Tracking Runoff and Pollutant Reductions

MIDS Work Group Meeting January 21, 2011



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 MemoSystem 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	
Entity	Water Quality Volume/ Stormwater Runoff Volume	Stormwater Runoff Rate	Pollutant Loading
	Karion Volanic	Ranon Rate	V
Florida			<u> </u>
Kitsap Co.	X	X	
Pennsylvania	X	X	X
Purdue	X		X
Stearns Co.			Χ
Virginia	X	X	Χ



Draft Memo System/Calculator Suggestions

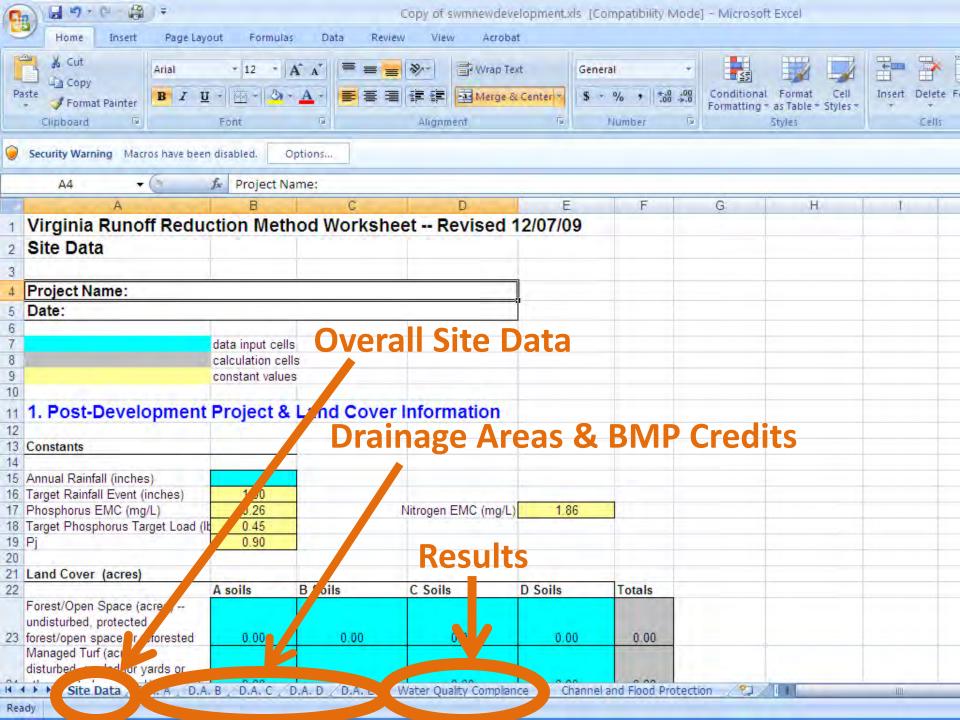
Should:

