New Chapter 500 Proposal - Long Memo

Table of Contents

1 Executive Summary: Proposed Chapter 500 Stormwater Rule Updates 3
2 Purpose and Background 5
2.1 Overview of Maine State Stormwater Regulations 5
2.2 Why Update Chapter 500? 5
2.3 Overview of Proposed Chapter 500 Standards 6
2.3.1 Procedures for Waivers and Exceptions 7
2.4 Locations where More Stringent Rules Apply 7
2.4.1 Urban Impaired Streams (UIS) 8
2.4.2 Lakes Most at Risk from New Development 8
2.4.3 Sensitive and Threatened Regions and Watersheds 8
2.5 Special Considerations for Transportation Agencies 10
3 Basic Standards 10
3.1 Erosion and Sediment Control 10
3.2 Applicability 11
3.3 Wetland and Natural Drainage Network Protection Standard 12
3.3.1 Wetland Protection 13
3.3.2 Natural Drainage Network Protection 14
3.3.3 Exceptions 16
3.4 Stormwater Conveyance Hydraulic Capacity Standard 16
3.5 Inspection, Maintenance and Good Housekeeping Standards 17
4 General Standards 17
4.1 Stormwater Control Measure Hierarchy 19
4.2 Runoff Volume Reduction Standard 20
4.2.1 New Development 20
4.2.2 Redevelopment 26
4.2.3 Waivers & Exceptions 27
4.3 Stressor Guided Stormwater Treatment Standard 28
4.3.1 Nitrogen and Phosphorus Stressors 29
4.3.2 Chloride Stressor 33

5 Phosphorus Standard 35
6 Flooding Standard 36
7 Other Standards 37
7.1 Urban Impaired Stream Standard 37
7.2 Discharge to Wetlands Standard 37

Figure 1. Mutually Exclusive Components of Land Development under Chapter 500 26
Figure 2. New Development in a Lake Watershed 38
Figure 3. New Development in a Non-Lake Watershed 39
Figure 4. New Development and Redevelopment in a Non-Lake Watershed 40
Figure 5. How to determine SCM Design Storage Volume 41

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1 Executive Summary: Proposed Chapter 500 Stormwater Rule Updates

The Stormwater Management Rules (Chapter 500) of the Department of Environmental Protection (Department) describe stormwater standards for activities licensed under the State's Stormwater Management Law (SML) and Site Location of Development Law (SLODA). The Department is aiming to update Chapter 500 and closely related rules to require Low Impact Development (LID) practices and address climate adaptation and resiliency. The Department also aims to streamline the rules and improve day-to-day implementation of the State's stormwater regulatory program.

Existing Chapter 500 consists of four major categories of standards: Basic, General, Phosphorus, and Flooding. The Basic Standards apply to all regulated activities. The General and Phosphorus standards are collectively referred to as the stormwater quality standards. The Flooding Standard sets the peak flow control requirements and is referred to as the stormwater quantity standard. The proposed Chapter 500 framework envisions significant changes to the Basic and General standards by integrating and requiring key LID practices for all regulated activities. Furthermore, a more nuanced, targeted approach is followed in the proposed framework to address regional stormwater management needs. New features introduced for the Basic, General, and Flooding Standards are highlighted below:

Basic Standards:

- These standards will be restructured with an LID focus to preserve the newly defined "natural stormwater infrastructure" consisting of natural drainageways and wetlands. The new standards will apply to all regulated activities, as do the current standards.

General Standards:

- The Department will develop a new list of Sensitive and Threatened Regions and Watersheds (STRWs) to protect potential surface water quality degradation and impairment due to land development since restoration of the impaired waterbodies is far more costly and complex than proactive protection.
- New provisions include:
    - Volume Reduction Standard: The current Chapter 500 has no stormwater volume reduction standard. Volume reduction has been demonstrated to be an effective LID practice.
    - Stressor Guided Stormwater Treatment Standard: The current Chapter 500 assumes that all Stormwater Control Measures (SCMs) are equal in terms of stormwater quality control, without identifying or addressing specific stressors in the watershed. Under this new standard, nitrogen, phosphorus, and chloride have been selected as the pollutants of concern and SCMs will be required to target the pollutant(s) identified for the downstream water.

    - Stormwater Control Measure Hierarchy: The proposed framework prioritizes the use of nature-based, low maintenance SCMs that retain stormwater through evapotranspiration and infiltration.

- The new General Standards will apply to all SLODA projects regardless of their location. A more nuanced approach will be followed for the Stormwater Management Law (SML) projects depending on the size and sensitivity of the downstream water. In addition, certain SML projects will be eligible for fast-track permitting through Permit-by-Rule (PBR).

Flooding Standard:

- The rule updates also account for changing precipitation patterns due to climate change by integrating the most current rainfall data and projections. This ensures that stormwater infrastructure is designed to handle more intense and frequent storms, reducing flood risks and improving long-term resilience.

Overall, these updates represent a more strategic and science-based approach to stormwater management in Maine. By aligning regulations with watershed-specific needs, prioritizing nature-based solutions, and adapting to evolving climate conditions, the new rules will help safeguard Maine's waterways, enhance community resilience, and streamline permitting for projects that incorporate best practices in stormwater management.

2 Purpose and Background

The purpose of this memo is to put together the pieces developed in the individual technical subcommittees so that the Technical Committee can see the whole picture of how Chapter 500 is proposed to function and why.

Stormwater, especially urban runoff (both from impervious surfaces and other developed lands), contains pollutants. Urbanization alters hydrology and stream habitat structure. There is a link between impervious cover and stream health. At higher levels of urbanization, water quality and habitat quality decline even with modern stormwater treatment. At high levels of urbanization, site by site stormwater treatment alone will not protect water quality, unless stormwater is treated under a comprehensive strategy.

2.1 Overview of Maine State Stormwater Regulations

Maine's stormwater regulatory regime consists of several interacting components, which include:

- **State Statutory Programs:**
  - Maine State Erosion and Sedimentation Control Law sets the minimum erosion and sedimentation control standards for all earth disturbing activities regardless of size applies to the whole state.
  - Maine Stormwater Management Law (SML) requires DEP to adopt rules specifying quantity and quality standards for stormwater from projects that disturb one acre or more
  - Chapter 500 (and related Chapter 501 and 502) stipulate the stormwater standards that must be followed to comply with the Stormwater Management Law.
  - Maine Site Location of Development (SLODA or Site Law) requires review of developments that may have a substantial effect upon the environment.

- **Federally Delegated National Pollutant Discharge Elimination System (NPDES) Programs:**
  - **Maine Construction General Permit** (MCGP) is a state-issued permit that regulates stormwater discharges from construction activities that disturb one or more acres of land.
  - **Maine Municipal Separate Storm Sewer Systems Permit** (MS4) regulates stormwater discharges from certain municipalities and institutions to reduce pollution in waterways.
  - **Multi-Sector General Permit** (MSGP) regulates stormwater discharges from industrial facilities.

2.2 Why Update Chapter 500?

The new Chapter 500 schema addresses several shortcomings with the current Chapter 500 Rules. Currently the rules require that all regulated activities meet the same General Standards regardless

of where they are located. Current rules do not consider the sensitivity of the downstream resources, the development potential of the location, or which stressors impact these watersheds. As a result, engineered structural stormwater treatment systems are commonly installed in many stream watersheds that are not necessarily threatened by land development.

Watersheds at lower risk from development can be protected by preserving the key components of natural stormwater infrastructure rather than constructing treatment measures after the fact to try to repair the impacts of development. Natural stormwater infrastructure refers to the landscape features that naturally manage stormwater by slowing, infiltrating, filtering, and storing runoff. This includes wetlands, natural drainage networks such as streams and floodplains, and undeveloped land that serves as forested or meadow buffers. These features help maintain watershed health by reducing erosion, improving water quality, supporting groundwater recharge, and providing resilience to hydrologic changes caused by development.

Additionally, non-specific engineered systems may be insufficient measures to mitigate the stormwater impacts of urban and urbanizing stream watersheds because they don't target the stressors that threaten the health of the watershed, and therefore, may not provide treatment for the most important stressors in the watershed. The stressors of concern are identified as: nitrogen, phosphorus, chloride, and post-development stormwater volume. New standards are necessary for deliberate control of these stressors, particularly in the urban watersheds and areas of growth.

Specifically, the Department has identified the following limitations of the current Chapter 500 rules that can be addressed under the updated Chapter 500.

Current Chapter 500:

- LID credit has been proven to be insufficient to promote implementation of LID principles. A different approach to LID is needed.
- Does not directly require the control of stormwater volume increase due to regulated land development.
- Does not require selection of control measures to address the stressors specific to the receiving waters.
- Does not require preservation of the natural stormwater infrastructure existing on a site.
- Does not address peak flow increases due to climate change.

Current Chapter 500 requires the same level of stormwater treatment regardless of the location of regulated land development and its potential impact on the receiving water (i.e., regulations are the same in sparsely developed versus densely developed areas).

2.3 Overview of Proposed Chapter 500 Standards

Proposed changes to Chapter 500 consist of several different categories of standards. For the present they are being referred to by the following names, with the intention of updating the names of these standards for clarity and ease of use prior to rulemaking.

- Basic Standards: These standards apply to all regulated projects and target natural stormwater infrastructure. Smaller projects may only have to meet the Basic Standards and may be eligible for a Permit by Rule.

- General Standards: These standards apply to larger projects in more sensitive watersheds and consists of stormwater control measures for runoff volume control and treatment of identified stressors of concern.
- Phosphorus Standard: This standard applies to projects within lake watersheds by implementing a per-acre phosphorus allocation. It remains the same as in the current Chapter 500.
- Flooding Standard: This standard applies to larger projects and aims to control peak flows. It remains the same as in the current Chapter 500, except for updating the precipitation source.

These standards are explained in greater detail in the sections below. These are the minimum requirements for Chapter 500. If more stringent standards apply at the local, state, or federal level, they are still required.

2.3.1 Procedures for Waivers and Exceptions

New Chapter 500 standards have been crafted with the intent of incorporating LID practices into site design as early as possible. The regulated community will need to follow a systematic approach prioritizing nature-based retention measures and allowing the use of engineered structural measures as the higher priority alternatives are exhausted. We anticipate that the regulated activities that will develop a relatively high portion of their parcels will be challenged more than the other activities to comply with the new LID standards. Another challenge will be for the activities that are required to meet both the LID standards, especially runoff volume reduction standard, and chloride control standard.

The Department intends to draft the new rules such that reasonable waivers and exceptions are provided under the new standards. The waivers and exceptions are not going to be unilaterally claimed and used by the applicants; they are going to be subject to the approval of the review authority, primarily the Department or its Designees[1]. There will be an alternative analysis requirement for the activities that cannot comply with the primary LID standards (wetland and natural drainageway protection standards, runoff volume reduction standard). It is important to provide technical guidance and decision support tools well understood by the regulated community (e.g., consulting engineers) and the regulators (e.g., review engineers) so that the alternative analysis step is as clear and objective as possible. The Department is planning to provide this guidance and tools through the Stormwater Manual Update project which is currently underway and will be completed by the final adoption of new Chapter 500.

2.4 Locations where More Stringent Rules Apply

The existing Chapter 500 rules call out two types of watersheds for additional stormwater treatment: “urban impaired streams” and “lakes most at risk from new development”. In addition

[1] Please note that the Stormwater Management Law has a “Stormwater Capacity” provision (Section 7(C)) for the municipalities that have ordinances meeting or exceeding Chapter 500 standards. This provision will be effect under new Chapter 500 as well and the “Stormwater Capacity” municipalities will be implementing stormwater standards like those in Chapter 500.

to these categories, the new Chapter 500 proposal includes "sensitive and threatened regions and watersheds".

