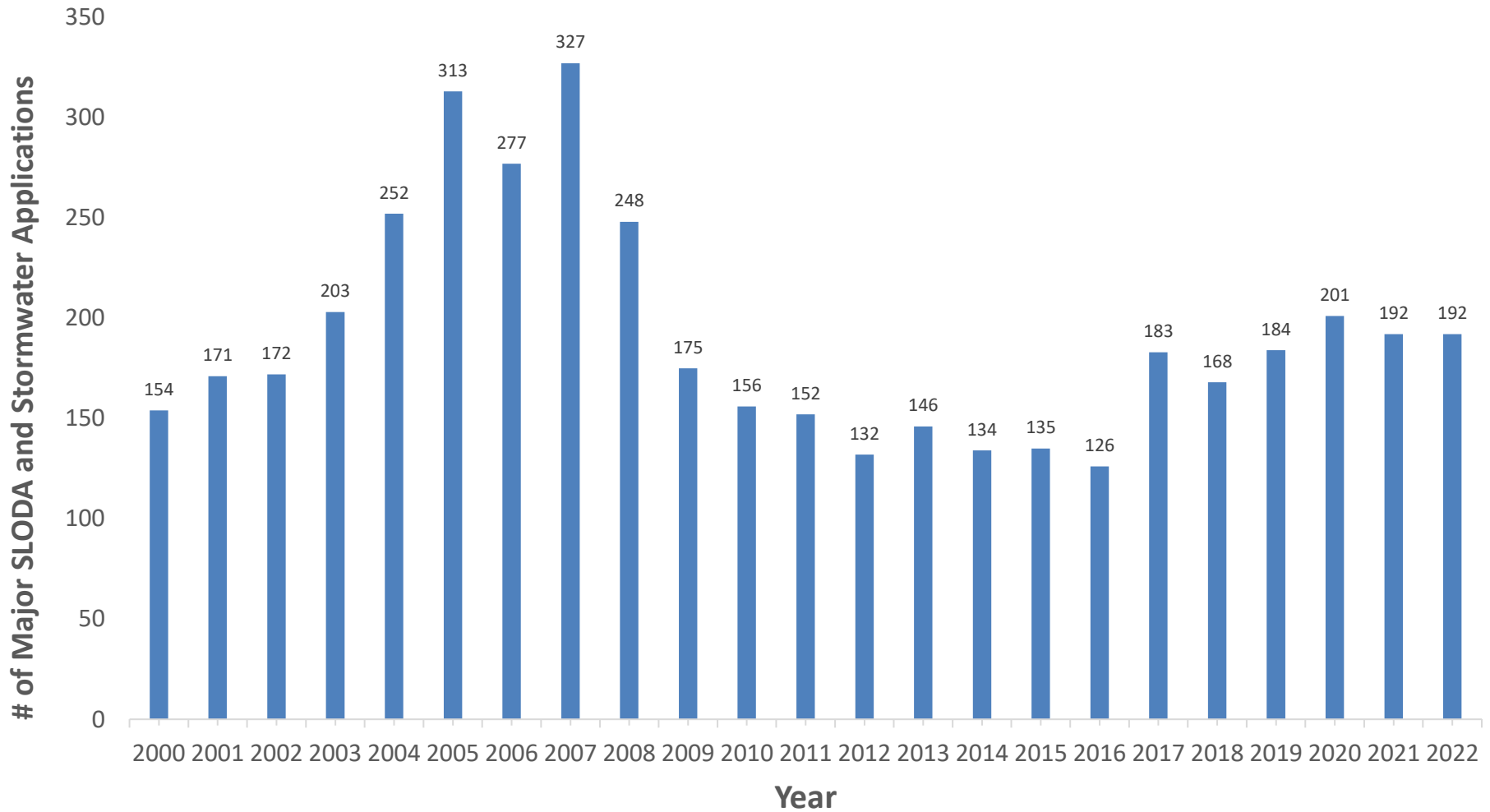
Maine ESC Best
Management
Practices Manual
for Designers and
Engineers



Maine Stormwater
Best Management
Practices Manual
(Three Volumes)



Completed Major SML & SLODA Applications



Major Application = New Application (N) + Minor Amendment (B) + Amendment (A)



Current Chapter 500 Standards & Their Evaluation



Watersheds & Existing Chapter 500 Standards

SML & SLODA Projects

Watershed

Specific

Non-specific

Chapter 500
Standard

Urban
Impaired
Stream*

Phosphorus
**

General

*: Apply to SLODA projects in the Urban Impaired Stream watersheds (Chapter 502).

** : Apply to the projects in the lake watersheds.



Urban Impaired Stream Standard (Chapter 500(4)(E))



- SLODA projects in UIS watersheds are required to comply with the General Standards
- In addition, they are subject to additional requirements:
 - a. Mitigate stormwater impact of the existing developed areas through treatment or elimination,
 - OR
 - b. Pay a compensation fee to the administrator.

- Mitigation and compensation procedure is in Chapter 501.
- The Department may require the use of alternative or additional stormwater treatment measures to address a specific stressor.

