VERMONT

Evolving Approaches to Stormwater Management

Vermont Stormwater Management Manual Update, Meeting #1

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Room 11, Vermont Statehouse, Montpelier

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STONE ENVIRONMENTAL INC

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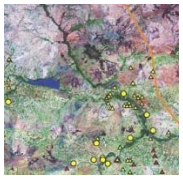
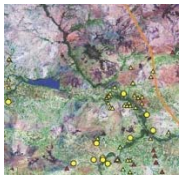
Key Topics



1 Current framework for stormwater management in VSMM

2 Highlights of innovative program from other jurisdictions

3 Options to consider for Vermont



Key Topics

1 Current framework for stormwater management in VSMM

2 Highlights of innovative programs from other jurisdictions

3 Options to consider for Vermont

Current VSMM Practice

- Stormwater construction permits are administered through an NOI process for any project creating one acre or more of disturbance
  - Approved separately from permits for post-construction stormwater management
- State stormwater discharge permit required for:
  - New impervious surfaces greater than 1 acre;
  - Redevelopment of existing impervious, where the redeveloped portion is greater than 1 acre;
  - Expansions greater than 5,000 sf, if the total resulting impervious surface is greater than 1 acre.

Current VSMM Practice

- Treatment standards in VSMM include:
  - Water Quality Treatment Standard (WQv)

    Capture 90% of annual storm events

    Remove 80% of TSS and 40% of TP
  - Channel Protection (CPv)

    Extended detention of the one-yr, 24-hr event for 12-24 hours

    For projects that have disconnected the majority of impervious surfaces, the designer can demonstrate that the post-development peak discharge from the disconnected portion of the site for the one-year storm is no greater than if 12-hour detention was provided

Current VSMM Practice

- Treatment standards in VSMM include:
  - Groundwater Recharge (Rev)

    Maintain average annual recharge rate for the prevailing hydrologic soil group on the project site
  - Overbank Flood Protection (Qp10)
  - Extreme Flood Protection (Qp100)

Current VSMM Practice

- Stormwater credits can be used to reduce the required WQv and Rev
- Credits available in VSMM:
  - Natural area conservation
  - Disconnection of rooftop runoff

    Rooftop runoff is directed to a pervious area
  - Disconnection of non-rooftop runoff

    Impervious area "disconnected" to any discharge location cannot exceed 1,000 ft^2
  - Stream buffers

    Treating runoff through overland flow in a natural buffer with a minimum width of 50 ft

Current VSMM Practice

- Stormwater credits available in VSMM, cont.:
  - Grass channel
    - Channel bottom width between 2 ft and 8 ft
    - Side slopes 3H:1V or flatter
    - Channel slope less than or equal to 4%
  - Environmentally sensitive rural development
    - Total impervious cover is less than 8% of lot and project area
    - Minimum of 25% of the project is protected natural areas
    - Rooftop runoff is disconnected
    - Grass channels are used to convey runoff
    - Stream buffers are provided for perennial and intermittent streams

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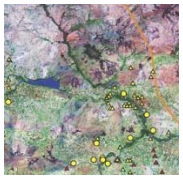


1 Current framework for stormwater management in VSMM

2 Highlights of innovative programs from other jurisdictions

- Maryland
- Virginia
- Minnesota
- Rhode Island
- South Burlington

3 Options to consider for Vermont

Maryland's Environmental Site Design Methodology

- Requires the implementation of environmental site design (ESD) at development sites to the maximum extent practicable (MEP) through the use of better site design techniques, alternative surfaces, non-structural techniques, and small-scale treatment practices.
- Approved ESD treatment practices include:
  - *Alternative Surfaces:* Green roofs, permeable pavements, and reinforced turf
  - *Nonstructural Practices:* Disconnection of rooftop runoff, disconnection of non-rooftop runoff, and sheet flow to conservation area
  - *Micro-scale Practices:* Rainwater harvesting, micro-bioretention, rain gardens, submerged gravel wetlands, landscape infiltration, swales, enhanced filters, infiltration berms, and drywells

Maryland's Environmental Site Design Methodology

- Previously, the use of nonstructural techniques was encouraged through optional site design "credits" in the 2000 Maryland Stormwater Manual
- Updated Stormwater Manual not only expands on the ESD practices, but also establishes a planning process to improve implementation.

