Tracking Runoff and Pollutant Reductions

MIDS Work Group Meeting January 21, 2011



p-gen3-121

Presentation Outline

- Review Draft Memo
- Demonstrate Virginia Spreadsheet
- Receive Feedback



Draft Memo System Selection for Screening

- Over 20 systems found
- Selection for screening based on:
 - Level of documentation
 - Applicability to site development
 - If two systems similar, only one chosen



Draft Memo Selected 15 Systems for Screening

- City of Seattle
- Georgia
- Florida
- Kitsap Co., WA
- Maryland
- Massachusetts
- Minnesota
- New Hampshire
- New Jersey
- Pennsylvania
- Purdue University

- Rhode Island
- Stearns Co., MN
- Ventura Co., CA
- Virginia





Draft Memo Initial Screening

Reviewed 15 systems for Goal(s):

- Pollutant Loading
- Groundwater Recharge Volume
- Water Quality Volume/Stormwater Runoff Volume
- Channel Protection Volume
- Stormwater Runoff Rate



Draft Memo Initial Screening

Rated 15 systems by:

- Native Hydrology Mimicry
- LID Promotion
- Pollutant Loading Estimation
- Scientific Evaluation
- User Friendliness
- Input Standardization
- BMPs in Series (Treatment Train) Inclusion



Draft Memo Selected 6 Systems for Further Evaluation

- Florida
- Kitsap County, WA
- Pennsylvania
- Purdue
- Stearns County, MN
- Virginia



Draft Memo System Documentation

Entity	Methodology Procedure Guidance	Methodology Calculator Instructions	Spreadsheet Calculator	Web- Based Calculator
Florida	Fair	None	None	None
Kitsap Co.	Excellent	Excellent	Excellent	None
Pennsylvania	Good	None	None	None
Purdue	Excellent	Excellent	Excellent	Good
Stearns Co.	Good	None	Good	None
Virginia	Good	Good	Excellent	None



Draft Memo System Foundations & Performance Standards

		Goal	
	Water Quality Volume/		
	Stormwater	Stormwater	Pollutant
Entity	Runoff Volume	Runoff Rate	Loading
Florida			Х
Kitsap Co.	Х	Х	
Pennsylvania	Х	Х	Х
Purdue	Х		Х
Stearns Co.			X
Virginia	X	Х	X



Draft Memo System/Calculator Suggestions

Should:

- Provide an incentive for LID
- Determine the stormwater volume control required on the site
- Determine TP and TSS removal
- Capable of evaluating BMPs in parallel and in series



Demonstrate Virginia Spreadsheet



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Site Data Worksheet



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Precipitation & Loading Site Land

Coefficients & Summary

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Total Load (TP) Reduction Required (lb/yr)

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vards or other turf to be mowed/managed	0.00	0,00	0.00	0.00	0.00
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Managed Turf	0.15	0.20	0.22	0.25	
Impervious Cover	0.95	0.95	0.95	0.95	
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Post Development Load (TN) (lb/yr)

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Coefficients & Summary

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Drainage Area Land Cover

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				- 1		- 1 -
	-					
						-
Drainage Area A Land Cover (acres)						
	Asoils	B Soils	C Soils	D Soils	Totals	
Forest/Open Space (acres) undisturbed, protected forest/open space or reforested					6.00	
land	0.00	0.00	0.00	0.00	0.00	
Managed Turf (acres) disturbed, graded						
for yards or other turf to be mowed/managed	0.00	0.00	0.00	0.00	0.00	
Impervious Cover (acres)	0,00	0.00	0.00	0,00	0.00	
				Total	0.00	



BMP Type and Credit Description

Apply Runoff Reduction Practices to Reduce Treatment Volume & Post-Develo



BMP Runoff Reduction

ad in Drain	age Area A			
Credit Area (acres)	Volume from Upstream RR Practice (cf)	Runoff Reduction (cf)	Remaining Runoff Volume (cf)	PI
0.00	0	1 0		1
	Credit Area (acres)	Credit Area (acres) Volume from Upstream RR Practice (cf)	Credit Area Upstream RR Reduction (acres) Practice (cf) (cf)	Credit Area (acres) Volume from Runoff Remaining (acres) Practice (cf) (cf) Volume (cf)



