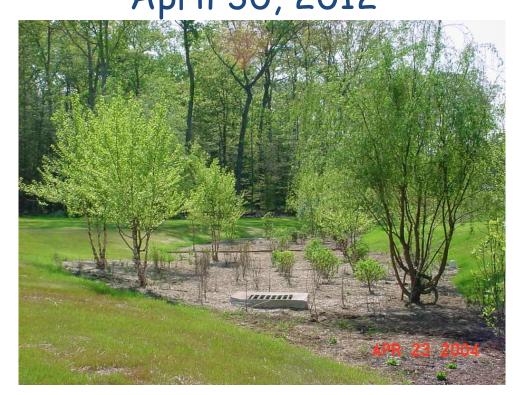
PERFORMANCE STANDARDS EXPERT PANEL RECOMMENDATIONS

Presented to the Urban Stormwater Workgroup April 30, 2012



The Expert Panel

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Protection

The Charge

The Panel was initially charged to evaluate:

- If full implementation of each new state stormwater performance standard will achieve sufficient nutrient and sediment removal at a new development site, and qualify as being "nutrient neutral" with respect to the Bay TMDL.
- How to assess situations at new development projects that only partially achieve the standard.
- What, if any, pollutant load reduction should be offered when the standards are applied to redevelopment projects that treat existing impervious cover that was not previously treated by any BMP.

The Charge

 What are the proper units that local governments will report to the state to incorporate into the Chesapeake Bay Watershed Model.

Beyond this general charge, the Panel was asked to:

- Determine whether to recommend if an interim BMP rate be established prior to the conclusion of the panel for WIP planning purposes.
- Provide a specific definition of how the performance standard approach is applied in each state, including runoff capture volume, degree of runoff reduction, and the potential situations where development projects may not fully comply with the standard.

The Charge

- Recommend procedures for reporting, tracking and verifying the removal rates achieved under the new performance standards.
- Critically analyze any unintended consequence associated with the removal rates and any potential for double- or over-counting of load reductions.

Key Points

- Performance Standards for each state
- Engineering Parameter
- Redevelopment
- Non-conforming Sites
- Design Examples
- Accountability

Key Elements of Panel Recommendations

- Not 1 universal removal rate for a diverse set of practices
- Unitization approach allows for comparison of the each state's unique EP
- Simple method to determine removal rates for each unique BMP
- Relatively simple reporting requirements for localities and states
- Flexible reporting, tracking and verification process that can align well with existing programs
- Improved methods for verification and performance to ensure pollutant removal occurring and will improve the health of the Bay

Performance Standards by State

- In last 5 years, each State has revised regulations to improve the performance of stormwater practices.
- All of the Sates have increased the volume of runoff treated on-site and encourage/require the use of runoff reduction and ESD practices.
- Each State has unique regulations, performance standards, compliance models and design criteria (Table 1)

STATE	PERFORMANCE STANDARD	RAIN DEPTH CONTROLLED
DC	Retain runoff volume on-site	1.2"
DE	Provide runoff reduction to have zero effective impervious for RPE	2.7"
EPA	Control 95% storm event on-site using RR to METF	1.4 - 1.7"
WD	Use ESD to the MEP to achieve runoff for woods in good condition	2.7"
NY	Provide runoff reduction for a fraction of WQv for 90% rain event	0.8 - 1.2"
PA	No increase in total runoff volume for all events up to the two year storm	2.8"
VA	TP load from new development may not exceed 0.41 lbs/ac/yr	1.0"
WV	Provide on-site runoff reduction	1.0"

How to Compare?

- Tempting to compare rainfall depth controlled....can be misleading
- Every State has a unique predevelopment hydrologic baseline and modeling approach (CN or Rv)
- Results in different Engineering Parameter (EP) for each State
- Unitization!

Engineering Parameters

 State-specific compliance spreadsheets many of which created by CSN and/or CWP will give you a site-specific EP

Site Data					
Site Name:					
Site Information					
Indicate Post-Development La	and Cover		Rv Coefficients		
Cover Type	Area (acres		Land Cover Type	Rv	
Natural Cover			Natural Cover	0.00	
Compacted Cover			Compacted Cover	0.25	
Impervious Cover			Impervious Cover	0.95	
Total	0.00				
Land Cover Summary					
% Natural Cover	#DIV/0!				
% Compacted Cover (acres)	#DIV/0!				
% Impervious Cover	#DIV/0!				
Site Rv	#DIV/0!				
Is Site a Federal Facility?		No			C
Regulatory Rain Event for Retent		1.2			
Stormwater Retention Volume	e, SWRv (cubic feet)	#DIV/0!			The state of the s
					P



How to Compare?