Maryland's Environmental Site Design Methodology

- Criteria for ESD are based on the runoff curve number (RCN) hydrology method and a simplified process to determine stormwater practices needed to replicate runoff characteristics similar to "woods in good condition" using look-up tables.
  - The ESDv is designed for the 1-yr, 24-hr storm, or 2.7 inches, therefore, it generally encompasses the water quality, recharge, and channel protection criteria from the 2000 Manual.
  - Only when the required ESDv cannot be met to the MEP are traditional structural practices allowed.
- Manual includes a comprehensive plan review process with phased submissions at three stages of design (Concept, Site Development, and Final stormwater management plans) to ensure compliance with the ESD to the MEP standard.

Virginia's Runoff Reduction Approach

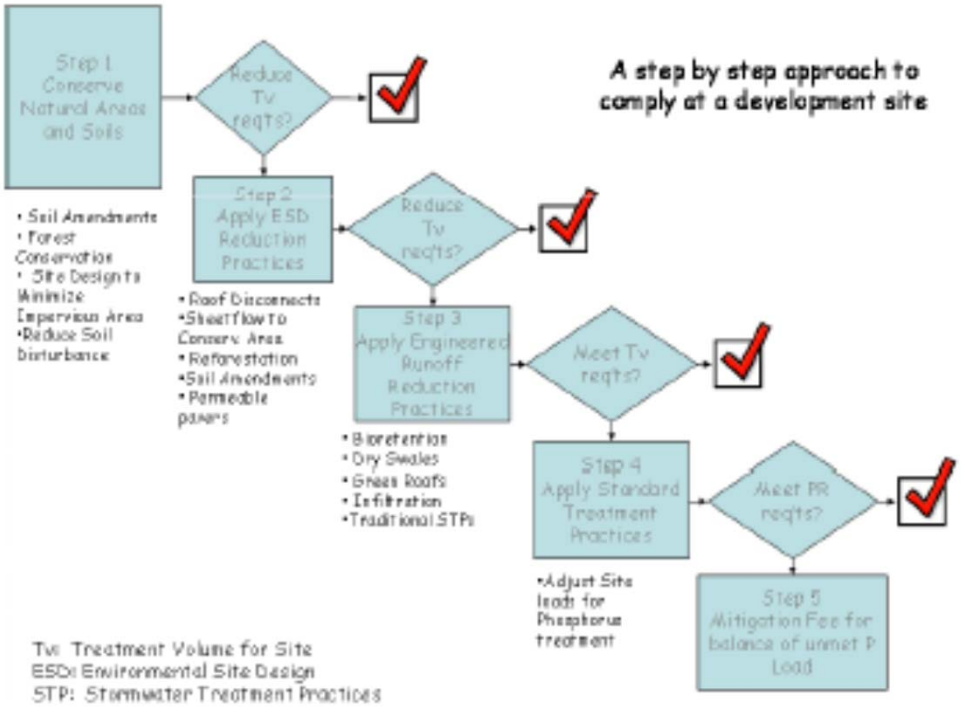
- Virginia's Stormwater Management Regulations, effective September 2011 and scheduled for full implementation in July 2014, replaced the existing water quality protection criteria with a Runoff Reduction Method (RRM) and pollution removal threshold.
- Runoff reduction approaches are generally characterized by :
  - Avoid unnecessary site disturbance and minimize the creation of impervious surface;
  - Reduce runoff volumes through the use of management practices that provide infiltration, extended filtration, soil amendments, rainwater harvesting and reuse, evapotranspiration; and,
  - Employ additional structural controls, as needed, to reduce the peak rate of discharge or reduce the pollutant load concentrations in the runoff volume.