- 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



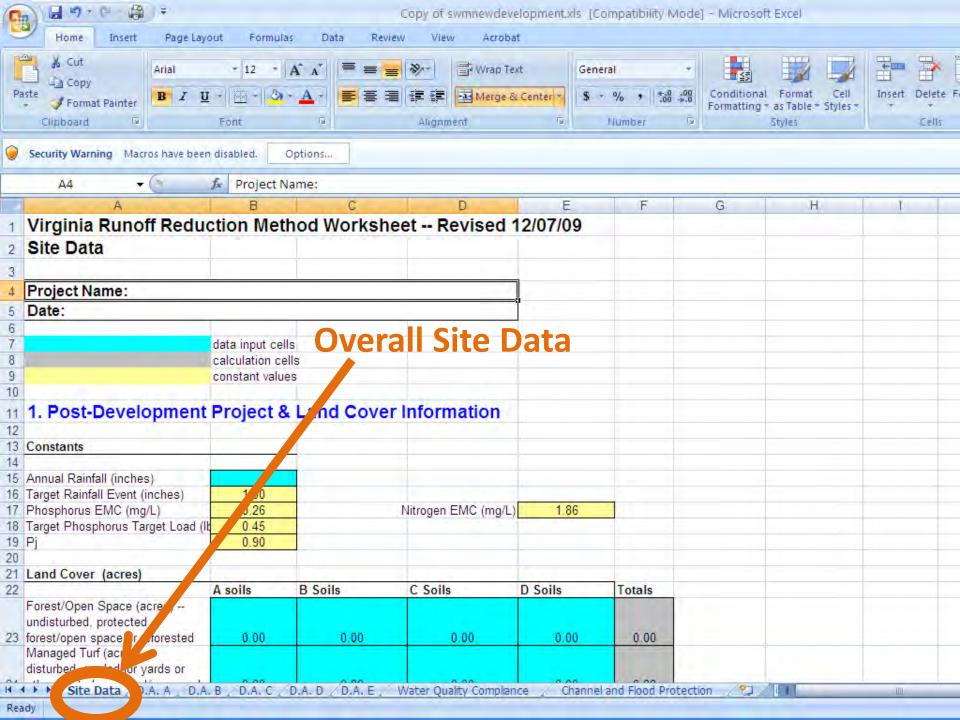
Demonstrate Virginia Spreadsheet





Site Data Worksheet





Input Legend

Precipitation & Loading

Site Land Cover

Coefficients& Summary

Site Data					
Project Name:					
Date:					
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Constants					
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Target Rainfall Event (inches) Phosphorus EMC (mg/L)	1.00 0.26		Nitrogon EMC (n==#)	1.06	
Phosphorus EMC (mg/L) Target Phosphorus Target Load (lb/acre/yr)	0.26		Nitrogen EMC (mg/L)	1.86	-
Pj	0.45				11
П	0.50				1141
Land Cover (acres)					-14
The state of the s	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	the state of the				A SA
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
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Rv Coefficients	A avila	B Soils	C Soils	D Soils	
Forest/Open Space	A soils	0.03	0.04	0.05	
Managed Turf	0.02	0.03	0.04	0.05	
Impervious Cover	0.15	0.95	0.95	0.25	
Impervious cover	0,00	0.00	0.00	0.00	
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Input Legend

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calculation cells	
constant values	
	data input cells calculation cells



Precipitation & Loading

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Constants					
Annual Rainfall (inches)					
Target Rainfall Event (inches)	1.00				
Phosphorus EMC (mg/L)	0.26	Nitroge	en EMC (mg/L)	1.86	
Target Phosphorus Target Load (lb	0.45				
Pj	0.90				



Site Land Cover

Land Cover (acres)						1
	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		0.00	0.00	0.00	0.00	
mowed/managed Impervious Cover (acres)	0.00	0.00	0.00	0.00	0.00	
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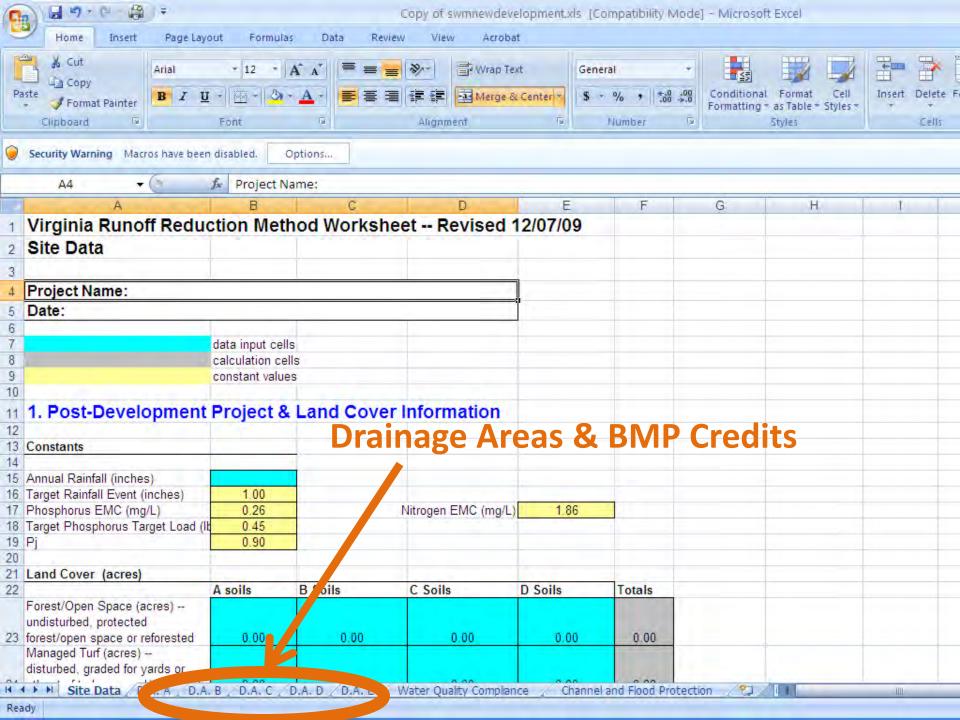