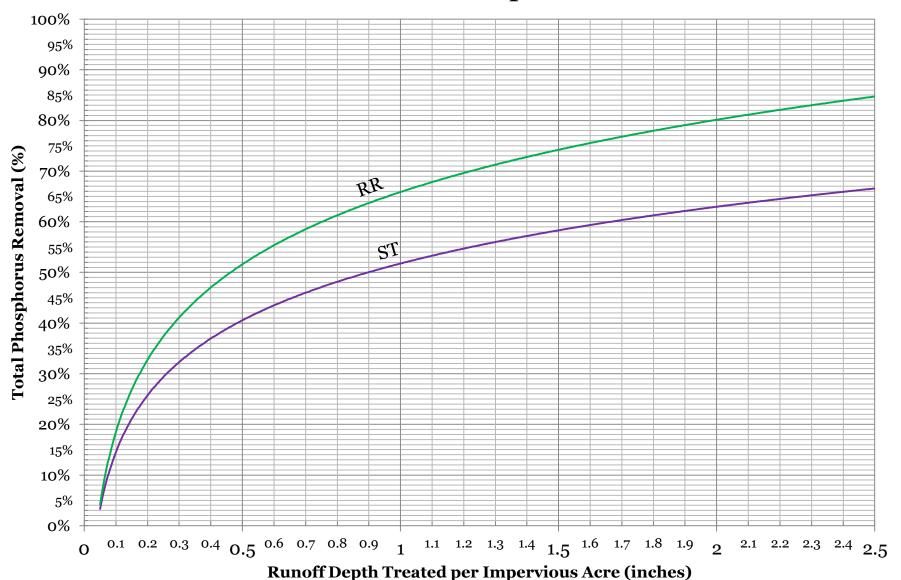
 Need to unitize in order to compare the performance standards across the Bay states

$$= \frac{(12 * EP)}{IA}$$

Removal Rates

- Same method as retrofit expert panel
- BMP removal rates are a function of runoff depth captured and the amount of stormwater treatment (ST) or runoff reduction (RR) achieved by the practice

Total Phosphorus Removal for RR and ST New Development Practices



Notes

- When a mix of practices is used, designers should use the curve based on the largest single practice or the practice the provides the majority of treatment
- Again, the removal rates are applied to the <u>entire</u> site area
- The reporting unit is the entire treated area of the site

Baseline Load

- Not necessary to report
- Load reduction computed by CBWM
- Localities only report the removal rate from the curves and the total treated acres for each project

Ease of Use

- Local governments need only to report*:
 - Number of acres treated under new performance standard
 - Acreage of non-complying projects
- State governments can report in a way that aligns with existing BMP reporting systems
- Should make life a bit easier on both local and state agencies

^{*}Localities should check with their state stormwater agency on specific data to report

REDEVELOPMENT

- Redevelopment standards apply to sites with existing <u>untreated impervious</u> <u>cover</u>
- States are moving toward more stringent redevelopment requirements
- Differs across the states

STATE	REDEVELOPMENT REQUIREMENT
DC	On-site retention of runoff from the 1.2 rainfall event
DE	50% reduction in existing effective impervious for the site
EPA	On-site runoff reduction for the 95% rainfall event
WD	Reduce existing imperviousness by 50%, or treat runoff from 1.0 inch of rainfall, or combination
NY	Reduce by 25% through IC reduction, BMPs or alternative practices
PA	20% WQ treatment for the site
VA	Reduce existing phosphorus load by 10 to 20% depending on disturbed area
WV	$0.25 - 0.8$ inch of on-site runoff reduction 2

Redevelopment Protocol

- Applies to redevelopment projects that meet the new redevelopment standards from 2010 and beyond
- Requires that designers confirm project is properly classified as redevelopment and not served by preexisting stormwater treatment practices
- Report Impervious Cover acreage treated
- Calculate Baseline Load (Appendix D)
- Submit aggregate mass of all pollutants removed each year by all qualifying redevelopment projects

REDEVELOPMENT

- Site-specific EP generated from each State's spreadsheet
- Used in the Redevelopment Equation

$$= \frac{(12 * EP)}{SA}$$

Why a different equation??

