

# DEQ Certification Class Presentations

**Class presentations are provided for study/review purposes only. Printouts of these PowerPoint slides will not be allowed into the exam testing centers.**

**August 2024**



# Exercise 1C

## Runoff Reduction and Stormwater Site Design

# Exercise 1C Materials

In your participant guide:

- Exercise 1C Instructions
  - Use this sheet to jot down your results and notes

## Exercise 1C: Instructions

**RUNOFF REDUCTION AND STORMWATER SITE DESIGN**

Using the original site data and saved spreadsheet from Exercise 1B as a starting point, follow the instructions below to evaluate the three treatment options (configurations I, II, and III below) for water quality compliance. Assume "C" soils throughout and use the New Development Compliance spreadsheet.

**Proposed Treatment Configuration Options**

- I. Extended Detention Level 2 (ED2) with a surface area of 0.25 acres.
- II. Compost-Amended Grass Channel (CAGC) with a surface area of 0.25 acres.
- III. Compost-Amended Grass Channel draining to Extended Detention Level 2 (CAGC to ED2) with a total BMP surface area of 0.5 acres.

**EVALUATE FOR WATER QUALITY COMPLIANCE**

Using the New Development Compliance spreadsheet, evaluate if the site meets water quality compliance for each treatment configuration (I, II, and III). Use the table below to guide the spreadsheet area inputs and to track results.

- Assume the entire site area will be treated for each treatment configuration.
- Determine the total load reduction requirement.
- Determine the total load reduction achieved.
- Determine if the selected treatment complies with the water quality compliance requirements.
- Enter the data into the spreadsheet.

		Start with Exercise 1B	Exercise 1C Configuration Options <i>(Enter spreadsheet land cover inputs)</i>		
			I. ED2	II. CAGC	III. CAGC to ED2
Site Data	Forest:	3 acres			
	Mixed Open	-			
	Managed Turf:	1.75 acres			
	Impervious Cover:	1.95 acres			
Results	Total Phosphorus Load Reduction Achieved:				
	Total Phosphorus Load Reduction Requirement:				
	Water Quality Treatment Requirements Met?				

Exercise 1C  
Plan Reviewer for Stormwater Management (v5.0) Page 1

# Exercise 1C Materials

In your participant guide:

- Module 4
  - Tables 4-2 and 4-4

FOREST
Land that will remain undisturbed <sup>1</sup> :
<ul style="list-style-type: none"><li>• Portions of the site that will NOT be disturbed during construction.</li><li>• Portions of residential lots that will NOT be disturbed during construction, as approved by the VESMP authority. Portions of residential lots that will NOT be disturbed during construction, as approved by the VESMP authority.</li><li>• Surface area of stormwater post-construction (P-BMPs)<sup>2</sup> that are NOT wet ponds, have some type of vegetative cover, and that do not replace an otherwise impervious surface.<sup>3</sup><ul style="list-style-type: none"><li>○ P-BMPs in this category include bioretention, dry swale, grass channel, stormwater wetland, soil amended areas that are vegetated, and infiltration practices that have a vegetated cover.</li></ul></li><li>• Other areas of existing forest, including wetlands, that will be protected during construction and that will remain undisturbed.</li><li>• Non-disturbed portions of the site that will be afforested (minimum of 400 woody stems per acre).</li></ul>

MIXED OPEN
Land that will remain undisturbed OR will be left in a natural vegetated state (bush hogged no more than four times per year):
<ul style="list-style-type: none"><li>• Portions of a development (residential lots, roadway rights-of-way, community open spaces areas, etc.) that were disturbed during construction and will not be mowed routinely but left in a natural vegetated state (can include areas bush hogged no more than four times per year or rotationally grazed) as approved by the VESMP authority.</li><li>• Community open space areas that will not be mowed routinely but left in a natural vegetated state (can include areas bush hogged no more than four times per year or rotationally grazed).</li><li>• Utility rights-of-way that will be left in a natural vegetated state (can include areas bush hogged no more than four times per year or rotationally grazed).</li><li>• Surface area of extended detention (ED) pond that is not mowed routinely.</li><li>• Other areas of existing mixed open that will be protected during construction and that will remain undisturbed.</li></ul>

# Exercise 1C Materials

## Virginia Runoff Reduction Method (VRRM) 4.1 New Development Spreadsheet

DEQ Virginia Runoff Reduction Method New Development Compliance Spreadsheet - VERSION 4.1

Project Name:   
 Date:  CLEAR ALL (F5)

DEQ Design Specifications List 2024 Stds & Specs

**Site Information**

ENTER AREAS IN DATA INPUT CELLS FOR RESULTS

Post-Development Project (Treatment Volume and Loads)

Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals
Forest (acres) - undisturbed, protected forest or managed forest					0.00
Mixed Open (acres) - undisturbed (in forests, managed areas or managed turf) (acres) - disturbed, graded for yards or other use to be					0.00
Impervious Cover (acres)					0.00
<b>TOTAL</b>					<b>0.00</b>

Post-Development Requirement for Site Area

TP Load Reduction Required (lbs/yr)

**LAND COVER SUMMARY - POST DEVELOPMENT**

Land Cover Summary		Treatment Volume and Nutrient Loads	
Forest Cover (acres)	0.00	Treatment Volume (acre-ft)	0.0000
Regained Rv Forest	0.00	Treatment Volume (cubic feet)	0
% Forest	0%	TP Load (lbs/yr)	0.00
Mixed Open (acres)	0.00	% Load (lbs/yr)	0.00
Regained Rv mixed open	0.00		
% Mixed Open	0%		
Managed Turf Cover (acres)	0.00		
Regained Rv turf	0.00		
% Managed Turf	0%		
Impervious Cover (acres)	0.00		
Rv impervious	0.00		
% Impervious	0%		
Site Area (acres)	0.00		
Site Rv	0.00		

# Exercise 1C

## Runoff Reduction and Stormwater Site Design

### Site Information:

- Project area = 6.7 acres
- Entire site treated for each configuration
- Pre and post soils all “C” (will be decompacted)

### Treatment Configurations:

- I. Extended Detention (ED) Level 2
  - II. Composted-Amended Grass Channel (CAGC)
  - III. CAGC to ED L2
- Surface area of each practice = 0.25 acres

### Determine for each treatment configuration:

Total phosphorus load reduction achieved:

Total phosphorus load reduction requirement:

Water quality treatment requirements met?

