



MEMORANDUM

To: Kerem Gungor, Maine Department of Environmental Protection

From: David Roman and Nicole Haggerty, Comprehensive Environmental Inc.

Date: September 4, 2025

Subject: Needs Assessment Summary – Manual Update Topics, Best Available Information Research, and Manual Outline

Introduction

This memorandum outlines the findings of a needs assessment to guide updates to the Maine Department of Environmental Protection's (DEP) Stormwater Manual (Manual). The goal of this assessment was to identify and prioritize essential areas within the Manual that need revision, expansion, or clarification to comply with the updated Chapter 500 rules and reflect the latest science. Targeted research based on Best Available Information (BAI) was then conducted to ensure that the updated Manual is based on the most current and applicable science and engineering practices. The results of this assessment are summarized below. Based on this effort, a preliminary proposed outline for the updated Manual has also been developed, including a preliminary list of potential design tools.

Needs Assessment Topics

To create a prioritized list of topics for updating the Manual, feedback was summarized from the following sources:

- Online survey (19 responses; May – June 2025)
- Meeting Notes from Workgroup Meeting 1 (May 19, 2025)
- Emailed feedback on priority Manual update topics from stakeholders and Maine DEP staff (April – May 2025)
- DEP's *New Chapter 500 Proposal – Long Memo* (April 4, 2025)
- Meeting Notes from Project Team Meeting 2 (June 24, 2025)
- Meeting Notes from Workgroup Meeting 2 (August 21, 2025)

Based on this feedback, **Table 1** in **Attachment A** provides a list of ranked priority topics ranging from a score of 1 to 6, with 6 being the highest priority. The table also identifies several areas where current knowledge or available data cannot fully inform Manual guidance, requiring targeted BAI research.



MEMORANDUM

Best Available Information Research

To ensure the Manual update reflects the latest science, research was conducted using the Best Available Information (BAI) for the topics identified through feedback (summarized above). The intent of this research was to:

- Identify recent developments in stormwater management, especially regarding Green Infrastructure/ Low Impact Development (LID), emerging contaminants, and maintenance of stormwater practices.
- Evaluate regionally accepted design standards and guidance for stormwater control measures.
- Support recommended updates to Manual content, structure, and design.

The research process involved a review of federal, state, and academic sources published in the last five years (\pm). The sources for BAI research include authoritative references and sources such as those identified by DEP in the original project Request for Proposal (dated August 14, 2024). Findings were then mapped to a working draft of the proposed Manual outline to ensure alignment between identified needs and planned content revisions. The results of the targeted BAI research (e.g., preliminary outcomes and potential sources for each topic) are provided in **Table 1** of **Attachment A**.

Proposed Manual Outline

Based on the efforts described above, a proposed outline for the updated Manual has been prepared. The outline incorporates the priority topics identified in the needs assessment and is guided by research findings and feedback from the Project Team. The goal of the proposed outline is to develop a clear, accessible, and technically reliable resource that promotes effective stormwater management across the state.

Besides technical accuracy, the outline's structure aims to improve usability for a broad range of users, including municipal staff, consultants, developers, and regulators. The proposed layout (two volumes instead of the current three) is designed to present the “why” before the “how,” fostering better understanding of stormwater management goals and enhancing implementation.

The outline development process involved review of the current (2016) Manual and incorporation of the following key considerations:

- Incorporating feedback from users of the current Manual.
- Aligning with updated regulatory expectations and emerging issues.



MEMORANDUM

- Structuring the Manual to better support both high-level review and project-specific design.
- Including tools, resources, and examples where appropriate.

The outline is intended to serve as a flexible framework to guide the development of the updated Manual. A brief summary of the proposed outline is provided below. For the more detailed outline, see **Table 2 of Attachment A**. The more detailed outline provides a comparison to the 2016 Manual, proposed subheadings, and notes on intended updates for each subsection.

Proposed Volume I: Stormwater Management and Technical Design Manual

This volume will present a combination of the current Volume I and Volume III topics, with necessary updates as identified in the needs assessment.

- Chapter 1. Introduction
- Chapter 2. Stormwater Hydrology and Impacts
- Chapter 3. DEP Stormwater Management and Objectives
- Chapter 4. Site Planning and Implementation of Control Measures
- Chapter 5. Design Criteria and Documenting Compliance
- Chapter 6. Inspection, Maintenance, and Good Housekeeping
- Appendix A. Stormwater Control Measure Fact Sheets
- Appendix B. Design Resources and Tools

Proposed Volume II: Phosphorus Control Manual

This volume will present the information in the current Volume II with minor updates to reflect Chapter 500 updates as applicable, as well as updated general formatting to match the proposed Volume I.

Potential Design Tools

The following is a list of potential design tools based on the results of the needs assessment and BAI research. Tool selection is subject to change until the proposed regulations have been written in more detail. Tools may be developed separately or developed into one larger tool with various subcomponents.



MEMORANDUM

1. **Performance Removal Curves:** Compile an Appendix of the most current Performance Removal Curves (PRCs) (e.g., *UNHSC PRC guidance; updated SNEP Stormwater Retrofit Manual expected Summer 2025, new ME buffer PRC, 2025 Draft MA MS4 Permit*).
2. **SCM Sizing Tool(s):** Develop an excel spreadsheet style tool that can be used to size SCMs to meet certain requirements (e.g., pollutant removal, retention, etc.). Model the tool after existing tools such as the MassDEP 2025 tool for SCM treatment trains, UNHSC Continuous Simulation calculator, and the EPA BMP-BATT tool.
3. **SCM Selection Tool or Alternative Analysis Template:** Create a fillable alternative analysis (or “feasibility analysis”) template for SCM selection based on the SCM design hierarchy. Model the template based on MassDEP 2025 guidance, tailored based on new Ch 500 requirements.
4. **Applicability of Standards:** Create an excel and ArcGIS Online tool to determine project site requirements based on site location and characteristics. Model after MassDOT WQ Data Form. Tool may include flow charts/ lookup tables/ maps as applicable for how standards may apply to projects. For example, for soil testing such as Chapter 12 of the NJDEP BMP Manual. Tool may be integrated into (1) through (4), above.

Next Steps

An initial draft of this memorandum was shared with the Workgroup via email on August 20, 2025, discussed during Workgroup Meeting 2 on August 21, 2025, and then updated based on the Workgroup’s feedback. Next steps include using this memo and the Workgroup’s feedback as the basis for the scope of work to perform updates to the Manual (Tasks 3 and 4 – Draft/ Final Revisions to the Manual).