2.4.1 Urban Impaired Streams (UIS)

The definition and use of the term "urban impaired stream" is in the current Chapter 500 rules and is remaining the same. Urban impaired stream means a stream or stream segment that meets the criteria of Chapter 502 and is listed in Chapter 502 Appendix B[2]. A project must meet the General Standards if located in the direct watershed of urban impaired stream and results in 20,000 square feet or more of impervious area, or 5 acres or more of developed area.

2.4.2 Lakes Most at Risk from New Development

The definition and use of the term "lakes most at risk from new development" is in the current Chapter 500 rules and is remaining the same. A lake is considered most at risk from new development if it meets the criteria listed in Chapter 502 and is listed in Chapter 502 Appendix A(3). Broadly, a lake is considered most at risk from new development if it is a public water supply, identified as being in violation of class GPA water quality standards, or is identified as particularly sensitive to eutrophication.

Severely blooming lakes constitute a subset of lakes most at risk from new development and are identified in Chapter 502 Appendix A. A severely blooming lake has a history of algal blooms, and the reduction of existing watershed phosphorus sources sufficient to eliminate those algal blooms is expected to be so difficult that the addition of new, incompletely mitigated development sources may prevent successful restoration of the lake.

A project in the direct watershed of a lake most at risk from new development must meet the Phosphorus Standard if results in 20,000 square feet or more of impervious area, or 5 acres or more of developed area. In certain cases, projects may choose to meet the New General Standards instead of the Phosphorus Standard.

2.4.3 Sensitive and Threatened Regions and Watersheds

The current Chapter 500 provides additional protection to streams in urban settings that have already been identified as impaired. However, there are many streams in urbanizing watersheds that are not listed as impaired but where both the current level of development and recent trends in development in the watershed indicate high potential for future impairment of the stream. The addition of Sensitive and Threatened Regions and Watersheds (STRW) to Chapter 500 provides additional protections for these streams from regulated discharges of stormwater and associated pollutants. This is essential because it is much easier and more cost-effective to prevent a stream from becoming impaired than it is to restore it, especially in urban and urbanizing areas where the landscape in the watershed has changed significantly.

The Stormwater Management Law (SML) anticipated this issue and included the requirement for the Department to create a list of Degraded, Sensitive and Threatened Regions and Watersheds.

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[2]06-096 CMR 502(3)(B) and 06-096 CMR 502 Appendix B
[3] 06-096 CMR 502(3)(A) and 06-096 CMR 502 Appendix A

Currently, Chapter 502 includes a list of Lakes Most at Risk from Development, which includes both degraded and sensitive and threatened lake watersheds. Additionally, Chapter 502 includes a list of Urban Impaired Streams, which identifies the degraded streams as required by the SML but fails to identify sensitive and threatened regions and watersheds. The intent of the Chapter 500 update effort includes amending Chapter 502 to add a list of Sensitive and Threatened Regions and Watersheds (STRW), along with the criteria used for creating this list. The plan is to regularly update (no more than every 5 years) this list based on changing land use data that becomes available through regularly updated GIS products.

There is a strong relationship between the percent impervious cover (IC) of a watershed and the quality of the biota, as reflected in the fish and insect communities living in the stream (Danielson et al). This relationship is partially a result of the pollutants carried in the stormwater from the developed area as well as the increase in the volume of stormwater runoff reaching the stream. While other factors influence this relationship, particularly the condition of the riparian corridor which is often altered in association with the development of the watershed, there is sufficient data now available on both current and past density of impervious cover to provide an effective tool for identifying both watersheds that may already be impaired as well as ones where the threat of future impairment is high.

The two impervious cover data sets used for this evaluation are: the 2021 NOAA Coastal Change Analysis Program (C-CAP) Version 2 IC Layer for estimating the current imperviousness of the watershed and the National Landcover Consortium Database (NLCD) historic (2001 to 2019) estimates of IC for assessing that rate of past change in IC. These data were extracted for stream catchments defined using the NHDPlus HiRes data set.

After much consideration, evaluation and input from the S&T Sub-committee and the Technical Committee, the proposal for identification of Sensitive and Threatened Stream Watersheds has been updated. The proposed criteria for determining which stream watersheds should be included in the STRW list are as follows:

- 1st, 2nd and 3rd order streams with watersheds ≥ 200 acres in size where:
    - the sum of the Current % IC[4] + 3(Change in % IC[5]) = >10%
- Watersheds of Class A and AA streams.

The drawback of the above approach is that while limiting the size of the watersheds included on the list is necessary in order to make the list useable and manageable, it excludes all smaller streams and non-stream catchments within highly urban or urbanizing municipalities from receiving the additional stormwater control measures that would apply to catchments on the list. Since the potential for new development in these small catchments is high, it is appropriate that development in these areas also meet the stormwater quantity (i.e., runoff volume reduction) and quality requirements for Sensitive and Threatened watersheds.

[4] 2021 NOAA Coastal Change Analysis Program (C-CAP) impervious layer
[5] 2001 and 2019 Land Cover Consortium National Land Cover Database (NLCD) impervious layers

Based on the factors above, urban and urbanizing municipalities are proposed to be included on the STRW list as Sensitive and Threatened Regions. The proposed list of municipalities was determined based on a combination of factors including current %IC, change in %IC, number of high %IC catchments located in the municipality, MS4 municipalities, number of SLODA and full SML permits/area/year, and best professional judgement. Thirty-nine municipalities are proposed for inclusion on the STRW list, and are included in Appendix A.

2.5 Special Considerations for Transportation Agencies

Most of the projects undertaken by Maine's transportation agencies are linear projects having certain characteristics different from the non-linear activities permitted under the Stormwater Management Law and Site Location of Development Act. For instance, linear transportation projects transect multiple catchments and have limited right-of-way. These characteristics will be considered in the implementation of new Chapter 500 standards to linear transportation projects.

After new Chapter 500 is finalized, the Department will negotiate with MaineDOT and MTA to update the "Stormwater Management Memorandum of Agreement (MOA)" between the three agencies pursuant to the Stormwater Management Law 38 M.R.S. §420-D(7)(G).

3 Basic Standards

The update to Chapter 500 proposes changing the Basic Standards that all regulated activities must meet. The new Basic Standards of Chapter 500 will incorporate important components of Low Impact Development that will limit the impact of projects by protecting the wetlands and natural drainage network through site layout and design.

The changes to Chapter 500 propose that projects meeting certain criteria will only need to meet the Basic Standards and not be required to meet the General Standards. Additionally, the stormwater Permit by Rule (PBR) eligibility thresholds of certain Stormwater Management Law (SML) projects that meet the new Basic Standards will be increased. The net effect is to simplify permit application requirements, speed up permit processing (through the PBR process) and ensure that projects expected to have minimal impact on water quality because of their size, location, and design will not require expensive, high maintenance engineered structural treatment measures.

3.1 Erosion and Sediment Control

The portion of the current Basic Standards that addresses erosion and sediment control during construction (existing Appendix A) will be removed from Chapter 500. Related requirements are now implemented through the Maine Construction General Permit (MCGP). The Department issued a new MCGP on January 14, 2025, which has stricter standards than Chapter 500 Appendix A.

Site Location of Development Act (SLODA) requires review of developments that may have a substantial effect upon the environment. These types of development have been identified by the Legislature and include developments such as projects occupying more than 20 acres, large structures (impervious area three acres or greater), large subdivisions, and oil terminal facilities. A

permit is issued if the project meets applicable standards addressing areas such as stormwater management, groundwater protection, infrastructure, wildlife and fisheries, noise, and unusual natural areas. SLODA includes a "stormwater management and erosion and sedimentation control standard (§484(4-A))". The Department has separate rules for SLODA permits in "Chapter 375. No Adverse Environmental Effect Standards of the Site Location of Development Act". Chapter 375(5) addresses erosion and sediment control and sets submission requirements for the SLODA applications. SLODA projects will still be required to comply with Chapter 375 regardless of any changes to Chapter 500. The new MCGP contains stricter standards than Chapter 375(5), so all erosion and sedimentation control plans will comply with MCGP standards. No construction that will disturb one acre or more is permitted to start without an NOI.

3.2 Applicability

In recognition of the fact that many land use activities result in less than one acre of impervious area and are therefore below the permitting threshold established in this Chapter, the Department acknowledges that it does not have the capacity to regulate all such activities. However, as a home-rule state, Maine allows municipalities to adopt more restrictive local stormwater standards as they see fit to address local water quality concerns. Additionally, municipalities may seek delegated authority or municipal capacity status from the Department, enabling them to conduct their own stormwater permitting programs in coordination with state requirements.

The Basic Standards will continue to apply to all Chapter 500 projects, namely

- All activities licensed under the State's SML:
  - The activities that result in one or more acres of disturbed area
- All activities licensed under the State's Site Location of Development Act.

Some projects needing a SML permit may quality for a Stormwater Permit by Rule (PBR). A Stormwater PBR is a streamlined permitting process that allows certain lower-impact stormwater projects to proceed without obtaining an individual stormwater permit, provided they meet predefined criteria and standards designed to prevent significant environmental harm. A project will qualify for a stormwater PBR if it meets the new Basic Standards and is in:

a. **Direct watershed of a lake most at risk or urban impaired stream** and results in less than 20,000 square feet of impervious area and occupies less than 5 acres; or
b. **Direct watershed of a lake that is not a lake most at risk** and results in less than one acre of impervious area and occupies less than 5 acres**;**
c. **Sensitive and threatened regions and watersheds** and results in less than one acre of impervious area and occupies less than 5 acres; or
d. **Any other non-lake watershed** and results in less than 3 acres of impervious area and occupies less than 5 acres.

Considering that MCGP classifies any construction activity that disturbs five or more acres as "large construction activity", the upper limit of Stormwater PBR eligibility has been adjusted to occupies five acres to have a regulatory approach consistent with MCGP. Regulated activities that occupy five or more acres and less than 20 acres will be required to have a full Stormwater permit if they will result in less than three acres of impervious area. The regulators will have more time to

review these “large” projects. This is a change from the current Chapter 500 where certain projects occupying up to 20 acres are eligible for a Stormwater PBR since they do not result in five acres of developed area (e.g., solar farms).

All the Basic standards must be met to qualify for the Stormwater PBR. SML projects that cannot meet the Wetland and Natural Drainage Network Protection Standards will be ineligible for PBR. Projects that demonstrate they cannot meet the Basic Standards will be required to meet the Runoff Volume Reduction Standard (Table 3) from the General Standards. Water quality level of control is not a priority for these projects since their pollutant load to the receiving waters is comparatively low. It must be noted that compliance with the Runoff Volume Reduction Standard will lower the pollutant load of these projects considerably along with their runoff volume.

3.3 Wetland and Natural Drainage Network Protection Standard

This standard targets natural stormwater infrastructure measures and LID practices and consists of wetland protection and natural drainage network protection elements as specified in sections 3.3.1 and 3.3.2.

Emphasis is often placed on the chemical parameters associated with good water quality, such as pollutant loading from wastewater and stormwater sources, but physical processes (e.g., flow regime patterns) and parameters (e.g., habitat structure) are just as critical to the health of a water body. The physical *presence* of water resources and their physical characteristics play a crucial role in the health of a watershed.

A clear relationship exists between the physical and chemical condition of the water body and the aquatic species that can survive in it. Maine’s water quality standards include an “aquatic life use” standard meant to ensure the protection of native fish and other aquatic species. Moreover, monitoring a water body’s ability to support healthy fish and other aquatic species provides regulators with a useful tool for determining whether or not that water body is meeting its designated water quality classification.

