Chesapeake and Atlantic Coastal Bays Critical Area Training:

Stormwater Management

May 12, 2022

Critical Area Staff

Overview

- Session 1: Intro to Critical Area stormwater management
  - Current requirements: Maryland Department of the Environment (MDE) Environmental Site Design (ESD)
  - CAC 10% pollutant reduction requirement
- Session 2: Critical Area Stormwater Guidance Manual
  - Common BMPs: submerged gravel wetlands, micro-bioretention, infiltration, sheet flow
  - Critical Area Stormwater Review Cheat Sheet
  - Planting for small projects
- ~Break~
- Session 3: Demos
  - Soil Information: Web Soil Survey
  - Review sample site plan

Session 1: SWM Intro

Maryland Department of the Environment (MDE): Environmental Site Design to the Maximum Extent Practicable (ESD to the MEP)

10% Phosphorus Removal In the Critical Area

Why Require Additional Analysis in the Critical Area?

- Stormwater is the fastest growing nutrient source in the Bay watershed.
- The last 1,000 feet does matter!

What is the 10% Rule?

- Requires post-development water quality to be 10% better than it was prior to development or redevelopment
- Quantified as a 10% reduction in Phosphorus
- Separate requirement from MDE ESD
- Required for projects with 250 square feet or more of disturbance
  - Private re/development projects: IDA only
  - State re/development projects: All designations

Evolution of the 10% Rule

- 1986 – Included in Critical Area Criteria
- 1987 – First 10% Guidance Issued by MWCOG
- 1993 – Second 10% Guidance released
- 2000 – MDE Stormwater Manual issued
- 2003 – Third 10% Guidance issued
- 2007 – Passage of the Maryland Stormwater Act
- 2008 – Passage of HB 1253 (Critical Area)
- 2009 – Updated MDE Stormwater Manual
- 2011 – ESD in the Critical Area Manual

CAC and MDE Interface

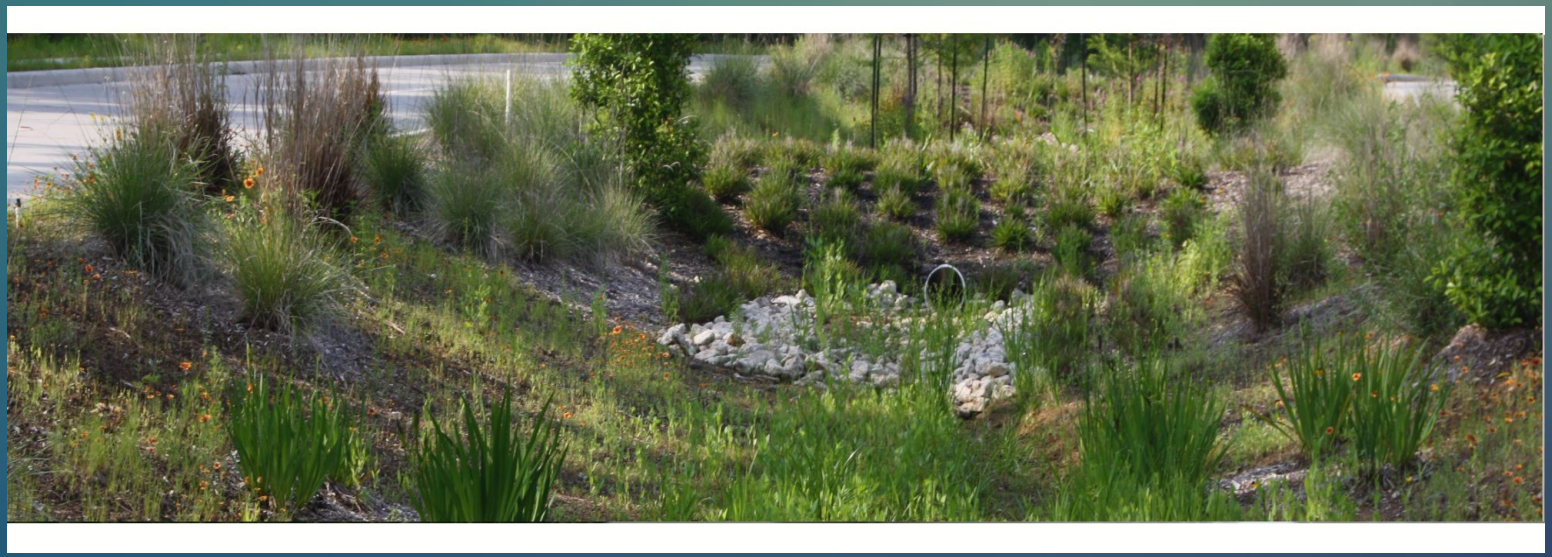
1) CAC 10% Rule includes development less than 5,000 sf.
2) Design BMP to meet MDE requirements.
3) Does the BMP meet the 10% phosphorus load reduction?
   a) If load removed is ≥ the pollutant removal requirement, then the onsite BMP meets the 10% Rule.
   b) If the BMP design does not meet the 10% Rule then:
      i) Evaluate alternative BMP designs;
      ii) Add additional BMPs;
      iii) Reevaluate project design so more of the site is treated by BMPs;
      iv) Design BMP to treat run-off from an offsite area; or
      v) If onsite/offsite BMPs are infeasible/insufficient then use offsets.

Redevelopment Standard

- MDE's redevelopment requirement:
  - Reduce existing impervious by 50%
    - Impervious Area Requiring Treatment (IART)
- CAC's redevelopment requirement:
  - Reduce pre-development phosphorus load by 50%
    - Automatically calculated in 10% spreadsheet

How the Spreadsheet Works

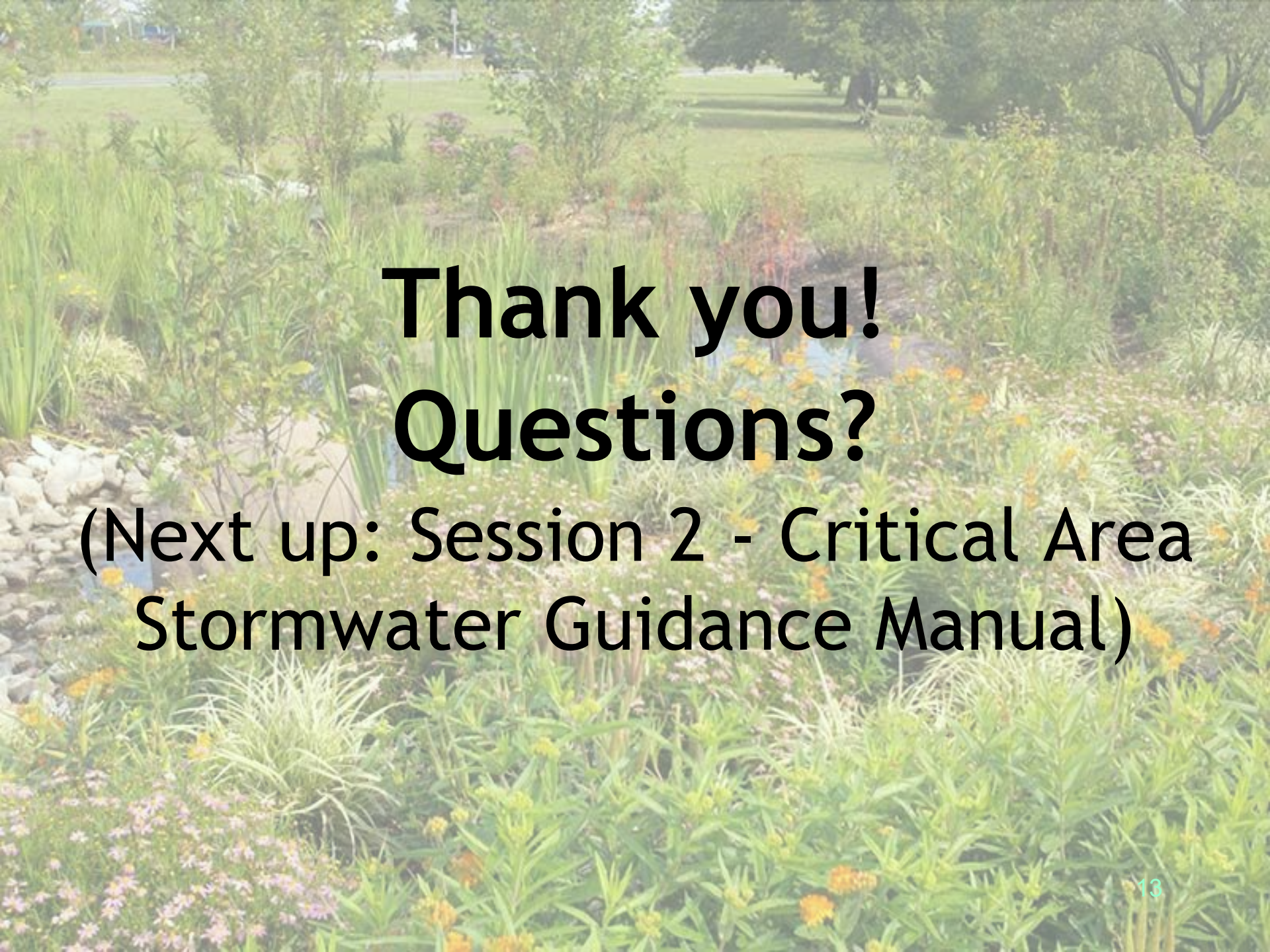
- Blue cells = Inputs
- Gray cells = Formulas (DO NOT TOUCH)
- Summary Tab for Quick Check
- Individual tabs for each BMP



Fee Schedule and Offset Policy

- Fee-in-Lieu: Minimum Rate of $35,000/lb
  - Local jurisdiction must have program set up to manage, track and implement FIL.
  - SWM FIL account must be separate from other FIL accounts.

- Guidance for planting offsets is in the IDA 10% SWM Manual



Thank you!
Questions?

(Next up: Session 2 - Critical Area Stormwater Guidance Manual)

Session 2:
Critical Area Stormwater Guidance Manual

CAC SW Guidance Manual: Consistency with MDE Guidance

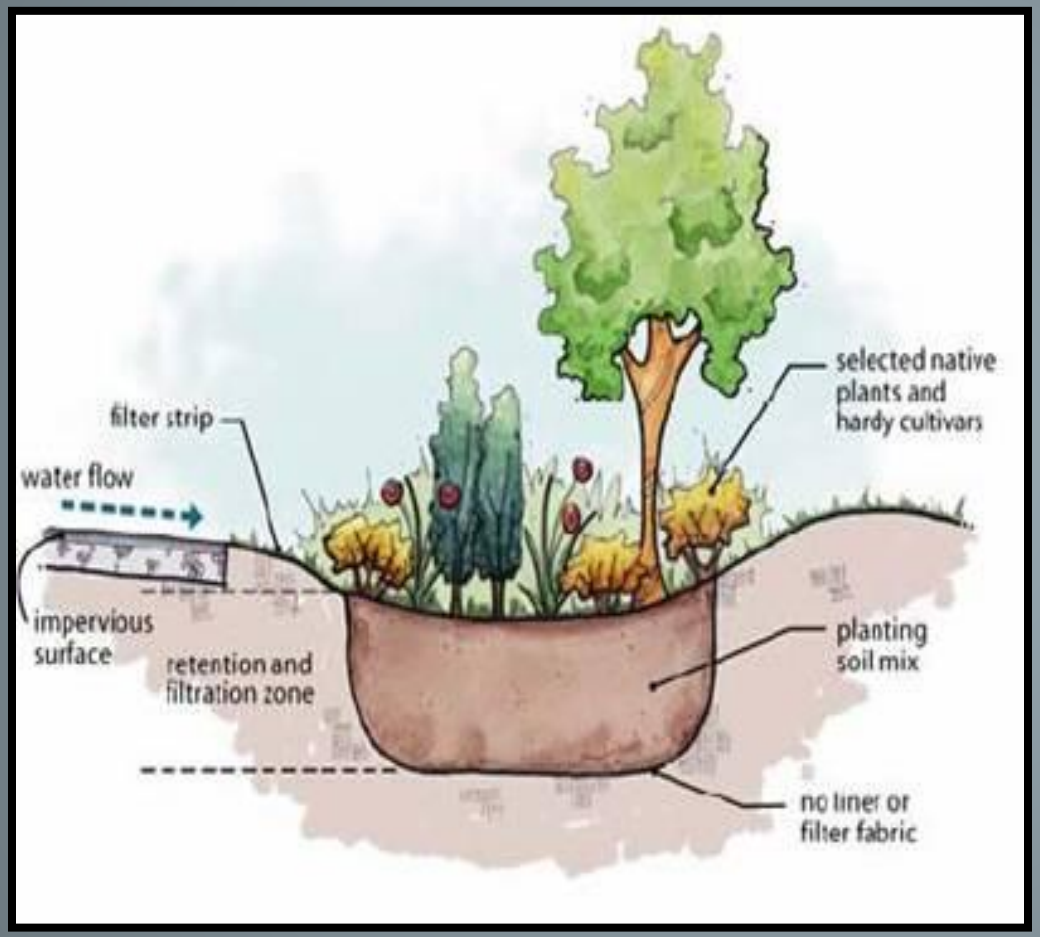
- The CAC Stormwater Guidance Manual conforms to the state-wide methods and equations prescribed for ESD to the MEP compliance (MDE, 2009)
- Same nomenclature and practice names as outlined in the state-wide manual
- Provides phosphorus removal rates for the list of ESD practices (see Appendix A)
- Provides Level 1 and 2 phosphorus removal rates for a few structural practices