# Exercise 1C

## Runoff Reduction and Stormwater Site Design

Not including P-BMPs		Including P-BMP surface areas	
Site Information		Site Tab	Drainage Area Tab
<b>Forest:</b>	3 acres		
<b>Mixed open:</b>	-		
<b>Managed turf:</b>	1.75 acres		
<b>Impervious cover:</b>	1.95 acres		

Total phosphorus load reduction achieved:

Total phosphorus load reduction requirement:

Water quality treatment requirements met?

**Note: P-BMPs = post-construction BMPs**

# I. Extended Detention L2



**Light green = Managed turf**  
**Dark gray = Building**  
**Light gray = Parking and sidewalks**

**Solution**

## DEFINITION: MIXED OPEN

Land that will remain undisturbed OR will be left in a natural vegetated state (bush hogged no more than four times per year), including:

- Portions of a development (e.g., residential lots, roadway rights-of-way, community open spaces areas) that were disturbed during construction and will not be mowed routinely but left in a natural vegetated state (can include areas bush hogged no more than four times per year or rotationally grazed) as approved by the VESMP authority.
- Community open space areas that will not be mowed routinely but left in a natural vegetated state (can include areas bush hogged no more than four times per year or rotationally grazed).
- Utility rights-of-way that will be left in a natural vegetated state (can include areas bush hogged no more than four times per year or rotationally grazed).
- Surface area of extended detention (ED) pond that is not mowed routinely.
- Other areas of existing mixed open that will be protected during construction and remain undisturbed.

# Exercise 1C

## I. Extended Detention (Level 2)

Not including P-BMPs		Including P-BMP surface areas	
Site Information		Site Tab	DA Tab
<b>Forest:</b>	3 acres	<i>3 acres</i>	<i>3 acres</i>
<b>Mixed open:</b>	-	<i>0 + 0.25 acres = 0.25 acres</i>	<i>0.25 acres</i>
<b>Managed turf:</b>	1.75 acres	<i>1.75 – 0.25 acres = 1.50 acres</i>	<i>1.50 acres</i>
<b>Impervious cover:</b>	1.95 acres	<i>1.95 acres</i>	<i>1.95 acres</i>

Total phosphorus load reduction achieved:

Total phosphorus load reduction requirement:

Water quality treatment requirements met?

# I. Extended Detention (Level 2)

1

DEQ Virginia Runoff Reduction Method New Development Compliance Spreadsheet - Version 4.1

Project Name:

Date:

CLEAR ALL  
(Ctrl+Shift+R)

BMP Design Specifications List: 2024 Stds & Specs

## Site Information

### Post-Development Project (Treatment Volume and Loads)

2

#### Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals
<b>Forest (acres)</b> -- undisturbed, protected forest or reforested land			3.00		3.00 *
<b>Mixed Open (acres)</b> -- undisturbed/infrequently maintained grass or shrub land			0.25		0.25
<b>Managed Turf (acres)</b> -- disturbed, graded for yards or other turf to be mowed/managed			1.50		1.50
<b>Impervious Cover (acres)</b>			1.95		1.95
<i>* Forest and Mixed Open areas must be protected in accordance with the Virginia Runoff Reduction Method</i>					6.70

Site D.A. A D.A. B D.A. C D.A. D D.A. E Water Quality Compliance Runoff Volume and CN Summary Constants Notes

Site tab

# I. Extended Detention (Level 2)

3

Drainage Area A							
Drainage Area A Land Cover (acres)							
	A Soils	B Soils	C Soils	D Soils	Totals	Land Cover Rv	Composite Loading P
Forest (acres)			3.00		3.00	0.04	0.08
Mixed Open (acres)			0.25		0.25	0.13	0.39
Managed Turf (acres)			1.50		1.50	0.22	0.75
Impervious Cover (acres)			1.95		1.95	0.95	0.86
					<b>Total</b>	6.70	

Site **D.A. A** D.A. B D.A. C D.A. D D.A. E Water Quality Compliance Runoff Volume and CN Summary Constants Notes

Drainage Area tab

# I. Extended Detention (Level 2)

Drainage Area A							
Drainage Area A Land Cover (acres)							
	A Soils	B Soils	C Soils	D Soils	Totals	Land Cover Rv	Composite Loading P
Forest (acres)			3.00		3.00	0.04	0.08
Mixed Open (acres)			0.25		0.25	0.13	0.39
Managed Turf (acres)			1.50		1.50	0.22	0.75
Impervious Cover (acres)			1.95		1.95	0.95	0.86
<b>Total</b>					6.70		
Stormwater Best Management Practices (RR = Runoff Reduction)							
Practice	Runoff Reduction Credit (%)	Mixed Open Credit Area (acres)	Managed Turf Credit Area (acres)	Impervious Cover Credit Area (acres)	Volume from Upstream Practice (ft <sup>3</sup> )	Runoff Reduction (ft <sup>3</sup> )	Remaining Runoff Volume (ft <sup>3</sup> )
<b>8. Extended Detention Pond (RR)</b>							
8.a. ED #1 (P-BAS-03)	0				0	0	0
8.b. ED #2 (P-BAS-03)	15	0.25	1.50	1.95	0	1,206	6,834

**4** Enter area treated by Extended Detention Level 2

# I. Extended Detention (Level 2)

Drainage Area A					
Drainage Area A Land Cover (acres)					
	A Soils	B Soils	C Soils	D Soils	Total
Forest (acres)			3.00		3.00
Mixed Open (acres)			0.25		0.25
Managed Turf (acres)			1.50		1.50
Impervious Cover (acres)			1.95		1.95
					0.95
					0.86
				<b>Total</b>	6.70

Runoff Reduction Credit (%)		Mixed Credit (ac)
<p><b>Does <u>not</u> meet target TP load reduction requirement</b></p>		<p><b>TP load reduction requirement = 1.39 lb/yr</b>  <b>TP load reduction = 0.80 lb/yr</b></p>

TOTAL IMPERVIOUS COVER TREATED (ac)	1.95	AREA CHECK: OK.
TOTAL MIXED OPEN TREATED (ac)	0.25	AREA CHECK: OK.
TOTAL MANAGED TURF AREA TREATED (ac)	1.50	AREA CHECK: OK.
TOTAL PHOSPHORUS REMOVAL REQUIRED ON SITE (lb/yr)	1.39	
TOTAL PHOSPHORUS AVAILABLE FOR REMOVAL IN D.A. A (lb/yr)	2.89	
TOTAL PHOSPHORUS REMOVED WITHOUT RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr)	0.00	
TOTAL PHOSPHORUS REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr)	0.80	
TOTAL PHOSPHORUS LOAD REDUCTION ACHIEVED IN D.A. A (lb/yr)	0.80	
TOTAL PHOSPHORUS REMAINING AFTER APPLYING BMP LOAD REDUCTIONS IN D.A. A (lb/yr)	2.09	