While natural systems tend to be robust, the cumulative impacts of habitat loss result in an inability of the system to support healthy aquatic life. For example, a stream that loses too many of its associated wetlands to impervious areas will suffer from the scouring effects of heavy runoff during storms and be starved from reduced baseflow during dry weather. That lack of baseflow and damage to the stream channel reduces the ability of the stream to support fish, insects, and other aquatic life. The stream will be unlikely to meet aquatic life standards.

Wetlands, particularly those associated with intermittent and ephemeral streams, provide essential services to associated stream systems, including: recharge of groundwater that supports downstream baseflow; detention of runoff during storm events; attenuation of fine sediments; and refugia for stream biota during dry periods. Cumulatively, many small wetlands within a headwater catchment support the biology, hydrology and geomorphology of the stream(s) to which they drain. They also enhance the stream systems’ resilience to extreme dry and wet conditions becoming more prevalent due to climate change.

Headwater streams include the most upstream perennial streams in a system and the intermittent (no surface flow during extended dry periods) and ephemeral (surface flow only during and shortly after storm events) streams. Headwater streams play a large role in downstream flood control, baseflow in downstream perennial reaches, pollution attenuation, sediment balance, and habitat and food supply for instream biota. When these headwaters are altered or eliminated, downstream reaches suffer.

While the benefits listed above demonstrate the importance of each individual headwater stream, the network of these drainage ways provides an intact delivery system to the downstream habitats. Activities that significantly alter the network (e.g. diversion of one channel into another, expansion or contraction of a drainage way's catchment size or increase in the catchment's impervious cover) can compromise the system's function by redistributing the stormwater load in ways that will dry up some channels and overload others, increasing the potential for catastrophic failure. Protection of the network's integrity is as important as protection of the individual channels that make up the network. Preserving the natural stormwater infrastructure of the site, i.e. natural drainage ways and wetlands, is essential to meeting the requirements of the SML.

3.3.1 Wetland Protection

The Wetland Protection standard prohibits disturbance of wetlands and provides an impervious area setback in order to allow for construction related activities around the developed area without encroaching on the wetland. While NRPA limits the amount of disturbance that can happen within a wetland, it does allow significant disturbance or elimination as long as offsite compensation is provided. This standard is an LID standard that is intended to preserve the integrity of all wetlands on site.

The "No Disturbance" requirement prevents any disturbance (e.g., filling, excavating, harvesting, draining) of freshwater and coastal wetlands as defined in the definitions section of NRPA, except in the case of wetland crossings. This prohibits temporary storage or installation of erosion and sedimentation controls, excepting those required for the installation of a stream crossing. These are the wetlands under the jurisdiction of NRPA and must be mapped on the Site Plans of the land development projects requiring SLODA or Stormwater permits.

The "Impervious Area Setback" is not a no disturbance setback. The setback is intended in part to reduce the risk of direct impact to wetland areas during construction, by ensuring available space outside of the wetland for the use of equipment, material storage, etc. during construction. Within this setback, disturbance can occur. All activities defined as disturbance under Chapter 500 are allowed within this setback. "Disturbed area" means all land areas that are stripped, graded, grubbed, filled, bulldozed or excavated at any time during the site preparation or removal of vegetation for, or construction of, a project.

1. <u>No Disturbance</u>
   There can be no disturbance of NRPA Protected wetlands on the project site.

2. <u>Impervious Area Setback</u>
   Impervious areas must be located at least 15 feet away from an NRPA protected wetland.

3. Exception to the No Disturbance and Impervious Area Setback requirements: Wetland Crossings

   Road crossings are allowed through NRPA protected wetlands provided that:

   a. The design standard for the Natural Drainage Way crossing (see 3.3.2.1 c) applies if the wetland contains a Natural Drainage Way.
   b. For wetlands containing no Natural Drainage Ways, the crossing has a permeable base (e.g. rock sandwich), culvert, or bridge allowing hydrologic connectivity under the road.
   c. The project's road layout is designed to limit both the number of wetland crossings and the cumulative square foot area of the wetlands impacted to the minimum necessary to support the project's function.

3.3.2 Natural Drainage Network Protection

3.3.2.1 Natural Drainage Ways

The Natural Drainage Network Protection standard is composed of no disturbance buffers for all natural drainage ways (NDW) (see definition below) with allowances for NDW crossings. There is existing precedent for this type of standard in the SLODA, which includes a "No Unreasonable Alteration of Natural Drainage Ways" standard (Chapter 375 (3)). This provides some protection to natural drainage ways. Chapter 375 rules require a drainage right-of-way at least 30 ft in width for the protection of natural drainage ways and restricts any grading or other construction activity which will unreasonably alter natural drainage ways, adversely affect adjacent parcels or impede drainage from adjacent parcels into the project site. The proposed Natural Drainage Network Protection standard in Chapter 500 expands and clarifies this concept.

a. Natural Drainage Way (NDW) Definition – any pre-development natural channel with an eroded mineral (sand, gravel, rock, or hard clay) bottom that is within, passing through, or adjacent to the project site.

   i. NDW-1 – mapped as a 1st or higher order stream in the National Hydrology Dataset (NHD) Plus High-Resolution[6] Stream Layer.

   ii. NDW-2 – not mapped as a 1st or higher order stream in the NHD Plus High-Resolution Stream Layer = 15 ft

b. Minimum NDW No Disturbance Buffers

   i. NDW-1 = 75 ft

      i. Off-site NDW-1. If a NDW-1 on an adjacent parcel is less than 75 feet from the property boundary, the portion of a 75 foot setback from that

[6] National Hydrography Plus High Resolution dataset is a comprehensive hydrography product of USGS. Detailed information is available here. NHDPlus HR stream layer mentioned in this memo refers to the NHDPlus HR "flowlines" layer.

NDW-1 that is within the project property will be designated as a no disturbance setback.

ii. NDW-2 = 15 ft

iii. No Disturbance. No disturbance and no cutting of vegetation is allowed within these buffers except for necessary road crossings. These buffers are part of the natural stormwater infrastructure. Intact buffers allow natural drainage ways to come out of their banks and utilize a floodplain during high flows. Additionally, NDW buffers provide plant matter (e.g., leaves) supply from vegetation along the channel to sustain aquatic life and shading by riparian trees provides temperature regulation. They provide stormwater retention during small and frequent events and dampening stormwater velocity. No disturbance buffers allow for these vital processes to be maintained. Exceptions are provided in section 3.3.3.

c. NDW Crossings – new road crossings are allowed on NDW-1 and NDW-2 drainage ways provided that:

i. Minimum opening size of an NDW crossing structure (bridge or culvert) will be determined using the Table below.

Drainage Area of the NDW Crossing (ac)	Design Peak Flow
<10	25 year
10-50	50 year
>50	100 year

ii. Crossings of perennial NDW-1 drainageways meet Stream Smart (aquatic connectivity) principles: (a) Span the Stream Channel, (b) Set the Crossing at the Correct Elevation, (c) Slope Matches the Stream, (d) Substrate in the Crossing.

iii. The road layout is designed to limit the number of crossings of NDW-1 drainage ways to the minimum necessary to support the project's function.

3.3.2.2 Downstream and Off-Site Channel Protection and/or Landscape Protection

a. Post-Development NDW Catchment Size and Imperviousness
The following applies to the catchments of the NDWs that leave the site in the pre-development condition to preserve downstream channel integrity:

i. The proposed development cannot increase the pre-development catchment area upstream of the point at which the NDW leaves the property by more than 10%.

ii. Impervious area draining into a NDW cannot be increased more than 10% of its pre-development catchment area upstream of the point at which the NDW leaves the property.

b. Redistribution of Stormwater Discharge
   i. If in the pre-development condition the stormwater discharge point from a catchment is unconcentrated, well distributed sheet flow not discharging directly to an NDW this flow condition must be maintained.
   ii. If the stormwater runoff has been concentrated prior to discharge from the property it must be effectively redistributed via a level-lip spreader that is at least 15 feet from the property boundary unless the catchment that drains to the level-lip spreader contains more than 20,000 sq. ft. of impervious area, in which case the level-lip spreader must be at least 50 feet from the property boundary. If the stormwater discharge point is at a property boundary, concentrated stormwater can be discharged if a drainage easement is obtained from the owner of the property to which the concentrated stormwater will drain.

c. Maintenance of channel continuity and catchment area at road crossings
   i. In instances where the upgradient slope will drain to the road ditch, crossing structures (e.g., culverts or rock sandwiches) must be frequently placed at intervals no greater than 250 feet to avoid concentration of flow and catastrophic erosion of downgradient channels.

3.3.3 Exceptions

a. The following activities associated with delivery of stormwater to the NDW are excepted from the no disturbance requirement:
   i. Installation of stabilization measures (e.g. regenerative stormwater conveyances) to prevent erosion due to a new stormwater discharge outlet,
   ii. Installation of stabilization measures (e.g. regenerative stormwater conveyances) to address erosion issues due to an existing stormwater discharge outlet.

b. No Disturbance Buffers *are not* required for sections of channel flow that are in pipes or culverts but *are* required for relocated or otherwise altered reaches of 1st or higher order streams.

c. Post development catchments less than 10,000 sq ft are excepted from the requirement to maintain sheet flow discharge.

d. If site limitations prevent adherence to the 250-foot spacing requirement for crossings, adjustments may be made at the Department's discretion to accommodate these constraints.

e. Existing road crossings of NDWs that are proposed for modification and that do not meet the NDW Crossing standards are exempt from the NDW Crossing standards if it is impracticable to upsize the existing NDW crossing to meet these standards.

3.4 Stormwater Conveyance Hydraulic Capacity Standard

The Department proposes moving the stormwater conveyance hydraulic capacity standards from the Flooding Standard into the Basic Standards, such that all stormwater conveyances permitted under Chapter 500 must comply with minimum hydraulic capacity standards:

The minimum stormwater conveyance hydraulic capacity will consist of a 25-year return period design storm for closed drainage and a 50-year return period design storm for open drainage systems. This change is more in line with what our partners are requiring and accommodates climate change resiliency.

3.5 Inspection, Maintenance and Good Housekeeping Standards

Since construction stormwater management of the projects will be addressed by the Maine Construction General Permit (MCGP), the new basic standards of Chapter 500 will address the post-construction management. Therefore, the following will be addressed in the appendices of the new Basic Standards:

- Minimum inspection and maintenance standards for the post-construction stormwater control measures (SCMs): e.g., SCM minimum inspection frequency. The State's updated "Stormwater Manual" will be referenced for detailed SCM inspection and maintenance guidelines. See Chapter 500 Appendix B(1)(2) for the current post-construction inspection and maintenance standards. The Department will continue the five-year recertification requirement in the existing Chapter 500. Improvements to the requirement include:
    - Inspections must be done by a qualified third party, no self-inspection unless the permittee has demonstrated capacity to carry out the inspections.
    - The Department will provide third party inspection and maintenance contract template ensuring that the stormwater management systems are routinely inspected in accordance with the approved inspection and maintenance plan. The Department will ensure that the permittee has sufficient resources for third party inspection.
    - Specify the maintenance and inspection procedures for specific SCMs in the Manual.
- Minimum good housekeeping standards applicable to post-construction operation and maintenance of the project: spill prevention, groundwater protection, authorized and unauthorized stormwater discharges. See Chapter 500 Appendix C for the current good housekeeping standards that apply to both construction and post-construction phases of a project. MS4 permittees and other municipalities may have additional maintenance, inspection and reporting requirements.
    - Good housekeeping measures specified in the MS4 general permit (MCM6) will be reviewed and considered for inclusion.