Chapter 501: Table 1

Type of surface	Compensation fee (per acre*)	Mitigation credits required (per acre*)
Non-roof impervious area	\$12,500	0.5 credits
Roof	\$5,000	0.2 credits
Landscaped area	\$2,500	0.1 credits

* fees or credits for fractions of an acre are prorated.



Phosphorus Standard

Lake Most at Risk from New Development

≥ 20,000 sf impervious area

≥ 5 ac developed area

Other Lakes

≥ 3 ac impervious area

≥ 5 ac developed area



- PAPB: Watershed Per Acre Phosphorus Budget (Stormwater Manual Volume II Appendix C)
- PPB = PAPB x Project Area (A)



- Pre-PPE: Pre-treatment Algal Available Phosphorus Export
- Post-PPE: Post-treatment Algal Available Phosphorus Export
- If Pre-PPE ≤ PPB → No Treatment Required!
- If Post-PPE ≤ PPB → No Mitigation or Compensation Required!



- TMC: Total Phosphorus Mitigation Credit
- TMC = Pre-existing Source Elimination Credit + Pre-existing Source Treatment Credit



- PPE: Project Phosphorus Export
- PPE = Post-PPE – TMC
- Compensation is available if:
 - The project lake is covered under the “Stormwater Compensation Fund (SCF)” program
 - PPE ≤ 0.4 x Pre-PPE

Phosphorus standard incentivizes:

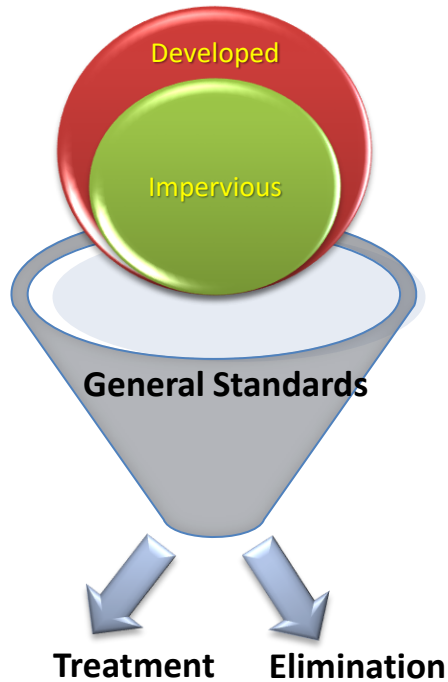
- Treatment and/or mitigation of the relatively high phosphorus exporting developed areas:
 - Roads, driveways, parking >> Landscaped areas, roofs
- Projects that develop relatively a small portion of a parcel:
 - No treatment may be required for certain projects

Compliance with the standard can be challenging for

- The projects that have relatively low PAPB and/or develop relatively a large portion of a parcel
- The project is in a lake watershed not covered under the SCF program



Projects in All Other Watersheds



Objectives of the General Standards (Chapter 500(4)(C)(2))

A stormwater management that will:

- Provide for pollutant removal or treatment,
- Mitigate for the increased frequency and duration of channel erosive flows due to runoff from smaller storms,
- Mitigate for potential temperature impacts.

Required Level of Treatment for New Development* (%)

Impervious Area	Developed Area
95%	80%

Required Level of Treatment for Redevelopment** (%)

SML Project: Developed Area (%)	SLODA Project: Developed Area (%)
0-80%	50-80%

Low Impact Development (LID) Credit (%)*** (Chapter 500(4)(C)(4))

Reduce Developed Area Requiring Treatment by	10-20%

The standards are met through treating developed areas using allowable treatment measures and/or eliminating existing developed areas

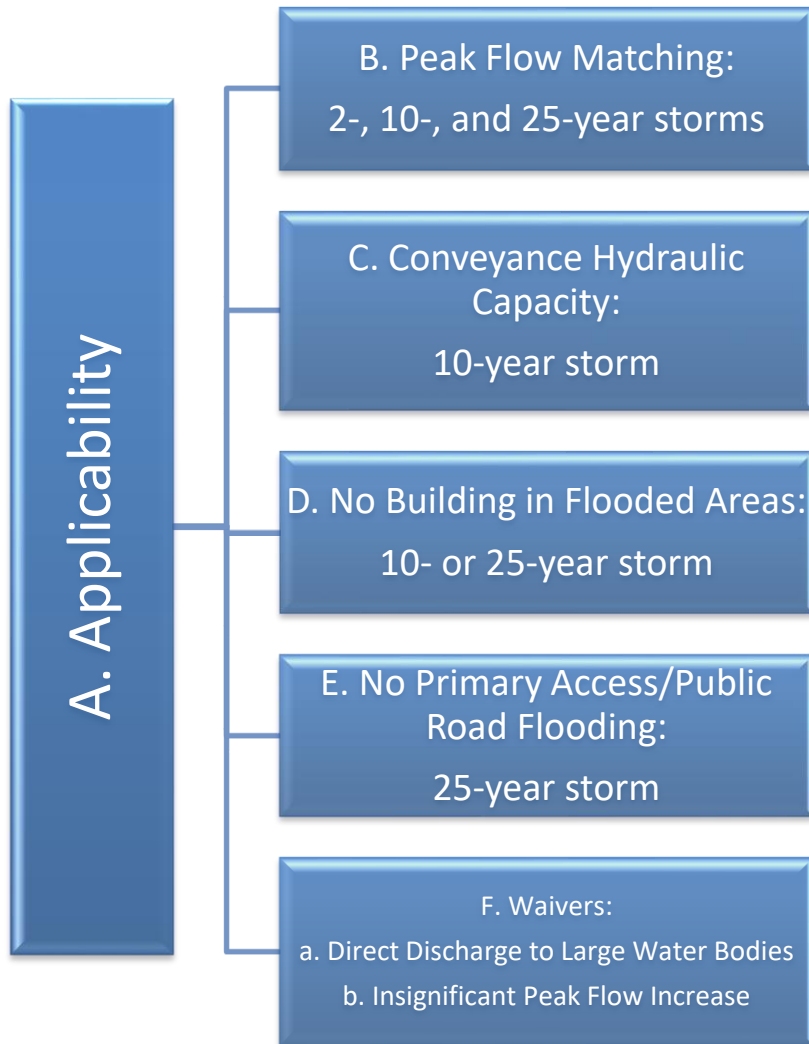
*: Certain exceptions can be allowed to reduce the required level of treatment (Chapter 500(4)(C)). For instance, linear portion of the project → 75% impervious area; 50% developed area.