Level 1 and 2 Designs

- "Design level" approach for estimating the phosphorus removal capability of certain stormwater practices

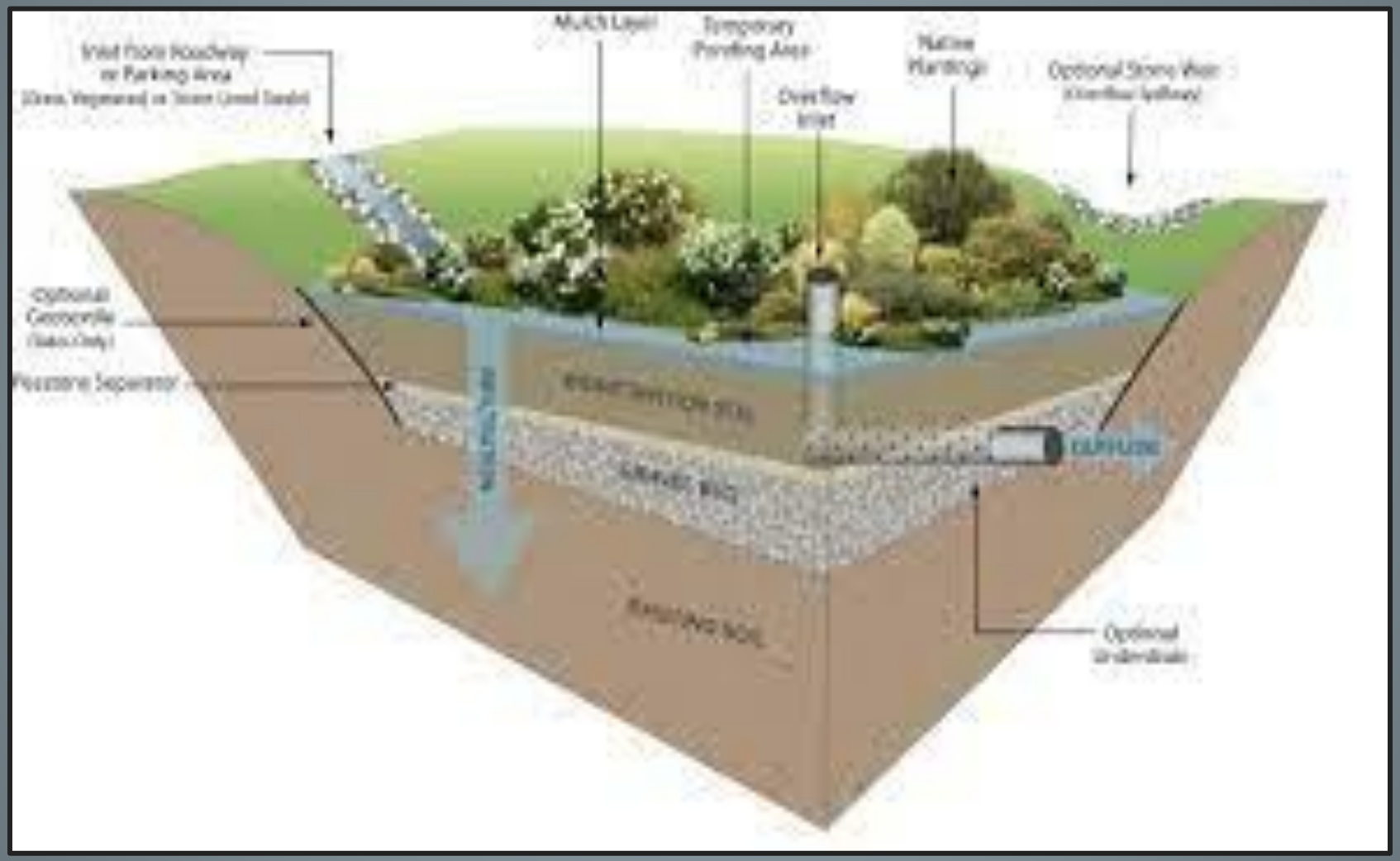
- A practice designed to Level 1 achieves a lower phosphorus removal rate than the more stringent Level 2 designs

Level 1 and 2 Designs

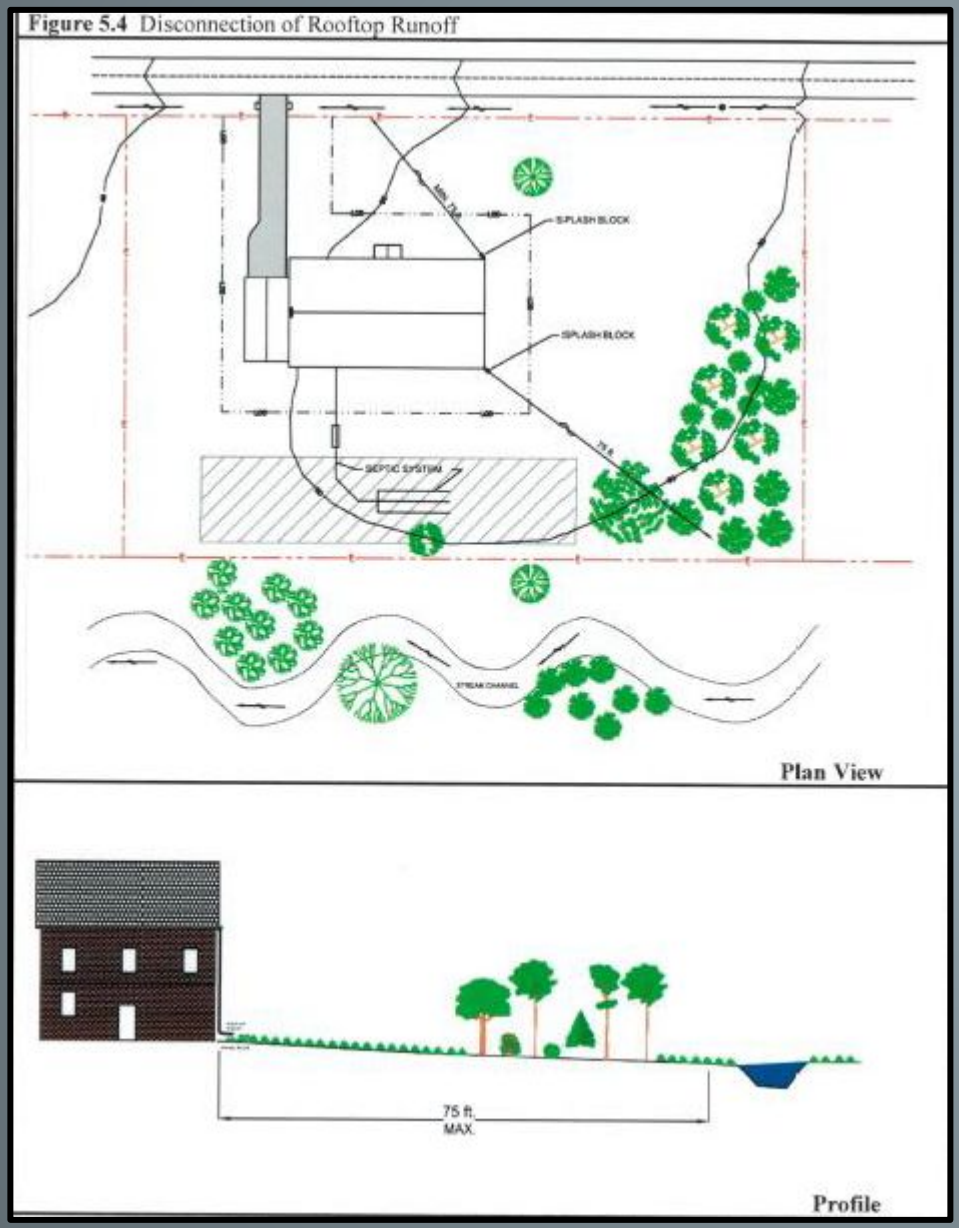


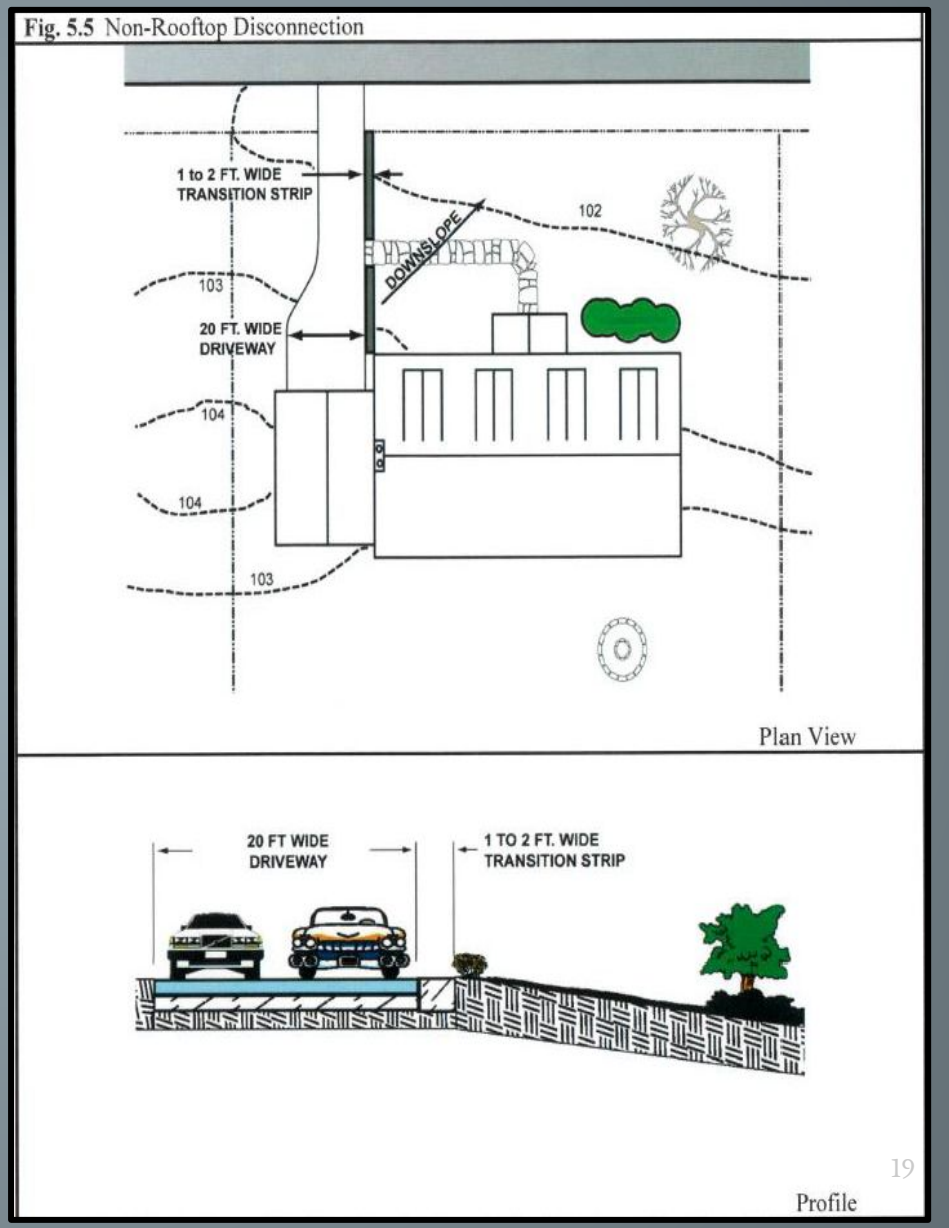
- Level 1 design equates to MDE's minimum design criteria for ESD practices
- Level 2 design includes an enhanced list of design features known to maximize phosphorus removal