**5** Scroll to bottom of Drainage Area tab for quick summary

Does not meet target TP load reduction requirement

TP load reduction requirement = 1.39 lb/yr  
 TP load reduction = 0.80 lb/yr

# I. Extended Detention (Level 2)

## Site Results (Water Quality Compliance) VRRM 4.1, 2024

Area Checks	D.A. A	D.A. B				CHECK
FOREST (ac)	3.00	0.00				K.
MIXED OPEN AREA (ac)	0.25	0.00				K.
MIXED OPEN AREA TREATED (ac)	0.25	0.00				K.
MANAGED TURF AREA (ac)	1.50	0.00				K.
MANAGED TURF AREA TREATED (ac)	1.50	0.00				K.
IMPERVIOUS COVER (ac)	1.95	0.00				K.
IMPERVIOUS COVER TREATED (ac)	1.95	0.00				K.
AREA CHECK	OK.	OK.				

**6** Go to Water Quality Compliance tab for full summary

TP load reduction remaining = 0.59 lb/yr

Treatment Volume (ft<sup>3</sup>) 8,476

### and TP By Drainage Area

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	TOTAL
INJECTION VOLUME ACHIEVED (ft <sup>3</sup> )	1,206	0	0	0	0	1,206
AVAILABLE FOR REMOVAL (lb/yr)	2.89	0.00	0.00	0.00	0.00	2.89
LOAD REDUCTION ACHIEVED (lb/yr)	0.80	0.00	0.00	0.00	0.00	0.80
TP LOAD REMAINING (lb/yr)	2.09	0.00	0.00	0.00	0.00	2.09
NITROGEN LOAD REDUCTION ACHIEVED (lb/yr)	8.55	0.00	0.00	0.00	0.00	8.55

Total Phosphorus	
FINAL POST-DEVELOPMENT TP LOAD (lb/yr)	3.14
TP LOAD REDUCTION REQUIRED (lb/yr)	1.39
TP LOAD REDUCTION ACHIEVED (lb/yr)	0.80
TP LOAD REMAINING (lb/yr):	2.33
REMAINING TP LOAD REDUCTION REQUIRED (lb/yr):	0.59



Does not meet water quality treatment requirements

# Exercise 1C

## I. Extended Detention (Level 2)

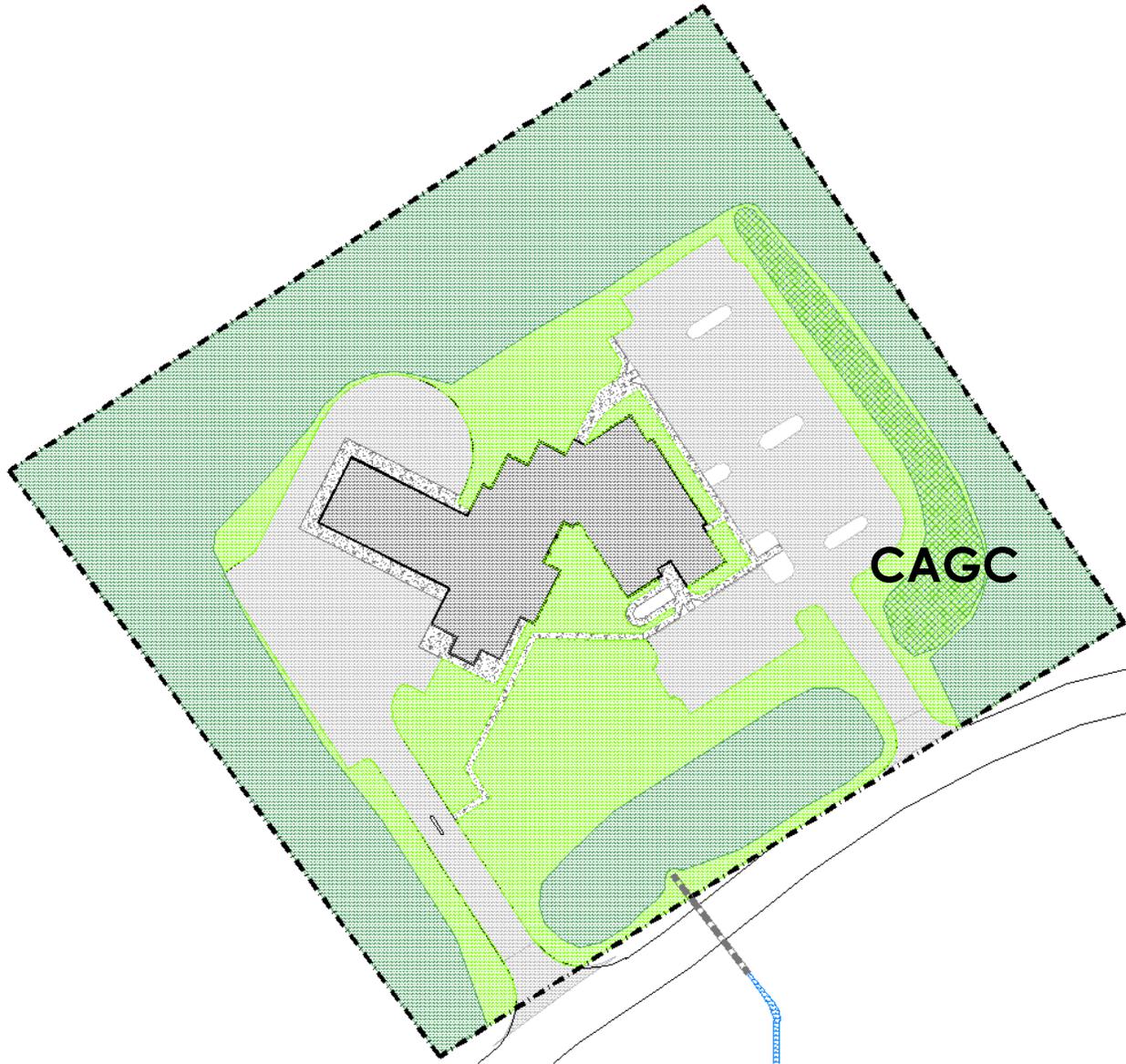
Not including P-BMPs		Including P-BMP surface areas	
Site Information		Site Tab	DA Tab
<b>Forest:</b>	3 acres	<i>3 acres</i>	<i>3 acres</i>
<b>Mixed open:</b>	-	<i>0 + 0.25 acres = 0.25 acres</i>	<i>0.25 acres</i>
<b>Managed turf:</b>	1.75 acres	<i>1.75 – 0.25 acres = 1.50 acres</i>	<i>1.50 acres</i>
<b>Impervious cover:</b>	1.95 acres	<i>1.95 acres</i>	<i>1.95 acres</i>