4 General Standards

The existing General Standards apply to all regulated activities regardless of their location or watershed (except for the activities that are in the lake watersheds and trigger the Phosphorus Standard[7]). The revised General Standards will no longer apply to most activities in areas thought to be less vulnerable to water quality degradation due to land use change (i.e. outside of Urban Impaired Stream watersheds, Lake watersheds, and Sensitive and Threatened Regions and

[7] Chapter 500(4)(D)

Watersheds) provided that they meet the Basic Standards (Wetland and Natural Drainageway Protection Standard). This change is intended to reduce the burden on projects where natural stormwater infrastructure is sufficient to protect water resources.

Additionally, the Current General Standards do not directly address important water quality threats, including post-development stormwater volume increase, loss of groundwater recharge, and specific stressors of concern based on the location of a regulated activity. Furthermore, the existing General Standards have not encouraged adoption of Nature-based and Low Impact Development stormwater treatment approaches, which provide additional water quality and environmental benefits compared to many traditional methods for stormwater management.

The new General Standards are designed to address these missing components and key water quality concerns and consist of two main components: the Runoff Volume Reduction Standard and the Stressor-Guided Stormwater Treatment Standard. The Runoff Volume Reduction Standard focuses on controlling runoff volume to mitigate hydrologic changes caused by most regulated activities. Meanwhile, the Stressor-Guided Stormwater Treatment Standard applies location-specific criteria to address pollutants of concern—nitrogen, phosphorus, and chloride—that impact downstream waters.

The existing approach to stormwater management does not fully account for the fact that most pollutants are released during the first flush of a storm event. Traditional volume-based treatment methods often result in oversized stormwater controls that require more space and maintenance than necessary. In contrast, the SCM Performance Curves, developed by the University of New Hampshire (UNH) and EPA, leverage long-term (typically for a period of 25 years or more) continuous simulation to provide a more accurate assessment of pollutant loading and treatment performance over time through model calibration and validation using the best available monitoring data. The performance curve development approach offers flexibility to (a) improve existing SCM curves as more comprehensive and/or site-specific monitoring data becomes available, (b) create curves for new SCMs, (c) expand existing SCM performance curves to address new pollutants of concern.

By using continuous simulation, these curves account for real-world variability in storm sizes, seasonal fluctuations, and pollutant discharge patterns. This enables the implementation of better BMPs that are appropriately sized, require less space, and effectively target stressors of concern—rather than relying on overly conservative and maintenance-intensive designs. The Department has retained a consultant to refine these curves further, particularly to enhance representation of forest and meadow stormwater buffers, which improve storage and evapotranspiration. This approach ensures that stormwater treatment is more effective, efficient, and aligned with the best available science.

The General Standards will apply to both new development and redevelopment, with less stringent requirements for redevelopment to reflect existing site conditions and practical constraints, as well as to encourage development in already developed areas rather than undeveloped locations.

The new General Standards will apply to all projects that:

- Result in 20,000 square feet or more of impervious area or occupy 5 acres or more in the Urban Impaired Stream Watersheds
- Result in one acre or more of impervious area, or occupy 5 acres or more in the Sensitive and Threatened Watershed or Regions
- Result in three acres or more of impervious area or occupy 20 acres or more (SLODA Projects) in a non-lake watershed

The Volume Reduction Standard (4.2) component of the new General Standards will also apply to SML projects[8] that wouldn't otherwise be subject to the General Standards because they do not meet the criteria above but have demonstrated they cannot comply with:

- The Wetland Protection Standard (3.3.1) or
- The Natural Drainage Network Protection Standards (3.3.2)

This is to ensure that at least some hydrologic control is provided for projects not getting the benefit of the natural stormwater infrastructure that is provided by the Wetland Protection and Natural Drainage Network Protection Standards.

For lake watersheds, applicants can elect to comply with the new General Standards rather than meet the Phosphorus Standard provided that the project:

- Results in one acre or more impervious area and occupies less than 5 acres in a lake watershed and:
  - Results in less than three acres of impervious area in a lake watershed
  - Is not located in the watershed of a severely blooming lake (indicated in Chapter 502)

4.1 Stormwater Control Measure Hierarchy

A hierarchical approach will be used to select the Stormwater Control Measures (SCMs) for the treatment of nitrogen, phosphorus, and runoff volume, with nature-based, non-structural retention SCMs having the highest priority. This hierarchy is intended to promote LID under Chapter 500. The project's stormwater system design engineer will demonstrate that higher priority SCMs have been properly evaluated before considering the lower priority SCM alternatives. The following SCMs will be considered in the descending order for nitrogen/phosphorus removal and runoff volume reduction:

a. Non-structural Retention[9] Measures (e.g. forested or meadow buffers)
b. Structural Retention Measures (e.g. infiltration trench, unlined bioretention cell, unlined soil filter)

[8] Specifically, the SML projects that would otherwise qualify for a stormwater PBR if they met these new Basic Standards.
[9] Here, "retention" refers to all SCMs that can reduce stormwater volume through infiltration and/or evapotranspiration. Not to be confused with wet ponds, which are commonly called as "retention ponds".

c. Structural Treatment Measures (treatment with no evapotranspiration or infiltration) (e.g. subsurface stormwater control measures, high flow rate proprietary measures).

The criteria for alternatives analysis will be stated in the Rule, ensuring that the requirement to incorporate Low Impact Development is explicitly stated. The updated Stormwater Manual will provide tools and technical guidance to help applicants meet the standards, including new and additional Stormwater Control Measures that support compliance. While the Rule establishes the framework for analysis and compliance expectations, the Manual will serve as a technical resource to guide effective implementation.

4.2 Runoff Volume Reduction Standard

The Runoff Volume Reduction standard aims to compensate for the pre-development infiltration loss due to new impervious cover, reduce post-development runoff volume, and approximate post-development hydrology to pre-development hydrology.

> The terms “retain” or “retention” signify evapotranspiration, infiltration, capture & reuse mechanisms affecting water balance of a site:
>
> Surface Runoff (Stormwater) = Precipitation – Evapotranspiration – Infiltration – Capture & Reuse

4.2.1 New Development

New development in an Urban Impaired Stream watershed shall utilize Table 2 to meet the Runoff Volume Reduction Standard. Projects located in Sensitive & Threatened Regions, projects that trigger SLODA (in any non-UIS watershed), and stormwater projects that cannot fully meet the new basic standards shall utilize Table 3 to meet the Runoff Volume Reduction Standard.

Table 1.A presents the “cumulative runoff depth that must be retained” by new development activities located in the direct watershed of an Urban Impaired Stream. **Table 1.B** was created using the runoff depth- long-term cumulative runoff relationship to assist with sizing stormwater retention measures that will comply with the Runoff Volume Reduction standard.

Table 2 presents the values for new development in Sensitive & Threatened Regions and Watersheds. The runoff that must be retained for these activities is less than that for projects in Urban Impaired Stream watersheds (Table 2.A).

Table 1. New Development: Runoff Volume Reduction Requirements for the Activities in Urban Impaired Stream watersheds

A. Runoff Depth (Inches) from Project Impervious Area that Must be Retained		
Hydrologic Soil Group	Predevelopment Condition Replaced by Impervious Area	
	Meadow/Field	Forest*
A	0.69	0.79
B	0.56	0.66
C	0.41	0.52
D	0.28	0.38
B. Average Annual Runoff Volume Reduction (%) for Project Impervious Area		
Hydrologic Soil Group	Predevelopment Condition Replaced by Impervious Area	
	Meadow/Field	Forest
A	68	73
B	62	70
C	51	58
D	40	50

**The Department increased the values in this column by 0.1 inch to recognize the forest's surface storage potential which was not fully accounted for in the development of the values for meadows.*

Table 2. New Development: Runoff Volume Reduction Requirements for the Activities in Sensitive and Threatened Regions and Watersheds and SLODA projects**

A. Runoff Depth (inches) from Project Impervious Area that Must be Retained		
Hydrologic Soil Group	Predevelopment Condition Replaced by Impervious Area	
	Meadow/Field	Forest*
A	0.52	0.62
B	0.42	0.52
C	0.31	0.41
D	0.21	0.31
B. Average Annual Runoff Volume Reduction (%) for Project Impervious Area		
Hydrologic Soil Group	Predevelopment Condition Replaced by Impervious Area	
	Meadow/Field	Forest
A	58	64
B	50	58
C	42	50
D	31	42

**The Department increased the values in this column by 0.1 inch to recognize the forest's surface storage potential and to disincentivize the development of forested areas.*

*** Table 2 applies to the SLODA projects in the Urban Impaired Stream watersheds.*

Step-by-Step Instructions for Sizing Stormwater Control Measures to Meet the Runoff Volume Reduction Standard

1. Calculate average annual runoff volume reduction required for the project using the new impervious area replacing meadow/field or forest using **Table 2.B**. An area-weighted average must be calculated if new impervious area is proposed over multiple undeveloped land cover types and Hydrologic Soil Groups,

2. Use the average annual runoff volume reduction target level calculated in **Step #1** in the performance curve of a Stormwater Control Measure (SCM) to obtain the minimum sizing for the SCM,

3. Size the SCM to meet the minimum sizing requirement to comply with the Runoff Volume Reduction standard.

For the purposes of determining the hydrologic soil group of the area being developed, at least one soil exploration will be conducted for each half acre of proposed impervious area. These explorations should either confirm the presence of the soil shown in the NRCS Web Soil Survey or otherwise determine the hydrologic soil group of the underlying soil, as determined by a certified soil scientist by investigation of the site.

For structural stormwater control measures utilizing infiltration for volume reduction (no underdrain is included in the design), in-situ permeability tests shall be conducted at the elevation of the proposed infiltration to determine the measured infiltration rate.

Acceptable in-situ permeability tests include:

(1) A Guelph Permeameter, per the manufacturer's instructions, which shall be done at least 2 additional times, for a minimum of 3 observations in each location;

(2) A Compact Constant Head Permeameter, per the manufacturer's instructions, which shall be done at least 2 additional times, for a minimum of 3 observations in each location;

(3) A Falling Head Permeameter, per the manufacturer's instructions, which shall be done at least 2 additional times, for a minimum of 3 observations in each location

(4) A Double Ring Infiltrometer, in accordance with ASTM 3385 standards and using an inner ring that is at least 12 inches in diameter, which shall be done at least one time, for a minimum of one observation in each location; or

(5) A Turf-Tec Double Ring Infiltrometer, per the manufacturer’s instructions, which shall be done at least two additional times, for a minimum of three observations in each location; or

(6) A Modified Phillip-Dunne (MPD) Permeameter, per the manufacturer’s instructions, which shall be done at least four additional times, for a minimum of five observations in each location; or

(7) Additional methods of establishing soil hydraulic conductivity that utilize in-situ conditions and are accompanied by a recognized published source reference can be used after approval by the Department. A factor of safety of 2 shall be applied to the measured infiltration rate to arrive at the design infiltration rate.

Additional instructions will be provided in the updated Stormwater Manual.

For projects that incorporate underdrains (with no impermeable liner), design infiltration rates based on soil texture can be used in lieu of permeability testing for the purposes of stormwater control measure design. Note: a soil exploration will still need to be conducted as required by the existing Chapter 500 standards.

Table 3. Design Infiltration Rates Estimated Using Soil Textures

Hydrologic Soil Group	Infiltration Rate[10] (in/hr)	Soil Textures	Corresponding Unified Soil Classification
A	5	Gravel Sandy gravel	GW – well-graded gravels, fine to coarse gravel GP – poorly graded gravel
A	1.63	Silty gravels Gravelly sands Sand	GM – Silty gravel SW – well-graded sand, fine to coarse sand
A	0.8	Sand Loamy sand Sandy loam	SP – poorly graded sand
B	0.45	Silty sands	SM – silty sand
B	0.3	Loam Silt loam	MH – Elastic silt
C	0.2	Sandy clay Loam Silts	ML – silt
D	0.1	Clay loam	(no classification)
D	<0.1	Silty clay loam Sandy clay Silty clay Clay	SC – clayey sand CL – lean clay OL – organic silt CH – fat clay OH – organic clay, organic silt

Adapted from https://stormwater.pca.state.mn.us/index.php/Design_infiltration_rates

If the soil infiltration rate is <0.1 in/hr, underdrained SCMs with no impermeable liner are not practicable options. Non-structural stormwater control measures will have less rigorous soil testing requirements.