SWM “Cheat Sheet”

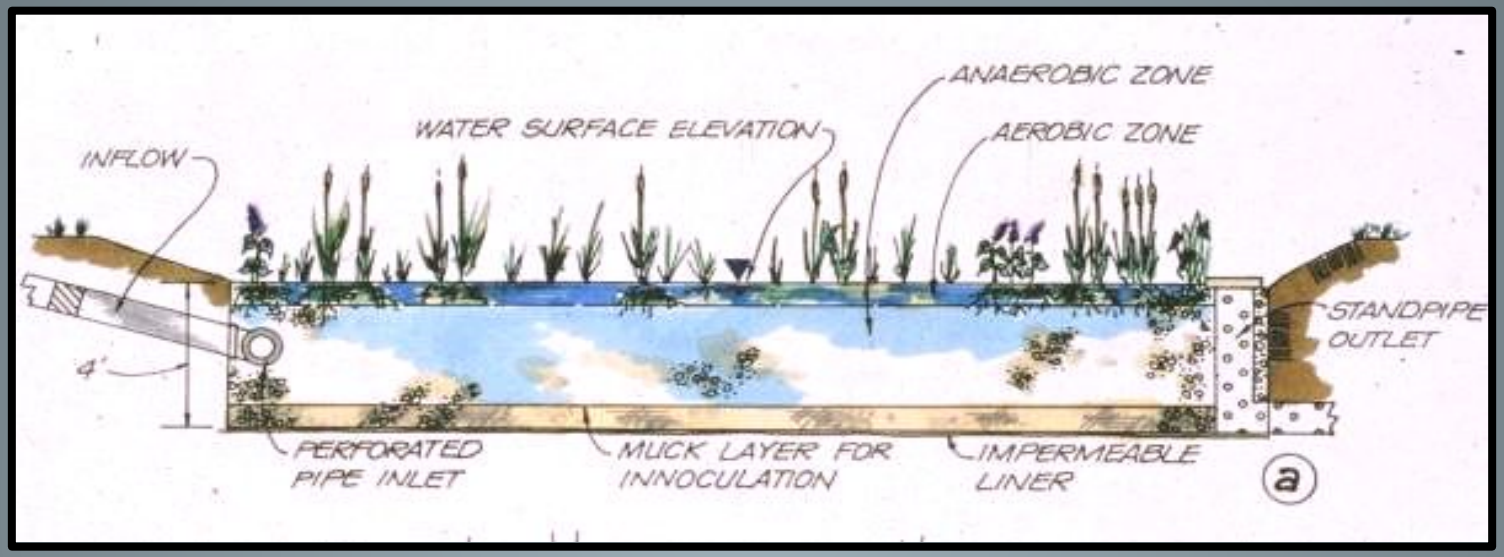


Rooftop and Non-Rooftop Disconnect





Submerged Gravel Wetland

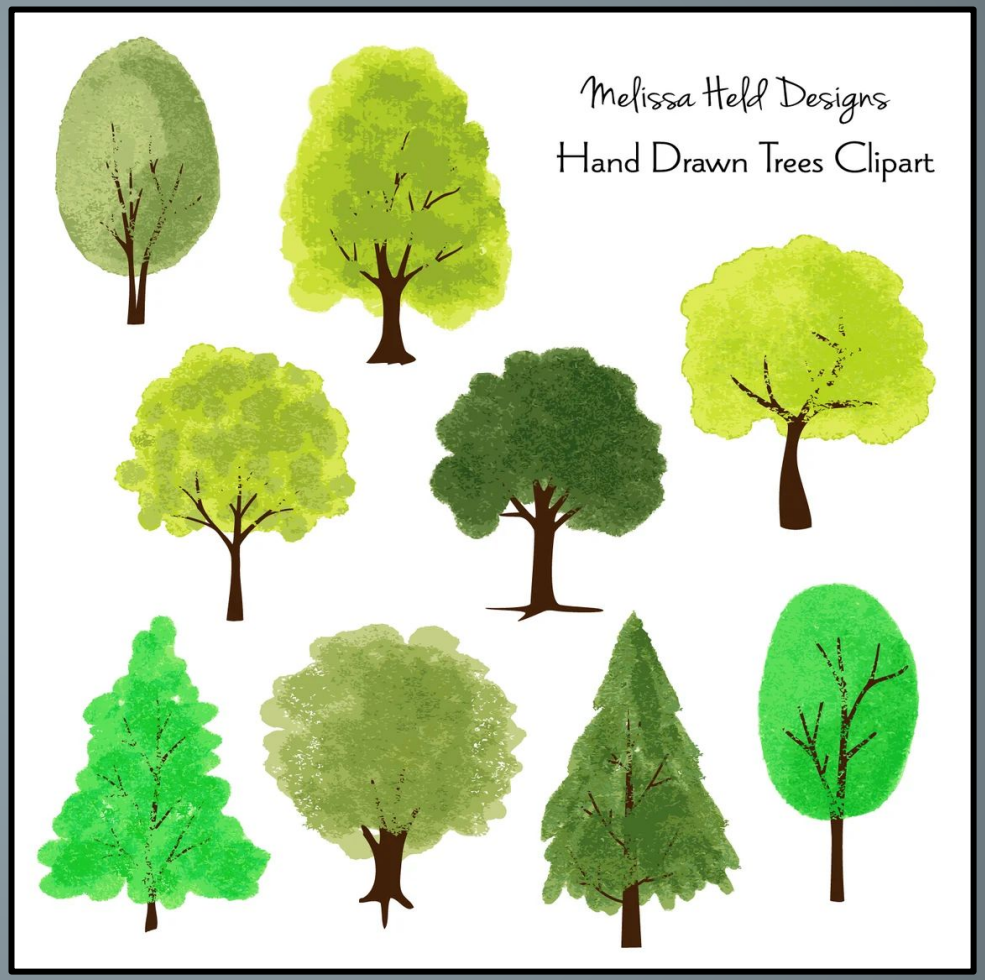


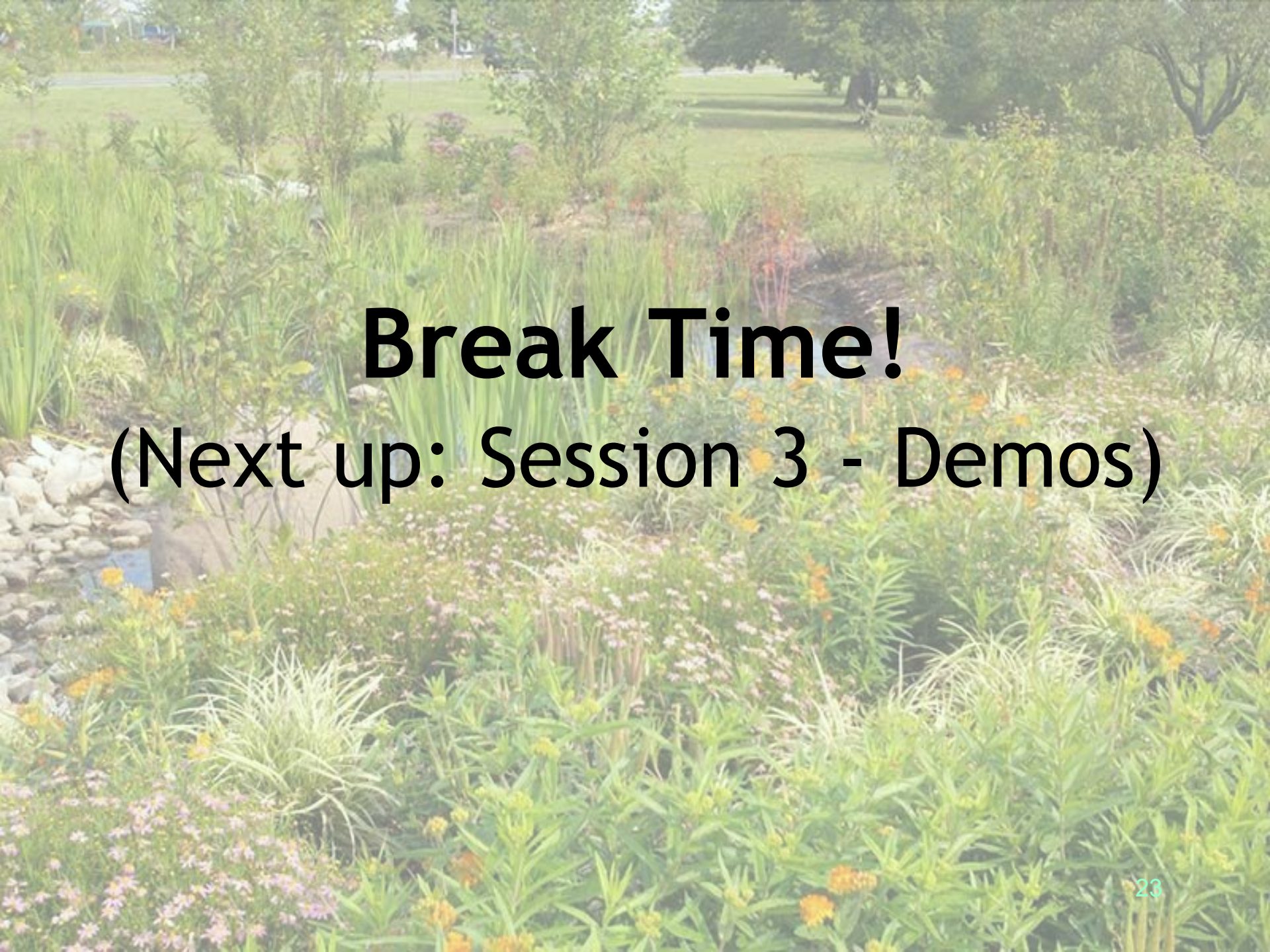
Stormwater in the Critical Area Buffer Zone

- **In general: SWM not permitted in the Buffer**
  - **exception- BMA and setbacks**
- **SWM Pipes and outfalls**
- **Buffer cannot be used for disconnection purposes (rooftop, non-rooftop, or sheet flow to conservation areas)**
  - **exception - minimum distance**
- **Regenerative conveyance wetlands (also known as Coastal Plain Outfalls)**

Planting to Meet 10%

- 1 acre of native trees = 400 ¾-inch caliper trees = 2.5 lbs of phosphorus removed; or
- 100 square feet of permanent disturbance can be offset by planting one ¾-inch caliper native tree
- only applicable for small residential projects; (2,000 s.f. disturbance)
- EX: 10% requirement = 0.35 lbs/P per year = 56 native trees
  - multiply 10% requirement by 400, then divide by 2.5 = # trees required





Break Time!

(Next up: Session 3 - Demos)

Session 3:

Demonstrations - Soil Type & 10% Worksheet

Hydrologic Soil Groups (HSGs)

- Soil properties, including the HSG, govern which SWM practices are feasible at a given site
- The HSG also influences the phosphorus removal rate SWM BMPs can achieve

Hydrologic Soil Groups

Group A is sand, loamy sand or sandy loam types of soils. It has low runoff potential and high infiltration rates even when thoroughly wetted.

