



Software Tools for the Changing Environment

RUNOFF REDUCTION ANALYSIS MADE EASY

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VIRGINIA STORMWATER MANAGEMENT PROGRAM (VSMP) PERMIT REGULATIONS

CHAPTER 60, Virginia Administrative Code

- **Implementation date: July 1, 2014 for Parts II A & II B: General Administrative & Technical Criteria for Regulated Land-Disturbing Activities**
- **Part II C Technical Criteria for Grandfathered Projects until June 30. 2019 (Section 4VAC50-60-48)**

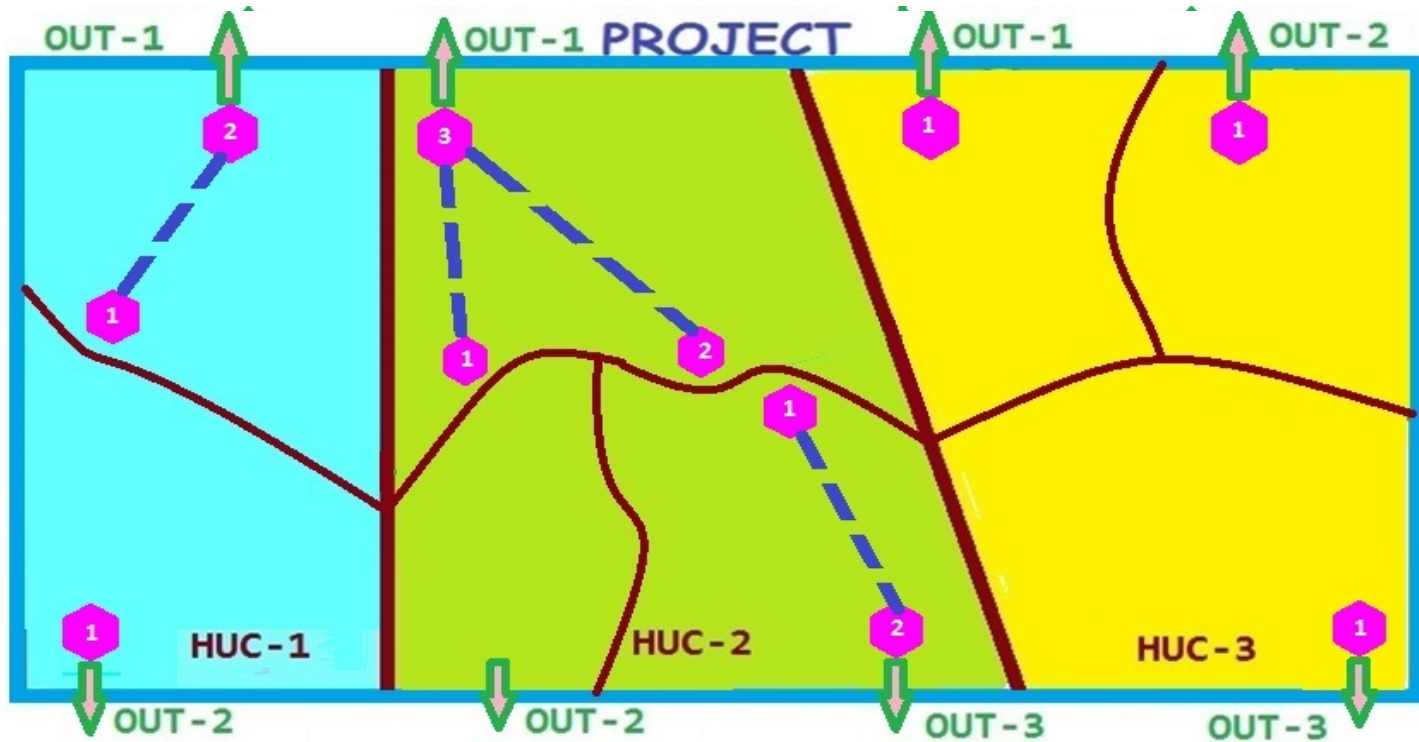
All Land Disturbance one Acre or more

- **WATER QUALITY COMPLIANCE for each Hydrologic Unit Code (HUC)**
- **RECEIVING CHANNEL PROTECTION (Energy Balance) for each Outfall**
- **OVERBANK FLOODING PROTECTION for each Outfall**

Exceptions

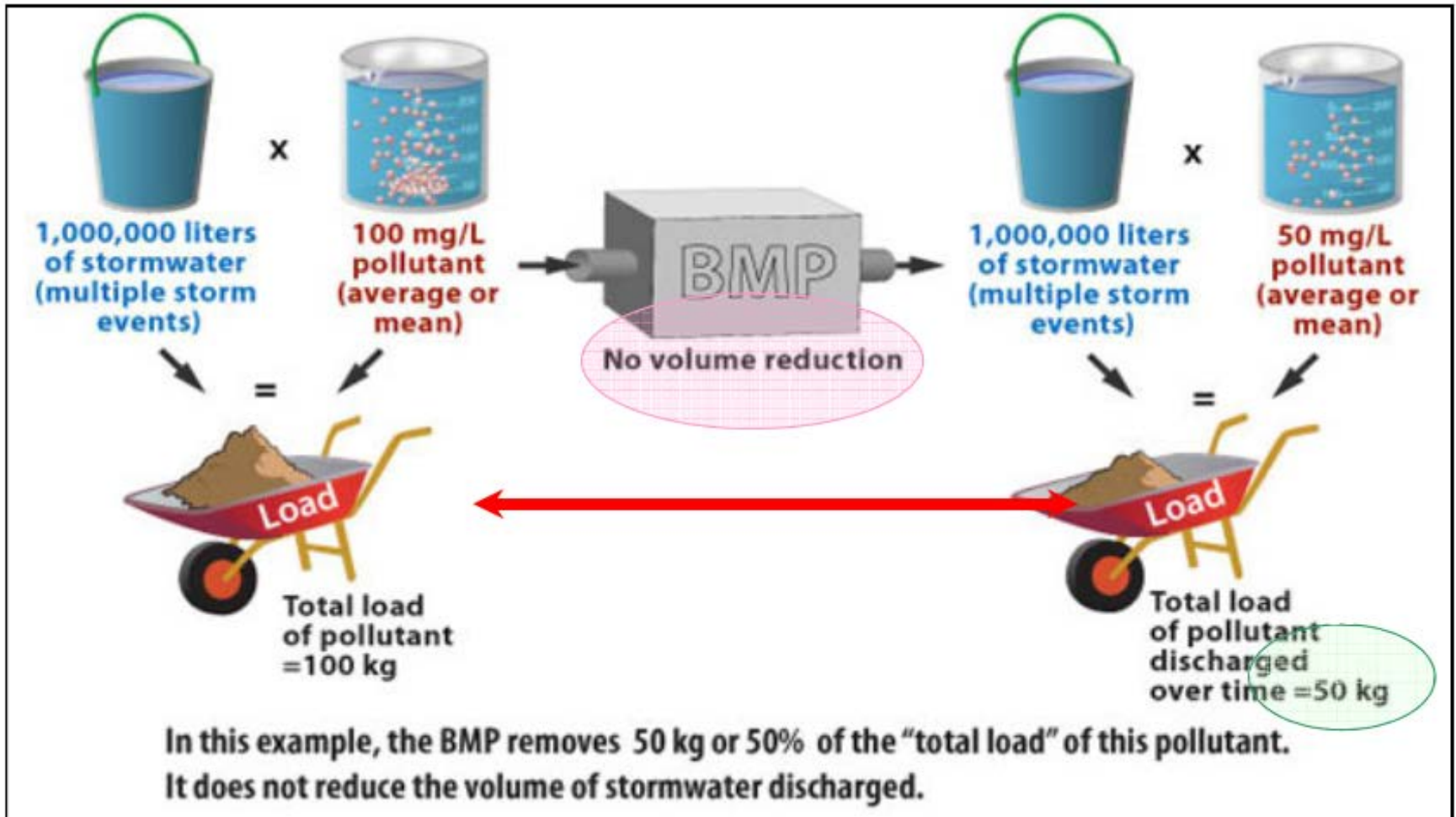
- **2,500 Sq.Ft. of Land Disturbance in Special Protection Areas**
- **“One Percent Rule” for Quantity Compliance for Outfalls**