Coefficients & Summary

Rv Coefficients				
	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	######			
Managed Turf Cover (acres)	0.00			
Weighted Rv(turf)	0.00			
% Managed Turf	######			
Impervious Cover (acres)	0.00			
Rv(impervious)	0.95			
% Impervious	######			
Total Site Area (acres)	0.00			

Drainage Areas & BMP Credits Worksheet





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Drainage Area Land Cover

Drainage Area A		T T				
		1114				
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Drainage Area A Land Cover (acres)			10 to 1			
	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	0.00	0.00	0.00	0.00	
Impervious Cover (acres)	0.00	0.00	0.00	0.00	0.00	
impervious dever (deres)	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

lopment L	oad in Drain	age Area A			
Credit	Credit Area (acres)	Volume from Upstream RR Practice (cf)	Runoff Reduction (cf)	Remaining Runoff Volume (cf)	PI E1
0.45	0.00	0	0	0	



BMP Phosphorus Reduction and Downstream Routing

Phosphorus Efficiency (%)	Phosphorus Load from Upstream RR Practices (lbs)	Untreated Phosphorus Load to Practice (lbs.)	Phosphorus Removed By Practice (lbs.)	Remaining Phosphorus Load (lbs.)	Downstream Treatment to be Employed
0	0.00	n 00	0.00	0.00	



Reduction Summary

							$\overline{}$				
		ТО	TOTAL PHOSPHOROUS REMOVAL REQUIRED ON SITE (lb/yr) TOTAL RUNOFF REDUCTION IN D.A. A (cf)								
			0								
	PHOSPHORUS REMOVAL FROM RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr)										
SEE WA	ATER QUALITY	COMPLIANO	CE TAB FOR S	SITE COMPLIANC	E CALCULATIONS						