** : Sliding scale based on the “Ranked (Pollutant) Impact Change Due to Redevelopment”: more pollutant reduction, more reduction in the required level of developed area treatment.

***: Sliding scale based on the “Percentage of the Developed Area Treated with LID Measures”.

Improving Flooding Standard

Current Flooding Standard



New Chapter 500

	Proposals/Recommendations
A	Maintain current thresholds
B	<ul style="list-style-type: none"> Eliminate 2-year peak flow attenuation req. Eliminate static precipitation data (Appendix H). Use best available precipitation data. <p><u>Detailed technical work necessary on:</u></p> <ul style="list-style-type: none"> Watershed-specific flood control (UIS and Sensitive/Threatened Watersheds) Design storms* Precipitation data source* Storm distribution*
C	<ul style="list-style-type: none"> Improve/expand this standard to apply on the projects requiring SML permit
D	<ul style="list-style-type: none"> Clarify design storm requirement
F	<ul style="list-style-type: none"> Evaluate the waivers
*: Climate change consideration.	



Consensus-based Rulemaking for Chapter 500 Stakeholder Engagement Process



Goals & Scope

- **Promote Low-Impact Development (LID)**
 - Driven by new MS4 requirements from EPA and stormwater management trends moving toward nature-based solutions and green infrastructure
- **Address climate change & provide for better adaptation and resiliency for stormwater infrastructure**
 - Prompted by Maine Won't Wait & Maine Climate Council + general stormwater management trends across the USA
- **Streamline Rules**
 - Improve day-to-day operations and implementation
 - Provide better organization of requirements & standards



Goals & Scope (bonus)

- **Update Maine's Stormwater BMP Manual**
 - Capture recent advances in the industry and adapt to the evolving management strategies
 - Support the implementation of Chapter 500 updates with quality guidance and examples
- **Synergize construction & post construction requirements/standards**
 - New Maine CGP issued on January 14, 2025.
 - Construction General Permit will handle construction stormwater standards
 - Chapter 500 will primarily contain post-construction stormwater standards



Stakeholder Engagement Process Summary

- Third-party Facilitator (FB Environmental)
- 12-month long process
 - December 2023 → December 2024
- Meetings held every month except for January and May
- 7 Steering Committee meetings
- 7 Technical Committee meetings
- 16 Subcommittee meetings
- +70 hours of meeting time