HIERARCHY OF DESIGN PROCESS

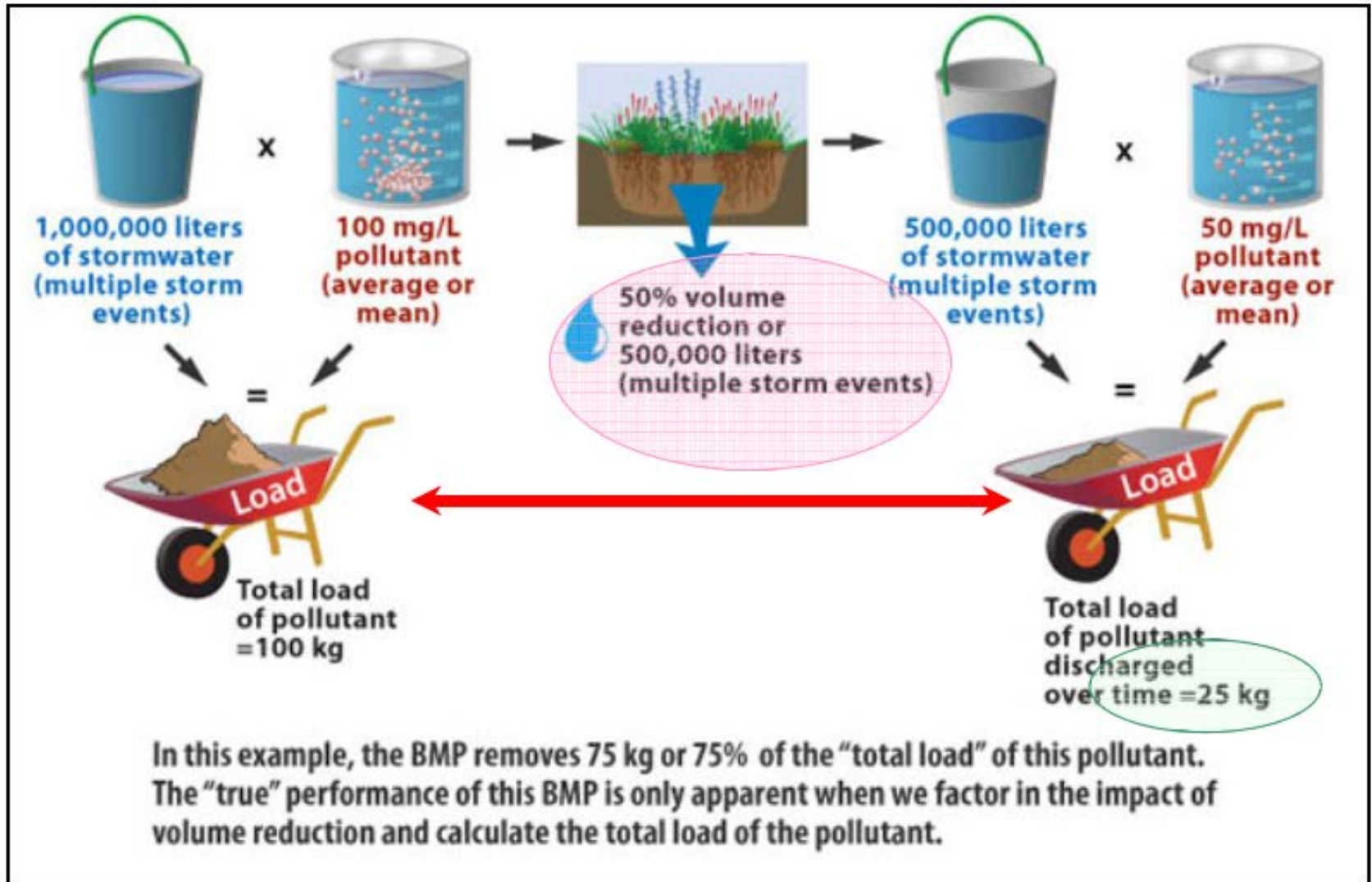


CHECK EACH HUC FOR WATER QUALITY COMPLIANCE
CHECK EACH OUTFALL FOR CHANNEL & FLOOD PROTECTION
DETERMINE RUNOFF AND POLLUTANT LOAD REDUCTION
FOR EACH BMP.