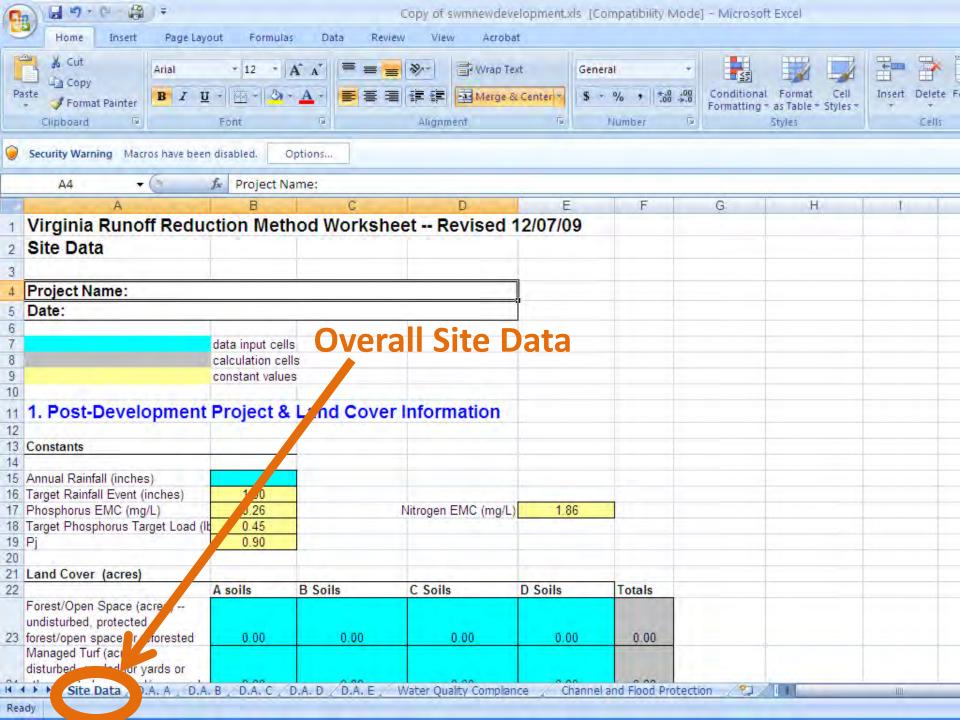


Example: 10 Acre Site on B soils with 80% Imperviousness



Example: Site Data Worksheet



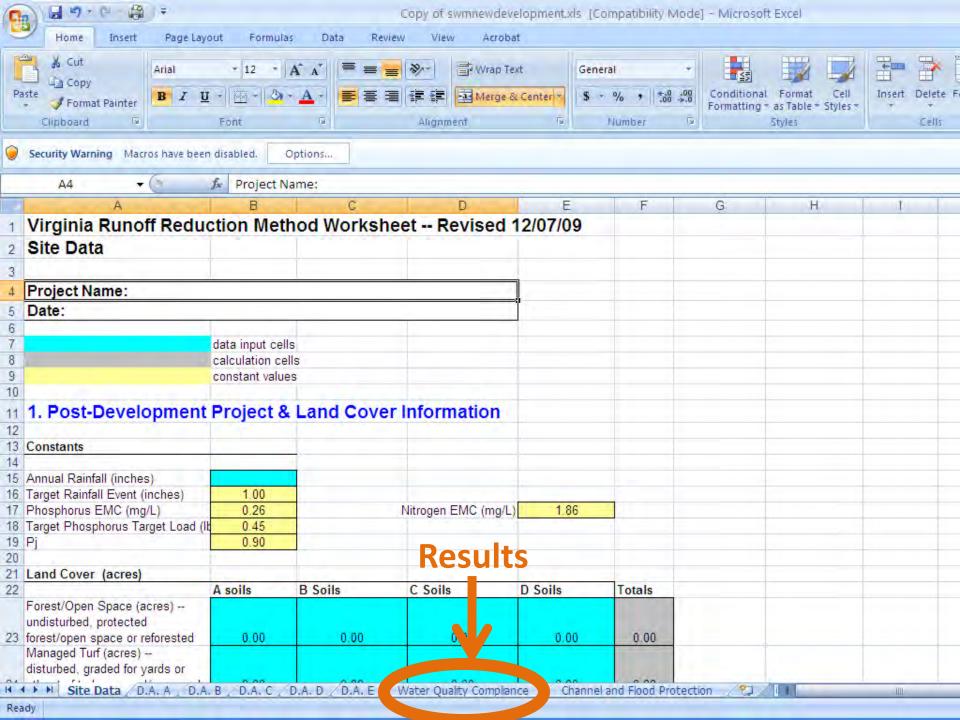


Site Data					
Sile Dala					
Project Name: 10-Acre 80%	lmn I	2 Soils			
Date: 1/21/2011	iirip. c	3 30115			
Date. 1/2 1/2011					
	data inr	out cells			
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1. Post-Development P	roject	& Lar	nd Cover II	nforma	ation
Constants					
Annual Rainfall (inches)	30				
Target Rainfall Event (inches)	0.00	King to take		4.00	
Phosphorus EMC (mg/L)	0.26	Nitroge	en EMC (mg/L)	1.86	
Target Phosphorus Target Load (lb					
Pj	0.90				
Land Cover (acres)					
Edita Gover (acres)	A soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres)					10000
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
				Total	10.00