There will be a minimum of one foot separation from the seasonal high groundwater table below the bottom of a structural stormwater control measure.

[10] The term infiltration rate in this document refers to saturated hydraulic conductivity (Ksat).

If a proposed infiltration measure is located over highly permeable soils (greater than 8.27 in/hr), such as those derived from ablation till, stratified drift, aeolian sand, or other highly permeable overburden, it must include a minimum of 18 inches of soil filter media and the minimum separation from the seasonal high groundwater table below shall be 18 inches from the bottom of stormwater control measure or an alternative design approved by the department.

Stormwater control measures that utilize infiltration into native soils as a method of runoff volume reduction shall have a maximum of 1 acre of impervious area and a maximum of 2 acres of developed area in the contributory drainage area. To help preserve the function of the control measure and control pollutant loading, pretreatment (in the form of grass swales, impervious disconnection, sediment forebays, or other methods approved by the Department) can be required.

Hypothetical Example #1: Compliance with the new Runoff Volume Reduction Standard

A new development is proposed over existing undeveloped, forested area in an Urban Impaired Stream (UIS) watershed. The proposed development will replace one-acre forested area which is on Hydrologic Soil Group (HSG) A soil with new impervious area (e.g., pavement, building). The undeveloped area that will remain downgradient the new impervious area is on HSG D soil. This is the most challenging case for the new Runoff Volume Reduction Standard.

Following procedure will be used to size an appropriate stormwater control measure (SCM) to meet the Runoff Volume Reduction Standard:

- Since the proposed development is converting forest (HSG A) to impervious in an UIS watershed, the minimum runoff volume reduction requirement is 73% (see **Table 2.B**). This means the SCM to be proposed must remove, on average, at least 73% of the annual surface runoff volume from the impervious area,
- The designer will prioritize the use of non-structural retention SCMs (e.g., vegetated stormwater buffers) per the SCM hierarchy (see **Section 4.1**),
- The designer will use SCM performance curves to calculate the minimum sizing required to meet the target runoff volume reduction of 73%. The SCM curves that are readily available in the New England Stormwater Retrofit Manual (NESRM) and Massachusetts Municipal Separate Storm Sewer System General Permit (MA MS4GP) are used in this example for demonstration purposes:

#	SCM	Minimum Size	Performance Curve Used
1	Impervious Area (IA) Disconnection	1 (impervious area): 60 (pervious area)	NESRM (Page 88)
2	IA Disconnection through Storage	1 (impervious area): 1 (pervious area) & 0.7-inch storage volume	MA MS4GP (Appendix F Attachment 3)
3	Infiltration Basin	1.1-inch storage volume	NESRM (Page 100)
4	Infiltration Trench	1.5-inch storage volume	NESRM (Page 118)

- The minimum size values given above indicate that:
    - Non-structural retention SCM (#1) can be impractical,
    - A combination of structural and non-structural SCMs (#2) can also be impractical,
    - A structural retention SCM (#3 or #4) can be practical to meet the required runoff volume reduction.
- **Important Note:** IA disconnection performance curves were developed using pervious developed areas (e.g., lawn). These curves do not necessarily represent the performance of forested and meadow stormwater buffers commonly used in Maine. The Department has an ongoing project to develop performance curves for these SCMs.

4.2.2 Redevelopment

The Department wants to encourage development on already developed sites rather than undeveloped sites where possible.

Under the existing Chapter 500, redevelopment is defined as an activity, not including maintenance, undertaken to redevelop or otherwise improve property in which the newly developed area is located within the same footprint as the existing developed area. A minor amount of undeveloped land, as determined by the Department on a case-by-case basis, may be included within the perimeter of the existing developed area.

The standards for redevelopment projects apply only to the area being redeveloped, also known as the "redevelopment area". They do not apply to any new development on the same site.

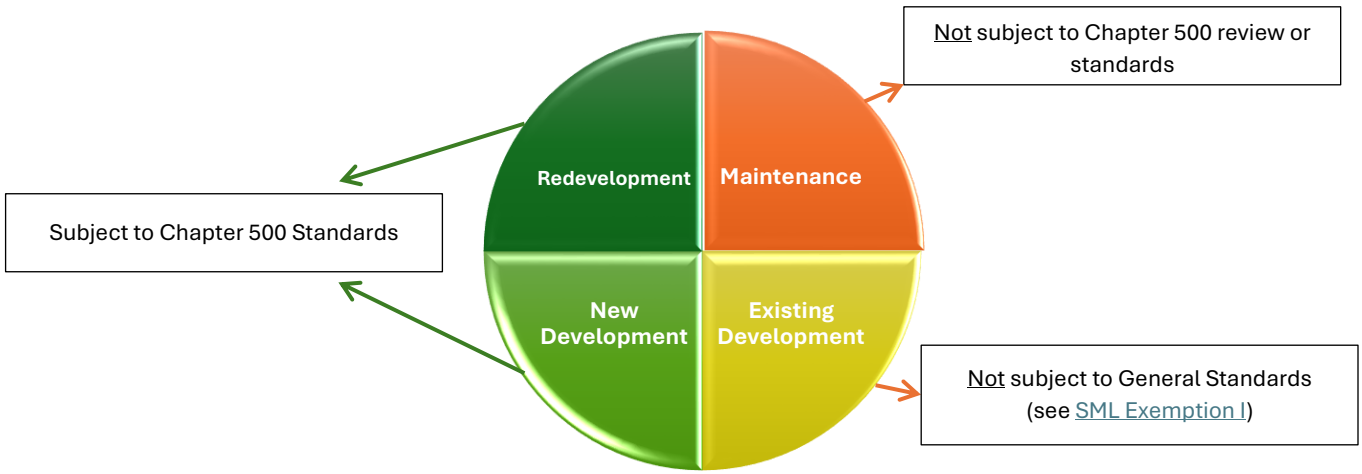


Figure 1. Mutually Exclusive Components of Land Development under Chapter 500.

The Department proposes that the Runoff Volume Reduction Standard applies to the increase in impervious area of the redevelopment site. The project does not need to provide runoff volume reduction for redevelopment that reduces or maintains impervious area.

To determine the Average Annual Percent Reduction required for the increase in impervious area of the redevelopment project to be used for the design of the SCMs, use the following steps.

First calculate the **Net Increase Impervious Area (%)**:

- (Proposed Impervious Area - Existing Impervious Area)/Redevelopment Area = Net Increase Impervious Area (%)

Second, calculate **Average Annual Percent Reduction (%)**:

- Average Annual Percent Reduction (%) = Net Increase Impervious Area (%)/2. Average annual percent reduction cannot be less than 10% or exceed 30%.

The above calculations apply to the net increase in impervious area, i.e. the treatment area.

Step-by-Step Instructions for Sizing Stormwater Control Measures to Meet the Runoff Volume Reduction Standard for Redevelopment

1. Use the average annual runoff volume reduction calculated above in the performance curve of a Stormwater Control Measure (SCM) to obtain the runoff depth for the SCM.

2. Multiply the runoff depth by the treatment area to determine the size of the SCM needed.

4.2.3 Waivers & Exceptions

Project staff who are evaluating a project will determine whether exemptions apply.

There will be a waiver from strict adherence to the Runoff Volume Reduction Standard available to:

1. Sites with activities where infiltration of stormwater runoff poses an elevated risk of groundwater contamination (see current Chapter 500 Appendix D).
2. Sites with clearly identified constraints where all available options have been considered.
3. Sites that do not drain to a stream but discharge directly to a lake, a major river, or certain coastal waters.

For sites with an elevated risk of groundwater contamination due to on-site activities, rooftop runoff should be prioritized, if applicable, to meet the runoff volume reduction standard. If the runoff volume reduction standard cannot be satisfied through management of rooftop runoff alone, the applicant may request a waiver for the remaining volume required to meet the standard. This runoff shall be directed to vegetated stormwater buffers to satisfy the standard. In the event that the runoff volume cannot fully be captured by vegetated stormwater buffers or in situations where buffers are not feasible, a narrative must be provided to explain why this is the case. The procedure and detailed guidance for alternatives analysis will be provided in the Stormwater Manual. The remaining volume needed to meet the runoff volume reduction standard should then be directed to stormwater control measures that are designed to slowly release the remaining volume over a 36-72-hour period. The release time can be reduced depending on the remaining volume[11].

For sites with activities that pose a contamination risk to roof-top runoff (such as exhaust venting or smoke stacks), stormwater runoff should be directed to vegetated stormwater buffers or stormwater control measures that have additional treatment (a soil filter media with a minimum of 18 inches of depth) before being allowed to infiltrate into the native soils.

Before the design of the site is submitted, the site soil must be properly investigated by a qualified professional (e.g. certified soil scientist, professional engineer with site evaluator license, certified

[11] The Department will ensure that the release period requirements will not result in impracticable SCM outlet configurations (e.g., very narrow orifices).

geologist with site evaluator license). For projects with sites that have clearly identified constraints, a narrative must be provided explaining the constraints. Alternative site layouts should be provided to verify that on-site constraints cannot be overcome. If the site constraints are related to soil conditions or seasonal high groundwater, additional soil investigations shall be provided to verify the constraints. Sites with constraints should attempt to meet the runoff volume reduction standard to the maximum extent practicable, including attempts to utilize vegetated stormwater buffers as a means of meeting the standard. Any remaining stormwater runoff volume should be directed to stormwater control measures that are designed to slowly release the remaining volume over a 36-72-hour period.

The Department will be developing criteria to clarify which rivers are major rivers and which types of coastal waters Waiver #3 (above) would apply to. These will be large waters that are not vulnerable to the volume from stormwater runoff, as this waiver only applies to runoff volume. Water quality stressors are discussed in the following section.

4.3 Stressor Guided Stormwater Treatment Standard

In addition to the post-development runoff volume (see 3.2), the Department has identified three stressors to be treated or controlled by the new General Standards, nitrogen, phosphorus, and chloride. Nitrogen and phosphorus are conventional pollutants that can be removed from stormwater using various treatment measures. The new standards specifically address nitrogen and phosphorus but also address other conventional pollutants because SCMs designed to treat nitrogen and phosphorus generally remove other conventional pollutants by the same processes. Chloride cannot be effectively treated or filtered out of stormwater and will, therefore, require a different set of control measures.

While thermal pollution (increased water temperature) is not explicitly designated as a primary stressor, the new stormwater standards will help mitigate temperature impacts as a byproduct of other requirements. Several mechanisms within the proposed standards will contribute to cooling stormwater before it reaches surface waters, including:

- Runoff volume reduction standard: provides infiltration of the first flush. The initial portion of runoff, which typically has the highest temperature, will infiltrate into the ground, where it can be cooled naturally.
- Gravel trench outlets are integrated into wet pond designs to cool water before discharge.
- Stormwater Control Measure Hierarchy will encourage use of vegetated stormwater buffers. These will help reduce direct heating of stormwater and slow runoff, allowing for natural cooling.

Baseflow chloride toxicity is often the dominant stressor in headwater stream watersheds where land includes commercial or institutional development because of heavy applications of deicing salts on the parking lots and road networks. The Department will identify the stressor(s) of concern for each UIS and S&T watersheds. This list will be made available on the Department website before the new rules go into effect.