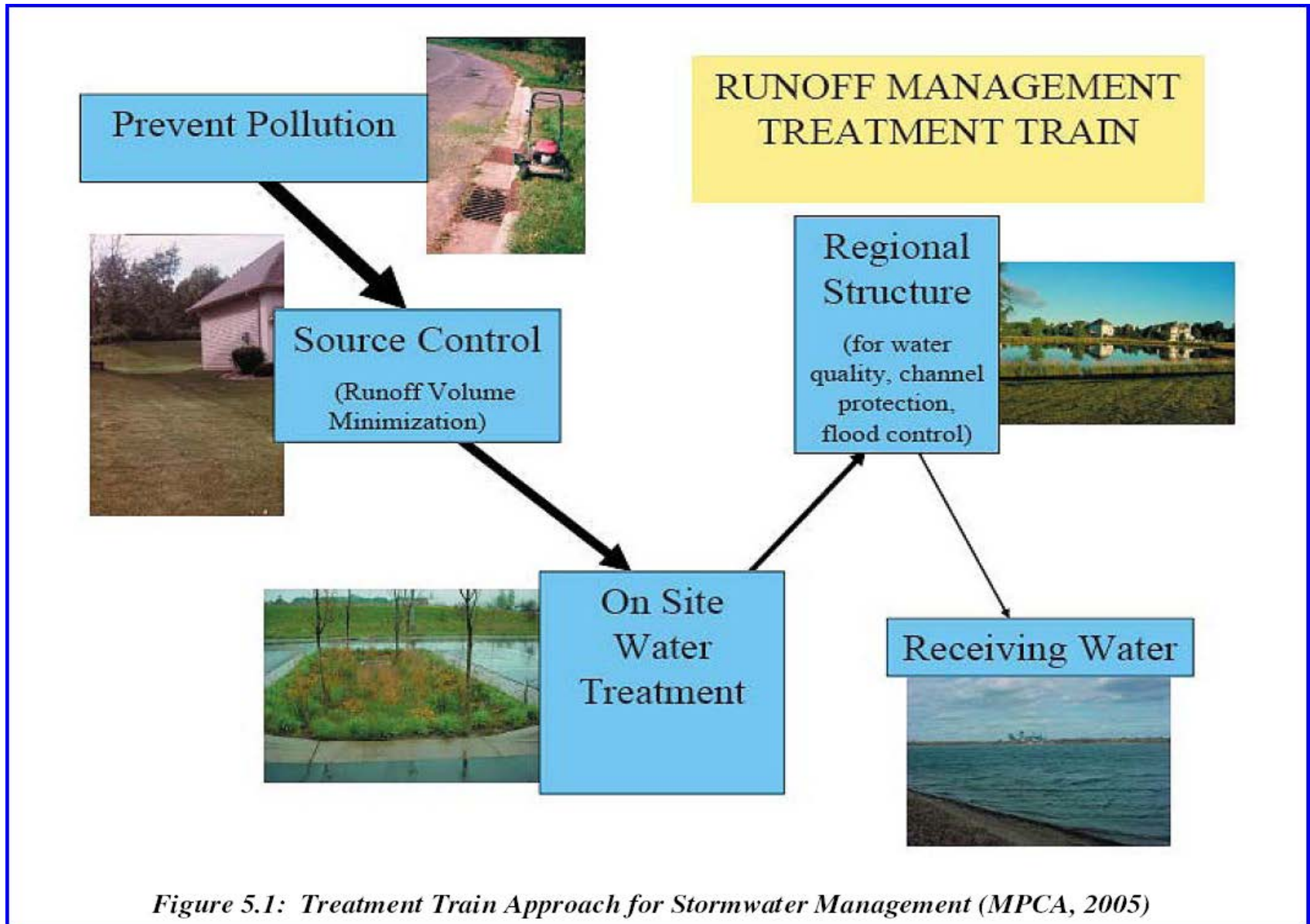
DESIGN PHILOSOPHY



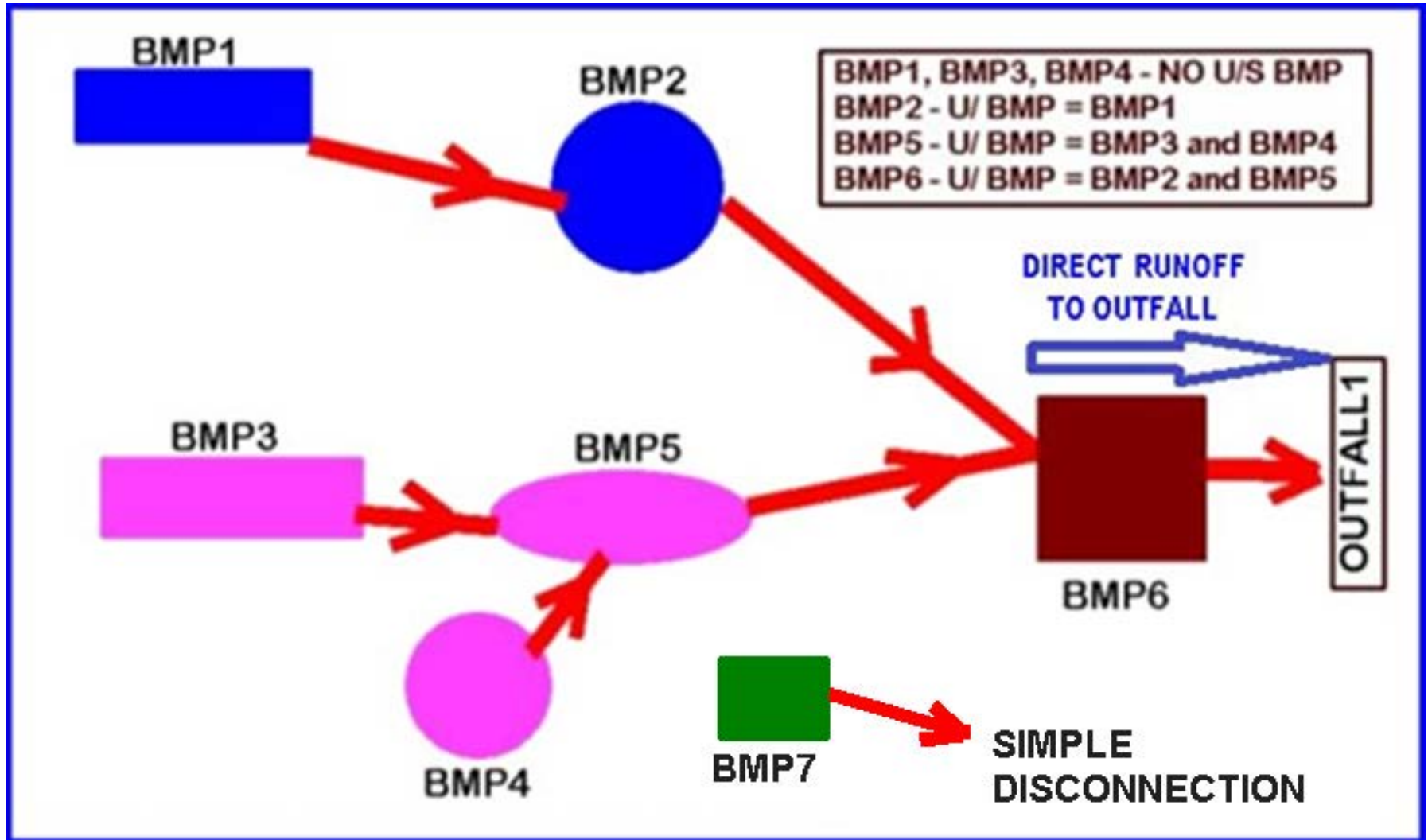
DESIGN PHILOSOPHY



DESIGN APPROACH



TREATMENT TRAIN



QUALITY CONTROL

**Part II-B NEW Development
PH Load $\leq 0.41\text{lb/ac/year}$**

**Part II-B Redev. A.2.a Total
Site Area ≥ 1 ac & $IA_{\text{post}} \leq$
 IA_{pre} : $PH_{\text{post}} \leq 0.8 \times PH_{\text{pre}}$**

**Part II-B Redev. A.2.b Total
Site Area < 1 ac & $IA_{\text{post}} \leq$
 IA_{pre} : $PH_{\text{post}} \leq 0.9 \times PH_{\text{pre}}$**

**Part II-B Redev. A.2.c $IA_{\text{post}} >$
 IA_{pre} : $PH_{\text{post}} \leq 0.41 \times (IA_{\text{post}} -$
 $IA_{\text{pre}}) + I.F. \times TP_{\text{pre}}(\text{Other Area})$**

IF LINEAR DEVELOPMENT PROJECT

**Part II-B LDP A.2.d:
 $PH_{\text{post}} \leq 0.8 \times PH_{\text{pre}}$**

OUTFALL ANALYSIS (QUANTITY CONTROL)