BMP Phosphorus Reduction and Downstream Routing

T	Phosphorus	Untreated			Becommentation
1.1	Load from Upstream RR Practices (lbs)	Phosphorus Load to Practice (lbs.)	Phosphorus Removed By Practice (lbs.)	Remaining Phosphorus Load (lbs.)	Downstream Treatment to be Employed



Reduction Summary

	то				#DIV/0!	
	10			QUIRED ON SITE (Ib/yr) EDUCTION IN D.A. A (cf)		
PHOSPHO				CTICES IN D.A. A (lb/yr)		
					0.00	
SEE WATER QUALITY	COMPLIANC	E TAB FOR S	SITE COMPLIANC	E CALCULATIONS		



Example: 10 Acre Site on B soils with 80% Imperviousness



Example: Site Data Worksheet



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	nnual Rainfall (inches)									
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	hosphorus EMC (mg/L)	J.26		Nitrogen EMC (mg/L)	1.8	6				-
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	and Cover (acres)	10-10								
22		A soils	B Soils	C Soils	D Soils	Totals				
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	ndisturbed, protected prest/open space r prore	sted 0.00	0.00	0.00	0.0	0.00				
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d	isturbed and or yards	or								
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Site Data				·	
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Constants					
Annual Rainfall (inches)	30				
Target Rainfall Event (inches)				_	
Phosphorus EMC (mg/L)	0.26	Nitroge	en EMC (mg/L)	1.86	
Target Phosphorus Target Load (Ib				1	
Pj	0.90		1		
Land Cover (acres)	Acoile	B Soils	C Saila	D Soils	Totals
Forest/Open Space (acres)	A SUIIS	D SOIIS	C Solis	D Solis	Totals
undisturbed, protected forest/open	1.1				
space or reforested land	0.00	0.00	0.00	0.00	0.00
Managed Turf (acres) disturbed,					
graded for yards or other turf to be					
mowed/managed	0.00	2.00	0.00	0.00	2.00
Impervious Cover (acres)	0,00	8.00	0.00	0,00	8.00
				Total	10.00



Rv Coefficients	5			1.1
	A soils	B Soils	C Soils	D Soils
Forest/Open Space	0.02	0.03	0.04	0.05
Managed Turf	0.15	0.20	0.22	0.25
Impervious Cover	0.95	0.95	0.95	0.95
			_	
Land Cover Summary				
Forest/Open Space Cover (acres)	0.00			
Weighted Rv(forest)	0.00			
% Forest	20%			
Managed Turf Cover (acres)	2.00			
Weighted Rv(turf)	0.20			
% Managed Turf	20%			
Impervious Cover (acres)	8.00			
Rv(impervious)	0.95	-		
% Impervious	80%			
Total Site Area (acres)	10.00			



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	Target Rainfall Event (inches) Phosphorus EMC (mg/L)	1.00 0.26	1	Nitrogen EMC (mg/L)	1.8	C		
	Target Phosphorus Target Load (Ib			Nitrogen Elvic (mg/E)	1.0	0		
19		0.90						
20	.1			Result	S			
	Land Cover (acres)		0.00	nesure	Line of the			
22		A soils	B Soils	C Soils	D Soils	Totals		
	Forest/Open Space (acres)							
	undisturbed, protected							
	forest/open space or reforested	0.00	0.00		0.0	0.00	-	
	Managed Turf (acres) disturbed, graded for vards or							
~	Site Data D.A. A D.A.	0.00	0.00	A 00				
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Initial Results

	Site Results
	Phosphorous
29,040	TOTAL TREATMENT VOLUME (cf)
8.23	TOTAL PHOSPHOROUS LOAD REDUCTION REQUIRED (LB/YEAR)
(RUNOFF REDUCTION (cf)
0.00	PHOSPHOROUS LOAD REDUCTION ACHIEVED (LB/YR)
12.73	ADJUSTED POST-DEVELOPMENT PHOSPHOROUS LOAD (TP) (lb/yr)
8.23	REMAINING PHOSPHOROUS LOAD REDUCTION (LB/YR) NEEDED
	Nitrogen (for information purposes)
29,040	TOTAL TREATMENT VOLUME (cf)
	PUNCEE REDUCTION (cf)
0.00	RUNOFF REDUCTION (cf) NITROGEN LOAD REDUCTION ACHIEVED (LB/YR)
0.00	
91.07	ADJUSTED POST-DEVELOPMENT NITROGEN LOAD (TP) (lb/yr)