Total phosphorus load reduction achieved: **0.80 lb/yr**

Total phosphorus load reduction requirement: **1.39 lb/yr**

Water quality treatment requirements met? **NO**

# II. Compost-Amended Grass Channel



## DEFINITION: FOREST

Land that will remain undisturbed<sup>1</sup>, including:

- Portions of the site that will NOT be disturbed during construction.
- Portions of residential lots that will NOT be disturbed during construction, as approved by the VESMP authority.
- Surface area of stormwater post-construction BMPs (P-BMPs) that are NOT wet ponds, have some type of vegetative cover, and do not replace an otherwise impervious surface.
  - P-BMPs<sup>2</sup> in this category include bioretention, dry swales, grass channels, stormwater wetlands, soil-amended areas that are vegetated, and infiltration practices that have a vegetated cover.
- Other areas of existing forest, including wetlands, that will be protected during construction and that will remain undisturbed.
- Non-disturbed portions of the site that will be afforested (minimum of 400 woody stems per acre).

<sup>2</sup> Post-construction BMPs are presented here as P-BMP(s).

# Exercise 1C

## II. Compost-Amended Grass Channel

Not including P-BMPs		Including P-BMP surface areas	
Site Information		Site Tab	DA Tab
<b>Forest:</b>	3 acres	$3 + 0.25 = 3.25$ acres	3.25 acres
<b>Mixed open:</b>	-	0	0
<b>Managed turf:</b>	1.75 acres	$1.75 - 0.25 = 1.50$ acres	1.50 acres
<b>Impervious cover:</b>	1.95 acres	1.95 acres	1.95 acres

Total phosphorus load reduction achieved:

Total phosphorus load reduction requirement:

Water quality treatment requirements met?

# II. Compost-Amended Grass Channel

## Drainage Area A

### Drainage Area A Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals	Land Cover Rv	Composite Loading P
Forest (acres)			3.25		3.25	0.04	0.08
Mixed Open (acres)					0.00	0.00	0.00
Managed Turf (acres)			1.50		1.50	0.22	0.75
Impervious Cover (acres)			1.95		1.95	0.95	0.86
<b>Total</b>					<b>6.70</b>		

### Stormwater Best Management Practices (RR = Runoff Reduction)

Practice	Runoff Reduction Credit (%)	Mixed Open Credit Area (acres)	Managed Turf Credit Area (acres)	Impervious Cover Credit Area (acres)	Volume from Upstream Practice (ft <sup>3</sup> )	Runoff Reduction (ft <sup>3</sup> )	Remaining Runoff Volume (ft <sup>3</sup> )
<b>8. Extended Detention Pond (RR)</b>							
8.a. ED #1 (P-BAS-03)	0				0	0	0
8.b. ED #2 (P-BAS-03)	15				0	0	0

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# II. Compost-Amended Grass Channel

DEQ Virginia Runoff Reduction Method New Development Compliance Spreadsheet - Version 4.1

Project Name:   
Date:

CLEAR ALL  
(Ctrl+Shift+R)

BMP Design Specifications List: 2024 Stds & Specs

## Site Information

### Post-Development Project (Treatment Volume and Loads)

8

#### Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals
Forest (acres) -- undisturbed, protected forest or reforested land			3.25		3.25 *
Mixed Open (acres) -- undisturbed/infrequently maintained grass or shrub land					0.00
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed			1.50		1.50
Impervious Cover (acres)			1.95		1.95
<i>* Forest and Mixed Open areas must be protected in accordance with the Virginia Runoff Reduction Method</i>					6.70

Site | D.A. A | D.A. B | D.A. C | D.A. D | D.A. E | Water Quality Compliance | Runoff Volume and CN | Summary | Constants | Notes

# II. Compost-Amended Grass Channel

**Drainage Area A**

Drainage Area A Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals	Land Cover Rv	Composite Loading P
Forest (acres)			3.25		3.25	0.04	0.08
Mixed Open (acres)					0.00	0.00	0.00
Managed Turf (acres)			1.50		1.50	0.22	0.75
Impervious Cover (acres)			1.95		1.95	0.95	0.86
					<b>Total</b>		
					6.70		

Site **D.A. A** D.A. B D.A. C D.A. D D.A. E Water Quality Compliance Runoff Volume and CN Summary Constants Notes

**9** Copy land cover areas to Drainage Area A tab

# II. Compost-Amended Grass Channel

Drainage Area A							
Drainage Area A Land Cover (acres)							
	A Soils	B Soils	C Soils	D Soils	Totals	Land Cover Rv	Composite Loading P
Forest (acres)			3.25		3.25	0.04	0.08
Mixed Open (acres)					0.00	0.00	0.00
Managed Turf (acres)			1.50		1.50	0.22	0.75
Impervious Cover (acres)			1.95		1.95	0.95	0.86
<b>Total</b>					6.70		

Stormwater Best Management Practices (RR = Runoff Reduction)							
Practice	Runoff Reduction Credit (%)	Mixed Open Credit Area (acres)	Managed Turf Credit Area (acres)	Impervious Cover Credit Area (acres)			
<b>4. Grass Channel (RR)</b>							
4.a. Grass Channel A/B Soils (P-CNV-01)	20						
4.b. Grass Channel C/D Soils (P-CNV-01)	10						
4.c. Grass Channel with Compost Amended Soils as per specs (P-FIL-08)	20		1.50	1.95	0	1,584	6,338

**10** Enter area treated by practice (all impervious and turf areas treated by practice)

# II. Compost-Amended Grass Channel

**Drainage Area A**

Drainage Area A Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils
Forest (acres)			3.25	
Mixed Open (acres)				
Managed Turf (acres)			1.50	
Impervious Cover (acres)			1.95	
			<b>Total</b>	