Maine DEP is still in the process of drafting the updated Chapter 500 rules. Therefore, CEI will plan to start updating those components of the Manual that do not significantly overlap with the potential rules. It is anticipated that CEI will initially focus on the following topics:

- Chapter 1 – Introduction
- Chapter 2 – Stormwater Hydrology and Impacts
- Site planning and SCM overview aspects of Chapter 4 – Site Planning and Implementation of Control Measures
- Appendix A – Stormwater Control Measure Fact Sheets



MEMORANDUM

Attachment A – Supporting Tables

- **Table A.1** - Prioritization of Manual Update Topics and Associated BAI Research
- **Table A.2** - Preliminary Proposed Manual Outline
- **Table A.3** – Full BAI Reference List with Links



MEMORANDUM

ATTACHMENT A

Supporting Tables

- **Table A.1** - Prioritization of Manual Update Topics and Associated BAI Research
- **Table A.2** - Preliminary Proposed Manual Outline
- **Table A.3** – Full BAI Reference List with Links

Table A.1 - Prioritization of Manual Update Topics and Associated BAI Research¹

Topic	Score ²	Needs Notes	BAI Needs	BAI Outcomes	BAI Sources
General					
Infiltration & Soils Testing Guidance	5.6	<ul style="list-style-type: none">Clear guidance to help meet infiltration/ volume reduction standardFor SCM design - what needs to be done under what circumstance (e.g., flow chart)– standardized protocols (e.g., test pits, infiltration testing, HSG determination, mounding, review setback requirements)Additional considerations for: sensitive hydrologic soil conditions, compaction/ soil structure, frost depth, structure and porosity of buffer soils	<ul style="list-style-type: none">State-of-the-practice infiltration recommendations (e.g., effective in-situ infiltration testing protocols)	<ul style="list-style-type: none">Model after MassDEP 2025 guidancePotential Manual Location: Ch 5 (<i>Infiltration & Soils Testing</i>)	<ul style="list-style-type: none">MassDEP 2025 Stormwater Handbook (6.3 Soil Evaluation Procedures)Minnesota Stormwater Manual- Determining soil infiltration rates (link)Minnesota Stormwater Manual- Understanding and interpreting soils and soil boring reports for infiltration BMPs (link)Minnesota Stormwater Manual- Infiltration design guideline- determining site infiltration rates (link)New Jersey Stormwater BMP Manual- Chapter 12: Soil Testing Criteria (link)
Alternatives Analysis for SCM Design	5.2	<ul style="list-style-type: none">Clear guidance on how to exhaust alternatives to meet the standardsClear, consistent process to streamline reviews	<ul style="list-style-type: none">Research how other State manuals have handled this (e.g., feasibility analysis vs. alternatives analysis)	<ul style="list-style-type: none">Model after MassDEP 2025 guidance, tailored based on new Ch 500 requirements.Potential Manual Location: Ch 5 (<i>Alternatives Analysis</i>); App B (<i>Design Tools</i>)	<ul style="list-style-type: none">MassDEP 2025 Stormwater Handbook (Appendix B. Written Feasibility Analysis Template)Other resources:<ul style="list-style-type: none">NH AoT Waivers (Env-Wq 1509)North Carolina DEQ 2023 Stormwater Control Measure Credit Document- Approval Process for New Stormwater Technologies (link)Ventura County 2025 Technical Guidance Manual for Stormwater Quality Control Measures- Alternative Compliance (link)
SCM O&M Guidance	5.1	<ul style="list-style-type: none">Need for SCM-specific inspection, maintenance, and reporting requirements	<ul style="list-style-type: none">SCM-specific maintenance recommendationsExisting SCM installations (e.g., common failure modes, potential maintenance indicators)	<ul style="list-style-type: none">Failure vs. maintenance indicators from UNHSC and Minnesota media deconstruction reportsAdditional considerations from Villanova and WA researchModel SCM-specific maintenance recommendations after 2025 MA and NH SCM fact sheetsPotential Manual Location: Ch 6 (<i>Inspection & Maint.</i>); App A (<i>SCM Fact Sheets</i>)	<ul style="list-style-type: none">MassDEP 2025 Stormwater Handbook (Appendix A. SCM Fact Sheets)2025 NH Stormwater Manual (Appendix A. SCM Fact Sheets)UNHSC <i>Site Deconstructive Investigation of Stormwater Control Measures at the UNH Stormwater Center</i> (March 2025)Minnesota Stormwater Manual - Management of soil and engineered media removed from bioretention basins and similar stormwater treatment devices (link)University of Minnesota St. Anthony Falls Laboratory online Stormwater Treatment: Assessment and Maintenance Manual - Assessment Programs (link)North Carolina State University Stormwater Engineering Group- Effect of Visibility on Maintenance Investment and Consequent Performance of Urban Stormwater Control Measures (link)Villanova Center for Resilient Water Systems- Underperformance Assessment Framework for Bio-infiltration Systems (link)Washington DEP Stormwater Action Monitoring- Evaluation of BMP maintenance conditions (link)
SCM Schematics & Specs	4.6	<ul style="list-style-type: none">Updates to Schematics / Design Criteria / Specs to meet new Ch 500 requirements and state of the practice (e.g., filter media), flexibility to address site-specific goalsConsideration of construction phase in design of SCMs (e.g., expand on guidance for the use of permanent SCMs for controlling construction runoff, protection of HSG A/B soils if subject to volume reduction standard)	<ul style="list-style-type: none">Optimization of SCM designs and site preparation techniques to achieve significant volume reduction and pollutant removal/ groundwater protection (e.g. Filter media specifications, porous pavement specifications).	<ul style="list-style-type: none">Model after newer media specifications from UNHSC, SNEP Retrofit Manual, WA DEPPotential Manual Location: App A (<i>SCM Fact Sheets</i>)	<ul style="list-style-type: none">UNHSC Design Specifications (e.g., Bioretention Soil Mix, Porous Asphalt Pavement and Infiltration Beds, Gravel Wetland, Hybrid Bioretention) (link)SNEP New England Stormwater Retrofit ManualWashington State Department of Ecology- Guidance on using new high performance bioretention soil mixes (link)