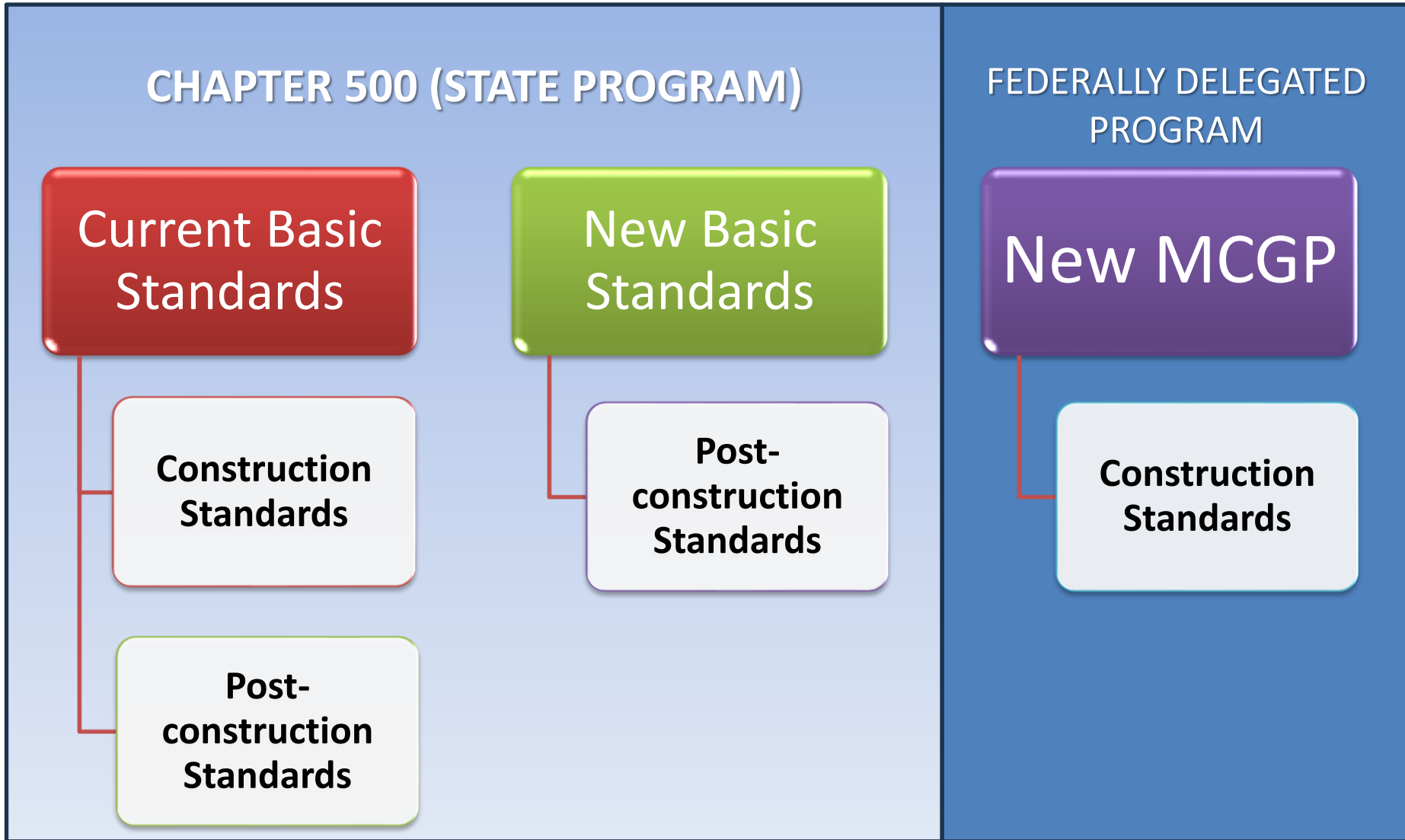
Chapter 500 Update: The Big Picture

Implementation of the New Rules



Synergy between Construction and Post-Construction Standards

Standards Apply to the Activities Disturbing One or More Acre



New Basic Standards (promoting LID)

- **Wetland Protection**
 - No disturbance area
 - Impervious area setbacks
 - Exception for wetland crossings
- **Natural Drainage Network Protection**
 - No disturbance setbacks for Natural Drainage Ways (NDW)
 - Post-Development NDW Catchment Size
 - Redistribution of Stormwater at the Property Boundary
 - Maintenance of channel continuity and catchment area at road crossings
- **Stormwater Conveyance Hydraulic Capacity**



Stream Watersheds

- Urban Impaired Streams (Chapter 502)

Lake Watersheds

- Lakes Most At Risk from New Development (Chapter 502)

Sensitive & Threatened

- Sensitive & Threatened Watersheds (Chapter 502)
- Sensitive & Threatened Regions (Chapter 502)



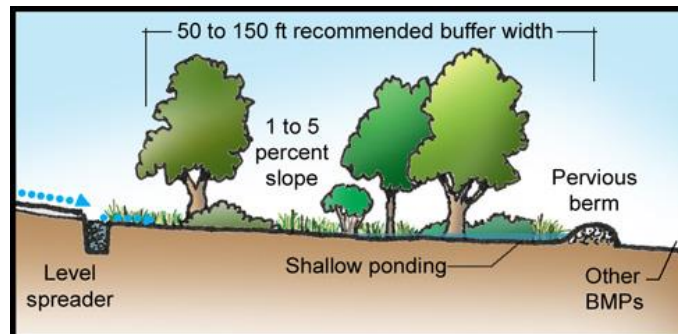
Sensitive & Threatened Watersheds & Regions

- Mandate exists currently in statute, but Chapter 500 has yet to meaningfully address that section of the law.
- Targeting specific stressors & nutrients with properly sized stormwater control measures
- Require treatment in areas where it's needed and ease treatment requirements in areas with less development.



Performance Curves for SCM Sizing

- Based on continuous simulation models
- Better for tailoring measures to remove specific nutrients
- Enables better site-specific design approaches
- Systems are efficiently sized
- Will be used to meet the “New General Standards”
- *Working to develop stormwater buffer performance curves*



New General Standards

Runoff Volume Reduction Standard

- Compensate for infiltration loss, reduce post-development runoff volume, approximate pre-development hydrology
- Full standard for UIS watersheds
- Reduced standard for Sensitive Threatened Regions & Watersheds, Site Law, Cannot meet Basic Standards