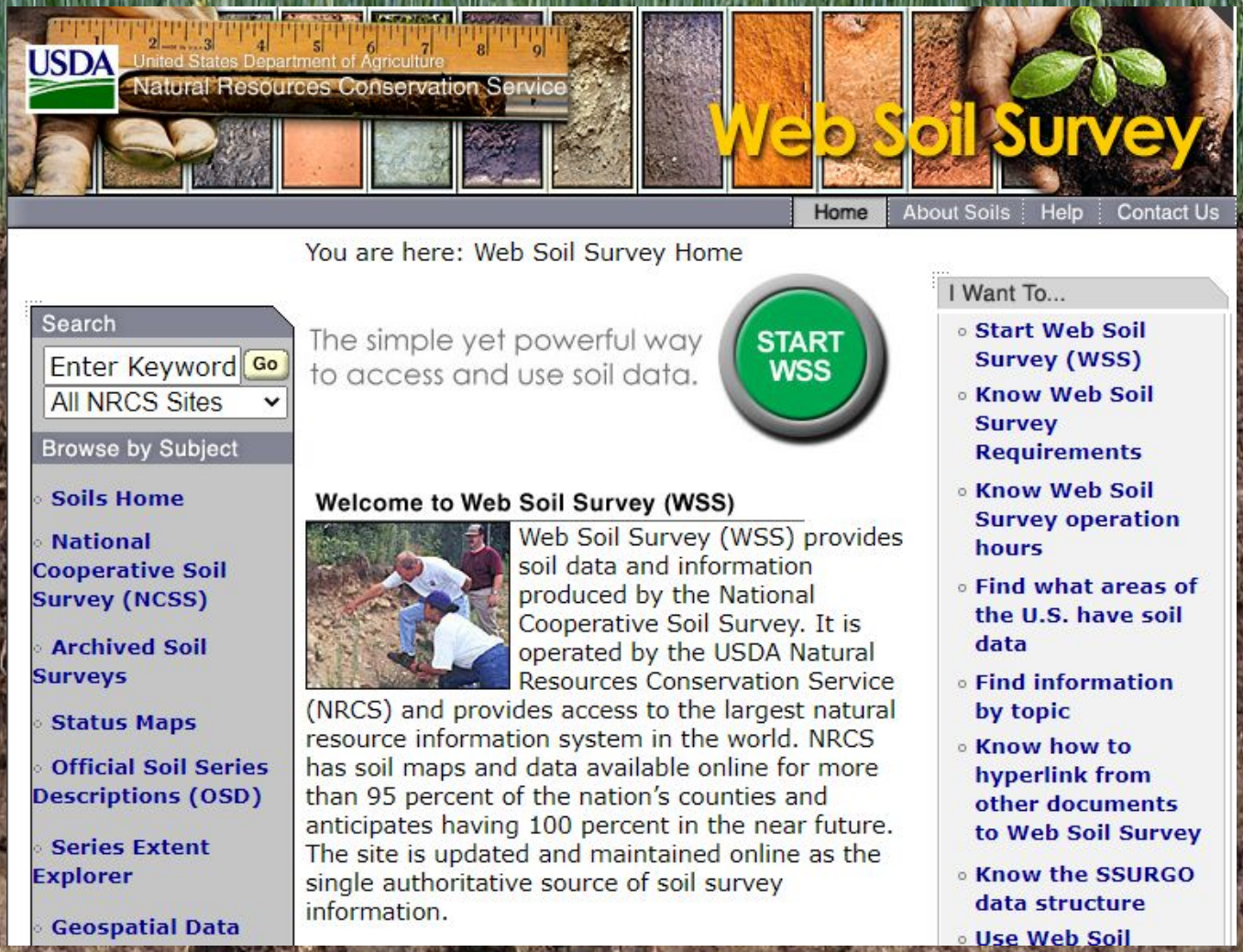
Group B is silt loam or loam. It has a moderate infiltration rate when thoroughly wetted

Group C soils are sandy clay loam. They have low infiltration rates when thoroughly wetted

Group D soils are clay loam, silty clay loam, sandy clay, silty clay or clay. This HSG has the highest runoff potential. They have very low infiltration rates when thoroughly wetted

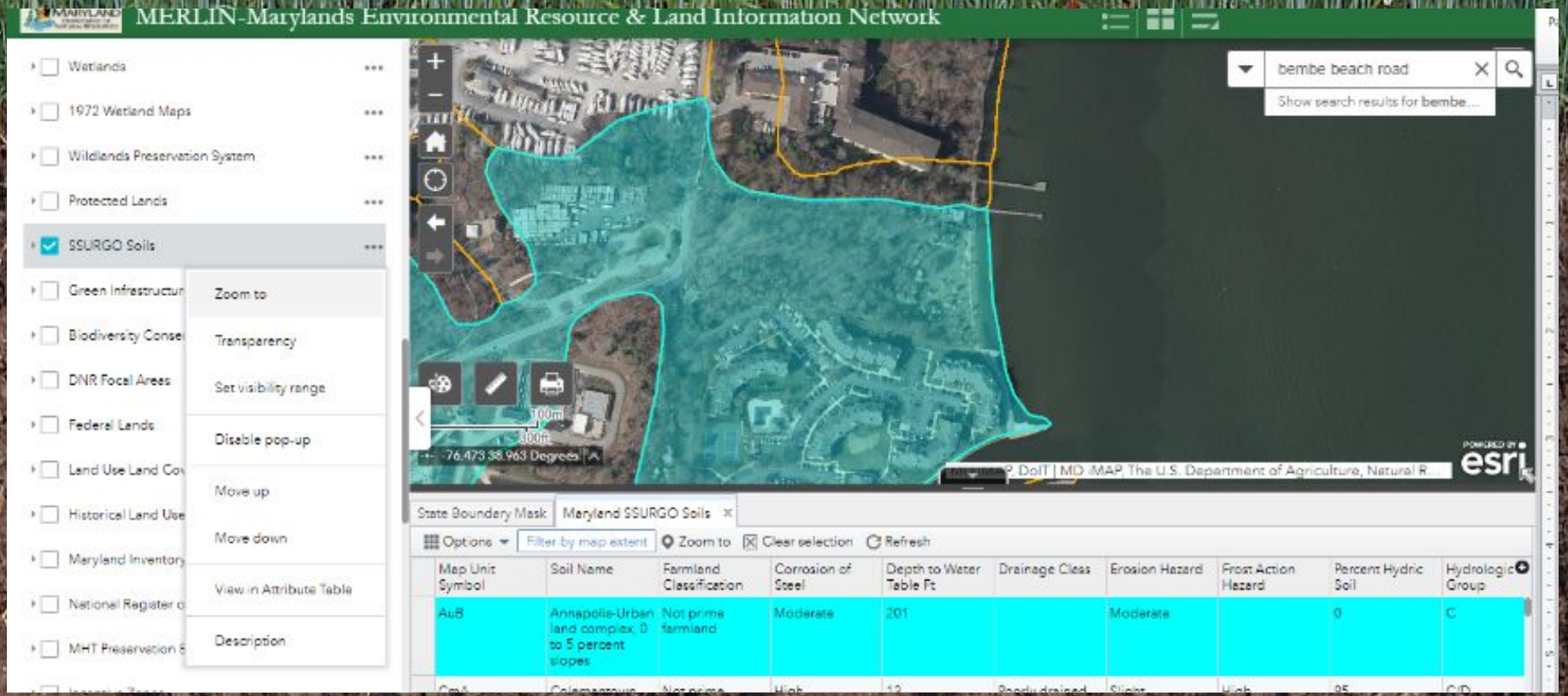
How to Determine Soil Type

Web Soil Survey



How to Determine Soil Type

MERLIN



Soil Type and SWM BMPs

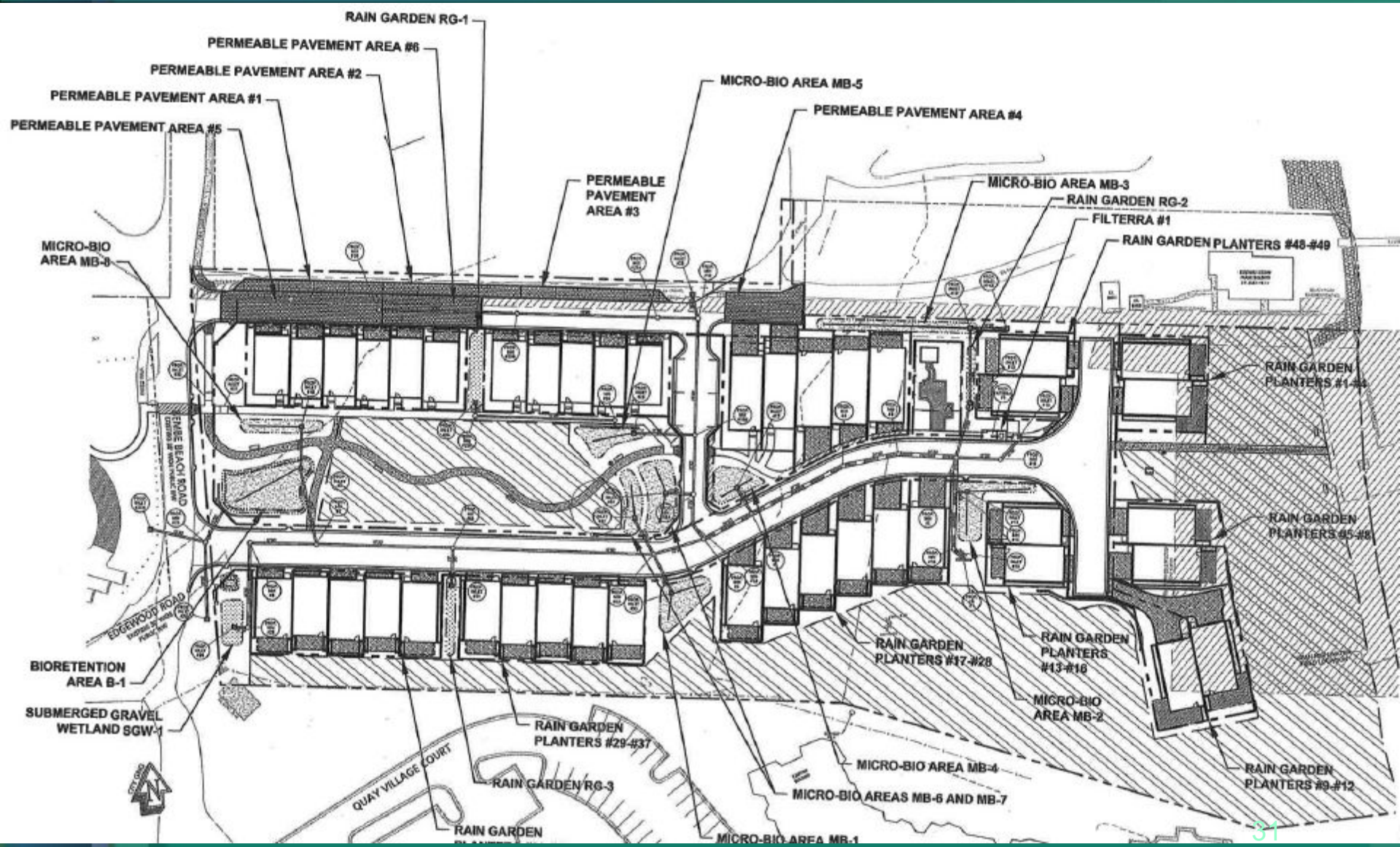
10% Spreadsheet Demo

Bembe Beach Example

- Site Area: 5.28 acres
- Existing Impervious: 0.28 acres (to remain)
- New Impervious: 1.84 acres
- Soil Type: entirely C

Overall Site & SWM Plan

Site Plan
Sheet 1 of 10



	A	B	C	D
12	**Step 1: Complete ESD Implementation Checklist**			
13				
14	*Check all of the Following ESD Practices That Were Implemented at Site*			*Yes - No - N/A*
15	Environmental Mapping Was Conducted at Site Prior to Layout			
16	Natural Areas Were Conserved (e.g., forests, wetlands, steep slopes, floodplains)			
17	Stream, Wetland and Shoreline Buffers Were Reserved			
18	Disturbance of Permeable Soils Was Minimized			
19	Natural Flow Paths Were Maintained Across the Site			
20	Building Layout Was Fingerprinted to Reduce Clearing and Grading at Site			
21	Site Grading Promoted Sheetflow From Impervious Areas to Pervious Ones			
22	Site Design Was Evaluated to Reduce Creation of Needless Impervious Cover			
23	Site Design Was Evaluated to Maximize Disconnection of Impervious Cover			
24	Site Design Was Evaluated to Identify Potential Hotspot Generating Area for Stormwater Treatment			
25	Erosion and Sediment Control Practices and Post Construction Stormwater Management Practices Were Integrated into a Comprehensive Plan			
26	Tree PlantingWas Used at the Site to Convert Turf Areas into Forest			
27				