 \rightarrow Turns out each state defines its Redevelopment EP based solely on Impervious Cover :: SA = IA

NON-CONFORMING PROJECTS

- Most of the Bay states are gradually phasing in new performance standards.
- Because of this not all projects will fully comply with new performance standards.
- Includes new development or redevelopment projects installed in 2011:
 - Designed under old performance standards for various reasons
 - Don't fully meet new performance standards (for various reasons) AND are not mitigated by an offset

Non-conforming Project Recommendations

- Served by a single BMP which can be classified under existing CBP-approved BMP category: use existing removal rate
- Served by multiple BMPs: report removal rates from graphs, year installed, treated DA, %IC, predevelopment land cover, GPS coordinates
- If using an offset mitigation, track equivalent impervious cover to be mitigated in the future and the status of retrofit construction
 - No double-counting!

Design Examples



Design Examples Low Density Residential



- Development of 25 acre site in $\frac{1}{2}$ acre lot residential subdivision in Pennsylvania
- Predevelopment conditions: 50% forest, 50% meadow + 100% C soils
- Post-development land cover: 25% impervious, 50% turf, 25% forest
- Will use a mix of RR practices

Design Examples Low Density Residential

· Using the New Development Equation:

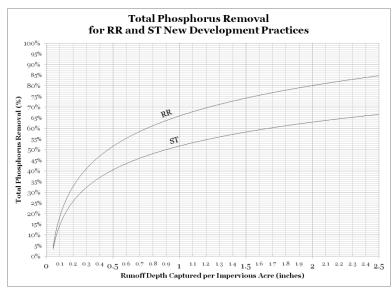
$$=\frac{(EP)(12)}{IA}$$

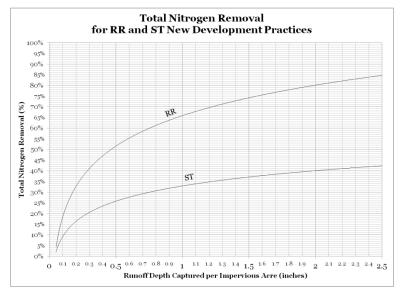
- EP = Engineering Parameter = 1.16 ac-ft
- IA = Impervious Area = 6.25 acres

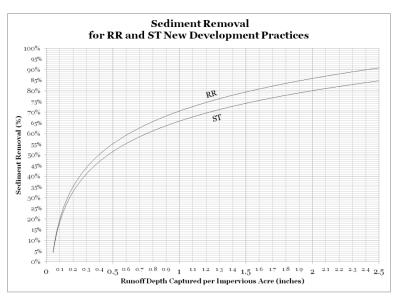
$$\frac{(1.16)(12)}{6.25} = 2.23 inch$$



Design Examples Low Density Residential







Pollutant Removal Efficiencies of the practice

TP	TN	TSS
82%	82%	88%



Commercial Retail



- 10-acre site developed into a big-box retail store in VA
- Predevelopment = 100% meadow
- Post-development = 80% impervious, 20% turf
- Use of ST practices

Design Examples - Commercial Retail

Using the New Development Equation:

$$=\frac{(EP)(12)}{IA}$$

- EP = Engineering Parameter = 0.67 ac-ft
- IA = Impervious Area = 8 acres

$$\frac{(0.67)(12)}{8} = 1.01$$
 inches

Pollutant Removal Efficiencies of the practice

TP	TN	TSS		
52%	33%	66%		

Design Examples - Redevelopment



- Redevelopment of a 2-acre facility in DC
- Predevelopment = 50% impervious, 50% turf
- Post-development = 50% impervious, 50% turf
- 100% D soils
- Site will use RR practices



Design Examples - Redevelopment

Using the Redevelopment Equation:

$$=\frac{(EP)(12)}{SA}$$

- EP = Engineering Parameter = 0.12 ac-ft
- SA = Site Area = 2 acres

$$\frac{(0.12)(12)}{2} = 0.72 inches$$

Pollutant Removal Efficiencies of the practice

TP	TN	TSS		
59%	59%	63%		

Accountability

- 1. Basic Reporting Unit
- 2. State BMP Reporting Systems
- 3. Local Reporting to the State
- 4. Initial Verification
- 5. Local Record-Keeping
- 6. Non-conforming Projects
- 7. Periodic Inspections
- 8. Downgrading
- 9. Non-M54s
- 10. Offsets and Mitigation