Rv Coefficients	1-1-1			i i wet
	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			





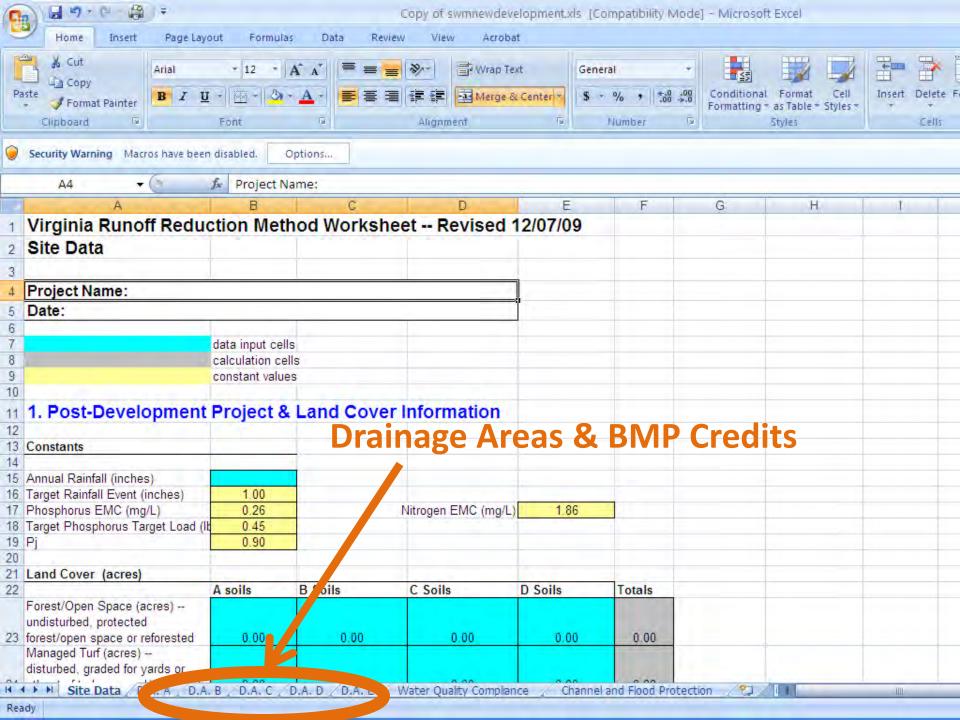
Initial Results

Site Results	
Phosphorous	7.1
TOTAL TREATMENT VOLUME (cf)	29,040
TOTAL PHOSPHOROUS LOAD REDUCTION REQUIRED (LB/YEAR)	8.23
RUNOFF REDUCTION (cf)	
PHOSPHOROUS LOAD REDUCTION ACHIEVED (LB/YR)	0.00
ADJUSTED POST-DEVELOPMENT PHOSPHOROUS LOAD (TP) (lb/yr)	12.73
REMAINING PHOSPHOROUS LOAD REDUCTION (LB/YR) NEEDED	8.23
Nitrogen (for information purposes)	
TOTAL TREATMENT VOLUME (cf)	29,040
RUNOFF REDUCTION (cf)	0
NITROGEN LOAD REDUCTION ACHIEVED (LB/YR)	0.00
ADJUSTED POST-DEVELOPMENT NITROGEN LOAD (TP) (lb/yr)	91.07