Virginia's Runoff Reduction Approach

- Total Phosphorus (TP) is used as an indicator pollutant to determine compliance with water quality criteria
  - Phosphorus load limit for new development is 0.41 lb./acre/year
- Requires a "treatment volume" to be calculated by multiplying the composite runoff index by the 90th percentile storm event in VA (1" of rain) by the entire site area (including managed turf and forest/open space land cover categories)

Virginia's Runoff Reduction Approach

- Virginia's RRM uses a spreadsheet-based credit calculator tool to calculate site-specific TP loads, BMP treatment volumes and aid in the design and review processes,
- Virginia invested significant time and staff resources in a stepwise, deliberative stakeholder process in order to tailor the approach to their specific water quality concerns.



Minnesota's Minimal Impact Design Standards (MIDS)

- Minnesota recently finalized (June 2013) its Minimal Impact Design Standards (MIDS); the MIDS contain three main elements:
  - A higher performance goal for new development and redevelopment
  - New modeling methods and credit calculations that standardize the use of a range of stormwater techniques
  - A credits system and ordinance package that allows for increased flexibility and a streamlined approach to regulatory programs for developers and communities

Minnesota Pollution Control Agency | www.pca.state.mn.us

Minnesota Minimal Impact Design Standards

CLEAN WATER LAND & LEGACY AMENDMENT

What is Minimal Impact Design Standards?

Minimal Impact Design Standards (MIDS) represent the next generation of stormwater management in Minnesota. The emphasis today is on keeping the raindrop where it falls in order to minimize stormwater runoff and pollution and preserve natural resources. Low Impact Development (LID) is an approach to stormwater management that mimics a site's natural hydrology as the landscape is developed and preserves and protects environmentally-sensitive site features such as riparian buffers, wetlands, steep slopes, valuable (mature) trees, floodplains, woodlands and highly permeable soils.

Minnesota's new MIDS offers guidelines, recommendations and tools that will help LID be implemented more uniformly across Minnesota's landscape and provides guidance to effectively implement the concepts and practices LID promotes and encourages.

MIDS contains four main elements to meet these needs:

- A stormwater volume performance goal for new development, redevelopment and linear that will provide enhanced protection for Minnesota's water resources.
- New credit calculations that will standardize the use of a range of innovative structural stormwater techniques.
- Design specifications for a variety of green infrastructure best management practices (BMPs).
- A model MIDS ordinance package that will help developers and communities implement MIDS.

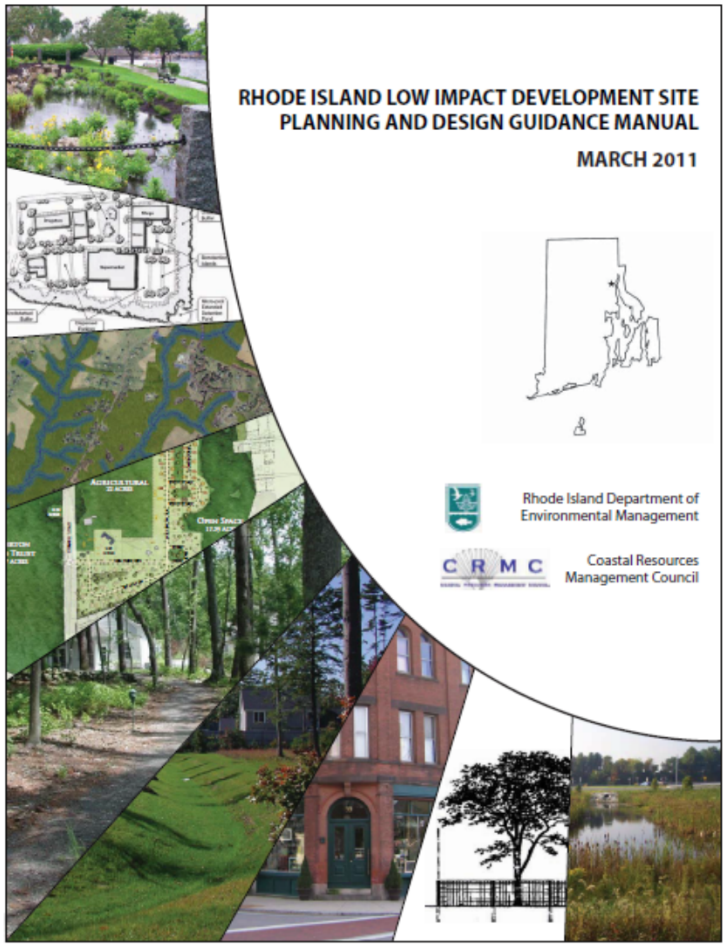
Tree trenches at Maplewood Mall

Minnesota's Minimal Impact Design Standards (MIDS)