4.3.1 Nitrogen and Phosphorus Stressors

4.3.1.1 New Development

The new General Standards will require the design of SCMs to achieve minimum average annual Nitrogen or Phosphorus load reductions. The treatment measures will be sized using SCM performance curves to meet the minimum nutrient load reduction for a given site. The Department proposes a minimum annual average load reduction of 60% for new development. This is the current amount of treatment in the existing Chapter 500 rules. Most SCMs are not capable of achieving greater reductions of nitrogen. Utilizing the performance curves for sizing treatment measures means that continuous model runs will not be required.

The proposal suggests excluding certain rooftops from the nutrient load reduction requirement based on the assumption that these impervious areas export considerably less nitrogen and phosphorus as compared to the other impervious surfaces. Rooftops not excluded include asphalt roofs and roofs on industrial facilities, because these surfaces can contribute conventional pollutants to runoff. The performance curves are developed for impervious area, therefore a different method is needed to determine sizing for landscaped areas, which are not impervious but will still require treatment. The Department is continuing its work on the SCM sizing requirements for landscaped areas. In the draft proposal below (subject to change), landscaped area is proposed to be included at a fixed value for SCM sizing.

For a structural SCM:

Minimum Design Storage Volume = a x IA + b x LA
IA: Impervious Drainage Area of the structural SCM
LA: Landscaped Drainage Area of the structural SCM
a = “Depth of Runoff from Impervious Area” from the SCM performance curve
b = Fixed value of 0.4-inch (Current Chapter 500(4)(C)(3) sizing standard for structural SCMs) for both phosphorus and nitrogen target pollutants on HSG C and D soils. b=0 for phosphorus and nitrogen target pollutants on HSG A and B soils.

To determine the SCM sizing for the General Standards, compare the minimum size required to meet the Runoff Volume Reduction Standard to the minimum size required to meet the Nitrogen or Phosphorus Reduction Standard and use the larger of the two. See Figure 5 at the end of this document for a visual representation of how the Runoff Volume Reduction Standard and the Stressor Guided Treatment Standard work together for the sizing of SCMs.

Hypothetical Example #2: Compliance with the new Runoff Volume Reduction Standard & the new Nutrient Reduction Standard

This example builds on "Hypothetical Example #1" given above.

A new development is proposed over existing undeveloped, forested area in an Urban Impaired Stream (UIS) watershed. The proposed development will replace one-acre forested area which is on Hydrologic Soil Group (HSG) A soil with new impervious area (e.g., pavement, building). The undeveloped area that will remain downgradient the new impervious area is on HSG D soil. The new development will have to meet both the new Runoff Volume Reduction Standard and the new Nutrient Reduction Standard. The proposed project is in a non-coastal area; hence, its average annual phosphorus load must be reduced by, at least, 60%.

Following procedure will be used to size an appropriate stormwater control measure (SCM) to meet both standards:

- The minimum runoff volume reduction requirement is 73% (see **Example #1** and **Table 2.B**),
- The designer will prioritize the use of non-structural retention SCMs (e.g., vegetated stormwater buffers) per the SCM hierarchy (see **Section 4.1**),
- The designer will use SCM performance curves to calculate the minimum sizing required to meet the target runoff volume reduction of 73%. and the target phosphorus load reduction of 60%. For brevity, results for only two SCM categories are presented below:

#	SCM	Minimum Design Storage Volume		Performance Curve Used
		Runoff Volume Reduction	Phosphorus Load Reduction	
1	Infiltration Basin	1.1 inch	0.36 inch	NESRM (pp. 99-100)
2	Infiltration Trench	1.5 inch	0.45 inch	NESRM (pp. 107-108)

- The minimum size values given above indicate that:
    - For both SCM categories, minimum design storage volume required to meet the target runoff volume reduction of 73% is greater than the minimum design storage volume required to meet the target phosphorus load reduction of 60%,
    - The designer must use the SCMs to meet the minimum design storage volume for runoff volume reduction
    - Assuming that the SCMs will only treat one-acre impervious area, the required design storage volumes become:
        - Infiltration Basin = 43,560 x 1.1/12 = 3,993 cubic ft
        - Infiltration Trench = 43,560 x 1.5/12 = 5,445 cubic ft
- The above design storage volumes are reasonable considering the minimum storage requirement of 1-inch for impervious areas under current Chapter 500 standards.
- In reality, site limitations will determine whether SCMs can be installed. For example, separation to bedrock and seasonally high water tables.

4.3.1.2 Redevelopment

The Department proposes to use reduced annual Nitrogen or Phosphorus load reduction requirements for redevelopment activities. The intent is for Chapter 500 to require a reduction in pollutant loads from redevelopment projects while still encouraging developers to choose redevelopment locations over undeveloped areas. Redevelopment is already addressed for projects in lake watersheds meeting the Phosphorus Standard because the parcel being redeveloped will still have to meet the parcel's phosphorus budget.

Current Chapter 500 standards are based around limiting the *increase* of the pollutant load (see Chapter 500(4)(C)(2)(d)). This allows a higher level of pollutants off the existing site and typically a reduced treatment level. Currently, redevelopment projects are allowed to receive up to 20%-point treatment credit for their developed areas unless their "ranked impact change due to redevelopment" exceeds two. In other words, under current Chapter 500 rules, redevelopment projects are allowed to increase pollutant export as compared to existing condition and still receive treatment credit.

The new Chapter 500 proposed standard instead requires that the pollutant load impact ranking must be reduced to be eligible for a reduced level of treatment for nitrogen or phosphorus as compared to new development projects.

The reduced requirements for redevelopment projects apply only to the area being redeveloped, also known as the "redevelopment area". Any new development should be treated to the full extent required by the new General Standards (i.e., 60% phosphorus for non-coastal; 60% nitrogen for coastal).

The Department will assign a pollutant ranking based on **Table 4**, and may, on a case-by-case evaluation of individual projects, modify the ranking by up to 2 points considering project-specific features. Table 6 is a modification of the current Chapter 500's Table 2: Pollutant Impact Rankings of Various Redevelopment Land Uses. Some of Table 2's cover types have been separated to better reflect their pollutant export rates resulting in the new Table 6 below:

Table 4. Proposed Pollutant Impact Rankings of Various Redevelopment Land Uses

Land Use	Type	Pollutant Ranking
Roads where idling may occur periodically due to traffic volume and intersections; High use parking lots	Non-roof impervious	5
Other roads; Medium use parking lots	Non-roof impervious	4
Other parking lots and driveways;	Non-roof impervious	3
Asphalt rooftops; Roofs on an industrial facility	Roof	3
Other rooftops;	Roof	0
Bikeways; Walkways/foot traffic-only pavement;	Non-roof impervious	2
Grassed areas mowed more than twice per year;	Landscaped	2
Non-grass landscaped areas; Stormwater treatment/storage systems (except buffers)	Landscaped	1
Buffers; Meadow mowed no more than twice per year; Forest	Natural	0

The amount of treatment required is scaled based on the amount of pollutant discharge that would result from the redevelopment project if the discharge were untreated.

The method for determining the treatment requirement for redevelopment projects includes:

a. To calculate the impact ranking for the existing condition, multiply the land area of each type of existing land use by its pollutant ranking.
b. To calculate the impact ranking for the proposed condition, multiply the land area of each type of existing land use by its pollutant ranking.
c. Divide the existing impact rating by the total redevelopment area.
d. Divide the proposed impact rating by the total redevelopment area.
e. Subtract the value in Item c from the value in Item d. Note: this value can be a negative number. Use this value in the left column of **Table 5** (below) to determine the applicable treatment level required for the redevelopment project.

Table 5. Treatment Levels for Redevelopment Projects

Ranked Impact Change Due to Redevelopment	Minimum Annual Average Nitrogen or Phosphorus Load Reduction (%)
0.0 or greater	60
≥ -1.0 to ≤ 0.0	40
> -2.0 to ≤ -1.0	20
≤ -2.0	0

4.3.2 Chloride Stressor

Chloride toxicity is a critical concern in freshwater ecosystems because when chloride concentrations reach toxic levels, they override all other water quality stressors in terms of their impact on aquatic life. Many organisms, including fish and macroinvertebrates, cannot tolerate high chloride levels, leading to loss of biodiversity and ecosystem collapse.

One of the most concerning aspects of chloride pollution is baseflow toxicity—the slow, continuous release of chloride-laden groundwater into streams. This occurs when salt-laden runoff infiltrates into the ground, where it dissolves and persists in groundwater reserves. Because groundwater is a major contributor to stream baseflow (especially in summer and fall when surface runoff is minimal), high chloride concentrations in groundwater can lead to year-round chronic toxicity in streams, even when no road salt is actively being applied. This is particularly harmful because many freshwater organisms rely on baseflows for survival during the driest times of year.

In contrast, chloride that enters streams during spring melt events or heavy storms is a more temporary stressor—while it can cause short-term spikes in salinity, the high volume and rapid movement of water allows for dilution and flushing. Additionally, there is generally less biological activity during the times of year when melt events occur. However, when chloride infiltrates groundwater, it accumulates over time and can take decades to flush out, making it a long-term and persistent threat. This is why chloride control measures should prioritize keeping chloride-laden runoff out of infiltration systems that feed groundwater.

The control methods for chloride to be included in the new Chapter 500 are still under development. The new Chapter 500 will have a description of the new chloride control standard and the types of chloride control measures allowed. Details of the specific chloride control measures and technical guidance for the implementation of the standard will be provided in the Stormwater Manual. Until the SML is amended, chloride control will only apply to SLODA projects.

The types of control measures being considered are:

- Measures that minimize the area over which salt is applied
- Measures that limit or minimize the amount of salt applied
- Measures that minimize the chronic baseflow toxicity affecting stream biota

For developments where runoff volume reduction and nutrient control are also required, possible options include:

- Maximizing runoff volume reduction for the rooftops (infiltration of roof runoff) to compensate for the pavement runoff volume which will not be reduced.
- Treating the pavement with non-infiltrating SCMs: While this measure will not “treat” or remove chlorides, it will help treat other pollutants and ensure that the chloride-laden water is not infiltrated directly to groundwater.

A draft point system has been developed as a method of assessing control methods for the chloride stressor and is presented in **Table 8**. Portions of the table include SCMs that require qualified personnel for proper operation and maintenance. This may require third party maintenance contracts.

Table 8. Draft Chloride Point System

ELIGIBLE CHLORIDE CONTROL PRACTICES Total Points Required: New Development = 75 Redevelopment = 30	Points Earned
Section A: Practices that prevent infiltration of meltwater	
A.1 Provide lined stormwater SCMs and secure/lined stormwater conveyances for parking runoff	required
A.2 Strategically locate snow storage on impervious surfaces that drain to secure conveyances	required
A.3 Seasonally bypass parking storm/meltwater around intentional and incidental infiltration SCMs*	35
A.4 Provide a "Smart" system that strategically stores and releases high chloride stormwater**	50
Section B: Practices that minimize the area requiring salt application **Minimum Points required from Section B: New Development = 50 Redevelopment = 10**	
Covered or stacked parking	
B.1 Points assigned equivalent to % of total parking that is covered	0 to 100
Heated pedestrian surfaces	
B.2 Sidewalks and entryways heated	25
B.3 Designated pedestrian lanes in parking lot heated	15
Seasonally reduced parking for commercial retail from January 1 to April 15	
B.4 Points assigned equivalent to % of total parking that is isolated and not plowed or salted	0 to 90
Minimize # of parking spaces and/or area required per parking space	
B.5 Conservative sizing of individual parking spaces – 50% compact spaces	5
B.6 90 degree parking with rows parallel to the longest dimension of the lot	5
Redevelopment only - Replace existing parking with infill buildings or otherwise reduce parking	
B.7 Points assigned equivalent to the % reduction in total parking area	0 to 50
Practices that limit the amount of salt applied	
B.8 Sweep and reuse granular salt applied to all pedestrian surfaces after every storm/melt event	15
Practices that dilute chloride contamination in groundwater	
Dilute groundwater by infiltrating low chloride roof runoff – SCM designed to infiltrate:	
B.9 Points assigned equivalent to the ratio of the area of roof runoff infiltrated to project impervious area times the cumulative percentage of annual runoff infiltrated (%ARI) (see **Table 9**)	0 to 50

* Details of and guidance for A.3 practice will be determined during the Stormwater Manual update project. The Department is considering additional measures that will improve overall SCM operation and maintenance, which will be instrumental in effective implementation of A.3.