Example: Drainage Areas & BMP Credits Worksheet



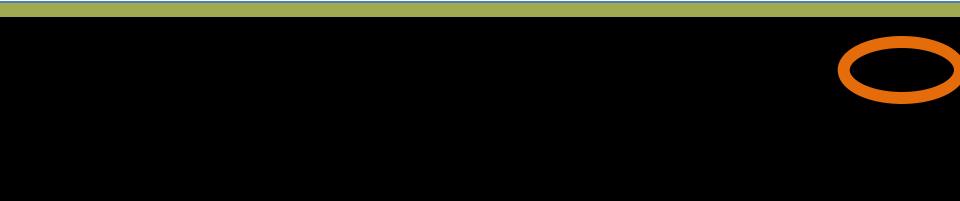
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17 Phosphorus EMC (mg/L)	0.26		Nitrogen EMC (mg/L)	1.8	6		
18 Target Phosphorus Target Load (II	0.45		0				
19 Pj	0.90						
20							
21 Land Cover (acres) 22	A soils E	oils	C Soils	D Soils	Totals		
Forest/Open Space (acres) undisturbed, protected	A SOIIS	ons	C 30lls	0 30115	Totals		
23 forest/open space or reforested Managed Turf (acres)	0.00	0.00	0.00	0.0	0.00		
disturbed, graded for yards or							
HI + H Site Data	. B _ D.A. C _ D.A	A. D / D.A 1	Water Quality Complian	ce / Ch	annel and Flood Protect	ion / 🔁 / 🔲	III
Ready					Charles and the Annal Anna		

Input Drainage Area Land Cover

Drainage Area A		1				
					-	
		-1	-	- 1		
				1 I		
					1	
		-		- 11	1	
Drainage Area A Land Cover (acres)	3 m	41.00			I III and	
	A soils	B Soils	C Soils	D Soils	Totals	
Forest/Open Space (acres) undisturbed, protected forest/open space or reforested land	0.00	0.00	0.00	0.00	0.00	
Managed Turf (acres) disturbed, graded for yards or other turf to be						
mowed/managed	0.00	2.00	0.00	0.00	2.00	
Impervious Cover (acres)	0.00	8.00	0.00	0.00	8.00	
	1			Total	10.00	



Add Bioretention





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	Annual Rainfall (inches)	1.00		-	-					
	Target Rainfall Event (inches) Phosphorus EMC (mg/L)	1.00 0.26		Nitrogen EMC (mg/L)	1.8	C				
	Target Phosphorus Target Load (Ib			Nitrogen Elvic (mg/E)	1.0	0		-		
19		0.90								
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22		A soils	B Soils	C Soils	D Soils	Totals				
	Forest/Open Space (acres)									
	undisturbed, protected									
	forest/open space or reforested	0.00	0.00		0.0	0.00				
	Managed Turf (acres) disturbed, graded for vards or									
-	Site Data D.A. A D.A.	0.00	0.00	0.00						
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Check Results

Site Results	
Phosphorous	
TOTAL TREATMENT VOLUME (cf)	29,040
TOTAL PHOSPHOROUS LOAD REDUCTION REQUIRED (LB/YEAR)	8.23
RUNOFF REDUCTION (cf)	11035
PHOSPHOROUS LOAD REDUCTION ACHIEVED (LB/YR)	6.64
ADJUSTED POST-DEVELOPMENT PHOSPHOROUS LOAD (TP) (lb/yr)	6.09
REMAINING PHOSPHOROUS LOAD REDUCTION (LB/YR) NEEDED	1.59
Nitrogen (for information purposes)	
TOTAL TREATMENT VOLUME (cf)	29,040
RUNOFF REDUCTION (cf)	11035
NITROGEN LOAD REDUCTION ACHIEVED (LB/YR)	55.31
ADJUSTED POST-DEVELOPMENT NITROGEN LOAD (TP) (Ib/yr)	35.76

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15 Annual Rainfall (inches) 16 Target Rainfall Event (inches)	1.00								
17 Phosphorus EMC (mg/L)	0.26		Nitrogen EMC (mg/L)	1.8	6				
18 Target Phosphorus Target Load (II	0.45		0						
19 Pj	0.90								
20									
21 Land Cover (acres) 22	A soils E	oils	C Soils	D Soils	Totals		······································		
Forest/Open Space (acres) undisturbed, protected	A SOIIS	ons	C 30lls	0 30115	Totals				
23 forest/open space or reforested Managed Turf (acres)	0.00	0.00	0.00	0.0	0.00				
disturbed, graded for yards or									
HI + H Site Data	. B _ D.A. C _ D.A	A. D / D.A 1	Water Quality Complian	ce / Ch	annel and Flood Protect	ion 🖉 🔲	III		
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Route Bioretention to Grass Channel