- As part of the MIDS development effort, existing credit tracking systems and calculators were evaluated to determine which existing tools from other jurisdictions best addressed several criteria:
  - Provide an incentive for incorporating low impact development (LID) techniques onto a site
  - Determine the stormwater volume control required on the site
  - Determine TP and TSS removal
  - Provide volume and pollutant removal credit for BMPs in parallel and in series
  - Focus on pollutant removals for sites with Hydrologic Soil Group D soils
  - Not replace existing models, such as HydroCAD, for calculating and showing conformance to stormwater peak runoff rate requirements

Rhode Island's Mandatory LID Checklist

- LID site planning and design objectives can be split into three main categories:
  - *Avoid the impacts* – Preserve, and where possible restore, natural features;
  - *Reduce the impacts* – Reduce impervious cover; and
  - *Manage the impacts at the source* – Design site specific runoff reduction, treatment, and source controls" (Rhode Island DEM and CRC, 2011)



Rhode Island's Mandatory LID Checklist

- Rhode Island offers state-level integration of LID as the "industry standard" for development and redevelopment.
- Rhode Island's Stormwater Management Checklist, which is part of the required Storm Water Management Plan submittal, is a guide for engineers and designers to refer to during all stages of a project to ensure that they are meeting all applicable requirements
  - Conventional practices like detention basins are not allowed to be used to meet treatment standards

    This means that the menu of available practices is skewed towards GSI
  - LID checklist applies equally to both new development and redevelopment projects, bringing in sites that never would have had to consider GSI before

South Burlington's Land Development Regulations

- Proposed revisions to the LDRs include a new performance standard that would require the use of LID practices in order prevent the WQv from leaving a project site via overland runoff
  - If it is not possible to infiltrate the volume of stormwater runoff due to one or more constraints, the WQv can be treated using "traditional" stormwater treatment practices
  - Constraints include:

    Seasonally high or shallow groundwater

    Shallow bedrock

    Soil infiltration rates of less than 0.2 inches per hour

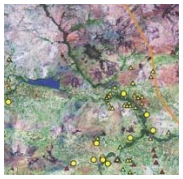
    Contaminated soils

    Presence of a "stormwater hotspot"

South Burlington's Land Development Regulations

- Proposed revisions would also expand site design requirements for redevelopment:
  - If the area of the lot that is to be redeveloped or substantially reconstructed is greater than 3%, but less than 50%, of the lot's existing impervious area, then only those portions of the lot that are being redeveloped or substantially reconstructed must comply
  - If the area of the lot that is being redeveloped or substantially reconstructed exceeds 50% of the lot's existing impervious area then all of the lot's impervious surfaces must comply

Key Topics



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Options to Consider for Vermont

- General considerations: who, what, when, where, why and how?
  - Who is being regulated?
  - What are permittees required to do to comply?
  - When did the changes take effect?
  - Where do the regulations apply?
  - Why were the regulatory thresholds selected?
  - How is the program being implemented?

Options to Consider for Vermont

- These translate to the need for discussion of:
  - Guiding "philosophy" of stormwater management

    Regulate vs. incentivize

    Regulatory threshold
  - Feasibility of implementing and maintaining stormwater management practices
  - Availability of staff time/resources at DEC for permit review and compliance support
  - Desired timeline for program implementation
  - Opportunities for training for site designers

Options to Consider for Vermont

Permit Type	Impervious (acres)	Source
Pre 2002 Permit	1044	VT Stormwater Management Database, queried 9/25/2013
9010	4199	
9015	2271	
INDS	632	
9030 (RDA)	102	
MS4 Permit	10792	Intersection of MS4 boundaries with the Lake Champlain NDVI Impervious Surface Layer