**11** Scroll to bottom of Drainage Area tab for quick summary

TOTAL IMPERVIOUS COVER TREATED (ac)	1.95	AREA CHECKED
TOTAL MIXED OPEN TREATED (ac)	0.00	AREA CHECKED
TOTAL MANAGED TURF AREA TREATED (ac)	1.50	AREA CHECKED

TOTAL PHOSPHORUS REMOVAL REQUIRED ON SITE (lb/yr)	1.32
TOTAL PHOSPHORUS AVAILABLE FOR REMOVAL IN D.A. A (lb/yr)	2.79
TOTAL PHOSPHORUS REMOVED WITHOUT RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr)	0.00
TOTAL PHOSPHORUS REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr)	0.89
TOTAL PHOSPHORUS LOAD REDUCTION ACHIEVED IN D.A. A (lb/yr)	0.89
TOTAL PHOSPHORUS REMAINING AFTER APPLYING BMP LOAD REDUCTIONS IN D.A. A (lb/yr)	1.90

SEE WATER QUALITY COMPLIANCE TAB FOR SITE COMPLIANCE CALCULATIONS

TP load reduction requirement = 1.32 lb/yr  
 TP load reduction = 0.89 lb/yr

Does not meet target TP load reduction requirement

Site **D.A. A** D.A. B D.A. C D.A. D D.A. E Water Quality Compliance Runoff Volume and CN Summary Constants Notes

# II. Compost-Amended Grass Channel

## Site Results (Water Quality Compliance) VRRM 4.1, 2024

Area Checks	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	AREA CHECK
FOREST (ac)	3.25	0.00	0.00	0.00	0.00	OK.
MIXED OPEN AREA (ac)	0.00	0.00	0.00			
MIXED OPEN AREA TREATED (ac)	0.00	0.00	0.00			
MANAGED TURF AREA (ac)	1.50	0.00	0.00			
MANAGED TURF AREA TREATED (ac)	1.50	0.00	0.00			
IMPERVIOUS COVER (ac)	1.95	0.00	0.00			
IMPERVIOUS COVER TREATED (ac)	1.95	0.00	0.00			
AREA CHECK	OK.	OK.	OK.			

**12** Go to Water Quality Compliance tab for full summary

**TP load reduction remaining = 0.43 lb/yr**

### Runoff Reduction Volume and TP By Drainage Area

	D.A. A	D.A. B	D.A. C
RUNOFF REDUCTION VOLUME ACHIEVED (ft <sup>3</sup> )	1,584	0	0
TP LOAD AVAILABLE FOR REMOVAL (lb/yr)	2.79	0.00	0.00
TP LOAD REDUCTION ACHIEVED (lb/yr)	0.89	0.00	0.00
TP LOAD REMAINING (lb/yr)	1.90	0.00	0.00

NITROGEN LOAD REDUCTION ACHIEVED (lb/yr)	12.94	0.00	0.00	0.00	0.00	12.94
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Total Phosphorus	
FINAL POST-DEVELOPMENT TP LOAD (lb/yr)	3.06
TP LOAD REDUCTION REQUIRED (lb/yr)	1.32
TP LOAD REDUCTION ACHIEVED (lb/yr)	0.89
TP LOAD REMAINING (lb/yr):	2.17
REMAINING TP LOAD REDUCTION REQUIRED (lb/yr):	0.43



Does not meet water quality treatment requirements

### Total Nitrogen (For Information Purposes)

POST-DEVELOPMENT LOAD (lb/yr)	40.51
NITROGEN LOAD REDUCTION ACHIEVED (lb/yr)	12.94
REMAINING POST-DEVELOPMENT NITROGEN LOAD (lb/yr)	27.57

# Exercise 1C

## II. Compost-Amended Grass Channel

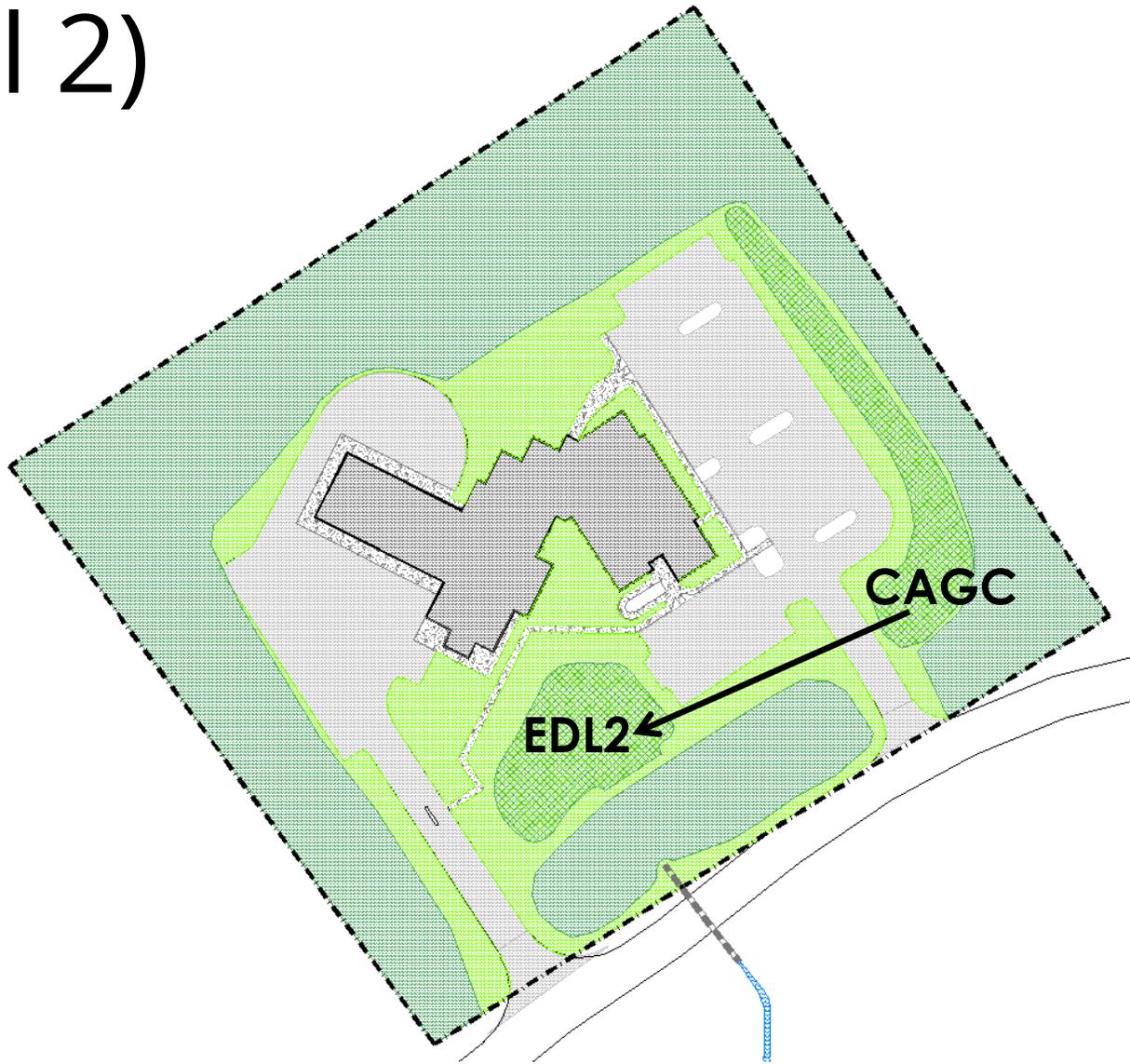
Not including P-BMPs		Including P-BMP surface areas	
Site Information		Site Tab	DA Tab
<b>Forest:</b>	3 acres	$3 + 0.25 = 3.25$ acres	3.25 acres
<b>Mixed open:</b>	-	0	0
<b>Managed turf:</b>	1.75 acres	$1.75 - 0.25 = 1.50$ acres	1.50 acres
<b>Impervious cover:</b>	1.95 acres	1.95 acres	1.95 acres