** MaineDOT has an ongoing project for a pilot-scale implementation of A.4. Details and guidance for A.4 practice will be determined during the Stormwater Manual project. Due to the advanced technology required for A.4 practice, the Department will ensure that A.4 is operated and maintained properly.

Table 9. Determination of Cumulative Percentage of Annual Runoff Infiltrated (%ARI) (Based on Boston (MA) 1992-2020 Precipitation Data; Source: SNEP Taunton Watershed Project)

Depth of runoff infiltrated (inches)	%ARI
0.1	18
0.2	31
0.3	42
0.4	50
0.5	58
0.6	64
0.7	69
0.8	73.5
0.9	77
1	80

If a point system is not implemented, a hierarchy approach will be considered for SCMs for the chloride stressor. The following SCMs will be considered for chloride control in the descending order. The designer will demonstrate that higher priority SCMs have been properly evaluated to move onto the lower priority SCMs:

a. Source Control Measures,
b. Structural Measures Mitigating Groundwater Contamination and Its Impacts.

5 Phosphorus Standard

This standard has proven to be effective and will remain unchanged from the current version in Chapter 500. The conservative "Per-acre Phosphorus Allocations" for lakes (see Stormwater Manual Appendix C) have been a successful approach to managing phosphorus pollution as it takes into account cumulative impacts on a water scale and allocates phosphorus budgets accordingly. These allocations can be further reduced if the Department determines that there is strong evidence for significant land development in the future. The Phosphorus Standard will continue to apply in addition to the new Basic Standards, ensuring long-term protection of lake water quality. An allowable per-acre phosphorus allocation for each lake will be determined by the Department unless the applicant proposes an alternative per-acre phosphorus allocation that is approved by the Department.

The Phosphorus Standard will continue applying to regulated activities in lake watersheds as described below:

- The Phosphorus Standard applies to all projects that:
    - Require a SLODA permit in a lake watershed
    - Result in ≥20,000 sq. ft. of impervious area or occupy ≥ 5 acres in the watershed of a Lake Most at Risk from New Development
    - Result in ≥ 1 acre of impervious area or occupy ≥ 5 acres in a lake watershed

- The Phosphorus Standard applies to all projects that choose not to meet the New General Standards that:
    - Result in ≥20,000 sq. ft. of impervious area or ≥ 5 acres of developed area in the watershed of a Lake Most at Risk from New Development and:
        - Result < 3 acres of impervious area and < 5 acres of developed area
        - Are not located in the watershed of a severely blooming lake
    - Result in ≥ 1 acre of impervious area or ≥ 5 acres of developed area in a lake watershed and:
        - Result < 3 acres of impervious area and < 5 acres of developed area

The compensation fee option will be unchanged except that Table 3 in Chapter 501 will be removed and the required compensation fee per pound of phosphorus export will be $25,000 across the board. This is the upper limit allowed under the Stormwater Law.

6 Flooding Standard

This standard is not changing from the current version in Chapter 500, except for the source of precipitation data and the addition of an optional detention waiver for the regulated activities in UIS watersheds.

The Flooding Standard applies to all projects that:

- Result in three acres or more of impervious area or occupy 20 acres, or
- Require a SLODA Permit.

The Department proposes to eliminate the stationary precipitation frequency table (Appendix H) and allow the use of best available precipitation data without a Chapter 500 revision requiring major substantive rulemaking. Like the approach followed by other New England states (see "Flood Control Proposal" document), use of currently available NOAA Atlas 14 or its most up-to-date version.

The Department proposes utilizing NOAA Atlas 14 + an 18% modifier to account for anticipated precipitation change due to climate change until NOAA Atlas 15 is released. The Department will utilize NOAA Atlas 15 upon release. As of April 2025, NOAA Atlas 15 is on schedule to be released for use for the lower 48 states, including Maine, in 2026. In the unlikely case of NOAA Atlas 15 project is delayed or canceled, the Department has other alternatives to leverage for anticipated precipitation (e.g., EPA National Stormwater Calculator).

The Department proposes adding an optional waiver of the detention standard in UIS, in exchange for contribution into a fund that would be used toward fixing larger flow issues in the watershed as a whole. This waiver could only be triggered providing the municipality in which the development is located has put this into practice by creating and administering the fund, modeling the watershed, and identifying projects. This proposal is under development.

7 Other Standards

7.1 Urban Impaired Stream Standard

The Urban Impaired Streams Standard in section 4H of the current version of Chapter 500 will remain in place. The standard will apply to regulated activities that require a SLODA permit or will result in three or more acres of impervious area or occupy 20 or more acres.

A possible addition to the Standard could be the option that the Department could waive a portion of the required compensation fee if a project completes a certain amount of chloride control.

7.2 Discharge to Wetlands Standard

This standard is a less understood and subjectively implemented standard of current Chapter 500 (see Chapter 500(4)(I)). The Department recognizes the need to protect wetlands from the stormwater impact and intends to include a standard designed to protect wetlands vulnerable to land development in new Chapter 500. The Department also aims to address the shortcomings of the current Discharge to Wetland Standard. For this purpose, the intent and applicability of the new standard must be clearer than the current standard.

The new standard will apply to the depressional freshwater wetlands because it is assumed that these wetlands are most susceptible to the stormwater impact of upgradient land development projects. An upgradient regulated activity can impact a depressional freshwater wetland by (a) depriving the surface runoff supply to the wetland (i.e., pre-development wetland catchment area is shrunk under post development), (b) inundating the wetland beyond the pre-development level (i.e., increased post-development stormwater discharge into wetland).

Under the new standard, a regulated activity cannot:

a. Decrease the pre-development catchment area of a depressional freshwater wetland more than 10%, and
b. Post-development runoff volume stored in a depressional freshwater wetland will be released within 48 hours after a 2-year 24-h storm restoring the pre-storm water elevation in the wetland.

The proposed standard addresses both potential impacts of a land development project on depressional freshwater wetlands.