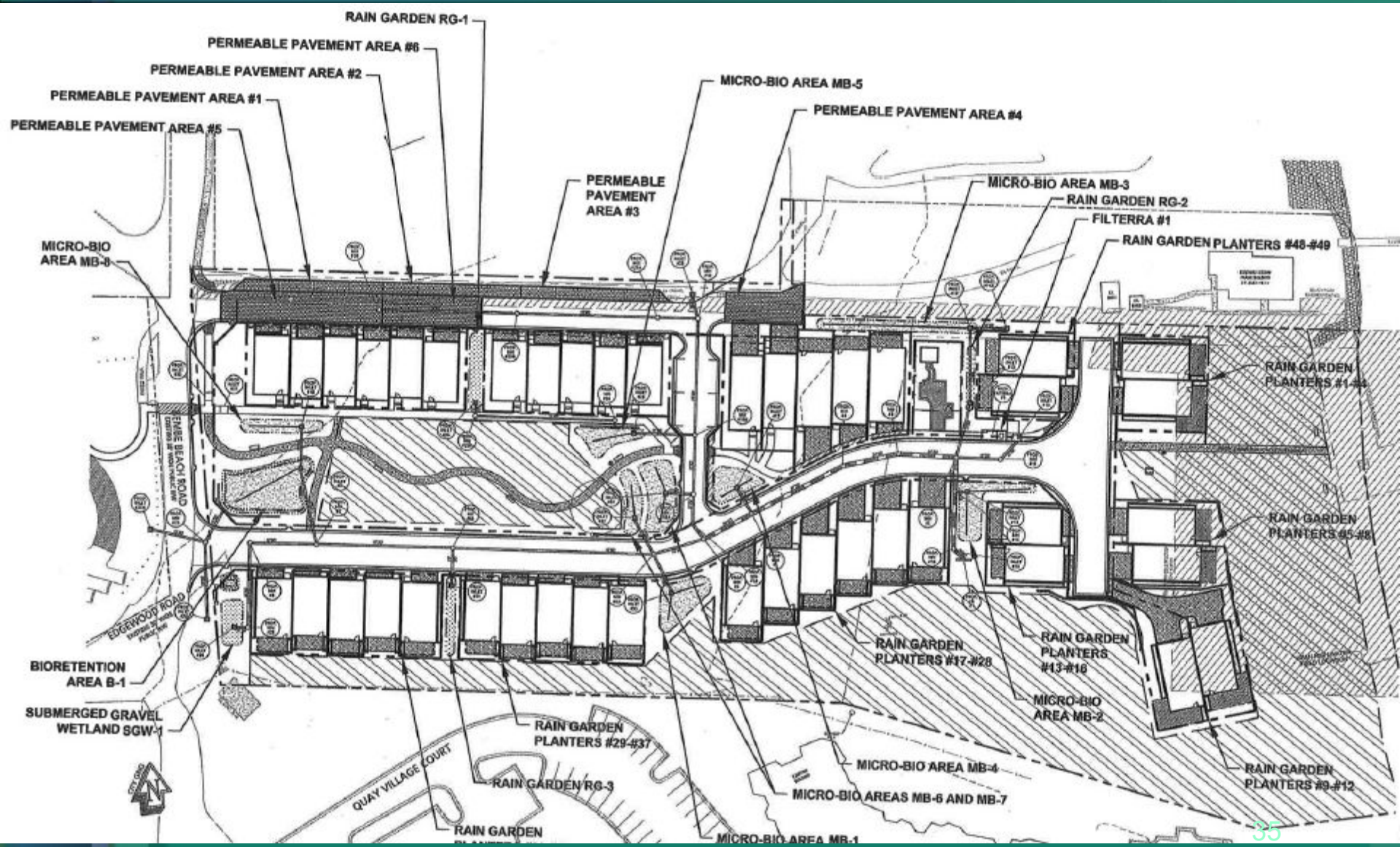
	A	B	C	D	E
27					
28	**Step 2: Calculate Site Imperviousness and Water Quality Volume, WQv (for redevelopment)**				
29					
30	Site Area, A (acres)	5.28	⇦ site area, or LOD		
31	Existing Impervious Surface Area (acres)	0.28			
32	Proposed Impervious Surface Area (acres)	2.12	⇦ total impervious (existing to remain + proposed)		
33	Rainfall Depth, P (in)	1.0			
34					
35	Existing Imperviousness, I_{pre}	5.3%			
36	Proposed Imperviousness, I_{post}	40.2%			
37					
38	*Water Quality Calculation for Redevelopment Only*				
39	Required Treatment Area (acres)	0.00			
40	Runoff Coefficient, Rv	0.95			
41					
42	**Water Quality Volume, WQv (cf)**	**0**			
43					
44	**Step 4: Calculate Environmental Site Design (ESD) Rainfall Target, P_E**				
45					
46	**Development Category (for ESD)**	**New Development**			
47					
48	% Soil Type A	0%			
49	% Soil Type B	0%			
50	% Soil Type C	100%			
51	% Soil Type D	0%			
52					

Step 3: Calculate Phosphorous Removal Requirement, RR for Critical Area Sites

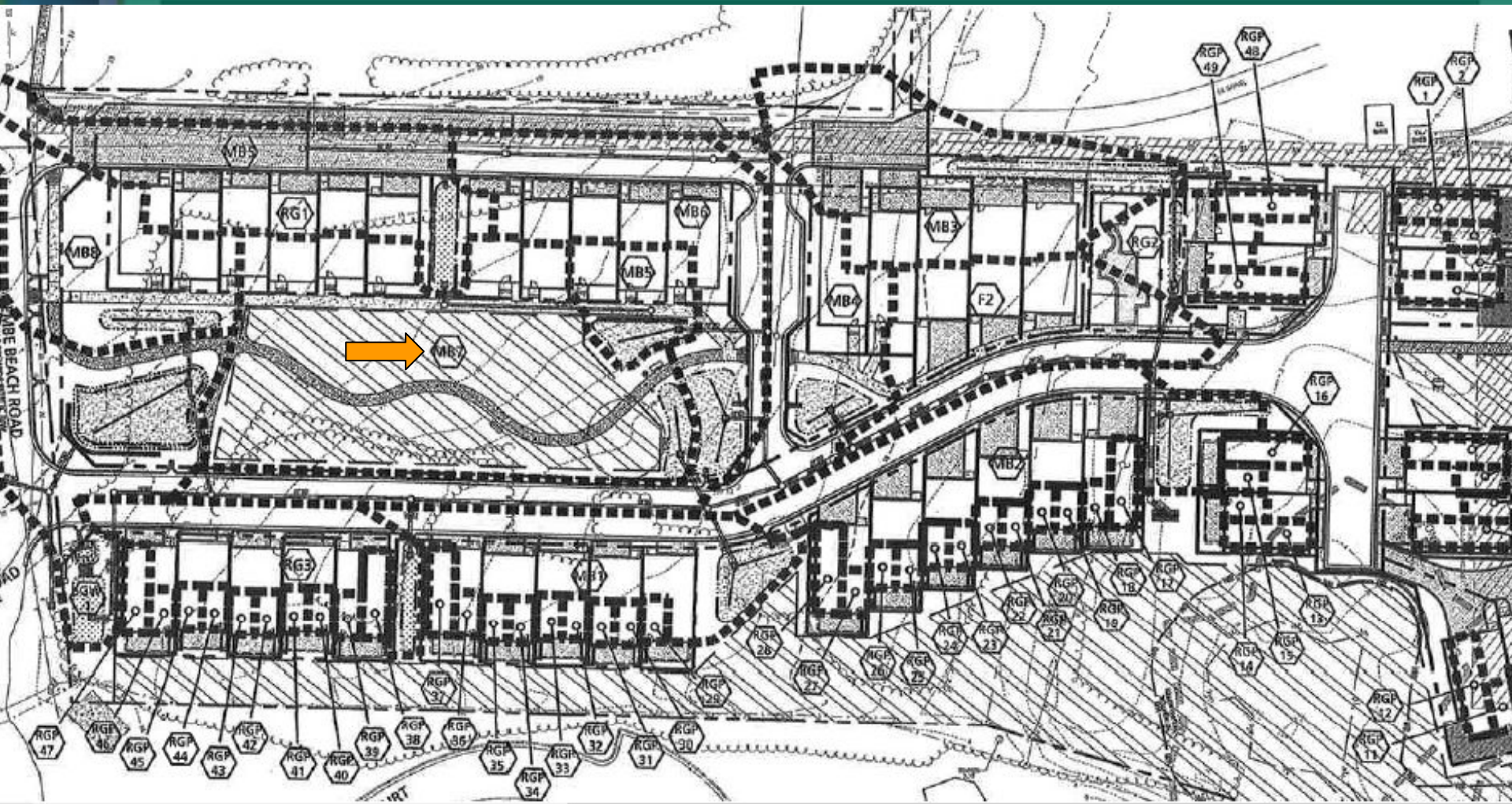
Development Category (for 10%)	New Development
New Development	
Average Annual Predevelopment Load, Lpre (lbs P / yr)	2.64
Redevelopment:	
Predevelopment Runoff Coefficient, Rv_{pre}	0.10
Phosphorous Mean Concentration, C (mg/L)	0.3
Average Annual Predevelopment Load, L_{pre} (lbs P / yr)	1.26
Post-Development Runoff Coefficient, Rv_{post}	0.41
Average Annual Post-Development Load, L_{post} (lbs P / yr)	5.32
Removal Requirement, RR (lbs P / yr)	**2.94**