Topic	Score ²	Needs Notes	BAI Needs	BAI Outcomes	BAI Sources
SCM Selection & Design Hierarchy	4.3	<ul style="list-style-type: none">Clear process for SCM selection (e.g., LID --> Retention --> Structural)Promote LID	<ul style="list-style-type: none">Research how other State manuals have handled design hierarchy (e.g., 2025 New Hampshire Stormwater Manual)Options for non-structural retention SCMs to meet the proposed standards (e.g., parking lots with multiple vegetated SCMs with small drainage areas, conservation subdivisions and innovative housing development such as cottage courts)	<ul style="list-style-type: none">Model after 2025 MA and NH SCM hierarchiesModel after MassDEP 2025 ESSD guidancePotential Manual Location: Ch 4 (<i>SCM Hierarchy</i>); App A (<i>SCM Fact Sheets</i>)	<ul style="list-style-type: none">MassDEP 2025 Stormwater Handbook (Appendix A. ESSD Credits)2025 New Hampshire Stormwater ManualNew Jersey Stormwater Management Rules (link)Other resources:<ul style="list-style-type: none">Chester County, PA Planning Commission- Conservation Subdivision Design Guide (link)
SCM Design Criteria	2.7	<ul style="list-style-type: none">Need for clear criteria and alignment with new Ch 500 (e.g., Volume Reduction vs. Treatment)Planting guidanceO&M design considerations (e.g., auxiliary features for easy inspection and access, valves for emptying permanent pools of wetlands)	<ul style="list-style-type: none">Optimization of SCM design for stormwater volume reduction/ treatment and vegetation survival	<ul style="list-style-type: none">Model after MA and NH planting guidanceAdditional considerations from Minnesota and Villanova researchPotential Manual Location: Ch 5 (<i>Standard Requirements</i>); App A (<i>SCM Fact Sheets</i>)	<ul style="list-style-type: none">MassDEP 2025 Stormwater Handbook (Appendix A. Bioretention planting guidance)Minnesota Stormwater Manual - Plant and vegetation information for stormwater management (link)University of Minnesota Water Resources Center- Managing urban pond vegetation to enhance water quality benefits (link)University of Minnesota Water Resources Center- Plants for stormwater design, interactive selection tool for stormwater professionals and the public (link)2025 NH Stormwater Manual (Appendix A. Bioretention planting guidance)Villanova Center for Resilient Water Systems- A Method to Assess Plant Behavior in Green Stormwater Infrastructure (link)Other publications:<ul style="list-style-type: none">Supporting evidences for vegetation-enhanced stormwater infiltration in bioretention systems: a comprehensive review (link)
SCM Example Calculations	2.5	<ul style="list-style-type: none">Example calcs for new standards (e.g., Volume Reduction vs. Treatment)New vs. Redevelopment calcsGuidance on use of SCM Performance Removal Curves (PRCs)	<ul style="list-style-type: none">Maine DEP has a separate ongoing contract to develop PRCs for stormwater buffer LID measures	<ul style="list-style-type: none">To include new ME DEP buffer guidance & PRCPotential Manual Location: Ch 5 (<i>Design Criteria</i>); App B (<i>Tools</i>)	---
Ch 500 Detailed Compliance Guidance on Standards	2.4	<ul style="list-style-type: none">Wetland and Natural Drainage Network Protection Standard (e.g., clarity on definitions and mapping, identification of NDW-2s)Stressor-Guided Stormwater Treatment StandardSection on “self-treating” impervious surfaces (e.g., Central Maine Power substation yards, railroad ballast, artificial turfs)	---	<ul style="list-style-type: none">BAI = N/APotential Manual Location: Ch 3 (<i>Ch 500 Overview</i>)	---
Design Tools to Assist in Calculations	2.3	<ul style="list-style-type: none">Modeling infiltrating SCMsSpreadsheets or other tools (e.g., educational videos?) to aid complex calculations, alternatives analysis templateExamples using design tools on a “test site”	<ul style="list-style-type: none">Possible use/ modification of existing design tools (e.g., how to use treatment trains with the EPA curves)Potential for Continuous Simulation guidance	<ul style="list-style-type: none">See Memorandum for explanation of proposed tools.Potentially reference/ incorporate additional tools as listed in Minnesota ManualPotential Manual Location: App B (<i>Tools</i>)	<ul style="list-style-type: none">MassDEP 2025 Pollutant Load Reduction Excel-based worksheets (link)MassDOT Water Quality Data Form (link)Minnesota Stormwater Manual - Stormwater models, calculators, and modeling (link)2025 NH Stormwater Manual; UNHSC WPS Calculator (link)Minnesota Stormwater Manual – Minimal Impact Design Standards: Design Sequence Flowchart- Flexible Treatment Options; MIDS Calculator (link)Interstate Technology Regulatory Council (ITRC) Stormwater Post-Construction BMP Evaluation Tool (link)
Adaptation & Resilience (e.g., update precipitation data)	2.1	<ul style="list-style-type: none">Incorporation of climate change considerations (e.g., impact of more frequent storms- small and large, NOAA 15?)	---	<ul style="list-style-type: none">BAI = N/APotential Manual Location: Ch 2 (<i>Adaptation and Resilience</i>)	---

Topic	Score ²	Needs Notes	BAI Needs	BAI Outcomes	BAI Sources
Stormwater Monitoring	2	<ul style="list-style-type: none">Guidance on monitoring requirements and methods	---	<ul style="list-style-type: none">BAI = N/APotential Manual Location: Ch 6 (<i>Monitoring</i>)	Noting general references: <ul style="list-style-type: none">MassDEP 2025 Stormwater Handbook (Appendix A. Infiltration basin monitoring wells design considerations)University of Minnesota St. Anthony Falls Laboratory online Stormwater Treatment: Assessment and Maintenance Manual - Sampling Methods/ Data Analysis (link)
Ch 500 Stormwater Regulatory Framework	1.9	<ul style="list-style-type: none">General vs. Basic vs. Other Standards (Flow Charts) & RationalClear definitions for new/ revised terms	---	<ul style="list-style-type: none">BAI = N/APotential Manual Location: Ch 3 (<i>Ch 500 Overview</i>)	---
General Formatting / Editorial Updates	1.8	<ul style="list-style-type: none">Improve overall readability and organization. Make sure readers understand the “why” before the “how”	---	---	---
Stormwater Control Measures (SCMs)					
Source Control BMPs (e.g., for chloride)	3.5	<ul style="list-style-type: none">High need for effective chloride control measures	<ul style="list-style-type: none">Identify or develop new or improved chloride control measures, particularly concerning mitigation of baseflow toxicity (e.g., cover parking spaces with a canopy)Evaluate the effectiveness, costs, and O&M implications of source control BMPs	<ul style="list-style-type: none">Model chloride source control based on NH Green SnowPro guidance/ Salt BMPs, MA salt storage and disposal guidance, MN Smart Salting guidance/ model ordinances and policiesIncorporate new ME chloride standards (Ch 500)Potentially include:<ul style="list-style-type: none">Minnesota Smart Salting Assessment ToolInnovative chloride source control SCMs (e.g., cover parking spaces with a canopy, MN hydronic snowmelt tubing under paved surfaces)Additional source control BMPs from 2024 Western Washington Stormwater ManualPotential Manual Location: Ch 4 (<i>Site Planning</i>); App A (<i>SCM Fact Sheets</i>)	<ul style="list-style-type: none">2025 NH Stormwater Manual (Appendix A. Snow and Ice Management)MassDEP 2025 Stormwater Handbook (Appendix A. Road Salt Storage and Snow Disposal)NH Salt BMPs (e.g., anti-icing, brine making, storage and housekeeping) (link)Minnesota Stormwater Manual - Smart Salting Assessment Tool (link)Minnesota Stormwater Manual - Chloride reduction case study: The Promenade of Wayata (hydronic snowmelt tubing) (link)2024 Stormwater Management Manual for Western Washington- Vol IV Source Control BMP LibraryNote: Did not find any case studies on using canopies over pavement specifically for chloride control
LID / Green Infrastructure Options	3.5	<ul style="list-style-type: none">Promote/ prioritize use of LID measures, make sure definitions are clear (e.g., LID vs. green infrastructure vs. environmentally sensitive site design)Updated guidance with a broader array of optionsExamples to show how LID can be integrated into site design to meet requirements	<ul style="list-style-type: none">State-of-the-practice LID measuresAdaptations for Maine specific conditions (e.g., difficult soils, cold climate)	<ul style="list-style-type: none">Model after 2025 NH and MA guidance/ LID options, cross check with EPA fact sheetsPotentially include options/ considerations from additional resources (e.g., Villanova Center for Resilient Water Systems research)Include MN cold climate considerationsPotential Manual Location: Ch 4 (<i>Site Planning</i>); App A (<i>SCM Fact Sheets</i>)	<ul style="list-style-type: none">MassDEP 2025 Stormwater Handbook2025 New Hampshire Stormwater ManualEPA- Green infrastructure fact sheets (link)Minnesota Stormwater Manual - Green Stormwater Infrastructure (GSI) and sustainable stormwater managementMinnesota Stormwater Manual – External resources for high-gradient stormwater step-pool swale (link)Villanova Center for Resilient Water Systems- Exploring Storm Intensities and the Implications on Green Stormwater Infrastructure Design (link)Villanova Center for Resilient Water Systems- Towards the intentional multifunctionality of urban green infrastructure: a paradox of choice? (link)Villanova Center for Resilient Water Systems- An Ensemble of Methods for Determining the Efficiency of Curb Inlets for Green Stormwater Infrastructure (link)Other resources:<ul style="list-style-type: none">2019 LID Manual for Southern California: Technical Guidance and Site Planning Strategies (link)2020 A Guide to LID Within Utah (link)Minnesota Stormwater Manual - Cold climate impact on runoff management (link)