Figure 2. New Development in a Lake Watershed

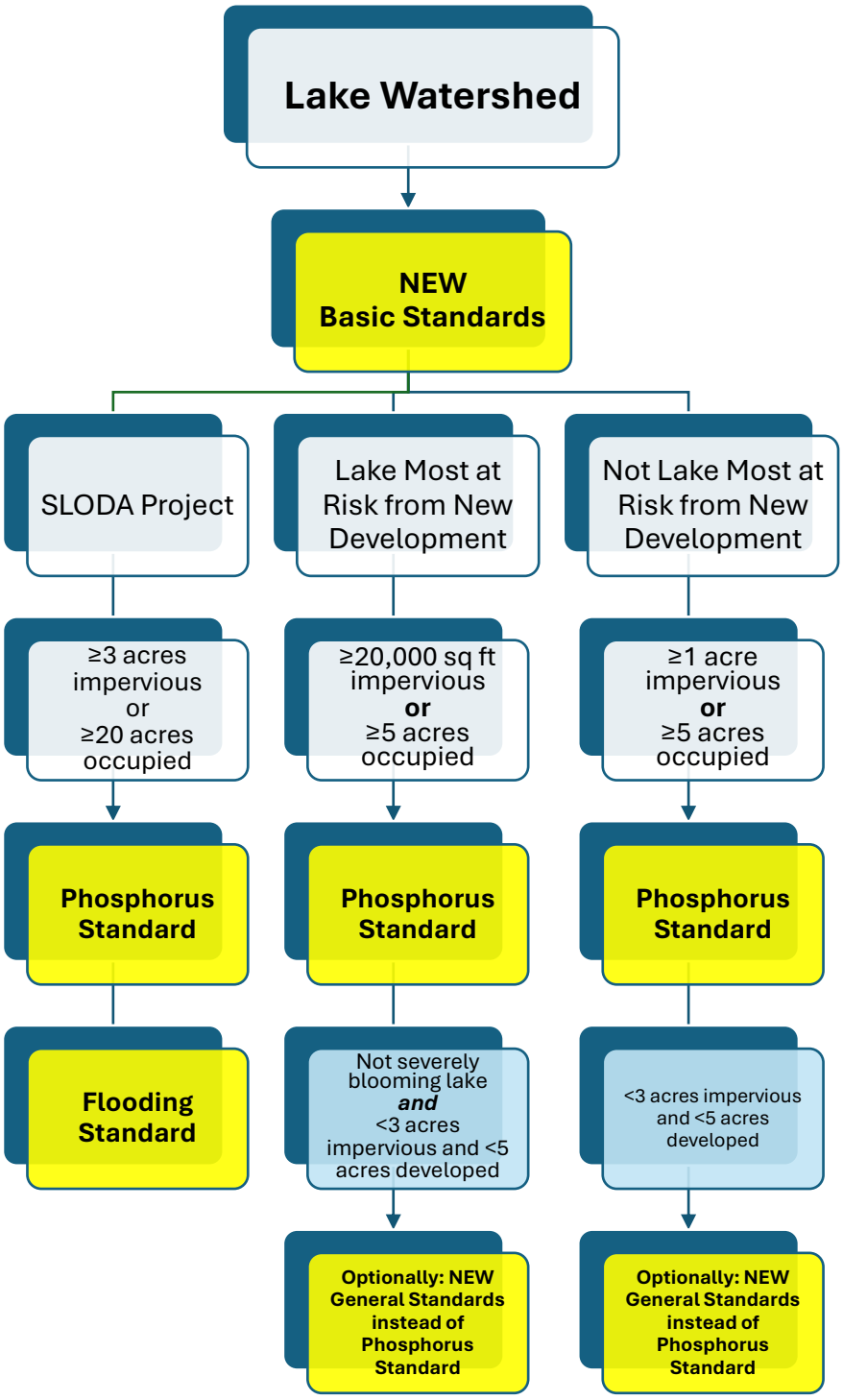


Figure 3. New Development in a Non-Lake Watershed

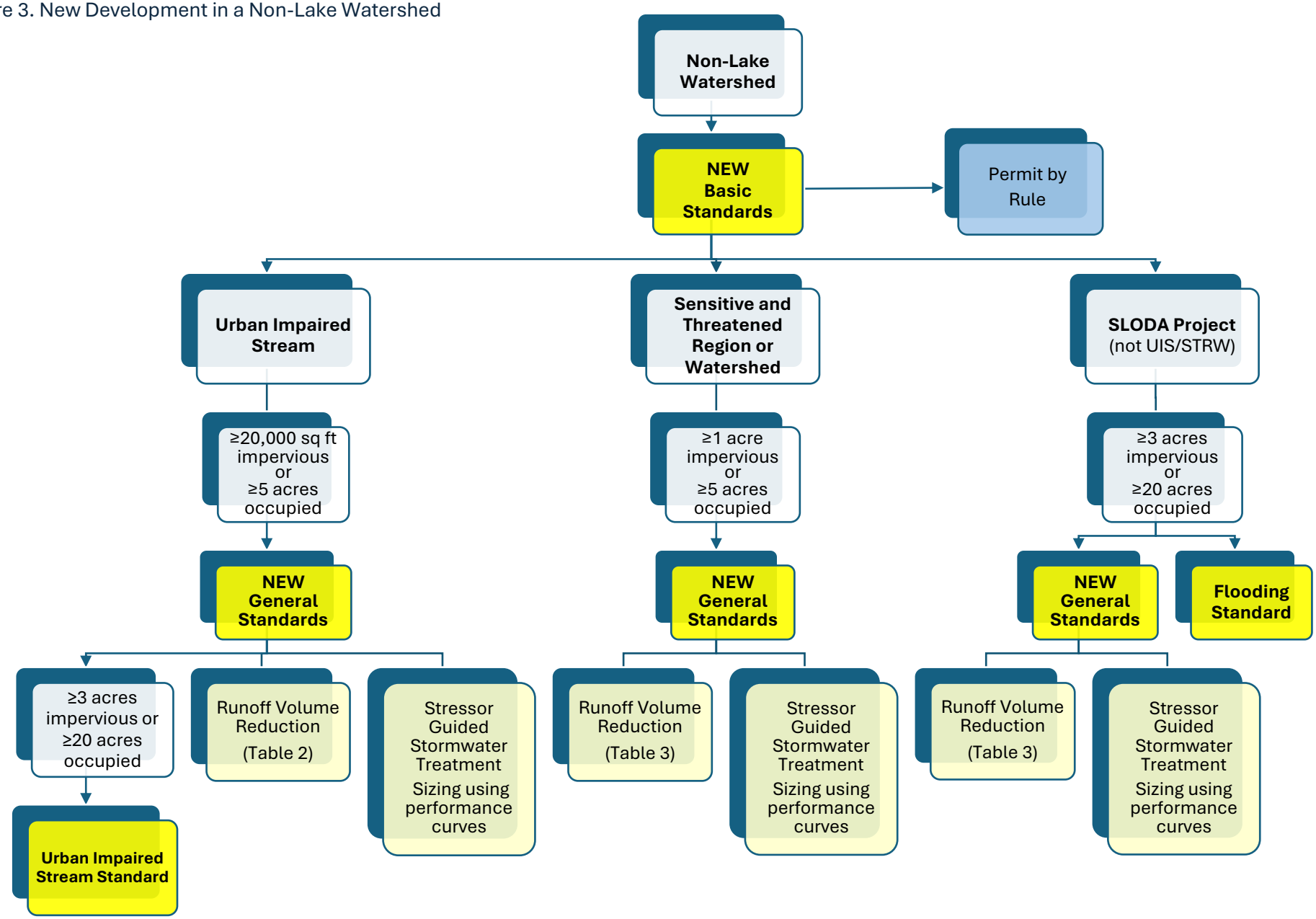


Figure 4. New Development and Redevelopment in a Non-Lake Watershed

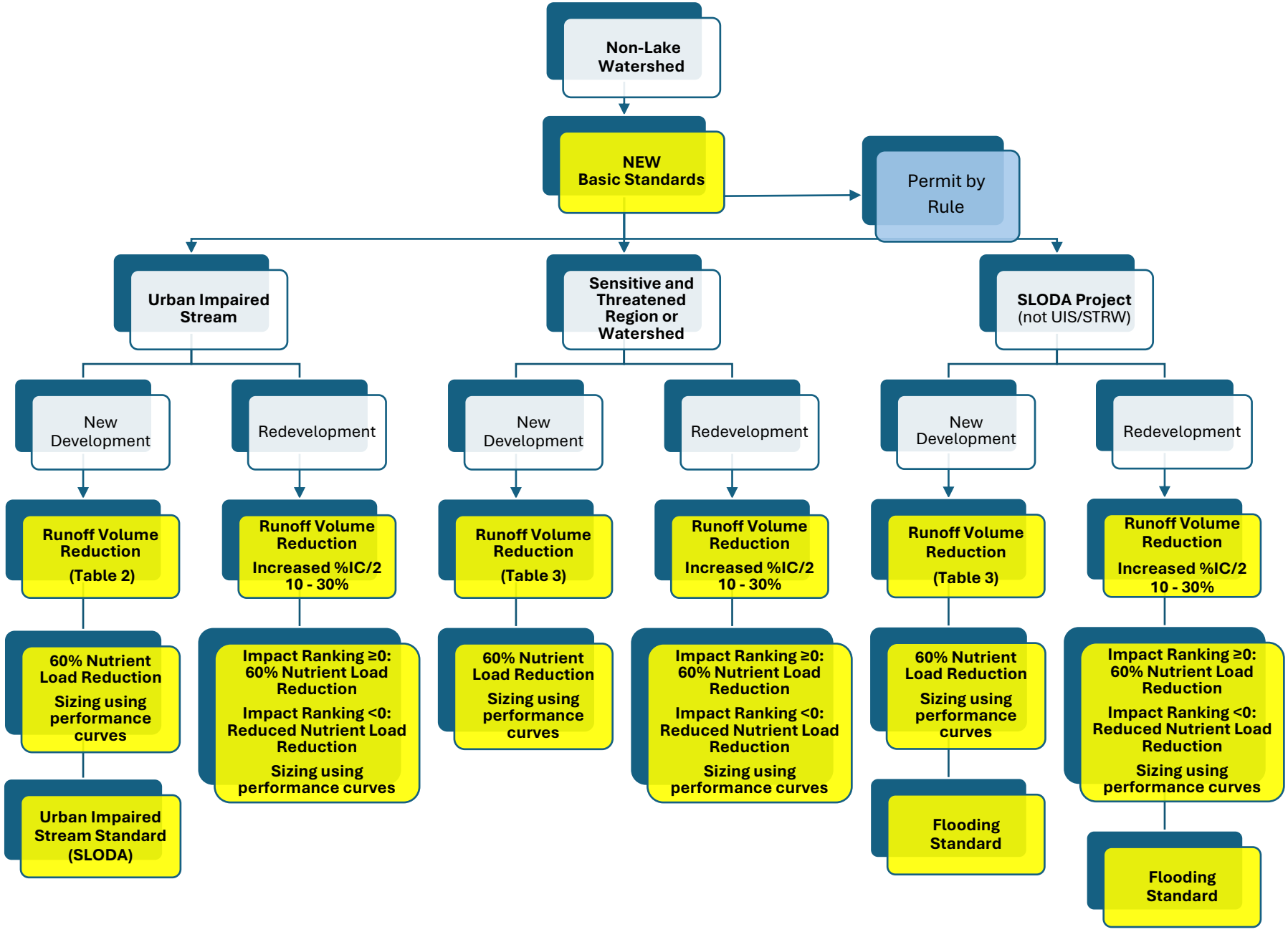
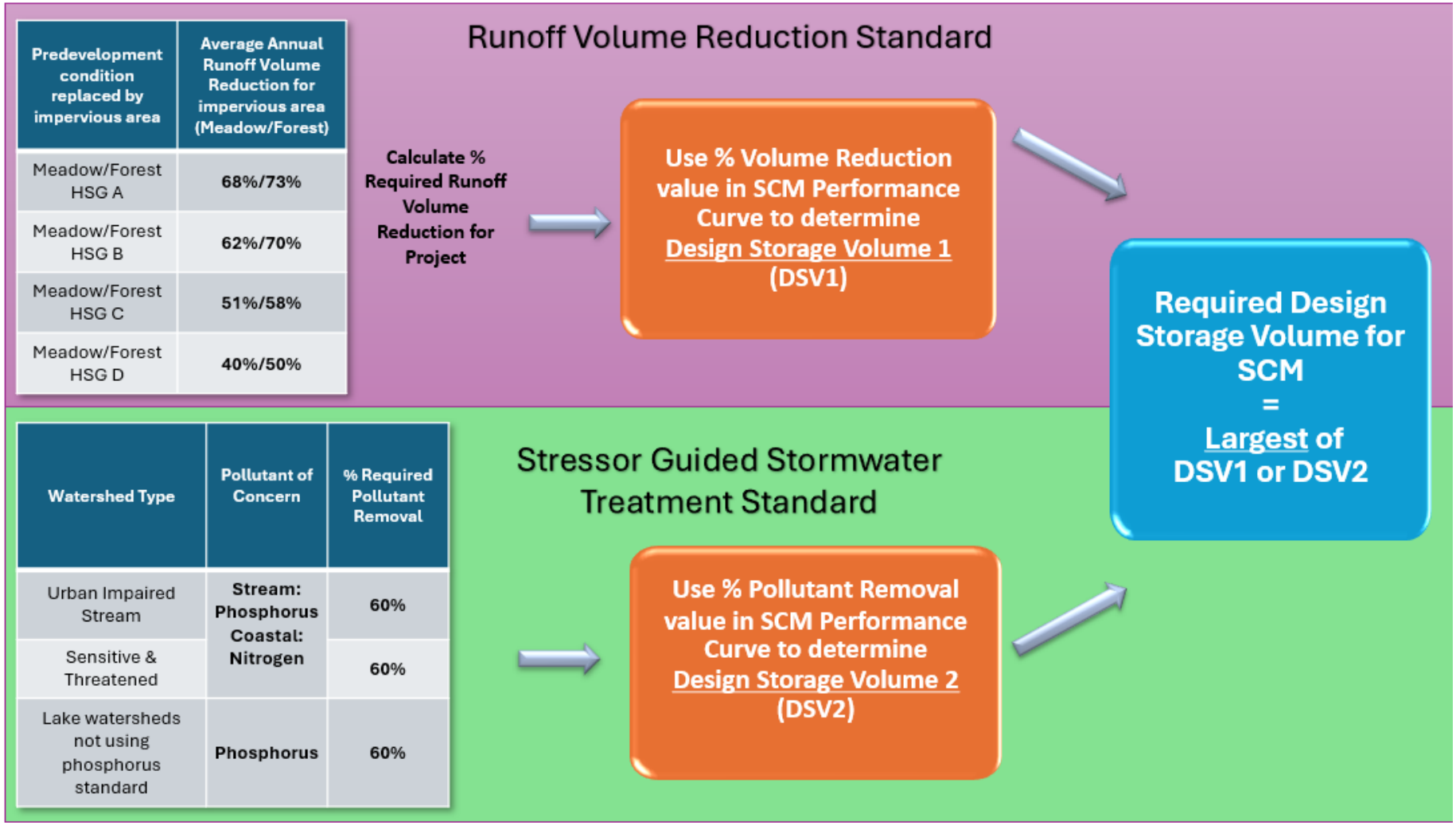


Figure 5. How to determine SCM Design Storage Volume



Appendix A: Sensitive and Threatened Regions

Revised list of Sensitive and Threatened Regions - 11/26/24		
Auburn	Freeport	Portland
Augusta	Gorham	Randolph
Bangor	Hallowell	Saco
Bath	Hampden	Sanford
Belfast	Hermon	Scarborough
Berwick	Kennebunk	South Portland
Biddeford	Kittery	Thomaston
Brewer	Lewiston	Topsham
Brunswick	Oakland	Waterville
Cumberland	Ogunquit	Wells
Eastport	Old Orchard Beach	Westbrook
Eliot	Orono	Windham
Falmouth	Owls Head	Yarmouth

Note: The above list was developed in response to comments received from the Technical Committee and incorporates additional selection criteria (SLODA and Stormwater Law permits for projects within the municipality issued over the period from 2001 to 2023 and normalized for the size of the municipality). The addition of this criterion resulted in the removal of 13 municipalities from the list of S&T Regions and the addition of 22 stream watersheds (ones located in the removed towns) to the list of individually identified Sensitive and Threatened Watersheds.