Basic Reporting Unit

- Number of treated acres that fully meet the state's stormwater performance standard
- Typical duration for the removal rate is twice the MS4 inspection cycle ≈ 3-5 yrs
- Removal rate can be extended based on field verification of performance

State Reporting Systems

- States report BMP data using CBPapproved rates/methods, reporting units, geographic location
- Periodically field verify BMPs



Local Reporting to the State

- Localities to submit basic spreadsheet documentation to the state once a year as part of their annual MS4 report
- Can submit aggregate acres that were treated to the standard: both new and redevelopment
- Potential reporting data:
 - Project classification
 - Total Drainage Area
 - Post Development land cover
 - Pre-development land cover
 - Year installed
 - GPS coordinates
- Localities to confirm with state stormwater agency on what info to report

Initial Verification of BMP Installation

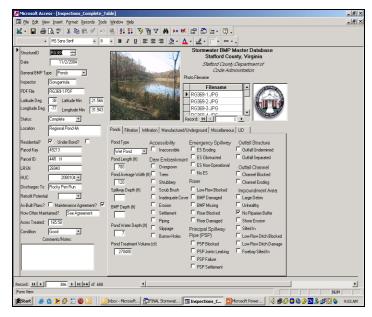
- Localities to verify that BMP:
 - Installed properly
 - Meets/exceeds design standards
 - Functions hydrologically as designed
- Initial verification should be provided by the designer or local inspector as condition of project completion.
- Localities to indicate in MS4 annual report that they have BMP review and inspection procedures in place and adequate staff to implement them



Local Record-Keeping

- Localities to maintain comprehensive project file for each project
- File to be maintained for the entire time that the removal rate will be claimed
- Localities encouraged to develop GIS-based BMP tracking system





Non-Conforming Projects

- Localities to keep track of any new development projects that are designed under the old standards
- Removal rates computed from the curves and reported separately to the state

BMP Inspections

- "Visual Indicators" technique in order to rapidly assess if a BMP is functioning
- Conducted during every other routine inspection under MS4 permits
- Appendix E: example form (CWP)