Topic	Score ²	Needs Notes	BAI Needs	BAI Outcomes	BAI Sources
Retention SCMs	3.4	<ul style="list-style-type: none">Interest in SCMs suitable for challenging site conditions (i.e., shallow profile SCMs)Clearly distinguish between “retention” and “non-retention” SCMs	<ul style="list-style-type: none">State-of-the-practice recommendations for SCM design that can effectively achieve infiltration and volume reduction in more challenging soil types (e.g., HSG D) and sites with high season water tables	<ul style="list-style-type: none">Include MN recommendations for BMP use in settings with shallow soils/ depth to bedrockInclude UNHSC Bioretention with ISRPotential Manual Location: App A (<i>SCM Fact Sheets</i>)	<ul style="list-style-type: none">Minnesota Stormwater Manual - BMP use in settings with shallow soils and shallow depth to bedrock (link)Minnesota Stormwater Manual - Shallow groundwater (link)UNHSC Hybrid Bioretention (link)
Smart SCMs	3.2	<ul style="list-style-type: none">Interest in innovative/ “smart” SCMs	<ul style="list-style-type: none">Evaluate the feasibility, effectiveness, cost-benefit, and O&M requirements of Smart SCMs (e.g., Continuous Monitoring and Adaptive Control for Chloride, small pumps, recycling stormwater through system multiple times)	<ul style="list-style-type: none">Model guidance based on available tools and existing case studiesPotential Manual Location: Ch 2 (<i>Innovative Solutions</i>)	<ul style="list-style-type: none">Opti Continuous Monitoring and Adaptive Control (link)StormHarvester Smart Tanks (link)Rainwater harvesting for irrigation (see Rainwater Harvesting SCMs below)Water Environment Federation- Rainfall to Results: The Future of Stormwater (link)Case study Sydney Park, Australia- stormwater is lifted from a channel into bioretention areas, then pumped for irrigation and pond circulation (link; link)Open Storm sensors (link)
Nature-Based Options	2.6	<ul style="list-style-type: none">Promote/ prioritize nature-based solutions	<ul style="list-style-type: none">Guidance on vegetation, soil decompaction and amendment, buffersTo discuss with Dave Rocque, who has ideas on the buffer amendment.	<ul style="list-style-type: none">Model after Minnesota and Washington soil amendment guidance, additional considerations from Dave RocquePotential Manual Location: Ch 4 (<i>Site Planning</i>); Ch 5 (<i>Soils Testing</i>)	<ul style="list-style-type: none">[Dave Rocque]Minnesota Stormwater Manual - Guidance for amending soils with rapid or high infiltration rates (link)2024 Stormwater Management Manual for Western Washington BMP T5.13 Post-Construction Soil Quality and Depth (link)
Retrofit SCMs	2.4	<ul style="list-style-type: none">Options for retrofitting existing development with SCMs	<ul style="list-style-type: none">Recent retrofit guidance (e.g., SNEP Retrofit Manual)	<ul style="list-style-type: none">Model after SNEP retrofit guidancePotential Manual Location: Ch 4 (<i>Retrofits</i>)	<ul style="list-style-type: none">SNEP New England Stormwater Retrofit Manual
SCMs / BMPs for Emerging Contaminants	2.4	<ul style="list-style-type: none">Need to address emerging contaminants, such as PFAS, microplastics, or 6PPD-q in artificial turf.	<ul style="list-style-type: none">Evaluate the effectiveness of current SCMs in addressing emerging contaminantsIdentify potential new SCMs or modifications to existing designs that can effectively target these pollutants	<ul style="list-style-type: none">Model guidance based on UNHSC and Minnesota research and 2024 Western Washington Stormwater ManualAdditional considerations from other publicationsPotential Manual Location: Ch 2 (<i>Emerging Contam.</i>); Ch 4 (<i>Site Planning</i>); App A (<i>SCM Fact Sheets</i>)	<ul style="list-style-type: none">UNHSC <i>How Green is Your Artificial Turf</i> (2013)Minnesota Stormwater Manual - Management of soil and engineered media removed from bioretention basins and similar stormwater treatment devices (link)University of Minnesota Water Resources Center- Capturing contaminants or emerging concern with biofiltration (link)University of Minnesota Water Resources Center- Polycyclic aromatic hydrocarbons in stormwater detention ponds (link)2024 Stormwater Management Manual for Western Washington- Vol I-1.5 Stormwater Pollutants and Their Adverse ImpactsWashington DEP Stormwater Action Monitoring- Bioretention effectiveness for 6PPD and PFAs (link)EPA- Key EPA Actions to Address PFAs (link)Other publications:<ul style="list-style-type: none">Review of emerging contaminants in green stormwater infrastructure: Antibiotic resistance genes, microplastics, tire wear particles, PFAS, and temperature (link)Controlling saturation to improve per- and polyfluoroalkyl substance (PFAS) removal in biochar-amended stormwater bioretention systems (link)Microplastic removal from urban stormwater: Current treatments and research gaps (link)
Proprietary / Manufactured SCMs	2	<ul style="list-style-type: none">Guidance on acceptance and performance of proprietary systems	<ul style="list-style-type: none">Independent, reliable performance data for proprietary SCMsViability, replacement triggers, and disposal of proprietary filter media	<ul style="list-style-type: none">Model after WA DEP TAPE guidanceSee SCM O&M GuidancePotential Manual Location: Ch 5 (<i>Design Criteria</i>); App A (<i>SCM Fact Sheets</i>); Ch 6 (<i>O&M</i>)	<ul style="list-style-type: none">Minnesota Stormwater Manual - Manufactured Treatment Devices (link)New Jersey CAT Technology Verification Database (link)WA DEP TAPE (link)