8.00	0	11035	16553	25	0.00	12.08	6.64		4.a. Grass Channel A/B	
0.00	0	0	0	25	0.00	0.00	0.00	0.00		
0.00	0	0	0	50	0.00	0.00	0.00	0.00		
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	Constants									
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	Annual Rainfall (inches)	1.00		-	-					
	Target Rainfall Event (inches) Phosphorus EMC (mg/L)	1.00 0.26		Nitrogen EMC (mg/L)	1.8	C				
	Target Phosphorus Target Load (Ib			Nitrogen Elvic (mg/E)	1.0	0		-		
19		0.90								
20	.1			Result	S					
	Land Cover (acres)			nesure	line -					
22		A soils	B Soils	C Soils	D Soils	Totals				
	Forest/Open Space (acres)									
	undisturbed, protected									
	forest/open space or reforested	0.00	0.00		0.0	0.00				
	Managed Turf (acres) disturbed, graded for vards or									
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Success in Meeting Standard

1	Site Results	0	0	0	L
· ·					
2	Phosphorous				
3	TOTAL TREATMENT VOLUME (cf)				
4	TOTAL PHOSPHOROUS LOAD REDUCTION REQUIRED (LB/YEAR)	8.23			
5					
6	RUNOFF REDUCTION (cf)				
7	PHOSPHOROUS LOAD REDUCTION ACHIEVED (LB/YR)	8.38			
8					
9	ADJUSTED POST-DEVELOPMENT PHOSPHOROUS LOAD (TP) (Ib/yr)	4.35			
10					
11	REMAINING PHOSPHOROUS LOAD REDUCTION (LB/YR) NEED	CONGRATULATION	IS!! YOU EXCEEDED	THE TARGET REDUC	TION BY 0.2 LB/YEAR
12					
13					
14					
15	Nitrogen (for information purposes)				
16	TOTAL TREATMENT VOLUME (cf)	29,040			
17					
18					
19	RUNOFF REDUCTION (cf)	14346			
20	NITROGEN LOAD REDUCTION ACHIEVED (LB/YR)	66.50			
21					
22	ADJUSTED POST-DEVELOPMENT NITROGEN LOAD (TP) (Ib/yr)	24.56			
23					
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Feedback & Questions for Group

- Who will be the primary/secondary users of the MIDS calculator?
- What are the "must have" features? Nice to be included, but are not required?
- What are the expectations for the MIDS calculator with other programs (TMDLs, MS4, anti-degradation, etc.)?
- How should stormwater runoff rate control be handled? Should the MIDS calculator attempt to simplify hydrology, create a new rate control model, and basically replace widely used models, such as HydroCAD? Or, should the MIDS calculator be focused on runoff volume?





Draft Memo Credit Suggestions

• Base credits on:

Continuous modeling (XP-SWMM for volume reduction and P8 for loading reduction) for popular BMPs (as many as budget allows)
Literature when budget doesn't allow

- Literature, when budget doesn't allow

MIDS Work Group should prioritize BMPs



Feedback & Questions for Group on Credits On which <u>structural</u> BMPs should Barr focus?

- Infiltration practices
 - Bioretention/raingarden
 - Porous pavement
 - Infiltration basin/trench
 - Infiltration shelf at wet pond
- Filtration practices
 - Vegetative swale/grass channel
 - Filter strip
 - Filtration basin (bioretention with drain tile)

Green Roof

- Extended detention practices
 - Wet pond
 - Underground storage/detention
- Enhancements/ modifications
 - Pretreatment
 - Iron/Alum
 - Harvesting & re-use



Feedback & Questions for Group on Credits On which <u>non-structural</u> BMPs should Barr focus?

- Cluster development/ conservation design
- Impervious Surface Design
 - Street & trail widths, cul-de-sac radii/design, etc.
 - Parking lot design
 - Disconnecting impervious surfaces
 - Management for buildup, street sweeping, etc.

- Landscape
 - management
 - Urban forestry

- Soil protection, etc.

Operation & Maintenance

- Street sweeping
- Turf and landscaping management