Example: Drainage Areas & BMP Credits Worksheet





Input Drainage Area Land Cover

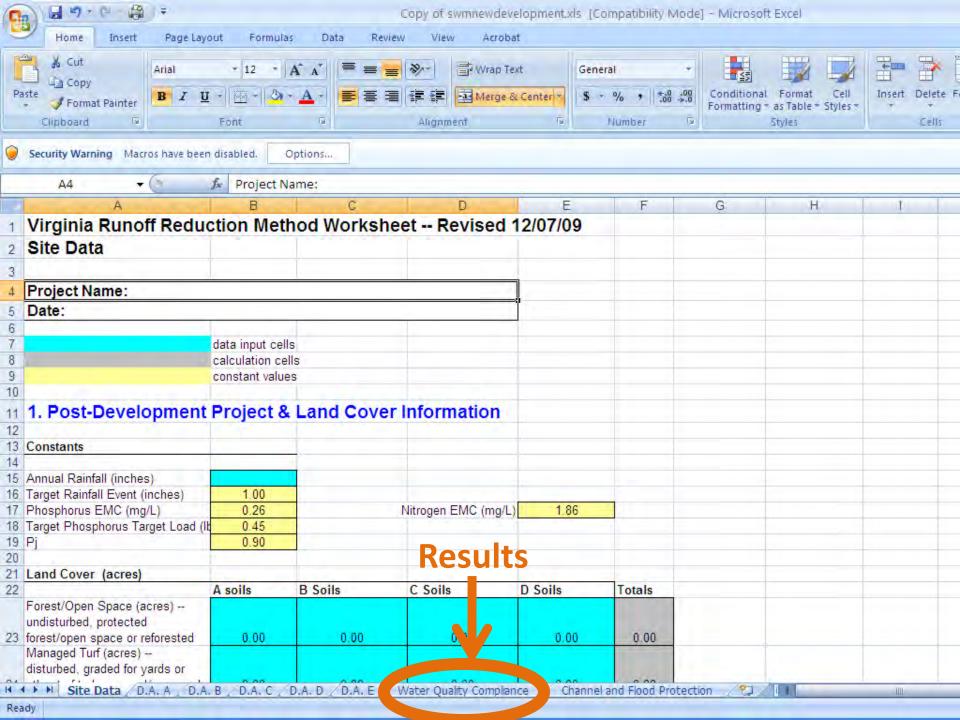
Drainage Area A		1,				
8 - 3U T-6			1 1			
		- 1		= [
		- 4				
					- 1	
				-11		
Drainage Area A Land Cover (acres)						
	A soils	B Soils	C Soils	D Soils	Totals	
Forest/Open Space (acres) undisturbed, protected forest/open space or reforested land	0.00	0.00	0.00	0.00	0.00	
Managed Turf (acres) disturbed, 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	
				Total	10.00	