Overall Site & SWM Plan

Site Plan
Sheet 1 of 10



SWM Practices - Drainage Areas



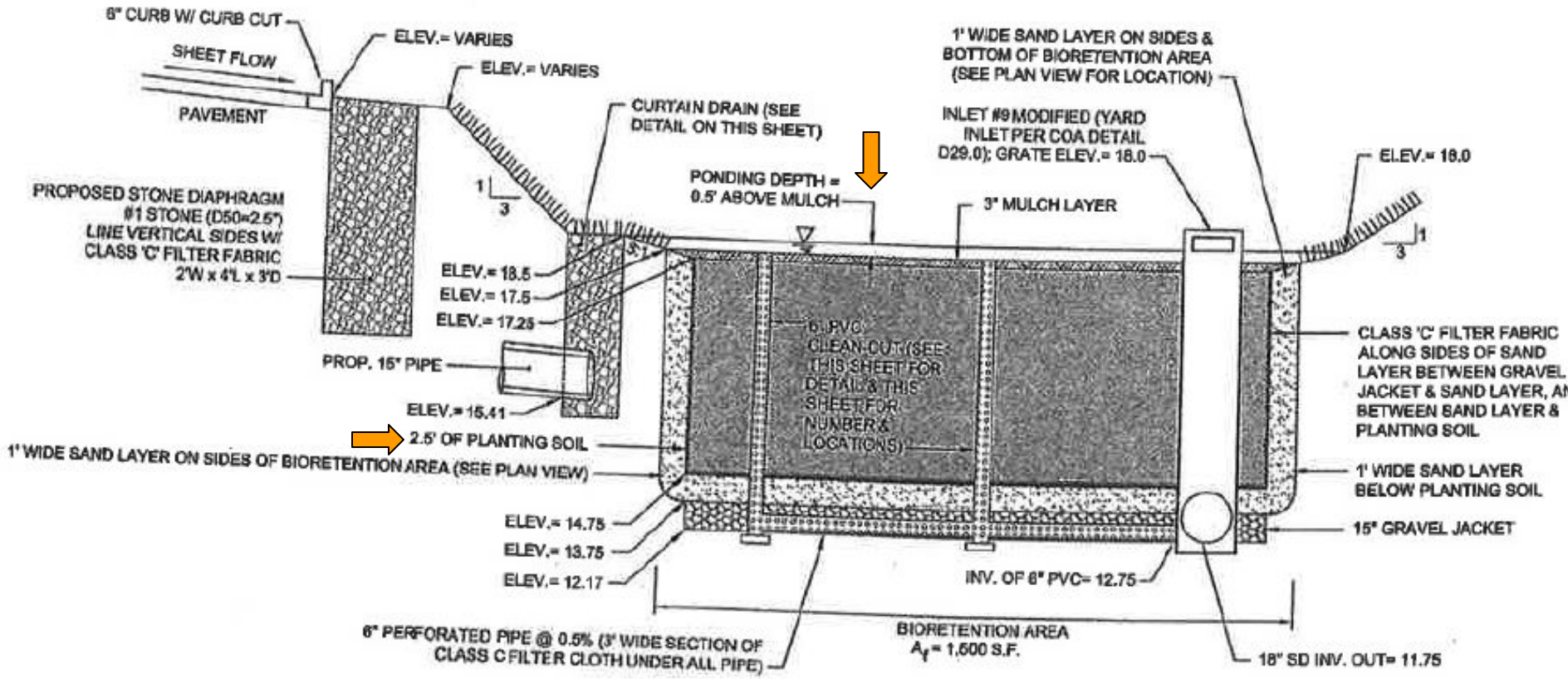
Site Plan
Sheet 2 of 10

SWM Practices - Drainage Areas

Site Plan
Sheet 2 of 10

MICRO-SCALE PRACTICES

DA	PRACTICE	DRAINAGE AREA - SQ. FT.	IMPERVIOUS AREA - SQ. FT.
MB1	MICRO-BIORETENTION AREA (M-6)	8,715	5,031
MB2	MICRO-BIORETENTION AREA (M-6)	9,736	8,975
MB3	MICRO-BIORETENTION AREA (M-6)	10,453	4,806
MB4	MICRO-BIORETENTION AREA (M-6)	7,243	4,642
MB5	MICRO-BIORETENTION AREA (M-6)	12,084	8,338
MB6	MICRO-BIORETENTION AREA (M-6)	13,161	10,369
MB7	MICRO-BIORETENTION AREA (M-6)	18,249	3,551
MB8	MICRO-BIORETENTION AREA (M-6)	7,417	3,684
SGW1	SUBMERGED GRAVEL WETLANDS (M-2)	2,840	1,396
RG1	RAIN GARDEN (M-7)	9,529	7,885
RG2	RAIN GARDEN (M-7)	2,617	1,406
RG3	RAIN GARDEN (M-7)	6,411	4,285
F1	FILTERRA	7,323	6,169
RGP1-48"	RAIN GARDEN PLANTERS	16,257	16,257



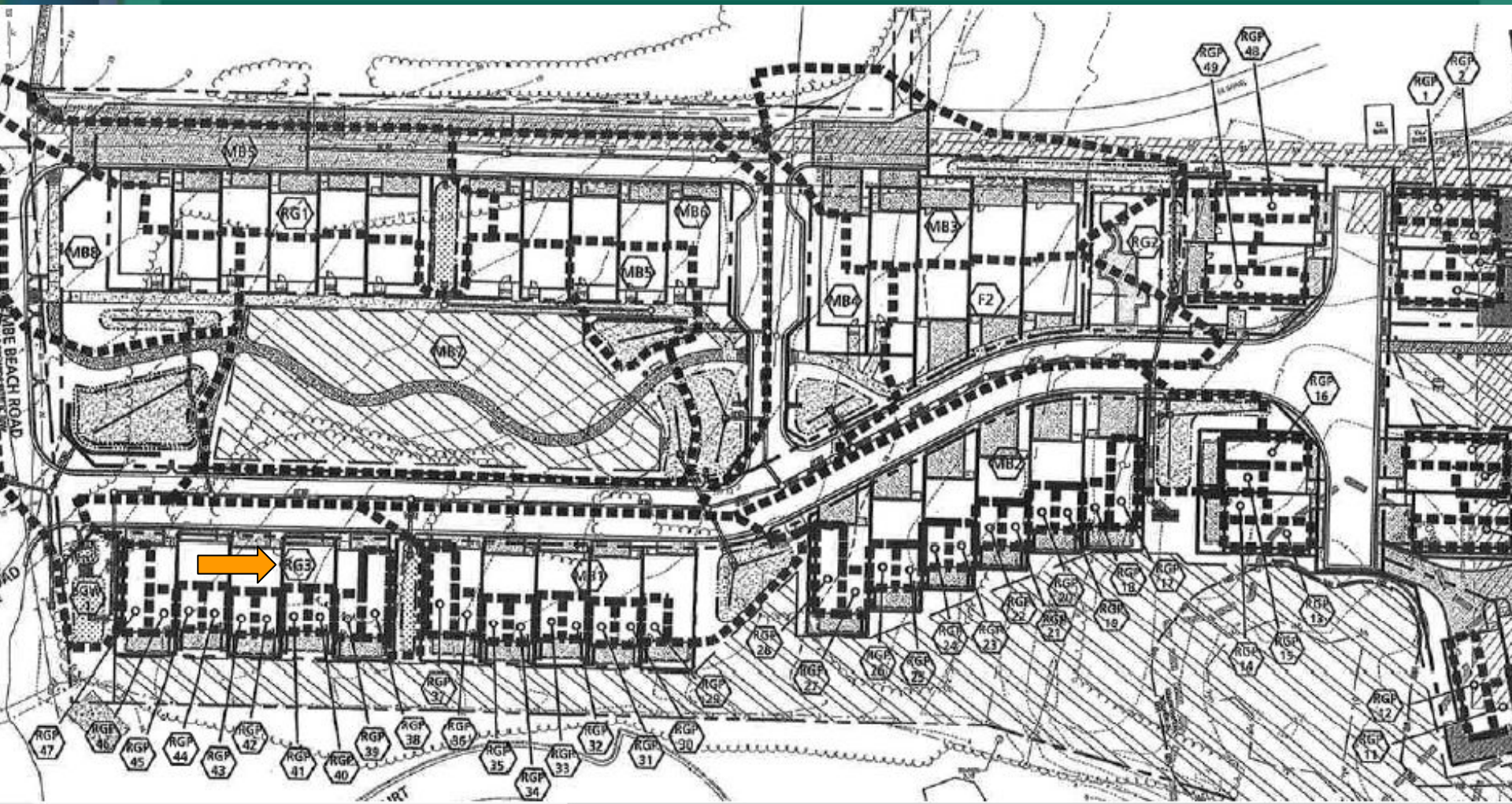
BIORETENTION AREA B-1 CROSS SECTION

SCALE: NONE

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
3	P_E Credit Description		Contributing Drainage Area (sf)	% Impervious Cover	Direct ESDv Received by Practice	WQv or ESDv from Up-Gradient Practices	Practice Specific Parameter(s)			WQv or ESDv credit (cf)	Runoff Volume Remaining (cf)	Down-Gradient Practice		Baseline Phosphorous Removal Efficiency	Adjusted Removal Efficiency Rate	P Load to Practice (lbs/yr)	Load Reduction (lbs/yr)	Remaining Load (lbs/yr)
4	ESDv credit is based on design storage volume						Surface Area (sf)	Ponding Depth (ft)	Media Depth (ft)									
5			6,717	70%	1,025	1179	740	0.5	2.3	1,051	1,153			50%	66%	0.26	0.17	0.09
6	ESDv credit is based on design storage volume						Surface Area (sf)	Ponding Depth (ft)	Media Depth (ft)									
7			9,583	80%	1,660	0	763	0.5	2.25	1,068	592			50%	59%	0.41	0.24	0.17
8	ESDv credit is based on design storage volume						Surface Area (sf)	Ponding Depth (ft)	Media Depth (ft)									
9			10,625	53%	1,260	0	739	0.5	2.25	1,035	225			50%	62%	0.31	0.20	0.12
10	ESDv credit is based on design storage volume						Surface Area (sf)	Ponding Depth (ft)	Media Depth (ft)									
11			7,243	62%	991	0	535	0.5	3.5	991	0			50%	66%	0.25	0.16	0.09
12	ESDv credit is based on design storage volume						Surface Area (sf)	Ponding Depth (ft)	Media Depth (ft)									
13			12,956	77%	2,166	0	497	0.5	4	1,044	1,122			50%	54%	0.54	0.29	0.25
14	ESDv credit is based on design storage volume						Surface Area (sf)	Ponding Depth (ft)	Media Depth (ft)									
15			13,372	84%	2,425	0	884	0.5	4	1,856	569			50%	61%	0.61	0.37	0.23
16	ESDv credit is based on design storage volume						Surface Area (sf)	Ponding Depth (ft)	Media Depth (ft)									
17			19,463	16%	865	0	420	0.5	4	865	0			50%	66%	0.22	0.14	0.07
18	ESDv credit is based on design storage volume						Surface Area (sf)	Ponding Depth (ft)	Media Depth (ft)									
19			7,417	50%	834	0	435	0.5	3.7	834	0			50%	66%	0.21	0.14	0.07
20	ESDv credit is based on design storage volume						Surface Area (sf)	Ponding Depth (ft)	Media Depth (ft)									
21			6,996	75%	1,141	0	119	0.5	1.75	143	998			50%	33%	0.29	0.09	0.19
22			94,372		12,368	1,179				8,887	4,660			50%	59%	3.09	1.81	1.28
23																		
24																		

Site Design | Calculation Summary | Nonrooftop Disconnect (C_D) | Permeable Pavers (C) | **Microbioretention(C_D)** | submerged gravel wetlands | Rain Garden C_D | storn

SWM Practices - Drainage Areas



Site Plan
Sheet 2 of 10

SWM Practices - Drainage Areas

Site Plan
Sheet 2 of 10

MICRO-SCALE PRACTICES

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MB1	MICRO-BIORETENTION AREA (M-6)	8,715	5,031
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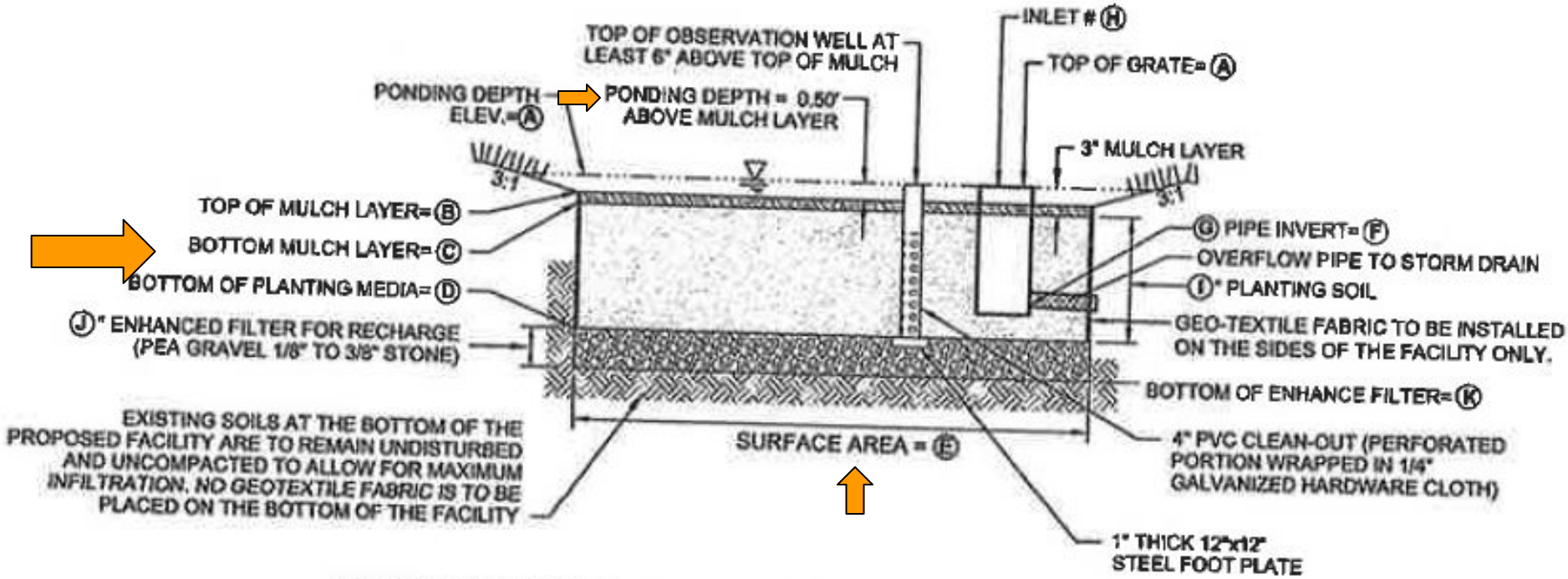
RGP1-48"	RAIN GARDEN PLANTERS	16,257	16,257

	RG-1	RG-2	RG-3
A	17.75	8.50	16.00
B	17.25	8.00	15.50
C	17.00	7.75	15.25
D	15.75	6.75	14.00
E	471	200	620
F	14.25	3.77	13.00
G	12	15	15
H	28	13	34
I	12	12	12
J	N/A	N/A	N/A
K	N/A	N/A	N/A

C to D depth (media depth) = 1.25 ft
E (surface area)



NOTE: SEE TABLE B.4.1 (MDE MANUAL) FOR MATERIAL SPECIFICATIONS FOR RAIN GARDENS.