- <20,000 acres of impervious regulated statewide
- DEC has estimated there is 140,000 acres of impervious surface in the Vermont-portion of the Champlain basin
- NRCS has estimated there is 393,000 acres of “developed land” in Vermont

Options to Consider – Big Picture

- Adopt higher performance goals for new development going forward
  - In Minnesota, the post-construction runoff volume for the 93rd percentile (or 1.1 inches of runoff from impervious surfaces statewide average) precipitation event must be retained on site

    The "1.1 inches" corresponds to what needs to be retained in order to not exceed the natural average annual runoff volume for HSG A, B, and C soils on a state-wide average basis
  - West Virginia's MS4 permit requires municipalities to implement a program requiring all new and redevelopment projects to manage the first inch of rainfall with no discharge to surface waters

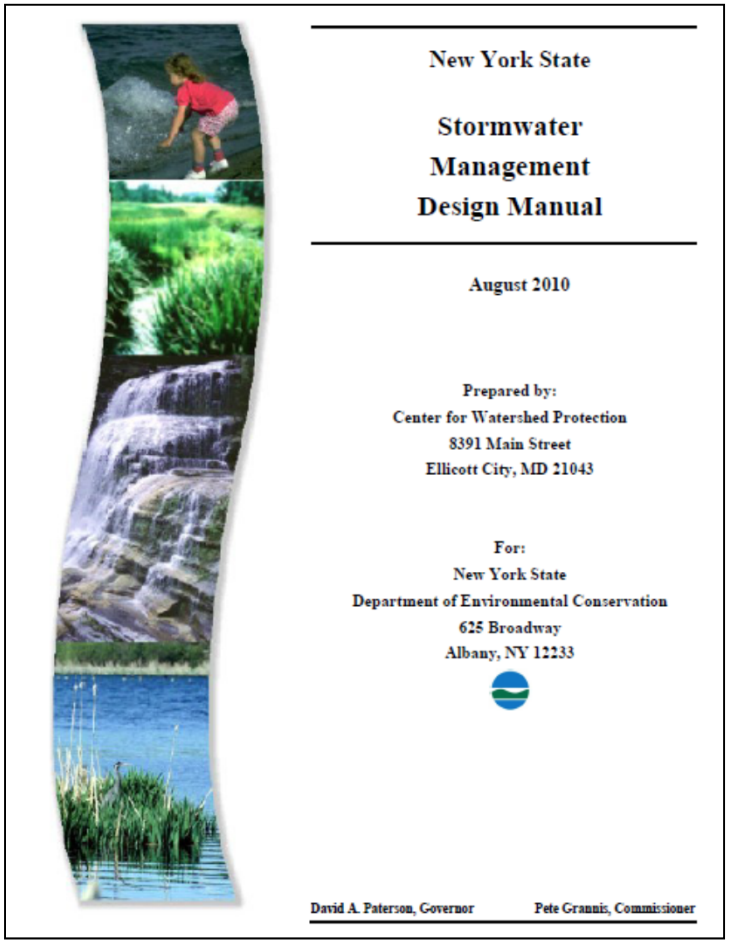
    Includes incentives for "sustainable development practices", where credits, up to a maximum reduction of 0.75 inches from the one inch runoff reduction standard may be accrued

Options to Consider – Big Picture

- Establish tiered permit requirements and/or thresholds for “at risk” watersheds
  - Maine’s *Phosphorus Standards* stipulate an allowable per-acre phosphorus allocation for watersheds of a “lake most at risk”
  - *Stormwater Management Overlay District*, such as those enacted by South Burlington (VT) and Pittsburgh (PA), that specify enhanced management measures in target subwatersheds

Options to Consider – Big Picture

- Modify the WQv standard to include both water quality considerations and a volume reduction target
  - New York's stormwater manual explicitly provides "credit" – reducing both the WQv and CPv - for projects that utilize low impact design approaches and infiltration practices



Options to Consider – LID/GSI Specific

- Enhance existing system - develop explicit guidance on applying for multiple credits, worksheets for non-structural practices
- Increase prominence of “alternate design standard” option for CPv
- Allow combinations of non-structural LID credits to apply fully to WQv and REv in cases other ESRD
- Add guidance on adjusting CN for larger storms?