FACILITY ID:			DATE:/_		Asses	SED BY:	
NAME:					-		HANDRELD/
ADDRESS:							GPS ID:
Рното IDs:							
SECTION 1- BAG	CKCROUND I	NEORMATION	(CIS)				
BMP Type:			(010)		YEAR	CONSTRUCTED:	
☐ Dry Detention Pond		Dry Swale		Wetland			
Extended Detention	Pond	Wet Swale	Ī	Level Spreader		District Princer	
Wet Pond		Grass Chann	nel	WQ Inlet		iblic Private	Unknown
Filter (specify:		Dry Well		Proprietary Device	1		
Infiltration (specify:		Permeable P	avement	Other	1		
Check if structure	is underground	Bioretention	1				
		SITE (CHARACTE	RIZATION			
				Discerned from: F	lan 🗆	County Data	GIS Field
CONTRIBUTING DRAINA						R QUALITY VOL	
Industrial	Commercial	Urban/Re			(FROS	t DESIGN PLAN):	(ft')
Forested Crop	Institutional Pasture	Golf cours	<u></u>	Park	1		
0.00		Other:					
SECTION 2- FIE	LO VISIT						
Rain in last 48 hrs?	Yes !	No Evi	idence of high v	vater table (e.g., excessi	ve soil sa	ituration)?	Yes No
		D	ESIGN ELEN	ŒNTS			
FACILITY SIZE:	On	SERVED WQ STORA	AGE VOL:	Hydraulic		DESIGN STORM	
Length:(ft)	_	(ft ³)		CONFIGURATION		Water Qual:	ity
Width:(ft)				On-line Facility		Flood Contr	
Surface Area:(ff)			Off-line Facility		Channel Pro	otection
Depth of WQ storage						Unknown	
BMP SIGNAGE: (check a		_		_		_	
None Public Property	☐ Flood W ☐ Do Not !		Stormwater Edu Other:	acation No T	respassin	s □w	ildlife Habitat
		OUTLE	ET CHARAC	TERISTICS			
PRIMARY OUTLET STRUCTURE:		ration w/ no oudet By-pass Other:		Riser Weir Las	ge Storn	Overflow C	pen channel
OUTLET FEATURES:	□ N/A □ 1	Frash Rack Pon	d Drain 🔲 In	verted outlet pipe	Hooded -	outlet Anti-v	ortex device
OURLET PEATURES:	Perforated p	ipe Gravel Diap	hragm	ficropool outlet M	ultiple or	tlet levels	
	Outlet in	cludes restrictor?	Yes No				
0	Erosion at Outle	st: None	Slight Mode	rate Severe			
OUTLETSTRUCTURE		None	Slight Mode	erate Severe			
CONDITIONS:	Outlet Clogging		Slight Mode	erate Severe			
	Outlet Clogging Structural Probl	ems: None	01000		. n ~	and the same of th	
	Structural Probl			channel Road dite		ici.	
CONDITIONS:	Structural Probl	Closed storm sewe		channel Road dite		ior:	
CONDITIONS AT OUTFALL: Active Erosion:	Structural Probl Stream Unknown None Slig	Closed storm sewe	er Surface o	channel Road dite	None	Slight Mo	derate Severe
CONDITIONS AT OUTFALL: Active Erosion:	Structural Probl Stream Unknown None Slig None Slig	Closed storm sewe	er Surface of	Odor: Algae:	□None □None	Slight Mo	derate Severe
CONDITIONS AT OUTFALL: Active Erosion:	Structural Probl Stream Unknown None Slig None Slig	Closed storm sewe	er Surface of	Odor: Algae:	□None □None	Slight Mo	derate Severe
CONDITIONS: CONDITIONS AT OUTFALL: Active Erosion: Trash:	Structural Probl Stream Unknown None Slig None Slig	Closed storm sewe	er Surface of	Odor: Algae:	□None □None	Slight Mo	derate Severe
CONDITIONS: CONDITIONS AT OUTFALL: Active Erosion: Trash:	Structural Probl Stream Unknown None Slig None Slig	Closed storm sewe	er Surface of	Odor: Algae:	□None □None	Slight Mo	derate Severe
CONDITIONS: CONDITIONS AT OUTFALL: Active Erosion: Trash:	Structural Problem Stream Unknown Unknown None Slig None Slig None Slig	Closed storm sewe	evere	Odor: Algae: Other WQ Problems:	None None	Slight Mo	derate Severe

Downgrading

- If BMP is not performing to its original design, have up to one year to take corrective maintenance/rehab actions
- If not fixed within the year, the removal rate is eliminated and reported to the state in the annual MS4 report
- Removal rate can be reinstated once corrective actions are taken

Non-MS4s

- WV and PA expect to have considerable development in non-MS4 areas
- These communities may not have the resources to meet the BMP verification protocol
- Recommend the creation of a separate committee to address these issues

Offsets and Mitigation

- The full site removal rate is allowed if a new BMP is built to offset a lack of compliance elsewhere
- No retrofit credit given to practices
 that were built to mitigate for not being
 able to meet the performance
 standards for new development

For Further Discussion

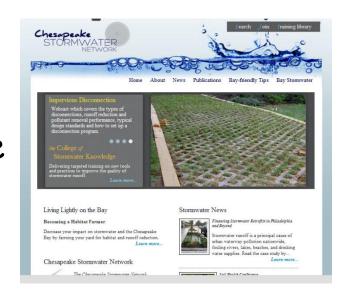


- ST vs. RR is an "apples" and "oranges" situation
- ST practices reduce pollutant loads through concentration reductions
- RR practices reduce pollutant loads through volume reductions
- Using a removal efficiency approach for RR practices is still a "workaround" and doesn't capture the hydrologic benefits of RR

Next Steps??

- Get the info out to the people who need it....
- Add to CSN website
- CSN to share report with Network of over 1300 Bay-wide stormwater professionals
- State-specific webcasts under CBSTP
- Redevelopment webcast
- New training resources to be developed







Next Steps??

- New spreadsheet tools being developed for several states
- Continue dialogue with CB modelers to improve benefits of RR practices in 2015 update
- New Experts Panel???