CHANNEL PROTECTION VOLUME

$Q_{1\text{Developed}}$

$$\leq \text{Site Improvement Factor} \times \frac{(Q_{1\text{Pre-developed}} \times RV_{1\text{Pre-developed}})}{RV_{1\text{Developed}}}$$

$$\leq Q_{1\text{Pre-developed}}$$

$$> \frac{(Q_{1\text{Forest}} \times RV_{1\text{Forest}})}{RV_{1\text{Developed}}}$$

FLOOD PROTECTION VOLUME

A. $Q_{10\text{Developed}} \leq \frac{(Q_{10\text{Pre-developed}} \times RV_{10\text{Pre-Developed}})}{RV_{10\text{Developed}}}$

B. $Q_{10\text{Developed}} \leq Q_{10\text{Pre-developed}}$

RUNOFF REDUCTION (RR) ANALYSIS

1

- Determine Pre-project Q1, Q2 & Q10 for the Total Site Area at each Outfall for the Existing Land Uses Using TR-55 Method

2

- Determine Post-project Q1, Q2 & Q10 for the Total Site Area at each Outfall for the post-development Land Uses Using TR-55 Method

3

- Determine the Runoff Volume (RV) reduced as a result of Curve Number and Tc Adjustment, Reservoir Storage and Simple Disconnection (Train Treatment)

4

- Determine Post-project Q1, Q2 & Q10 with RR for the Total Site Area at each Outfall for the Reduced RV Using TR-55 Method

SWMSoftVA[©]

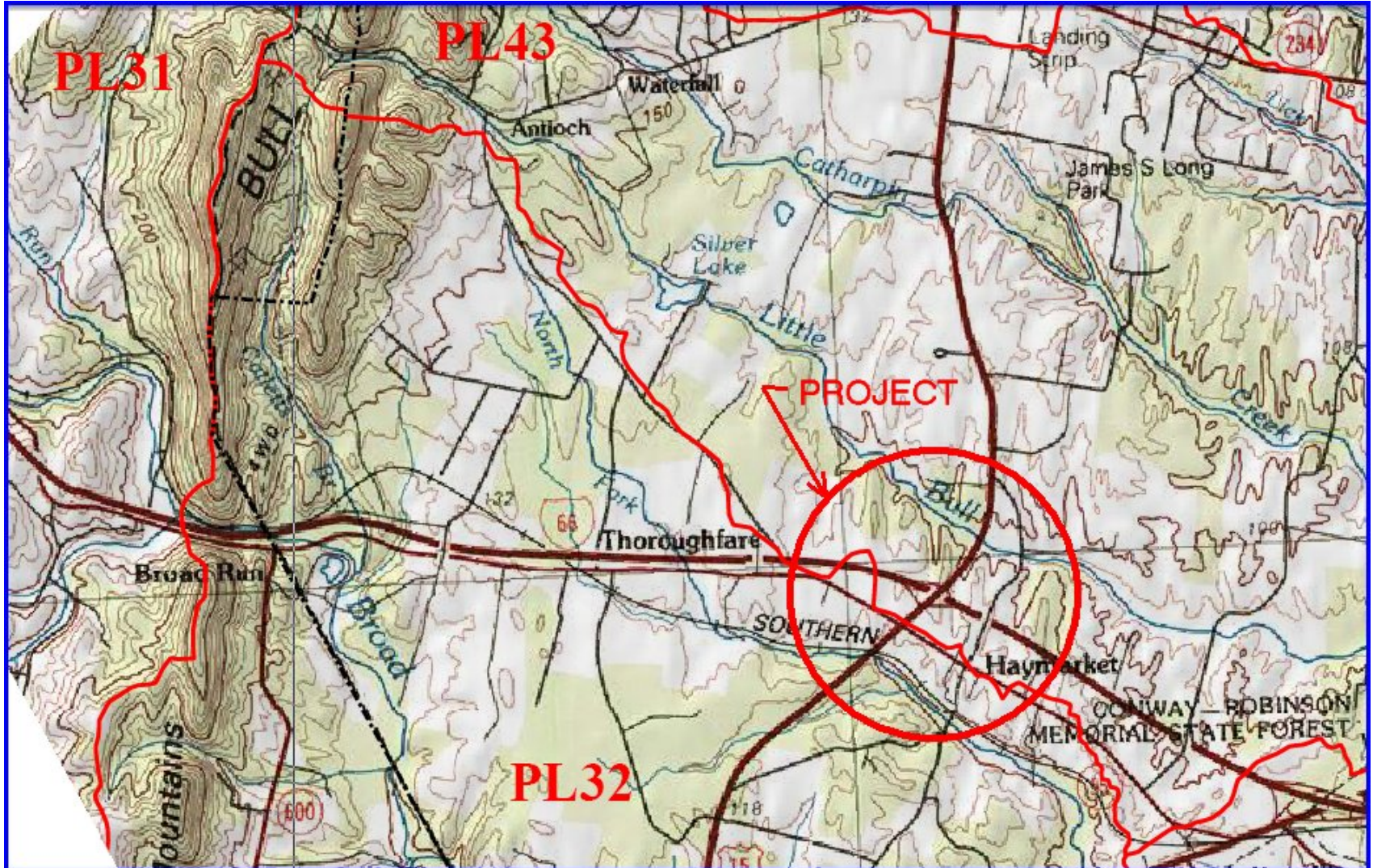
- ✓ Runoff Reduction Computations
- ✓ Grandfathered Projects
- ✓ Pollutant Load Reduction Computations
- ✓ Discharge Analysis (TR-55)
- ✓ Energy Balance Equations
- ✓ BMP Selection Criteria
- ✓ Design Of Structural And Non-structural BMPs
- ✓ Reservoir Routing (Storage-indication Method)
- ✓ Water Balance Analysis