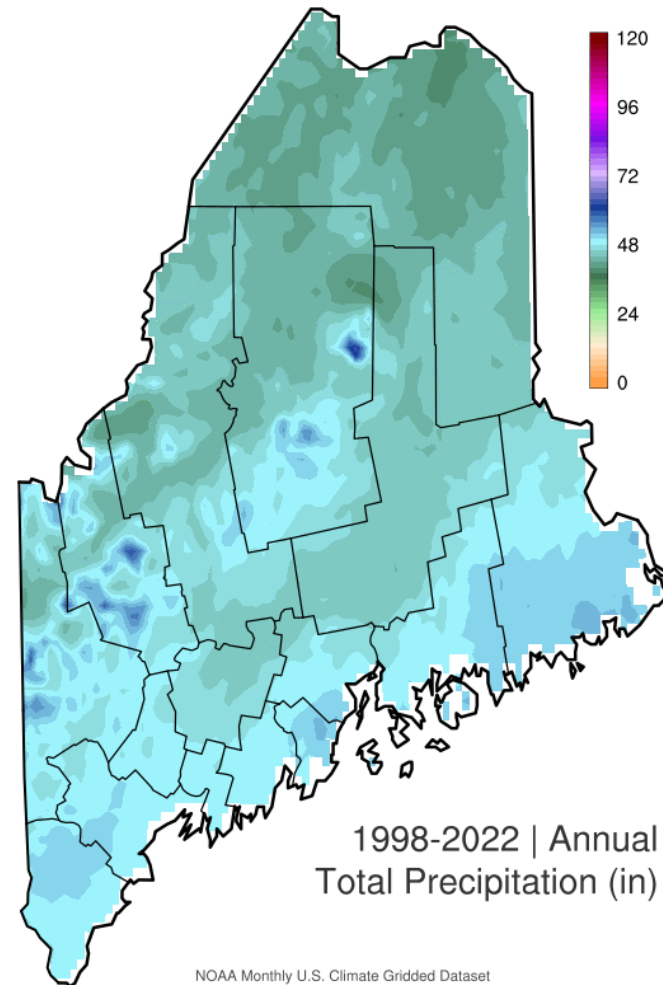
Stressor Guided Stormwater Treatment Standard

- Nitrogen and Phosphorous Stressors
 - Minimum average annual reductions using SCMs
 - Reduced requirements for Redevelopment
- Chloride Stressor
 - Chloride control measures for certain projects

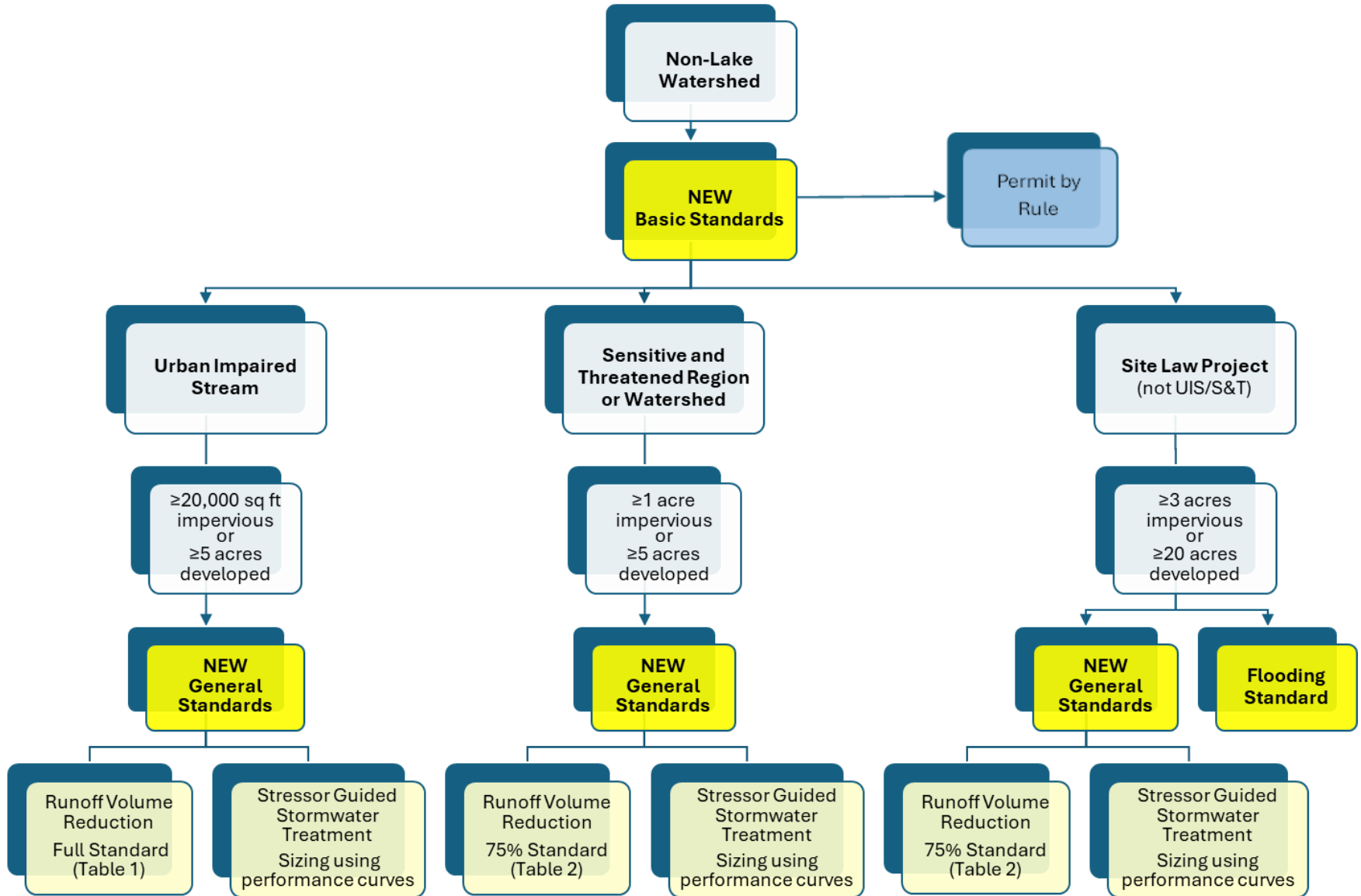


New Flooding Standard (climate change adaptation)