Topic	Score ²	Needs Notes	BAI Needs	BAI Outcomes	BAI Sources
SCMs to Mitigate Temperature Impacts	2	<ul style="list-style-type: none">Need for guidance on SCMs to mitigate thermal impacts for protecting cold-water fisheries and aquatic habitat	<ul style="list-style-type: none">SCM designs or modifications that optimize stormwater temperature reduction	<ul style="list-style-type: none">Model after MassDEP 2025 guidancePotentially include SCM modifications from other publicationsPotential Manual Location: Ch 4 (<i>Site Planning</i>)	<ul style="list-style-type: none">MassDEP 2025 Stormwater Handbook (5.2.2 Cold-Water Fisheries)Other publications:<ul style="list-style-type: none">Green Infrastructure in Series Reduces Thermal Impacts of Stormwater Runoff (link)Quantifying Thermal Characteristics of Stormwater through Low Impact Development Systems (link)Analysis of Thermal Pollution Reduction Efficiency of Bioretention in Stormwater Runoff under Different Rainfall Conditions (link)
Rainwater Harvesting SCMs	1.7	<ul style="list-style-type: none">Additional information on rainwater harvesting (e.g., sizing when taking irrigation into account). May also include irrigation with other SCMs (e.g., wet ponds)	<ul style="list-style-type: none">Use of rainwater harvesting SCMs to reduce the volume needing infiltration	<ul style="list-style-type: none">Model based on MA and NH guidanceAdditional considerations from Minnesota Stormwater Manual and NC State University Stormwater Engineering Group researchPotential Manual Location: App A (<i>SCM Fact Sheets</i>)	<ul style="list-style-type: none">MassDEP 2025 Stormwater Handbook (Appendix A. Rain Barrels and Cisterns)2025 NH Stormwater Manual (Appendix A. Rain Barrel/ Cistern w/ Reuse)North Carolina State University Stormwater Engineering Group- A Comparison of Methods to Address Anaerobic Conditions in Rainwater Harvesting Systems (link)North Carolina State University Stormwater Engineering Group- Evaluating the Occurrence and Relative Abundance of Mosquitoes in Rainwater Harvesting Systems (link)North Carolina State University Stormwater Engineering Group- Using Irrigation to Increase Stormwater Mitigation Potential of Rainwater Harvesting Systems (link)Minnesota Stormwater Manual - Case studies for stormwater and rainwater harvest and use/reuse (link)U.S. Department of Energy- Rainwater Harvesting Systems Technology Review (link)See Smart SCMs above

Table Notes:

1. Acronyms are defined as follows:

- BAI = Best Available Information
 - SCM = Stormwater Control Measure
 - LID = Low Impact Development
- BMP = Best Management Practice
 - O&M = Operation & Maintenance
 - PRC = Performance Removal Curve
- HSG = Hydrologic Soil Group

2. Topics were scored as follows, with a potential scoring range of 1 to 6:

- Online survey respondents ranked the above General and SCMs update topics based on priority. Based on online survey results, topic rating of “high” = 3 points, “medium” = 2 points, and “low” = 1 point. Ratings for each topic are summed, then divided by the number of responses (19), to get an average survey score.
- One additional point was added to the above score for topics that were identified as priority topics in Workgroup Meeting 1 discussions, emailed feedback, and the Ch 500 Long Memo.

Table A.2 - Preliminary Proposed Manual Outline

CURRENT (2016)			PROPOSED (2025)			PROPOSED (2025) UPDATE NOTES	
VOL I STORMWATER MANAGEMENT			VOL I STORMWATER MANAGEMENT AND TECHNICAL DESIGN				
Chap.	Title	Subheadings	Chap.	Title	Subheadings	To Include...	
1	Introduction	Regulatory Overview	1	Introduction	Regulatory Overview	---	
		Objective of This Manual			Objective of This Manual	<ul style="list-style-type: none">To present state-of-the-science design recommendations and how to meet regulatory requirements	
2	Stormwater Impacts	Past Stormwater Management Practices	2	Stormwater Hydrology and Impacts	---	<ul style="list-style-type: none">Combine Vol I Ch 2 Stormwater Impacts + Vol III Ch 2 Stormwater Hydrology	
		Water Quantity			Water Quantity	<ul style="list-style-type: none">Controlling Peak Discharges and Runoff VolumesFactors Affecting Runoff Quantity	
		---			Adaptation and Resilience	<ul style="list-style-type: none">Adaptation and resilience (climate change considerations, updated precipitation data)	
		Water Quality			Water Quality	<ul style="list-style-type: none">Factors Affecting Runoff Quality	
		---			Emerging Water Quality Challenges and Innovative Solutions	<ul style="list-style-type: none">Emerging contaminants (e.g., PFAs, microplastics) and Smart SCMs	
3	DEP Stormwater Management Objectives	The Four Stormwater Management Objectives	3	DEP Stormwater Management Objectives	Overview of ME State Stormwater Regulations	<ul style="list-style-type: none">Section 2.1 of long memo	
		---			Overview of Chapter 500 Standards	<ul style="list-style-type: none">Overview of updated Chapter 500 Framework and Terminology - Basic Standards, General Standards, Phosphorus Standard, Flooding StandardInfo from long memo, flow charts and visuals on how to determine which standards apply to projects-reference to new tool in Appendix B	
		BMPs to Achieve Objectives			---	---	
4	Low Impact Development	LID Techniques	4	Site Planning and Implementation of Control Measures	Overview of the Site Planning Process	<ul style="list-style-type: none">Permit and documentation requirements, design goals, site design techniques, etc.Intro to SCMs (overview of all SCMs types, distinguish between retention and non-retention)	
		The Implementation of LID			ESSD and LID Techniques	<ul style="list-style-type: none">Updated LID informationNew Environmentally Sensitive Site Design (ESSD) informationClear definitions and distinction between terms and how they relate to Ch 500	
---						SCM Selection	<ul style="list-style-type: none">Design Hierarchy / treatment trainsUpdated BMP Selection Matrix from Vol III Ch 1- promote LID (LID > Retention > Structural)Ability of SCMs to meet objectives (e.g., chloride, phosphorus, nitrogen, emerging contaminants, temperature; volume reduction; recharge)Selection Criteria (e.g., land uses, physical feasibility, ME-specific such as cold climate etc.)Setbacks
							Redevelopment/ Retrofits
			5	Design Criteria and Documenting Compliance			Requirements of Stormwater Standards
					Alternative Analysis	<ul style="list-style-type: none">NEW Overview of Alternative Analysis for SCM Design	
					Manufactured SCMs	<ul style="list-style-type: none">Acceptance of manufactured (i.e., proprietary) SCMs	
					Infiltration and Soils Testing	<ul style="list-style-type: none">NEW Infiltration and soils testing guidance	
			Example Calculations	<ul style="list-style-type: none">SCM example calculations for simple example sites (new vs. redevelopment)Up to five examples per Chapter[separate section or to be included in each applicable section- TBD]			
5	Housekeeping	---		6	Inspection, Maintenance, and Good Housekeeping	Inspection and Maintenance	<ul style="list-style-type: none">Overview of O&M (SCM-specific requirements to be included in App A fact sheets)
			Stormwater Monitoring			<ul style="list-style-type: none">Stormwater monitoring requirements and methods	