Total phosphorus load reduction achieved: **0.89 lb/yr**

Total phosphorus load reduction requirement: **1.32 lb/yr**

Water quality treatment requirements met? **No**

# III. Compost-Amended Grass Channel to Extended Detention (Level 2)



# Exercise 1C

## III. CAGC to EDL2

Not including P-BMPs		Including P-BMP surface areas	
Site Information		Site Tab	DA Tab
<b>Forest:</b>	3 acres	$3 + 0.25 = 3.25$ acres	3.25 acres
<b>Mixed open:</b>	-	$0 + 0.25 = 0.25$ acres	0.25 acres
<b>Managed turf:</b>	1.75 acres	$1.75 - 0.50 = 1.25$ acres	1.25 acres
<b>Impervious cover:</b>	1.95 acres	1.95 acres	1.95 acres

Total phosphorus load reduction achieved:

Total phosphorus load reduction requirement:

Water quality treatment requirements met?

# III. Compost-Amended Grass Channel to Extended Detention Level 2

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In Site tab, transfer 0.25 acres from managed turf to mixed open for EDL2 surface area and keep 0.25 acres of forest previously added for CAGC surface area

Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals
<b>Forest (acres)</b> -- undisturbed, protected forest or reforested land			3.25		3.25 *
<b>Mixed Open (acres)</b> -- undisturbed/infrequently maintained grass or shrub land			0.25		0.25
<b>Managed Turf (acres)</b> -- disturbed, graded for yards or other turf to be mowed/managed			1.25		1.25
<b>Impervious Cover (acres)</b>			1.95		1.95
<i>* Forest and Mixed Open areas must be protected in accordance with the Virginia Runoff Reduction Method</i>					6.70

Site

D.A. A

D.A. B

D.A. C

D.A. D

D.A. E

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# III. Compost-Amended Grass Channel to Extended Detention (Level 2)

Drainage Area A							
Drainage Area A Land Cover (acres)							
	A Soils	B Soils	C Soils	D Soils	Totals	Land Cover Rv	Composite Loading P
Forest (acres)			3.25		3.25	0.04	0.08
Mixed Open (acres)			0.25		0.25	0.13	0.39
Managed Turf (acres)			1.25		1.25	0.22	0.75
Impervious Cover (acres)			1.95		1.95	0.95	0.86
				<b>Total</b>	6.70		

Stormwater Best Management Practices (RR = Runoff Reduction)							
Practice	Runoff Reduction Credit (%)	Mixed Open Credit Area (acres)	Managed Turf Credit Area (acres)	Impervious Cover Credit Area (acres)	Volume from Upstream Practice (ft <sup>3</sup> )	Runoff Reduction (ft <sup>3</sup> )	Remaining Runoff Volume (ft <sup>3</sup> )
<b>4. Grass Channel (RR)</b>							
4.a. Grass Channel A/B Soils (P-CNV-01)	20				0	0	0
4.b. Grass Channel C/D Soils (P-CNV-01)	10				0	0	0
4.c. Grass Channel with Compost Amended Soils as per specs (P-FIL-08)	20		1.25	1.95	0	1,545	6,178

**14** Update areas in Drainage Area A tab

# III. Compost-Amended Grass Channel to Extended Detention (Level 2)

**15** Add downstream EDL2 practice via dropdown menu

Drainage Area A VRRM 4.1, 2024

Drainage Area A Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals	Land Cover Rv	Composite Loading P
Forest (acres)			3.25		3.25	0.04	0.08
Mixed Open (acres)			0.25		0.25	0.13	0.39
Managed Turf (acres)			1.25		1.25	0.22	0.75
Impervious Cover (acres)			1.95		1.95	0.95	0.86
<b>Total</b>					<b>6.70</b>		

**CLEAR BMP AREAS**

**Downstream practice**

--Select from dropdown lists--

Practice	Runoff Reduction Credit (%)	Mixed Open Credit Area (acres)	Managed Turf Credit Area (acres)	Impervious Cover Credit Area (acres)	Volume from Upstream Practice (ft <sup>3</sup> )	Runoff Reduction (ft <sup>3</sup> )	Remaining Runoff Volume (ft <sup>3</sup> )	Total BMP Treatment Volume (ft <sup>3</sup> )	Phosphorus Removal Efficiency (%)	Phosphorus Load from Upstream Practices (lb)	Untreated Phosphorus Load to Practice (lb)	Phosphorus Removed By Practice (lb)	Remaining Phosphorus Load (lb)	Downstream Practice to be Employed
<b>4. Grass Channel (RR)</b>														
4.a. Grass Channel A/B Soils (P-CNV-01)	20				0	0	0	0	15	0.00	0.00	0.00	0.00	
4.b. Grass Channel C/D Soils (P-CNV-01)	10				0	0	0	0	15	0.00	0.00	0.00	0.00	
4.c. Grass Channel with Compost Amended Soils as per specs (P-FIL-08)	20		1.25	1.95	0	1,545	6,178	7,723	15	0.00	2.60	0.83	1.77	8.b. ED #2