- Flooding Standard remains **largely unchanged**
 - Source of precipitation data change and adding optional detention waiver for UIS watersheds
- Use NOAA Atlas 14 with an 18% multiplier for climate change until NOAA Atlas 15 is released
 - Atlas 15 may be in effect by the time the rules are approved.
- Applies to Site Law Projects



New Development in a Non-Lake Watershed



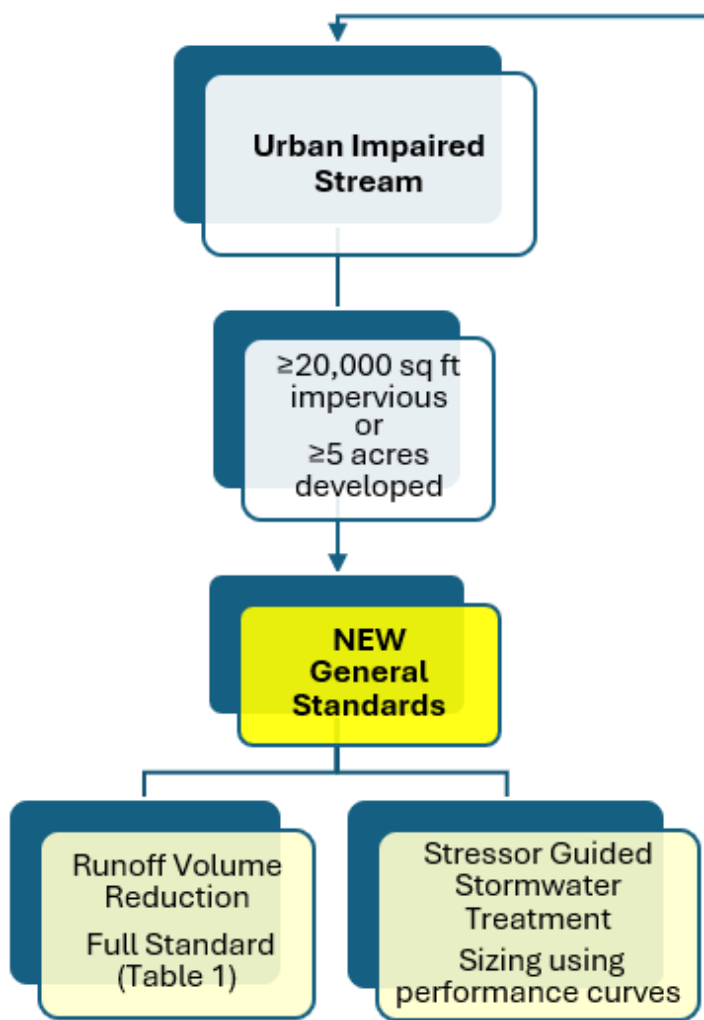
Step 1 – New Basic Standards



- **All Projects must meet New Basic Standards**
- Stormwater Law Projects qualify for a PBR if they are not required to meet:
 - The new General Standards or
 - The Phosphorus Standard