RAIN GARDEN CROSS SECTION

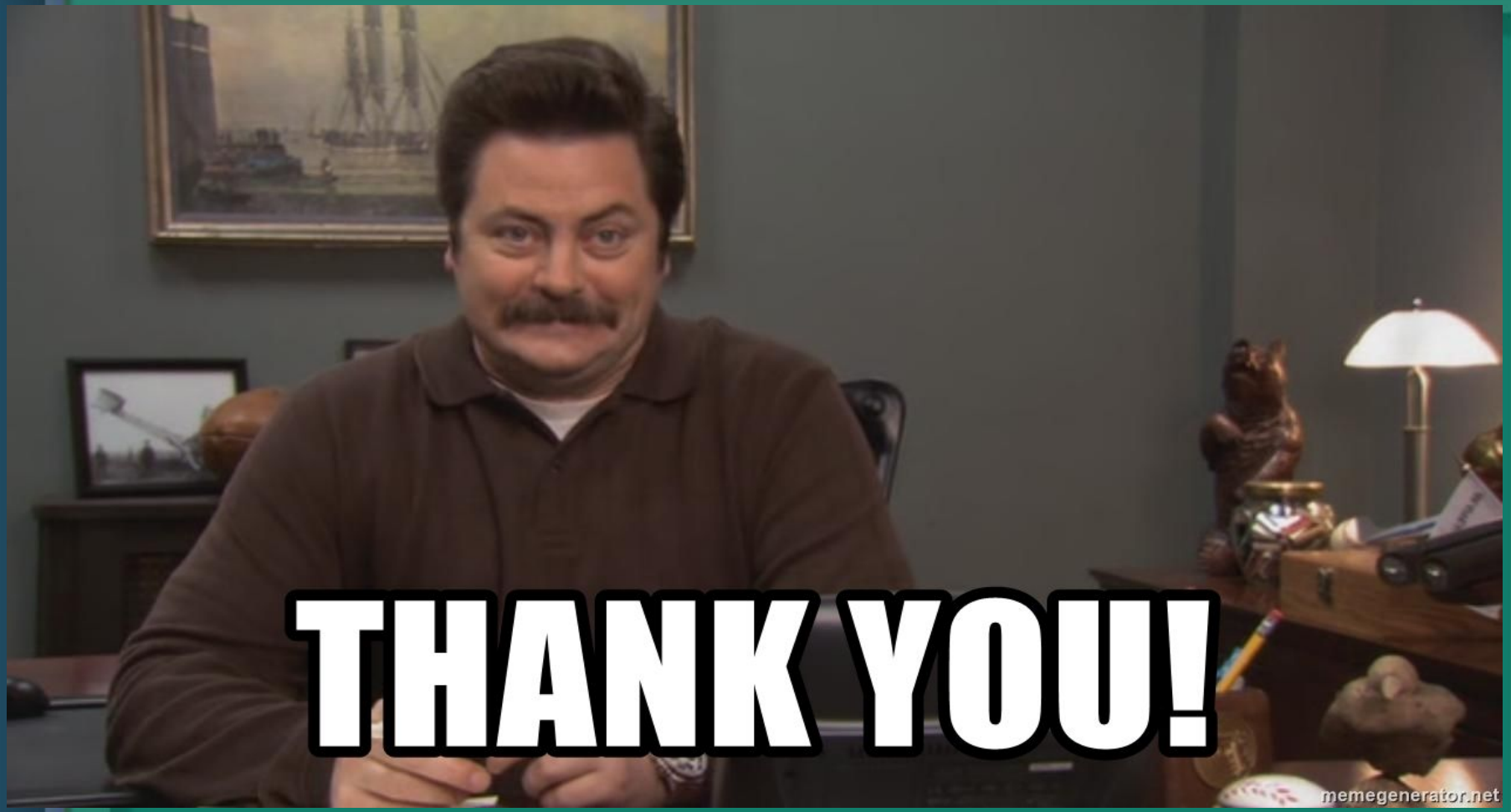
SCALE: NONE

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
5	*Micro-Scale Practices*	P_E Credit Description		Contributing Drainage Area (sf)	% Impervious Cover	Direct ESDv Received by Practice (cf)	WQv or ESDv from Up-Gradient Practices (cf)	Practice Specific Parameter(s)			WQv or ESDv credit (cf)	Runoff Volume Remaining (cf)	Down-Gradient Practice		Baseline Phosphorous Removal Efficiency	Average Adjusted Removal Efficiency Rate
6		ESDv credit is based on design storage						Surface Area (sf)	Ponding Depth (ft)	Media Depth (ft)			Micro-Bioretention (C/D			
7	Rain Gardens (C/D Soils)	volume		6,358	86%	1,177	278	500	0.5	1	450	1,005			25%	25%
8		ESDv credit is based on design storage						Surface Area (sf)	Ponding Depth (ft)	Media Depth (ft)						
9	Rain Gardens (C/D Soils)	volume		2,617	42%	252	0	210	0.5	1	189	63			25%	31%
10		ESDv credit is based on design storage						Surface Area (sf)	Ponding Depth (ft)	Media Depth (ft)						
11	Rain Gardens (C/D Soils)	volume		4,950	76%	817	0	620	0.5	1.25	620	197			25%	31%
12		ESDv credit is based on design storage						Surface Area (sf)	Ponding Depth (ft)	Media Depth (ft)						
13	Rain Garden Planter Boxes	volume		15,862	100%	3,391	0	1,975	0.5	1.25	1,975	1,416			25%	29%
14		ESDv credit is based on design storage						Surface Area (sf)	Ponding Depth (ft)	Media Depth (ft)						
15	Rain Gardens (C/D Soils)	volume				0	0				0	0			25%	
16	Total			29,787		5,637	278				3,234	2,681			25%	29%
17																
18																

	A	B
1	**Calculation Summary**	
2		
3	**Critical Area 10% Calculations**	
4	Removal Requirement, RR (lbs P / yr)	**2.94**
5	after non-structural and micro-scale BMPs (Steps 5 and 6)	
6	Total Load Reduction (lbs P / year)	2.93
7	Total Load Reduction Remaining (lbs P / yr)	**0.01**
8	after structural practices (Step 9)	
9	Total Load Reduction (lbs P / year)	3.79
10	Total Load Reduction Remaining (lbs P / yr)	**0.00**
11		
12		
13	**MDE's ESD to the MEP Calculations**	
14	ESD Runoff Volume, ESDv (cf)	14191.00
15	Total Treatment Volume (cf)	14191.00
16		
17	WQv or ESDv Treated (cf)	14742.24
18	PE achieved (inches)	1.87
19		
20	Entire ESDv Treated Through Environmental Site Design?	YES
21	ESDv Remaining? (cf)	0.00
22	If ESDV is not fully treated, is ESD to MEP achieved?	0.00
23		
24	Redevelopment WQv Requirements Met Through Environmental Site Design?	N/A
25	WQv Remaining? (cf)	0.00
26		
27	New Development WQv Requirements Met Through Environmental Site Design?	YES
28	WQv Remaining? (cf)	0.00
29		

Frequently Asked Questions

- What are the rules for measuring impervious cover?
- How do permeable pavements and green roofs affect impervious cover?
- How do you define site area for new/redevelopment?
- Where do you get data on predevelopment hydrologic soil groups?
- How do you deal with projects that cross the Critical Area boundary?


THANK YOU!
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Potential Future Topics

- SWM 201: SWM Resiliency
  - Overview of research
  - SLR and potential issues when locating BMPs as well as BMP type
  - Dealing with increased intensity and frequency of storms
  - Saltwater intrusion
  - Example : Town of Oxford
  - Small projects under 5,000 sf (Alex's table)

How the Spreadsheet Works

- Efficiencies vary from 20% - 80%
- One tab for each BMP
  - Allows for multiples of the same BMP
- Input of BMP-specific parameters (surface area, ponding depth, media depth, etc.)

SWM for State Projects < 5,000 sf

Practice	Microinfiltration *	Rain Garden	Microbioretention	Landscape Infiltration	Bioswale *	Planting
Limitations	*only AB, DA < 500 sf*	*pd < 0.5 ft, filter bed 12-18 in, DA < 2000*	*pd < 0.5 ft, filter bed > 18 in*	*only AB*	*many; filter bed > 18 in*	*Planting to meet stormwater management requirements is the preferred option if planting is already required to mitigate for clearing. Refer to the Green Book for the Buffer for planting credits and species permitted.*
250-500 sf	50 sf, 0.75 ft pd, 1.5 ft md	60 sf, 0.5 ft pd, 1.5 ft md	60 sf, 0.5 ft pd, 1.5 ft md	60 sf, 0.5 ft pd, 1.5 ft md	50 sf, 0.75 ft pd, 1.5 ft md	
500-1000 sf	(2) 500 DA, 50 SA, .75 pd, 1.5 md	115 sf, 0.5 ft pd, 1.5 ft md	115 sf, 0.5 ft pd, 1.5 ft md	115 sf, 0.5 ft pd, 1.5 ft md	95 sf, 0.75 ft pd, 1.5 ft md	
1000-2000 sf	(4) 500 DA, 45 SA, 1 pd, 1.5 md	250 sf, 0.5 ft pd, 1.5 ft md	235 sf, 0.5 ft pd, 1.5 ft md	235 sf, 0.5 ft pd, 1.5 ft md	190 sf, 0.75 ft pd, 1.5 ft md	
2000-3000 sf	N/A	(2) 1500 DA, 205 SA, 0.5 ft pd, 1.5 ft md	345 sf, 0.5 ft pd, 1.5 ft md	345 sf, 0.5 ft pd, 1.5 ft md	285 sf, 0.75 ft pd, 1.5 ft md	
3000-4000 sf	N/A	(2) 2000 DA, 280 SA, 0.5 ft pd, 1.5 ft md	460, 0.5 sf pd, 1.5 ft md	460, 0.5 sf pd, 1.5 ft md	375, 0.75 sf pd, 1.5 ft md	
4000-5000 sf	N/A	(2) 2000 DA, 280 SA, 0.5 pd, 1.5 md; 1000 DA, 150 sf	580, 0.5 sf pd, 1.5 ft md	580, 0.5 sf pd, 1.5 ft md	470, 0.75 sf pd, 1.5 ft md	

sf = square feet (all values not given a measurement are sf)

DA = drainage area (sf)

SA = surface area (sf)

pd = ponding depth

md = media depth

* these practices do not limit pd, so the SA can be smaller

Permanent disturbance means a material, enduring change in the topography, landscape, or structure that occurs as part of a development or redevelopment activity. Permanent disturbance includes: construction or installation of any material that will result in lot coverage, construction of a deck, grading and clearing except under temporary disturbance, and a septic system in a forest or developed woodland on a lot created before program approval, if clearing is required.