CURRENT (2016)			PROPOSED (2025)			PROPOSED (2025) UPDATE NOTES
6	Stormwater Design Considerations	---	---	---	---	<ul style="list-style-type: none">Move to start of new Chapter 4
Appx.	A. Landscape Designs to Enhance Stormwater Treatment	---	---	---	---	<ul style="list-style-type: none">Incorporate landscape design considerations in an LID/ESSD fact sheet
---			Appx.	A. Stormwater Control Measure Fact Sheets	---	<ul style="list-style-type: none">Note on "fact sheets": Format similar to 2025 NH Stormwater Manual fact sheetsFact sheet for LID/ESSD techniques; New techniques; Include nature-based options; Vol I App A landscape infoUpdated SCM schematics (up to 10 new figures, including diagrams and illustrations in above Chapters), specs, design criteriaIn addition to existing Vol III chapters, add notes on new: Source control SCMs, Retention SCMs, Smart SCMs, Manufactured SCMs, Rainwater harvesting SCMs per BAI research results
				B. Design Resources and Tools	---	<ul style="list-style-type: none">Design tools to be in callout boxes where applicable, then all listed in an AppendixDedicated webpage for tools so they can be updated without having to update the entire manual
					Up to 5 tools	<ul style="list-style-type: none">See memo for overview of proposed tools
				VOL II PHOSPHORUS CONTROL		
Chap.	Title	Subheadings	Chap.	Title	Subheadings	To Include...
---	---	---	---	---	---	<ul style="list-style-type: none">Minor updates to reflect Chapter 500 updates as applicable/ new formatting
VOL III TECHNICAL DESIGN						
Chap.	Title	Subheadings	Chap.	Title	Subheadings	To Include...
1	Introduction	---	---	---	---	<ul style="list-style-type: none">Move All content to Vol ICh 2 contents to be moved to Vol I, Ch 5 and updatedCh 3-10 to be moved to Vol 1, App ACh 11 to be moved to Vol 1, Ch 6App B approval letters will remain a website reference with content being moved to Vol I, Ch 5
2	Stormwater Hydrology	2.1 Controlling Peak Discharges and Runoff Volumes				
		2.2 Factors Affecting Runoff				
		2.3 Factors Affecting Runoff				
		2.4 Hydrologic Data for Maine				
3 - 10	Detention Basins; Wet Ponds; Buffers; Inf. BMPs; Filtration BMPs; Convenance; Separators, LID Techniques	---				
11	Operation and Maintenance					
Appx.	A. Runoff Estimation and Hydrologic Models					
	B. Approval Letters for Proprietary Systems					