CASE HISTORY

I-66/Route 15 Interchange Reconstruction

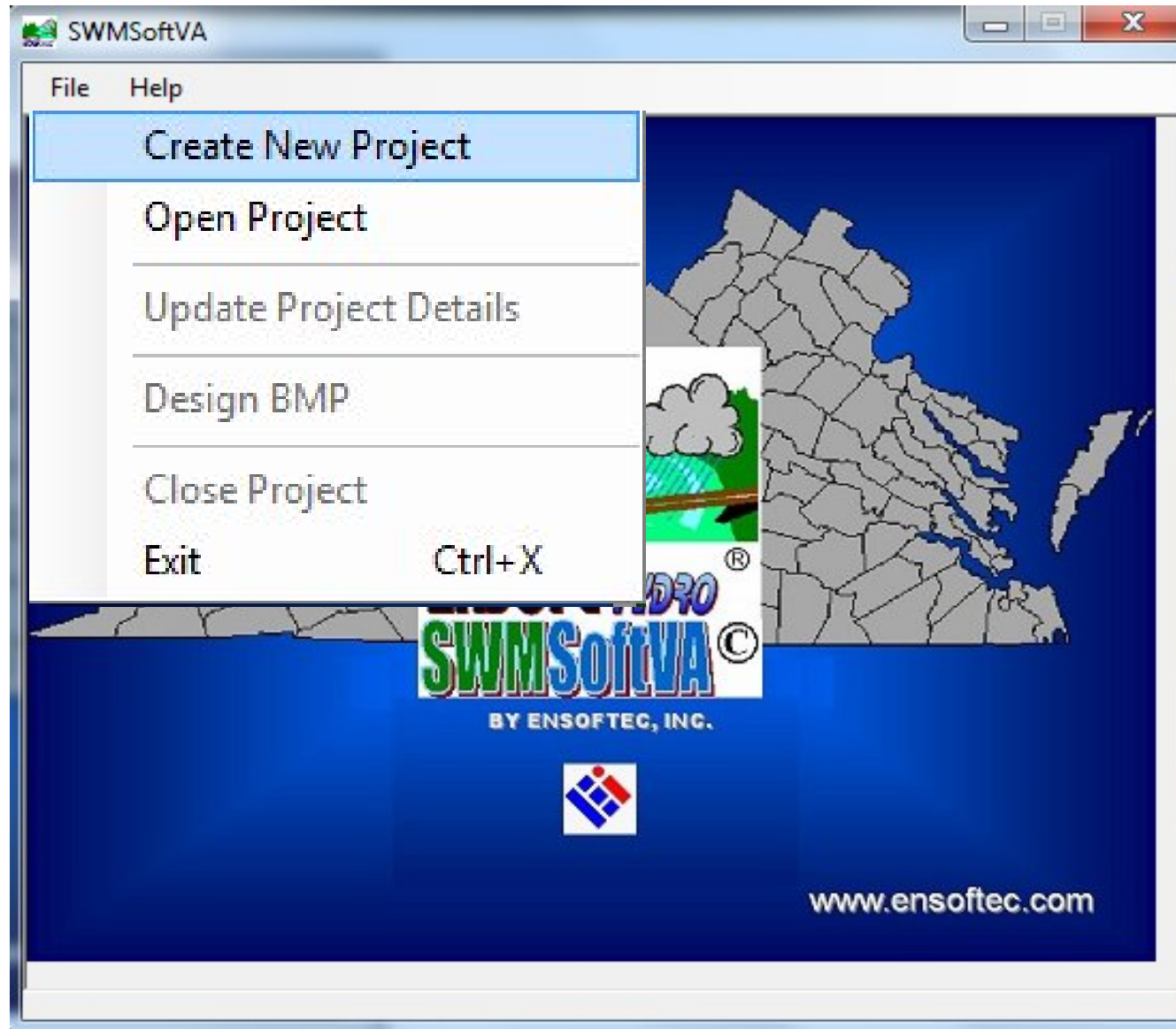
Prince William County, VA

VDOT Project # 0066-076-074, P101, R201, C501 (UPC100566)



SWMSOFTVA

CREATE NEW PROJECT



PROJECT SETUP

100566

File Help

Project Details

Project ID: 100566 Units: ENGLISH

Project Name: I-66 Route 15 Interchange Reconstruction

Designer: PS

Linear Development Project?: YES

Is This a Part II C Regulation Project (Provision 4VAC50-60-47.1)? YES

Description: VDOT PROJECT 0066-076-074 P-101; R-201; C-501

Location: Hay Market

County: Prince William State: VA

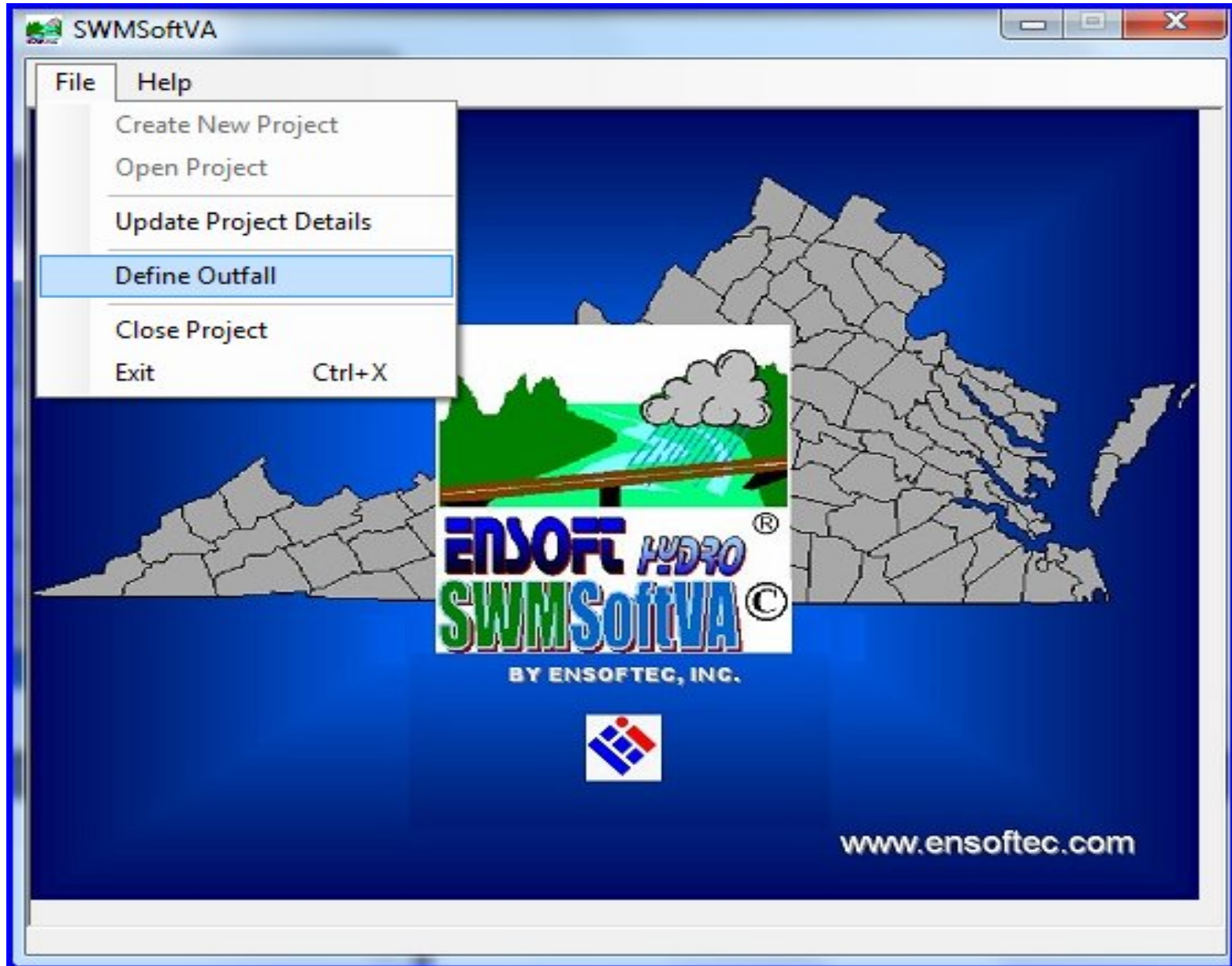
Hydrologic Unit Code

	HUC_NUMBER	HUC DESCRIPTION
▶	PL-32	BROAD RUN TRAPP BRANCH
	PL-43	UPPER BULL RUN
*		

Prince William

- Poquoson (city)
- Portsmouth (city)
- Powhatan
- Prince Edward
- Prince George
- Prince William
- Pulaski
- Rappahannock
- Richmond
- Richmond (city)
- Roanoke
- Roanoke-1
- Roanoke-2
- Rockbridge
- Rockbridge-1
- Rockbridge-2
- Rockingham
- Rockingham-1
- Rockingham-2
- Russell
- Scott
- Scott-1
- Scott-2
- Shenandoah
- Smyth
- Southampton
- Spotsylvania
- Stafford
- Suffolk (city)
- Surry