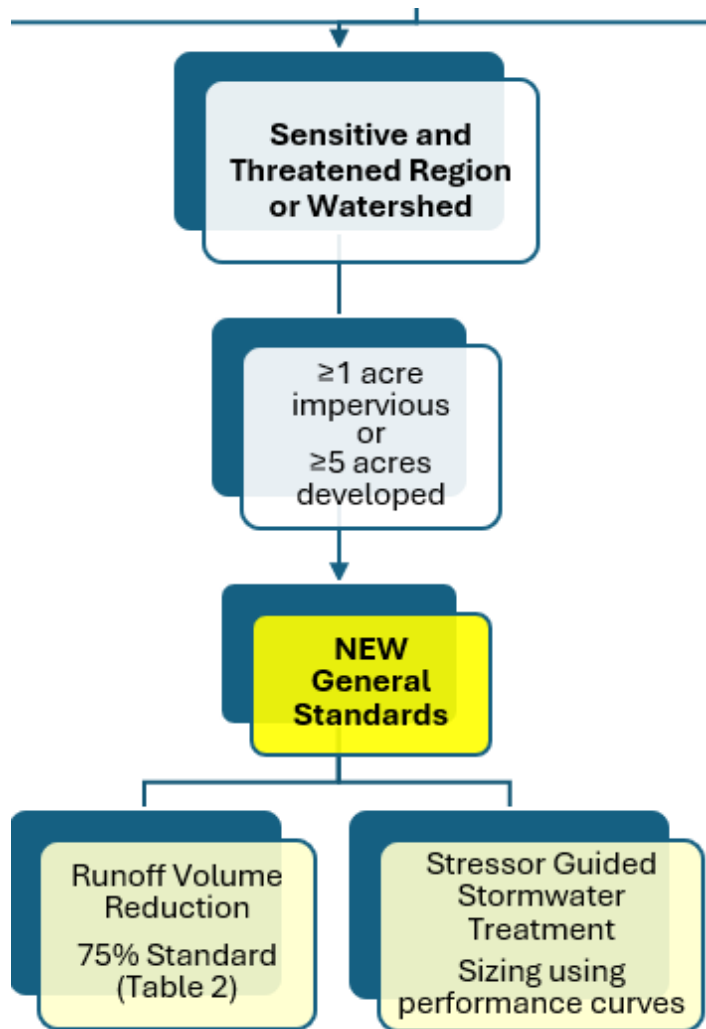
Step 2 – Urban Impaired Stream



- Projects in Urban Impaired Stream watersheds that exceed size thresholds must also meet **New General Standards**
 - Full Runoff Volume Reduction Standard
 - Stressor Guided Stormwater Treatment
 - DEP identified stressor(s): nitrogen, phosphorus, chloride
 - Sized using Performance Curves



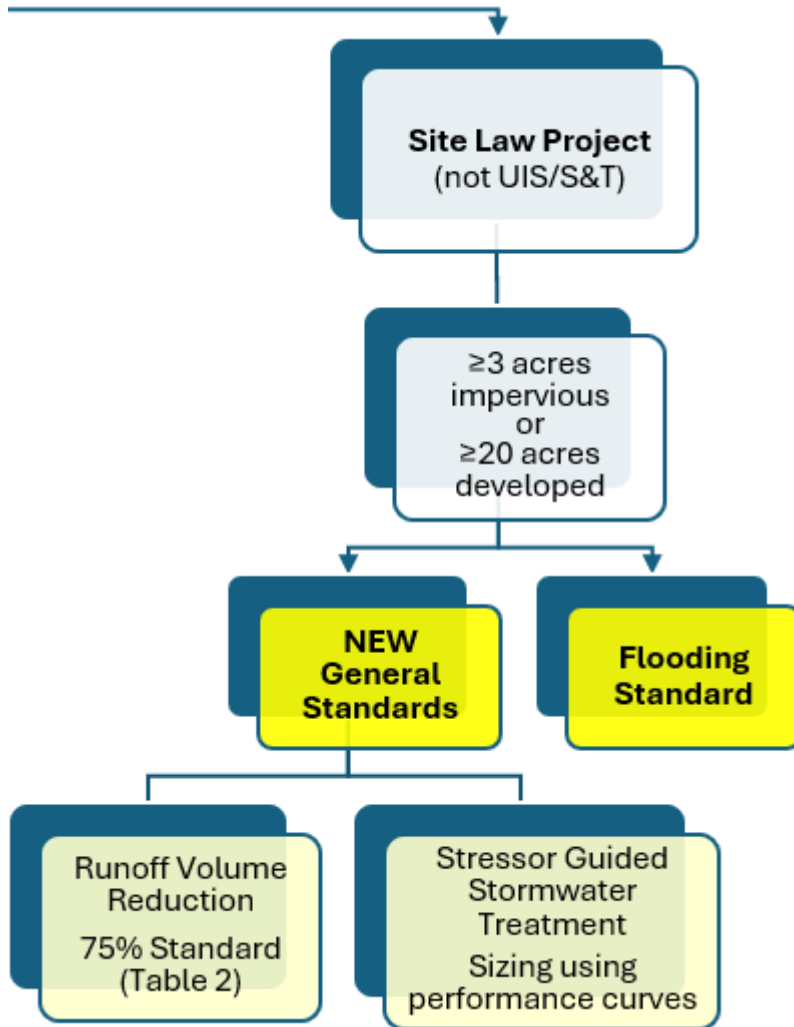
Step 3 – Sensitive & Threatened Regions or Watersheds



- Projects in S&T Regions or Watersheds that exceed size thresholds must also meet **New General Standards**
 - 75% of Runoff Volume Reduction Standard
 - Stressor Guided Stormwater Treatment
 - DEP identified stressor(s): nitrogen, phosphorus, chloride
 - Sized using Performance Curves



Step 4 – Site Law Projects (not in UIS or S&T)