Table A.3 – Full BAI Reference List

Topic	BAI Sources
Infiltration & Soils Testing Guidance	<ul style="list-style-type: none">• MassDEP 2025 Stormwater Handbook (6.3 Soil Evaluation Procedures)• Minnesota Stormwater Manual- Determining soil infiltration rates (https://stormwater.pca.state.mn.us/index.php?title=Determining_soil_infiltration_rates)• Minnesota Stormwater Manual- Understanding and interpreting soils and soil boring reports for infiltration BMPs (https://stormwater.pca.state.mn.us/index.php?title=Understanding_and_interpreting_soils_and_soil_boring_reports_for_infiltration_BMPs)• Minnesota Stormwater Manual- Infiltration design guideline- determining site infiltration rates (https://stormwater.pca.state.mn.us/index.php?title=Infiltration_design_guideline_-_determining_site_infiltration_rates)• New Jersey Stormwater BMP Manual- Chapter 12: Soil Testing Criteria (https://dep.nj.gov/stormwater/bmp-manual/)
Alternatives Analysis for SCM Design	<ul style="list-style-type: none">• MassDEP 2025 Stormwater Handbook (Appendix B. Written Feasibility Analysis Template)• Other resources:<ul style="list-style-type: none">◦ NH AoT Waivers (Env-Wq 1509)◦ North Carolina DEQ 2023 Stormwater Control Measure Credit Document- Approval Process for New Stormwater Technologies (https://www.deq.nc.gov/energy-mineral-and-land-resources/stormwater/bmp-manual/2023-nc-stormwater-control-measure-credit-document/download?attachment)◦ Ventura County 2025 Technical Guidance Manual for Stormwater Quality Control Measures- Alternative Compliance (https://www.vcstormwater.org/images/stories/NPDES_Documents/TGM/TGM_2025/VC_TGM_2025_Reissuance_Final_Complete_Document_rdx.pdf)
SCM O&M Guidance	<ul style="list-style-type: none">• MassDEP 2025 Stormwater Handbook (Appendix A. SCM Fact Sheets)• 2025 NH Stormwater Manual (Appendix A. SCM Fact Sheets)• UNHSC <i>Site Deconstructive Investigation of Stormwater Control Measures at the UNH Stormwater Center</i> (March 2025)• Minnesota Stormwater Manual - Management of soil and engineered media removed from bioretention basins and similar stormwater treatment devices (https://stormwater.pca.state.mn.us/index.php?title=Management_of_soil_and_engineered_media_removed_from_bioretention_basins_and_similar_stormwater_treatment_devices)• University of Minnesota St. Anthony Falls Laboratory online Stormwater Treatment: Assessment and Maintenance Manual - Assessment Programs (https://stormwaterbook.safl.umn.edu/developing-assessment-program)• North Carolina State University Stormwater Engineering Group- Effect of Visibility on Maintenance Investment and Consequent Performance of Urban Stormwater Control Measures (https://ascelibrary.org/doi/10.1061/JSWBAY.0000975)• Villanova Center for Resilient Water Systems- Underperformance Assessment Framework for Bio-infiltration Systems (https://ascelibrary.org/doi/10.1061/JSWBAY.0000987)• Washington DEP Stormwater Action Monitoring- Evaluation of BMP maintenance conditions (https://ecology.wa.gov/regulations-permits/reporting-requirements/stormwater-monitoring/stormwater-action-monitoring/sam-effectiveness-studies/bmp-maintenance-conditions)
SCM Schematics & Specs	<ul style="list-style-type: none">• UNHSC Design Specifications (e.g., Bioretention Soil Mix, Porous Asphalt Pavement and Infiltration Beds, Gravel Wetland, Hybrid Bioretention) https://extension.unh.edu/stormwater-center/pubs-specs-info• SNEP New England Stormwater Retrofit Manual• Washington State Department of Ecology- Guidance on using new high performance bioretention soil mixes (https://fortress.wa.gov/ecy/ezshare/wq/SWMMs/2024SWMMWW/Content/Resources/DocsForDownload/EmergingGuidance/ECYPub21-10-023_RevisedSeptember2024.pdf)
SCM Selection & Design Hierarchy	<ul style="list-style-type: none">• MassDEP 2025 Stormwater Handbook (Appendix A. ESSD Credits)• 2025 New Hampshire Stormwater Manual• New Jersey Stormwater Management Rules (https://dep.nj.gov/stormwater/)• Other resources:<ul style="list-style-type: none">◦ Chester County, PA Planning Commission- Conservation Subdivision Design Guide (https://www.chescoplanning.org/MuniCorner/ConservationSubdivision/Introduction.cfm)
SCM Design Criteria	<ul style="list-style-type: none">• MassDEP 2025 Stormwater Handbook (Appendix A. Bioretention planting guidance)• Minnesota Stormwater Manual - Plant and vegetation information for stormwater management (https://stormwater.pca.state.mn.us/index.php?title=Plant_and_vegetation_information_for_stormwater_management)• University of Minnesota Water Resources Center- Managing urban pond vegetation to enhance water quality benefits (https://wrc.umn.edu/managing-veg)• University of Minnesota Water Resources Center- Plants for stormwater design, interactive selection tool for stormwater professionals and the public (https://wrc.umn.edu/plants-sw)• 2025 NH Stormwater Manual (Appendix A. Bioretention planting guidance)• Villanova Center for Resilient Water Systems- A Method to Assess Plant Behavior in Green Stormwater Infrastructure (https://ascelibrary.org/doi/10.1061/JSWBAY.0000983)• Other publications:<ul style="list-style-type: none">◦ Supporting evidences for vegetation-enhanced stormwater infiltration in bioretention systems: a comprehensive review (https://pubmed.ncbi.nlm.nih.gov/36653688/)
Design Tools to Assist in Calculations	<ul style="list-style-type: none">• MassDEP 2025 Pollutant Load Reduction Excel-based worksheets (https://www.mass.gov/guides/massachusetts-stormwater-handbook-and-stormwater-standards)• MassDOT Water Quality Data Form (https://www.mass.gov/info-details/stormwater-management-unit)• Minnesota Stormwater Manual - Stormwater models, calculators, and modeling (https://stormwater.pca.state.mn.us/index.php?title=Stormwater_models_calculators_and_modeling)• 2025 NH Stormwater Manual; UNHSC WPS Calculator (https://scholars.unh.edu/stormwater/114/)• Minnesota Stormwater Manual – Minimal Impact Design Standards: Design Sequence Flowchart- Flexible Treatment Options; MIDS Calculator (https://stormwater.pca.state.mn.us/index.php?title=Minimal_Impact_Design_Standards)• Interstate Technology Regulatory Council (ITRC) Stormwater Post-Construction BMP Evaluation Tool (https://stormwater-1.itrcweb.org/3-bmp-screening-tool-and-considerations/)

Topic	BAI Sources
Stormwater Monitoring	<p>Noting general references:</p> <ul style="list-style-type: none">MassDEP 2025 Stormwater Handbook (Appendix A. Infiltration basin monitoring wells design considerations)University of Minnesota St. Anthony Falls Laboratory online Stormwater Treatment: Assessment and Maintenance Manual - Sampling Methods/ Data Analysis (https://stormwaterbook.safl.umn.edu/)
Source Control BMPs (e.g., for chloride)	<ul style="list-style-type: none">2025 NH Stormwater Manual (Appendix A. Snow and Ice Management)MassDEP 2025 Stormwater Handbook (Appendix A. Road Salt Storage and Snow Disposal)NH Salt BMPs (e.g., anti-icing, brine making, storage and housekeeping) (https://www.des.nh.gov/resource-center/publications?keys=SaltBMPs&purpose=&subcategory=)Minnesota Stormwater Manual - Smart Salting Assessment Tool (https://stormwater.pca.state.mn.us/index.php?title=Smart_Salting_Assessment_tool_(SSAt))Minnesota Stormwater Manual - Chloride reduction case study: The Promenade of Wayata (hydronic snowmelt tubing) (https://stormwater.pca.state.mn.us/index.php?title=Chloride_reduction_case_study:_The_Promenade_of_Wayzata)2024 Stormwater Management Manual for Western Washington- Vol IV Source Control BMP LibraryNote: Did not find any case studies on using canopies over pavement specifically for chloride control
LID / Green Infrastructure Options	<ul style="list-style-type: none">MassDEP 2025 Stormwater Handbook2025 New Hampshire Stormwater ManualEPA- Green infrastructure fact sheets (https://www.epa.gov/green-infrastructure/types-green-infrastructure)Minnesota Stormwater Manual - Green Stormwater Infrastructure (GSI) and sustainable stormwater managementMinnesota Stormwater Manual – External resources for high-gradient stormwater step-pool swale (https://stormwater.pca.state.mn.us/index.php?title=External_resources_for_high-gradient_stormwater_step-pool_swale)Villanova Center for Resilient Water Systems- Exploring Storm Intensities and the Implications on Green Stormwater Infrastructure Design (https://onlinelibrary.wiley.com/doi/10.1002/hyp.15333)Villanova Center for Resilient Water Systems- Towards the intentional multifunctionality of urban green infrastructure: a paradox of choice? (https://www.nature.com/articles/s42949-024-00145-0)Villanova Center for Resilient Water Systems- An Ensemble of Methods for Determining the Efficiency of Curb Inlets for Green Stormwater Infrastructure (https://ascelibrary.org/doi/10.1061/JSWBAY.0000998)Other resources:<ul style="list-style-type: none">2019 LID Manual for Southern California: Technical Guidance and Site Planning Strategies (https://www.casqa.org/resources/california-lid-gi/socal-lid-manual)2020 A Guide to LID Within Utah (https://deq.utah.gov/water-quality/low-impact-development)Minnesota Stormwater Manual - Cold climate impact on runoff management (https://stormwater.pca.state.mn.us/index.php?title=Cold_climate_impact_on_runoff_management)
Retention SCMs	<ul style="list-style-type: none">Minnesota Stormwater Manual - BMP use in settings with shallow soils and shallow depth to bedrock (https://stormwater.pca.state.mn.us/index.php?title=Shallow_soils_and_shallow_depth_to_bedrock)Minnesota Stormwater Manual - Shallow groundwater (https://stormwater.pca.state.mn.us/index.php?title=Shallow_groundwater)UNHSC Hybrid Bioretention (https://extension.unh.edu/stormwater-center/pubs-specs-info)
Smart SCMs	<ul style="list-style-type: none">Opti Continuous Monitoring and Adaptive Control (https://www.optirtc.com/)StormHarvester Smart Tanks (https://stormharvester.com/smart-tanks/)Rainwater harvesting for irrigation (see Rainwater Harvesting SCMs below)Water Environment Federation- Rainfall to Results: The Future of Stormwater (https://www.accesswater.org/?id=-10095513&fromsearch=true#iosfirsthighlight)Case study Sydney Park, Australia- stormwater is lifted from a channel into bioretention areas, then pumped for irrigation and pond circulation (https://www.landscapeperformance.org/case-study-briefs/sydney-park#overview; https://www.architectureanddesign.com.au/editorial/features/3-case-studies-that-utilise-stormwater-a-valuable)Open Storm sensors (https://www.digitalwaterlab.org/build)
Nature-Based Options	<ul style="list-style-type: none">[Dave Rocque]Minnesota Stormwater Manual - Guidance for amending soils with rapid or high infiltration rates (https://stormwater.pca.state.mn.us/index.php?title=Guidance_for_amending_soils_with_rapid_or_high_infiltration_rates)2024 Stormwater Management Manual for Western Washington BMP T5.13 Post-Construction Soil Quality and Depth (https://fortress.wa.gov/ecy/ezshare/wq/SWMMs/2024SWMMWW/2024_SWMMWW.htm#Topics/Shared/RTandFC_BMPs/MiscLIDBMPs/BMP_T513W_F661E.htm?Highlight=soil%20amendment)
Retrofit SCMs	<ul style="list-style-type: none">SNEP New England Stormwater Retrofit Manual