ADD OUTFALLS



ADD OUTFALL DETAILS

The screenshot shows the 'Outfall' software interface. On the left, the 'File' menu is open, with 'Design BMP' highlighted in red. A blue arrow points from this menu item down towards the 'BMP Data' table. The main window displays the 'Outfall Details' form with the following fields:

- Outfall Number:
- Station:
- Offset: ft
- HUC Number:
- HUC Description:
- Location:
- Road Name:
- Development Type:
- Comments:

Below the form, there are two red-bordered boxes containing data:

SCS Rainfall Data in Inches

Storm Frequency	Rainfall Depth (in)
1-Yr	<input type="text" value="2.51"/>
2-Yr	<input type="text" value="3.04"/>
10-Yr	<input type="text" value="4.67"/>
100-Yr	<input type="text" value="8.03"/>

Water Quality Parameters

Avg. Annual Rainfall	<input type="text" value="43"/>	in
Target Rainfall Event	<input type="text" value="1.0"/>	in
Phosphorous EMC	<input type="text" value="0.26"/>	mg/L
Target Phosphorous Load	<input type="text" value="0.41"/>	lb/acre/Yr
Nitrogen EMC	<input type="text" value="1.86"/>	mg/L
Fraction Of Runoff Producing Rainfall (Pj)	<input type="text" value="0.90"/>	

Below these boxes is a table labeled 'BMP Data':

BMP Number	Station	Offset	BMP Type
BMP-01	505+50	50.0	Dry Swale
BMP-04	507+00	60.0	Extended Detention Basin

A blue arrow points from the 'BMP Data' table down towards the bottom of the window.

STORMWATER TREATMENT PRACTICES

Low Impact BMPs (ESD)	Structural BMPs
Simple disconnection	Extended detention basin
Sheet flow to conservation area/veg. filter strip	Wet pond (Coastal / Non-Coastal)
Soil amended filter path	Infiltration basin
Vegetated roof (Green roof)	Bio-retention basin
Urban bio-retention (Stormwater planter)	Constructed wetlands
Dry Well or French drain (Micro-infiltration)	Filtering practice (Sand filter)
Rain garden (Micro bio-retention)	Manufactured devices
Permeable pavement	Dry swale
Grass channel (with or without compost amended)	Wet swale
Rainwater harvesting (Cisterns, tanks, etc.)	

BMP FACILITY SELECTION

BMP Data Performance

BMP Details

Outfall Details

Outfall Number Station Offset ft Location

Road Name HUC NO.

BMP Data

BMP Number Station Offset ft Location

BMP Type ?

BMP Design Level

Summary Of Areas (Acres)

	Pre- Development				Post-Development			
	A	B	C	D	A	B	C	D
Forest/Open Space	<input type="text" value="0.0"/>	<input type="text" value="0.50"/>	<input type="text" value="0.75"/>	<input type="text" value="0.0"/>	<input type="text" value="0.0"/>	<input type="text" value="0.0"/>	<input type="text" value="0.10"/>	<input type="text" value="0.0"/>
Managed Turf	<input type="text" value="0.0"/>	<input type="text" value="0.0"/>	<input type="text" value="0.30"/>	<input type="text" value="0.0"/>	<input type="text" value="0.0"/>	<input type="text" value="0.0"/>	<input type="text" value="0.25"/>	<input type="text" value="0.0"/>
Impervious Areas	<input type="text" value="0.0"/>	<input type="text" value="0.0"/>	<input type="text" value="0.32"/>	<input type="text" value="0.0"/>	<input type="text" value="0.0"/>	<input type="text" value="0.50"/>	<input type="text" value="1.02"/>	<input type="text" value="0.00"/>
Total Contributing Area	<input type="text" value="1.87"/>				<input type="text" value="1.87"/>			
Time Of Concentration (Hr)	<input type="checkbox"/> Compute Tc <input type="text" value="0.10"/>				<input type="checkbox"/> Compute Tc <input type="text" value="0.10"/>			

BMP SELECTION CRITERIA

BMP SELECTION CRITERIA		BMP PRACTICE																	
		Vegetated Roof/Green Roof	Dry Well/French Drain (Micro-infiltration)	Rain Garden (Micro-bio-retention)	Storm water Planter (Urban bio-retention)	Permeable Pavement	Grass Channel	Dry Swale	Bio-retention	Rainwater Harvesting	Infiltration	Extended Detention Pond	Sheet Flow to Conserved Area/Filler Strip	Wet Swale	Filtration Practice	Constructed Wetland	Wet Pond	Wet Pond (Coastal Plain)	Manufactured Device
Impervious Cover	> 0.11 acre?	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	> 0.46 acre?	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	> 2.3 acres?	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Contributing Drainage Area	> 0.06 acre?	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	> 0.5 acres?	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	> 2.0 acres?	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	> 5.0 acres?	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	< 10 acres?	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Ground Water Table / Bed Rock Elev.	> 50 acres?	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	< 2-ft below BMP bottom?	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	< 4-ft below BMP bottom?	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Soil Infiltration Rate	< 0.27 inches / hour?	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	< 0.50 inches / hour?	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	< 1.04 inches / hour?	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

IMPERVIOUS COVER

CONTRIBUTING DRAINAGE AREA

GROUND WATER TABLE/ROCK ELEV

SOIL INFILTRATION RATE

LEGEND: ACCEPTABLE ● SITE DEPENDENT ● RESTRICTED USE ● NOT SUITABLE ●

BMP SELECTION CRITERIA (Contd.)		BMP PRACTICE																	
		Vegetated Roof/Green Roof	Dry Well/French Drain (Micro-infiltration)	Rain Garden (Micro-bio-retention)	Storm water Planter (Urban bio-retention)	Permeable Pavement	Grass Channel	Dry Swale	Bio-retention	Rainwater Harvesting	Infiltration	Extended Detention Pond	Sheet Flow to Conserved Area/Filler Strip	Wet Swale	Filtration Practice	Constructed Wetland	Wet Pond	Wet Pond (Coastal Plain)	Manufactured Device
Slope	> 5 percent?	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	> 8 percent?	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Is BMP located within fill slope?	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Is BMP < 30-ft from any slope > 10%?	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Is BMP < 50-ft from any slope > 15%?	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Site Conditions	Is BMP located in Coastal Plain?	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Is BMP < 20-ft of any structure, property line, or vegetative buffer?	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Is BMP < 30-ft from any septic tank / drain field or < 100-ft from private wells and other restrictions?	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Should any mature tree be removed for construction of the BMP?	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Is BMP close to an unstable soil area?	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Is BMP < 100-ft up-slope or 20-ft down-slope from any buildings?	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Is BMP located within least topography or designated "hot spots"?	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

SLOPE

SITE CONDITIONS

LEGEND: ACCEPTABLE ● SITE DEPENDENT ● RESTRICTED USE ● NOT SUITABLE ●

BMP SELECTION CRITERIA

BMP SELECTION CRITERIA

SELECTION CRITERIA

Impervious Cover

- > 0.11 acre?
- > 0.46 acre?
- > 2.3 acres?