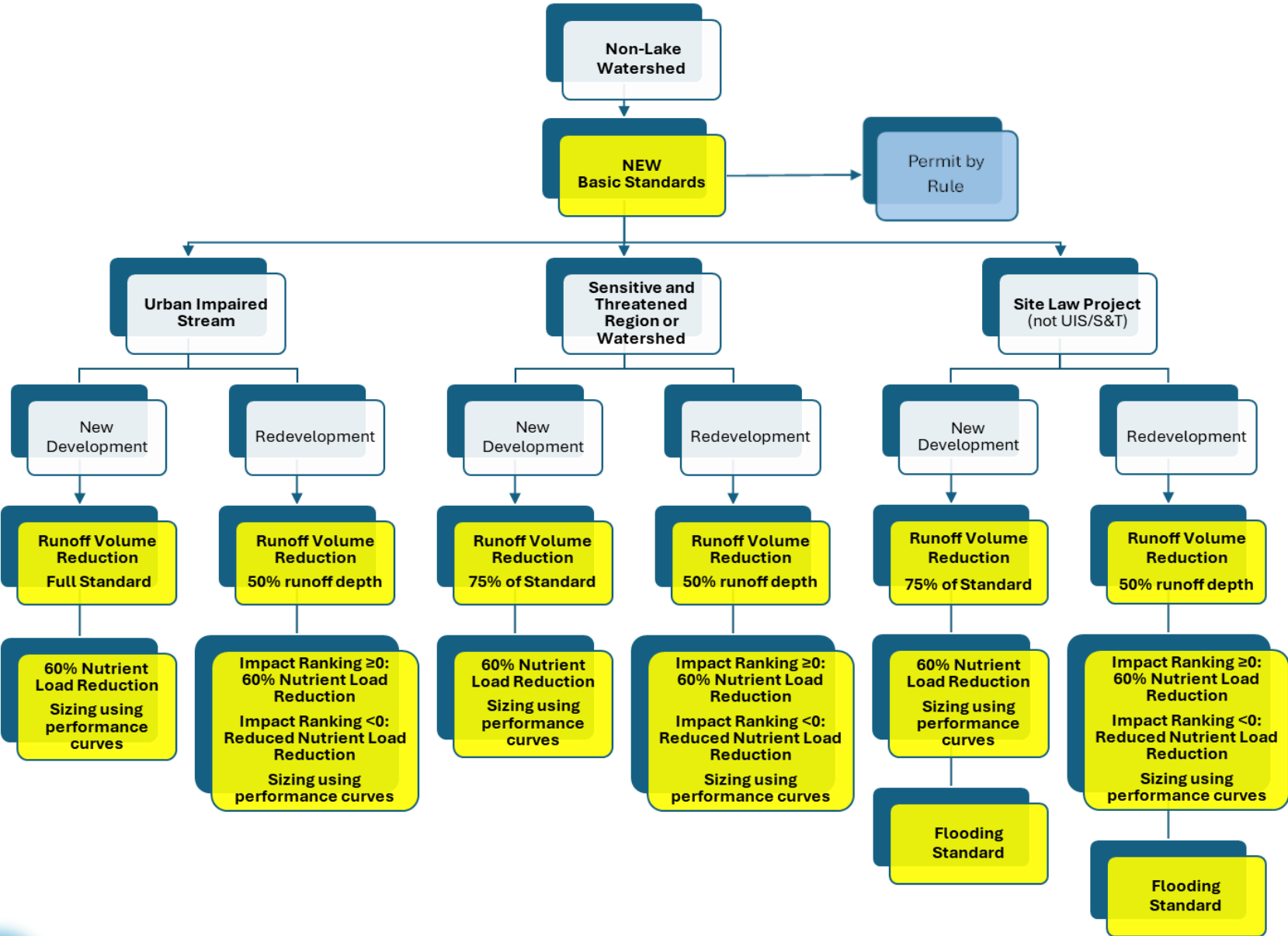


Site Law Size Projects (not in UIS or S&T) must also meet **New General Standards**

- 75% of Runoff Volume Reduction Standard
- Stressor Guided Stormwater Treatment
 - DEP identified stressor(s): nitrogen, phosphorus, chloride
 - Sized using Performance Curves



New Development + Redevelopment in a Non-Lake Watershed



Other Standards

- Phosphorus Standard
 - Remaining in place, minor compensation adjustment
- Urban Impaired Stream Standard
 - Remaining in place
- Discharge to Wetlands Standard
 - Changing maximum storage depth requirement



Example Project Reviews

- DEP Engineering Team
 - Evaluated the originally proposed core LID standards using example projects. Results of this evaluation were used to craft the new Basic Standards.
 - Has been working on example projects to demonstrate how new Chapter 500 standards will be implemented:
 - Preliminary results were presented to the Technical Committee on December 12th
- New Chapter 500 framework has been established:
 - The engineering team's work will flesh out the finer technical details



Stakeholder Engagement Process (SEP): Work Products



Action Items & Next Steps

- Engage with Steering Committee on Process Report
 - Draft form to committee members
 - Finalize report
- Rule Drafting
 - Underway
- Technical Work
 - Performance curve development for vegetative buffers
 - Stormwater BMP Manual Update
 - Contractor selected
 - Workgroup established
- Create Training Materials & Schedule Webinars
 - To assist with implementation



Chapter 500 Project Timeline

- Final Stakeholder Engagement Process Report Published
- Currently in Progress:
 - Rule drafting
 - Update of the Stormwater Manual
- Next Milestone:
 - Draft rules → Stakeholders for feedback



MAINE STORMWATER MANAGEMENT DESIGN MANUAL

Technical Design Manual
Volume III
MAY 2014



Wrap Up

Stay informed about Chapter 500 updates:

Sign up to “Chapter 500 stakeholders” mailing list by sending an e-mail to chapter500.dep@maine.gov

Bookmark DEP’s Chapter 500 webpage:

<https://www.maine.gov/dep/land/stormwater/ch500.html>





Contact:

chapter500.dep@maine.gov

www.maine.gov/dep