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D.A. A
D.A. B
D.A. C
D.A. D
D.A. E
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# III. Compost-Amended Grass Channel to Extended Detention (Level 2)

Drainage Area A VRRM 4.1, 2024

Drainage Area A Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals	Land Cover Rv	Composite Loading P
Forest (acres)			3.25		3.25	0.04	0.08
Mixed Open (acres)			0.25		0.25	0.13	0.39
Managed Turf (acres)			1.25		1.25	0.22	0.75
Impervious Cover (acres)			1.95		1.95	0.95	0.86

CLEAR BMP AREAS

Total Phosphorus Available for Removal in D.A. A (lb/y) 2.70  
 Treatment Volume in D.A. A (ft<sup>3</sup>) 7,841

Select from dropdown lists

Phosphorus from Stream Practices (lb)	Untreated Phosphorus Load to Practice (lb)	Phosphorus Removed By Practice (lb)	Remaining Phosphorus Load (lb)	Downstream Practice to be Employed
0.00	0.00	0.00	0.00	
0.00	0.00	0.00	0.00	
0.00	2.60	0.83	1.77	8.b. ED #2

**16** Add 0.25 acres of EDL2 surface area as mixed open in credit area cell

4. Grass Channel with Compost Amended Soils as per specs (P-FIL-08)														
4.c. Grass Channel with Compost Amended Soils as per specs (P-FIL-08)	20		1.25	1.95	0	1,545	6,178	7,723	15	0.00	2.60	0.83	1.77	8.b. ED #2

5. Dry Swale (RR)														
5.a. Dry Swale #1 (P-CNV-02)	40				0	0	0	0	20	0.00	0.00	0.00	0.00	
5.b. Dry Swale #2 (P-CNV-02)	60				0	0	0	0	40	0.00	0.00	0.00	0.00	

6. Bioretention (RR)														
6.a. Bioretention #1 or Micro-Bioretention #1 or Urban Bioretention	40				0	0	0	0	25	0.00	0.00	0.00	0.00	
6.b. Bioretention #2 or Micro-Bioretention #2 (P-FIL-05)	80				0	0	0	0	50	0.00	0.00	0.00	0.00	

7. Infiltration (RR)														
7.a. Infiltration #1 (P-FIL-04)	50				0	0	0	0	25	0.00	0.00	0.00	0.00	
7.b. Infiltration #2 (P-FIL-04)	90				0	0	0	0	25	0.00	0.00	0.00	0.00	

8. Extended Detention Pond (RR)														
8.a. ED #1 (P-BAS-03)	0				0	0	0	0	15	0.00	0.00	0.00	0.00	
8.b. ED #2 (P-BAS-03)	15	0.25			6,178	944	5,352	6,296	15	1.77	0.10	0.52	1.35	

Site

**D.A. A**

D.A. B

D.A. C

D.A. D

D.A. E

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# III. Compost-Amended Grass Channel to Extended Detention (Level 2)

Drainage Area A VRRM 4.1, 2024

Drainage Area A Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals	Land Cover Rv	Composite Loading P
Forest (acres)			3.25		3.25	0.04	0.08
Mixed Open (acres)			0.25		0.25	0.13	0.39
Managed Turf (acres)			1.25		1.25	0.22	0.75
Impervious Cover (acres)			1.95		1.95	0.95	0.86
<b>Total</b>					<b>6.70</b>		

CLEAR BMP AREAS

Total Phosphorus Available for Removal in D.A. A (lb/y) 2.70  
 Post Development Treatment Volume in D.A. A (ft<sup>3</sup>) 7,841

**Do not enter acreage more than once in P-BMP credit areas**

St...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
<b>4. Grass Channel (RR)</b>														
4.a. Grass Channel A/B Soils (P-CNV-01)	20				0	0	0	0	15	0.00	0.00	0.00	0.00	
4.b. Grass Channel C/D Soils (P-CNV-01)	10				0	0	0	0	15	0.00	0.00	0.00	0.00	
4.c. Grass Channel with Compost Amended Soils as per specs (P-FIL-08)	20		1.25	1.95	0	1,545	6,178	7,723	15	0.00	2.60	0.83	1.77	8.b. ED #2
<b>5.</b>														
					0	0	0	0	20	0.00	0.00	0.00	0.00	
					0	0	0	0	40	0.00	0.00	0.00	0.00	
<b>6.</b>														
					0	0	0	0	25	0.00	0.00	0.00	0.00	
					0	0	0	0	50	0.00	0.00	0.00	0.00	
<b>7.</b>														
					0	0	0	0	25	0.00	0.00	0.00	0.00	
7.b. Infiltration #2 (P-FIL-04)	90				0	0	0	0	25	0.00	0.00	0.00	0.00	
<b>8. Extended Detention Pond (RR)</b>														
8.a. ED #1 (P-BAS-03)	0				0	0	0	0	15	0.00	0.00	0.00	0.00	
8.b. ED #2 (P-BAS-03)	15	0.25			6,178	944	5,352	6,296	15	1.77	0.10	0.52	1.35	

**Do not enter managed turf or impervious cover areas—will double drainage area**



# III. Compost-Amended Grass Channel to Extended Detention (Level 2)

## Site Results (Water Quality Compliance) VRRM 4.1, 2024

Area Checks	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	AREA CHECK
FOREST (ac)	3.25	0.00	0.00	0.00	0.00	OK.
MIXED OPEN AREA (ac)	0.25	0.00	0.00	0.00	0.00	OK.
MIXED OPEN AREA TREATED (ac)	0.25	0.00	0.00	0.00	0.00	OK.
MANAGED TURF AREA (ac)	1.25	0.00	0.00	0.00	0.00	OK.
MANAGED TURF AREA TREATED (ac)	1.25	0.00	0.00	0.00	0.00	OK.
IMPERVIOUS COVER (ac)	1.95	0.00	0.00	0.00	0.00	OK.
IMPERVIOUS COVER TREATED (ac)	1.95	0.00	0.00	0.00	0.00	OK.
AREA CHECK	OK.	OK.	OK.	OK.	OK.	