Contributing Drainage Area

- > 0.06 acre?
- > 0.5 acres?
- > 2 acres?
- > 5 acres?
- < 10 acres?
- > 50 acres?

Ground Water Table / Bed Rock Elev.

- < 2-ft below bottom of BMP?
- < 4-ft below bottom of BMP?

Soil Infiltration Rate

- < 0.27 inches/hour?
- < 0.5 inch/hour?
- < 1.04 inches/hour?

SELECTION CRITERIA (C-11)

Slope

- > 5 percent?
- > 8 percent?
- > 15%?
- Is BMP located within fill slope?
- Is BMP < 50-ft from any slope >10%?
- Is BMP < 50-ft from any slope >15%?

Site Conditions

- Is BMP located in Coastal Plain?
- Is BMP < 20-ft of any structure, property line, or vegetative buffer?
- Is BMP < 50-ft from any septic tank / drainfield or < 100-ft from private wells and other restrictions?
- Should any mature tree be removed for construction of the BMP?
- Is BMP close to an unstable soil strata?
- Is BMP < 100-ft up-slope or 20-ft downslope from any buildings?
- Is BMP located within karst topography or designated "hot spots"?

BMPs

- Vegetat
- Rainwater Harvesting
- Extended Detention Basin
- Constructed Wetland
- Wet Pond
- Wet Pond (Coastal Plain)
- Manufactured Device

Selected BMP Extended Detention Basin

CLEAR **PRINT** **CLOSE**

ADD BMP DETAILS (CONTD.)

BMP Practice

BMP Type	Vegetated Roof/Green Roof	Dry Well/French Drain (Microinfiltration)	Wet Swale
BMP Design Level	LEVEL 1 DESIGN [RR: 45; TP: 0; TN: 0] LEVEL 1 DESIGN [RR: 45; TP: 0; TN: 0] LEVEL 2 DESIGN [RR: 60; TP: 0; TN: 0]	LEVEL 1 DESIGN [RR: 50; TP: 25; TN: 15] LEVEL 1 DESIGN [RR: 50; TP: 25; TN: 15] LEVEL 2 DESIGN [RR: 90; TP: 25; TN: 15]	LEVEL 1 DESIGN [RR: 0; TP: 20; TN: 25] LEVEL 1 DESIGN [RR: 0; TP: 20; TN: 25] LEVEL 2 DESIGN [RR: 0; TP: 40; TN: 35]
BMP Type	Rain Garden (Micro-Bioretenion)	Rainwater Harvesting	Constructed Wetland
BMP Design Level	LEVEL 1 DESIGN [RR: 40; TP: 25; TN: 40] LEVEL 1 DESIGN [RR: 40; TP: 25; TN: 40] LEVEL 2 DESIGN [RR: 80; TP: 50; TN: 60]	Credit for Water Reused Credit for Water Reused Water Quality Credit for Configuration Type 30	LEVEL 1 DESIGN [RR: 0; TP: 50; TN: 25] LEVEL 1 DESIGN [RR: 0; TP: 50; TN: 25] LEVEL 2 DESIGN [RR: 0; TP: 75; TN: 55]
BMP Type	Stomwater Planter/Urban Bioretention	Permeable Pavement	Wet Pond (Coastal Plain)
BMP Design Level	LEVEL 1 DESIGN [RR: 40; TP: 25; TN: 40] LEVEL 1 DESIGN [RR: 40; TP: 25; TN: 40]	LEVEL 1 DESIGN [RR: 45; TP: 25; TN: 25] LEVEL 1 DESIGN [RR: 45; TP: 25; TN: 25] LEVEL 2 DESIGN [RR: 75; TP: 25; TN: 25]	LEVEL 1 DESIGN [RR: 0; TP: 45; TN: 20] LEVEL 1 DESIGN [RR: 0; TP: 45; TN: 20] LEVEL 2 DESIGN [RR: 0; TP: 65; TN: 30]
BMP Type	Grass Channel	Dry Swale	Filtering Practice
BMP Design Level	TYPE 1 NO COMPOST AMDMT [TP: 15; TN: 20] TYPE 1 NO COMPOST AMDMT [TP: 15; TN: 20] TYPE 2 WITH COMPOST AMDMT [TP: 15; TN: 20]	LEVEL 1 DESIGN [RR: 40; TP: 20; TN: 25] LEVEL 1 DESIGN [RR: 40; TP: 20; TN: 25] LEVEL 2 DESIGN [RR: 60; TP: 40; TN: 35]	LEVEL 1 DESIGN [RR: 0; TP: 60; TN: 30] LEVEL 1 DESIGN [RR: 0; TP: 60; TN: 30] LEVEL 2 DESIGN [RR: 0; TP: 65; TN: 45]
BMP Type	Bioretention	Infiltration	Wet Pond
BMP Design Level	LEVEL 1 DESIGN [RR: 40; TP: 25; TN: 40] LEVEL 1 DESIGN [RR: 40; TP: 25; TN: 40] LEVEL 2 DESIGN [RR: 80; TP: 50; TN: 60]	LEVEL 1 DESIGN [RR: 50; TP: 25; TN: 15] LEVEL 1 DESIGN [RR: 50; TP: 25; TN: 15] LEVEL 2 DESIGN [RR: 90; TP: 25; TN: 15]	LEVEL 1 DESIGN [RR: 0; TP: 50; TN: 30] LEVEL 1 DESIGN [RR: 0; TP: 50; TN: 30] LEVEL 2 DESIGN [RR: 0; TP: 75; TN: 40]
BMP Type	Extended Detention Basin	Sheetflow to Conservation Area/Filter Strip	Manufactured Device
BMP Design Level	LEVEL 1 DESIGN [RR: 0; TP: 15; TN: 10] LEVEL 1 DESIGN [RR: 0; TP: 15; TN: 10] LEVEL 2 DESIGN [RR: 15; TP: 15; TN: 10]	Sheetflow to Conservation Area Sheetflow to Conservation Area Sheetflow to Filter Strip	NA Phosphorus Credit for Device Type 30 Nitrogen Credit for Device Type 30

Total Contributing Area

12.36

12.36

Time Of Concentration (Hr)

Compute Tc

0.10

Compute Tc

0.10

BMP FACILITY PERFORMANCE

BMP Data
Performance

BMP Design

Volume From Upstream RR Practice (cft)

Upstream BMP ID	Managed Turf		Impervious Areas	
	A/B	C/D	A/B	C/D
BMP-01	0	80	690	1407
	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0
Total Vol. (cft)	0.00	80.00	690.00	1,407.00

Rainfall and Peak Discharges

Storm Freq.	RF Depth in	Discharge cfs
1-Yr	2.51	30.96
2-Yr	3.04	40.38
10-Yr	4.67	70.33
100-Yr	8.03	133.84

HSG Soils Data

		HSG Soils	
		A and B	C and D
Managed Turf	acre	0.00	1.20
Impervious Cover	acre	1.00	8.01
Runoff Reduction	(cft)	621.00	4,510.00
Ph. Reduction	lb/yr	0.72	5.23
Ni. Reduction	lb/yr	4.36	31.68