Topic	BAI Sources
SCMs / BMPs for Emerging Contaminants	<ul style="list-style-type: none">• UNHSC <i>How Green is Your Artificial Turf</i> (2013)• Minnesota Stormwater Manual - Management of soil and engineered media removed from bioretention basins and similar stormwater treatment devices (https://stormwater.pca.state.mn.us/index.php?title=Management_of_soil_and_engineered_media_removed_from_bioretention_basins_and_similar_stormwater_treatment_devices)• University of Minnesota Water Resources Center- Capturing contaminants or emerging concern with biofiltration (https://wrc.umn.edu/cec-biofiltration)• University of Minnesota Water Resources Center- Polycyclic aromatic hydrocarbons in stormwater detention ponds (https://wrc.umn.edu/polycyclic-aromatic-hydrocarbons-stormwater-detention-ponds)• 2024 Stormwater Management Manual for Western Washington- Vol I-1.5 Stormwater Pollutants and Their Adverse Impacts• Washington DEP Stormwater Action Monitoring- Bioretention effectiveness for 6PPD and PFAs (https://ecology.wa.gov/regulations-permits/reporting-requirements/stormwater-monitoring/stormwater-action-monitoring/sam-effectiveness-studies/bioretention-effectiveness-for-6ppd-and-pfas)• EPA- Key EPA Actions to Address PFAs (https://www.epa.gov/pfas/key-epa-actions-address-pfas)• Other publications:<ul style="list-style-type: none">○ Review of emerging contaminants in green stormwater infrastructure: Antibiotic resistance genes, microplastics, tire wear particles, PFAS, and temperature (https://pubmed.ncbi.nlm.nih.gov/37777137/)○ Controlling saturation to improve per- and polyfluoroalkyl substance (PFAS) removal in biochar-amended stormwater bioretention systems (https://pubs.rsc.org/en-us/content/articlelanding/2024/ew/d3ew00767g)○ Microplastic removal from urban stormwater: Current treatments and research gaps (https://pubmed.ncbi.nlm.nih.gov/35751294/)
Proprietary / Manufactured SCMs	<ul style="list-style-type: none">• Minnesota Stormwater Manual - Manufactured Treatment Devices (https://stormwater.pca.state.mn.us/index.php?title=TP_and_TSS_credits_and_guidance_for_manufactured_treatment_devices_(mtds))• New Jersey CAT Technology Verification Database (http://www.njcat.org/verification-process/technology-verification-database.html)• WA DEP TAPE (https://ecology.wa.gov/regulations-permits/guidance-technical-assistance/stormwater-permittee-guidance-resources/emerging-stormwater-treatment-technologies)
SCMs to Mitigate Temperature Impacts	<ul style="list-style-type: none">• MassDEP 2025 Stormwater Handbook (5.2.2 Cold-Water Fisheries)• Other publications:<ul style="list-style-type: none">○ Green Infrastructure in Series Reduces Thermal Impacts of Stormwater Runoff (https://www.researchgate.net/publication/370428763_Green_Infrastructure_in_Series_Reduces_Thermal_Impacts_of_Stormwater_Runoff)○ Quantifying Thermal Characteristics of Stormwater through Low Impact Development Systems (https://www.mdpi.com/2306-5338/6/1/16)○ Analysis of Thermal Pollution Reduction Efficiency of Bioretention in Stormwater Runoff under Different Rainfall Conditions (https://www.mdpi.com/2073-4441/14/21/3546)
Rainwater Harvesting SCMs	<ul style="list-style-type: none">• MassDEP 2025 Stormwater Handbook (Appendix A. Rain Barrels and Cisterns)• 2025 NH Stormwater Manual (Appendix A. Rain Barrel/ Cistern w/ Reuse)• North Carolina State University Stormwater Engineering Group- A Comparison of Methods to Address Anaerobic Conditions in Rainwater Harvesting Systems (https://www.mdpi.com/2073-4441/13/23/3419)• North Carolina State University Stormwater Engineering Group- Evaluating the Occurrence and Relative Abundance of Mosquitoes in Rainwater Harvesting Systems (https://elibrary.asabe.org/abstract.asp?AID=53708&t=3&dabs=Y&redir=&redirType=)• North Carolina State University Stormwater Engineering Group- Using Irrigation to Increase Stormwater Mitigation Potential of Rainwater Harvesting Systems (https://ascelibrary.org/doi/10.1061/JSWBAY.0000913)• Minnesota Stormwater Manual - Case studies for stormwater and rainwater harvest and use/reuse (https://stormwater.pca.state.mn.us/index.php?title=Case_studies_for_stormwater_and_rainwater_harvest_and_use/reuse)• U.S. Department of Energy- Rainwater Harvesting Systems Technology Review (https://www.energy.gov/femp/rainwater-harvesting-systems-technology-review)• See Smart SCMs above