Add Bioretention



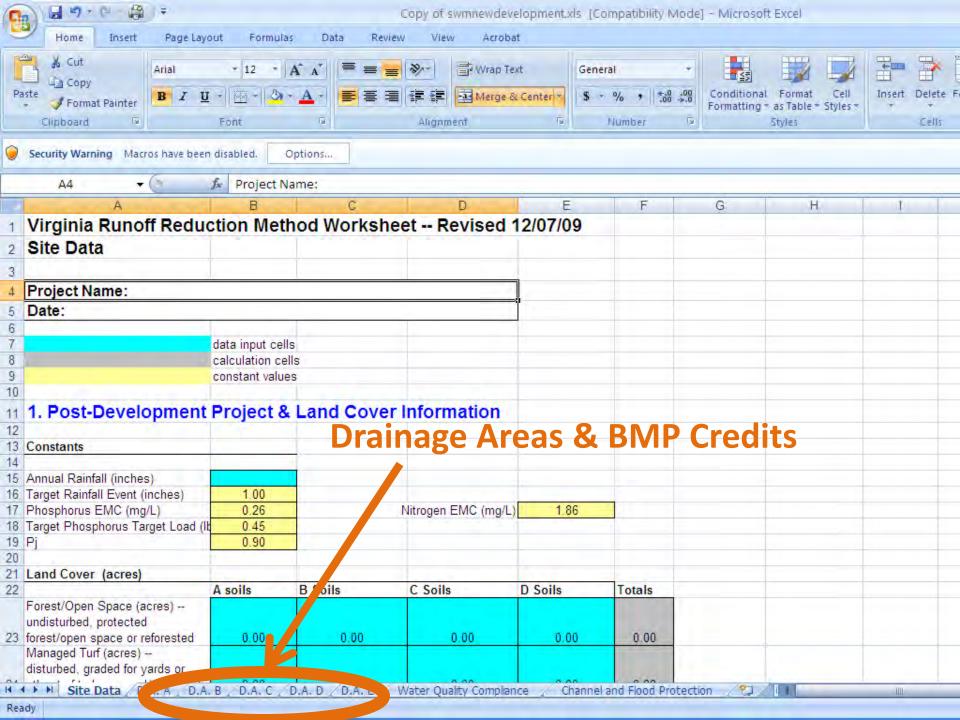




Check Results

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) (lb/yr)	35.76

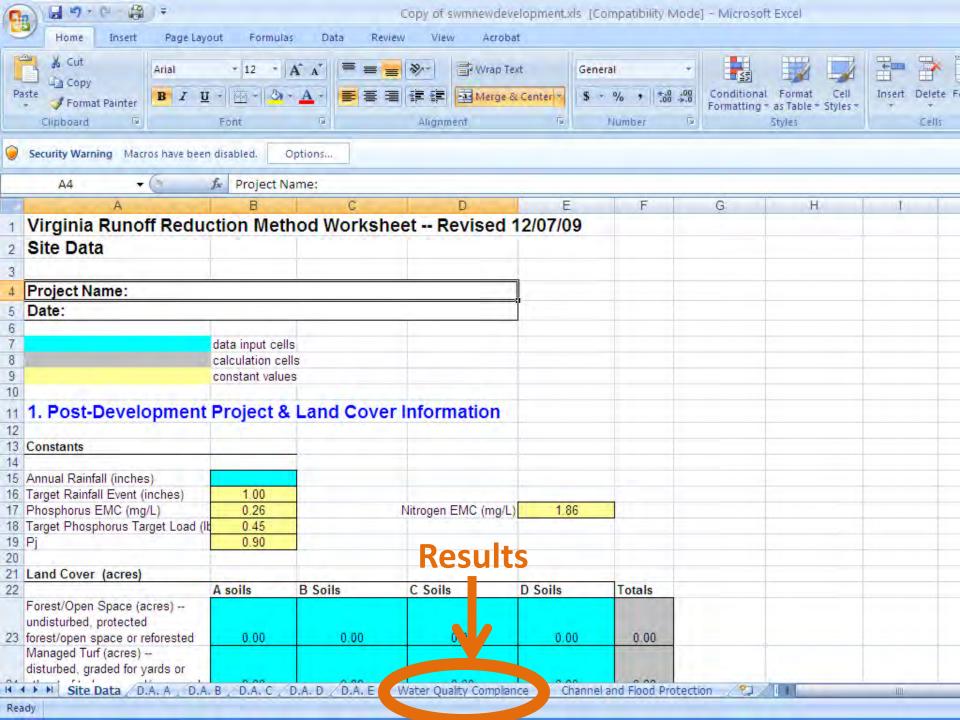




Route Bioretention to Grass Channel

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	0	0	50	0.00	0.00	0.00	0.00		
0.00	0	0	0	50	0.00	0.00	0.00	0.00		





Success in Meeting Standard

	A	0	U	-	_
1	Site Results				
2	Phosphorous				
3	TOTAL TREATMENT VOLUME (cf)	29,040			
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) (lb/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	111/				
15	Nitrogen (for information purposes)				
16	TOTAL TREATMENT VOLUME (cf)	29,040			
17					
18					
19	RUNOFF REDUCTION (cf)				
20	NITROGEN LOAD REDUCTION ACHIEVED (LB/YR)	66.50			
21					
22	ADJUSTED POST-DEVELOPMENT NITROGEN LOAD (TP) (lb/yr)	24.56			
23					
24					
25					
26					
27 28					
29					
30					
31					
	Site Data / D.A. A / D.A. B / D.A. C / D.A. D / D.A. E Water Qu	ality Compliance	Channel and Flood Pro	tection	

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

MIDS Work Group should prioritize BMPs



Feedback & Questions for Group on Credits On which structural 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