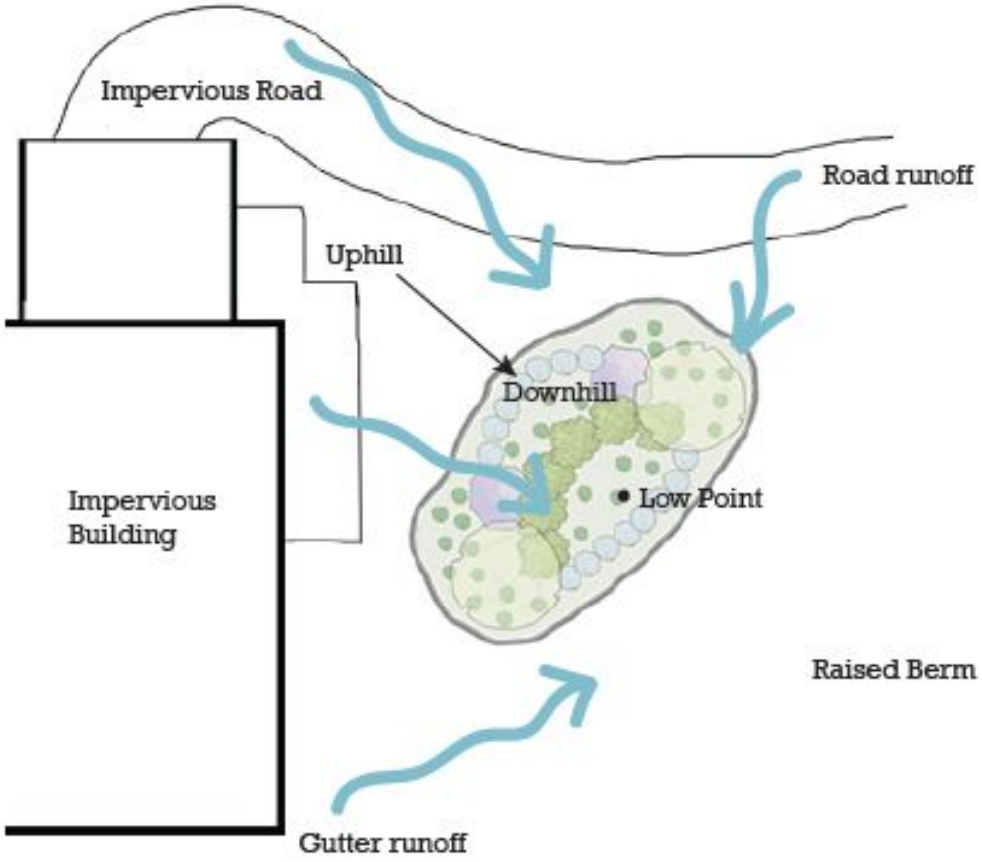
Alternatives and Combinations

1) One hundred square feet of permanent disturbance may be offset with the planting of one ¾ inch caliper tree, or a standard rain barrel that holds a minimum capacity of 50 gallons.
2) Practices may be mixed and matched. For example, if a project falls in the 3000-4000 sf category, requirements may be met with two options from the 500-1000 sf category in combination with one option from the 1000-2000 sf category.
3) For projects that do not require planting, up to 2,000 sf of disturbance may be treated by planting.

Rain Garden – Landscaped depression that collects stormwater and allows it to be absorbed by soils.

Tips and Suggestions

When selecting the location and size of a rain garden there are a few things to keep in mind. A rain garden is used to infiltrate water that would otherwise wash away as runoff. Your rain garden should be located where water naturally flows or is redirected to flow on the site. A small berm should be built on the far side of the rain garden to allow the water to pool to the correct depth, and permeable soils are preferred to allow proper drainage. A rain garden can be planted with very aesthetically pleasing plants, and can be a showcase of any site. Rain gardens serve many purposes and filtering your rainwater runoff is only the beginning.



Example Rain Garden Sizing

Project LOD	Rain Garden Surface Area	Ponding Depth	Media Depth
500-1000 Sf	115 Sf	0.5 Ft	1.5 Ft

-Starting Your Own Rain Garden-

1. Avoid rainy weather, which may compromise the installation and materials.
2. Locate all utility lines that go underneath the site.
3. Excavate all vegetation off of the site.
4. Amend soil with compost and sand as needed to create the proper well-draining soils needed.
5. Excavate your site down to the desired depth, in this case 18", at the bottom add in a layer of gravel to atleast 3".
6. Fill in your garden with the amended soil removed previously.
7. Construct a berm on the low side of the garden, the height of the berm in the center should equal the desired ponding depth of the garden.
8. Plant your native plants in the desired arrangement to nursery specifications for spacing.
9. Mulch the entire planting bed to a depth of no more than 2-3" deep in an even surface.

Critical Area Program Strategies for Coastal Adaptation

Oxford: A Case Study

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Anecdotal Assessment

Image Credit: Cheryl Lewis, Town of Oxford

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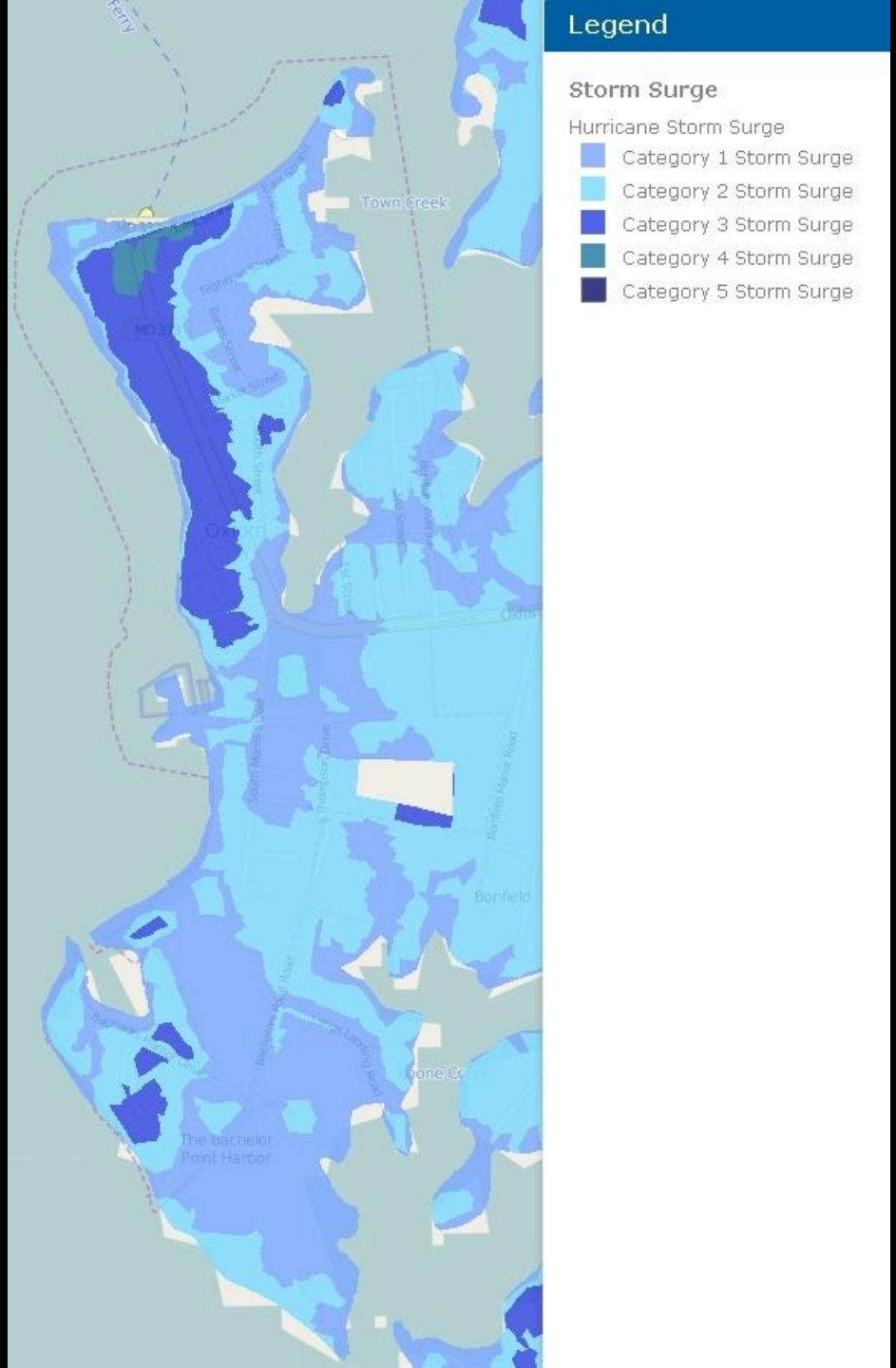

Geographic Assessment

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Geographic Assessment

Programmatic Assessment

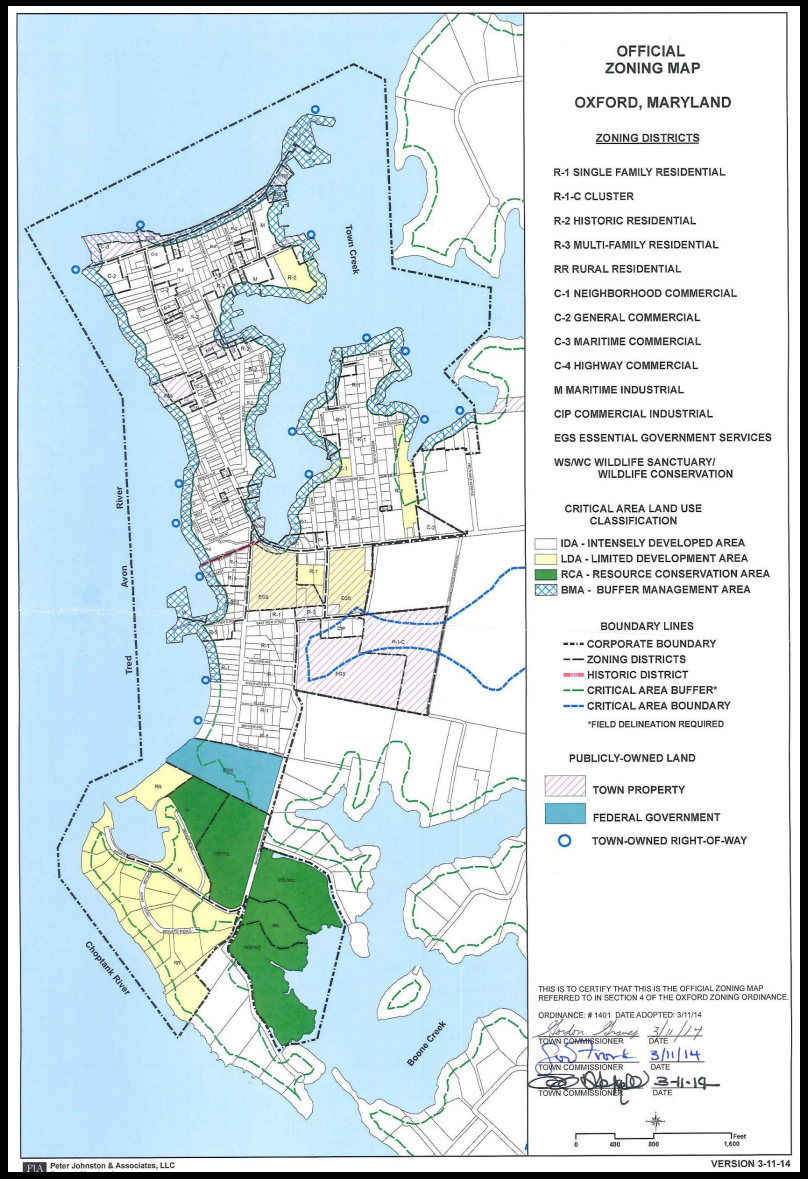

Image Credit: Cheryl Lewis, Town of Oxford

Strategy: SWM < 5,000 SF

Image Credit: Alliance for the Chesapeake Bay

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Strategy: IDA Tree Replacement

Diameter at breast height (DBH) of removed tree	**Planting Requirement**
Less than ten inches	One tree
Between ten and sixteen inches	Two trees
Greater than sixteen inches	Three trees

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Strategy: Resilient MBAs

Image Credit: Chesapeake Bay Foundation

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Strategy: Pervious Pavers in IDA

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