**TP load reduction requirement = 1.23 lb/yr**  
**TP load reduction achieved = 1.35 lb/yr**

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	TOTAL
RUNOFF REDUCTION VOLUME ACHIEVED (ft <sup>3</sup> )	2,489	0	0	0	0	2,489
TP LOAD AVAILABLE FOR REMOVAL (lb/yr)	2.70	0.00	0.00	0.00	0.00	2.70
TP LOAD REDUCTION ACHIEVED (lb/yr)	1.35	0.00	0.00	0.00	0.00	1.35
TP LOAD REMAINING (lb/yr)	1.35	0.00	0.00	0.00	0.00	1.35
NITROGEN LOAD REDUCTION ACHIEVED (lb/yr)	17.44	0.00	0.00	0.00	0.00	17.44

Total Phosphorus	
FINAL POST-DEVELOPMENT TP LOAD (lb/yr)	2.97
TP LOAD REDUCTION REQUIRED (lb/yr)	1.23
TP LOAD REDUCTION ACHIEVED (lb/yr)	1.35
TP LOAD REMAINING (lb/yr):	1.62
REMAINING TP LOAD REDUCTION REQUIRED (lb/yr):	0.00

**\*\* TARGET TP REDUCTION EXCEEDED BY 0.12 LB/YEAR \*\***



**Meets water quality treatment requirements**

**Save results as: EX1C.xlsm**

# Exercise 1C

## III. CAGC to EDL2

Not including P-BMPs		Including P-BMP surface areas	
Site Information		Site Tab	DA Tab
<b>Forest:</b>	3 acres	$3 + 0.25 = 3.25$ acres	3.25 acres
<b>Mixed open:</b>	-	$0 + 0.25 = 0.25$ acres	0.25 acres
<b>Managed turf:</b>	1.75 acres	$1.75 - 0.50 = 1.25$ acres	1.25 acres
<b>Impervious cover:</b>	1.95 acres	1.95 acres	1.95 acres

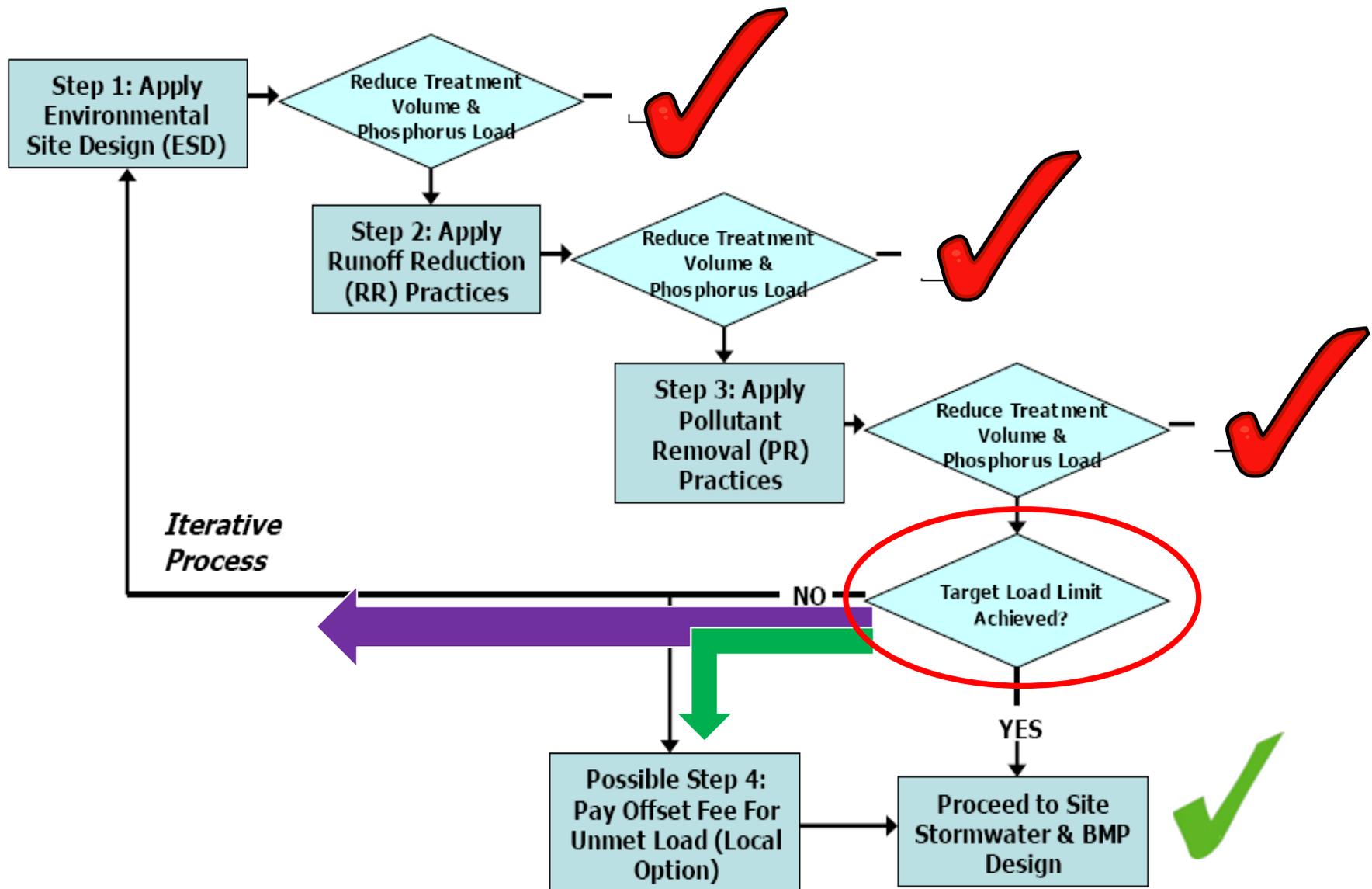
<input type="checkbox"/> Total phosphorus load reduction achieved:	<b>1.35 lb/yr</b>
<input type="checkbox"/> Total phosphorus load reduction requirement:	<b>1.23 lb/yr</b>
<input type="checkbox"/> Water quality treatment requirements met?	<b>Yes</b>

# Summary of Results

Treatment	Reduction	Remaining
I. Extended Detention (Level 2)	<b>0.80 lb/yr</b>	<b>0.59 lb/yr</b>
II. Compost-Amended Grass Channel	<b>0.89 lb/yr</b>	<b>0.43 lb/yr</b>
III. Compost-Amended Grass Channel Draining to Extended Detention (Level 2)	<b>1.35 lb/yr</b>	<b>None!</b> <b>(+0.12)</b>

# Virginia Runoff Reduction Method

## 3-Step Compliance



# Questions?