Treatment Volume Required (Tv)	(cft)	42,603.86
Phosphorus Load	lb/yr	5.950
Nitrogen Load	lb/yr	36.040

Carryover to Downstream BMP/Outfall

		HSG Soils	
		A and B	C and D
Runoff Carried D/S			
Managed Turf	(cft)	0	883.00
Impervious Areas	(cft)	3,518.00	24,675.00

D/S BMP Type:

OUTFALL ANALYSIS

Outfall Analysis

File Help

HUC Details
 HUC Number HUC Desc. Outfall Number

HUC - OUTFALL DATA

HUC Number	Outfall Number
PL-32	OUT-04
PL-32	OUT-05

TOTAL SITE AREAS IN OUTFALL (Acres)

	Pre-Development				Post-Development			
	A	B	C	D	A	B	C	D
Forest/Open Space	<input type="text" value="0.0"/>	<input type="text" value="5.75"/>	<input type="text" value="0.12"/>	<input type="text" value="0.0"/>	<input type="text" value="0.0"/>	<input type="text" value="5.21"/>	<input type="text" value="0.12"/>	<input type="text" value="0.0"/>
Managed Turf	<input type="text" value="0.0"/>	<input type="text" value="2.00"/>	<input type="text" value="4.38"/>	<input type="text" value="0.0"/>	<input type="text" value="0.0"/>	<input type="text" value="2.00"/>	<input type="text" value="5.34"/>	<input type="text" value="0.0"/>
Impervious Areas	<input type="text" value="0.0"/>	<input type="text" value="2.00"/>	<input type="text" value="4.38"/>	<input type="text" value="0.0"/>	<input type="text" value="0.0"/>	<input type="text" value="2.00"/>	<input type="text" value="5.34"/>	<input type="text" value="0.0"/>
	<input type="checkbox"/> Compute Tc (Hr.)		<input type="text" value="0.12"/>		<input type="checkbox"/> Compute Tc (Hr.)		<input type="text" value="0.14"/>	
Ponding/Swamp Area	<input type="text" value="0.0"/>	Acre		<input type="text" value="0.311"/>	Acre			

CONTRIBUTING DRAINAGE AREA AT OUTFALL

LAND COVER SUMMARY

	Pre-Development			Post-Development		
	Cover (Acres)	Weighted Rv	Percent (%)	Cover (Acres)	Weighted Rv	Percent (%)
Forest/Open Space	<input type="text" value="5.87"/>	<input type="text" value="0.03"/>	<input type="text" value="24.72"/>	<input type="text" value="5.33"/>	<input type="text" value="0.03"/>	<input type="text" value="22.05"/>
Managed Turf	<input type="text" value="11.50"/>	<input type="text" value="0.22"/>	<input type="text" value="48.42"/>	<input type="text" value="11.50"/>	<input type="text" value="0.22"/>	<input type="text" value="47.58"/>
Impervious Areas	<input type="text" value="6.38"/>	<input type="text" value="0.95"/>	<input type="text" value="26.86"/>	<input type="text" value="7.34"/>	<input type="text" value="0.95"/>	<input type="text" value="30.37"/>
Total SITE Area	<input type="text" value="23.75"/>	<input type="text" value="0.37"/>		<input type="text" value="24.17"/>	<input type="text" value="0.40"/>	

Weighted CN	<input type="text" value="64.9"/>	<input type="text" value="75.3"/>	<input type="text" value="76.6"/>	Site Improvement Factor	<input type="text" value="0.80"/>
Saturation	<input type="text" value="5.408"/>	<input type="text" value="3.284"/>	<input type="text" value="3.048"/>	Total Runoff Reduction Provided	<input type="text" value="8396"/> cft
RV (1Yr.24Hr) in.	<input type="text" value="0.30"/>	<input type="text" value="0.67"/>	<input type="text" value="0.73"/>	Watershed Area at OutFall	<input type="text" value="300"/> Acre
Remarks	<input type="text" value="CDA at Outfall > 1% Total Watershed Area. PROVIDE QUANTITY CONTROL."/>				

Perform Analysis Runoff Reduction (RR)

OUTFALL SUMMARY

WATER QUANTITY ANALYSIS

Water Quantity Analysis

RUNOFF REDUCTION (RR)

	1-Yr Storm	2-Yr Storm	10-Yr Storm
Rainfall Depth (in)	2.51	3.04	4.67
Q pre-proj (cfs)	22.01	33.72	76.90
Q post w/o RR (cfs)	19.56	29.58	66.03
RV dev w/o RR (in)	0.730	1.078	2.319
RV dev with RR (in)	0.631	0.982	2.217
Adjusted CN	74.4	74.9	75.4
Q post with RR (cfs)	16.61	26.64	62.82

ENERGY BALANCE SUMMARY

I.F. x $\{(Q_{1pre} \times RV_{pre}) / RV_{post}\}$ 18.667

Is $Q_{1post} > Q_{1pre}$? NO

$\{(Q_{1forest} \times RV_{forest}) / RV_{post}\}$ 2.777

Remarks Energy Mass Balance is Satisfied.

$\{Q_{10pre} \times RV_{pre} / RV_{post}\}$ 76.560

Remarks Flood Control Requirement is Satisfied.

ONE PERCENT RULE APPLIES

HUC SUMMARY

HUC Summary

HUC Details

HUC Number HUC Desc.

TOTAL SITE AREAS IN OUTFALL (Acres)

	Pre- Development				Post-Development			
	A	B	C	D	A	B	C	D
Forest/Open Space	<input type="text" value="0.00"/>	<input type="text" value="8.25"/>	<input type="text" value="8.42"/>	<input type="text" value="0.00"/>	<input type="text" value="0.00"/>	<input type="text" value="7.71"/>	<input type="text" value="8.42"/>	<input type="text" value="0.00"/>
Managed Turf	<input type="text" value="0.00"/>	<input type="text" value="6.89"/>	<input type="text" value="17.50"/>	<input type="text" value="0.00"/>	<input type="text" value="0.00"/>	<input type="text" value="6.84"/>	<input type="text" value="17.50"/>	<input type="text" value="0.00"/>
Impervious Areas	<input type="text" value="0.00"/>	<input type="text" value="2.20"/>	<input type="text" value="5.64"/>	<input type="text" value="0.00"/>	<input type="text" value="0.00"/>	<input type="text" value="2.20"/>	<input type="text" value="6.80"/>	<input type="text" value="0.00"/>

LAND COVER SUMMARY

	Pre- Development			Post- Development		
	Cover (Acres)	Weighted Rv	Percent (%)	Cover (Acres)	Weighted Rv	Percent (%)
Forest/Open Space	<input type="text" value="16.67"/>	<input type="text" value="0.04"/>	<input type="text" value="34.09"/>	<input type="text" value="16.13"/>	<input type="text" value="0.04"/>	<input type="text" value="32.61"/>
Managed Turf	<input type="text" value="24.39"/>	<input type="text" value="0.21"/>	<input type="text" value="49.88"/>	<input type="text" value="24.34"/>	<input type="text" value="0.21"/>	<input type="text" value="49.20"/>
Impervious Areas	<input type="text" value="7.84"/>	<input type="text" value="0.95"/>	<input type="text" value="16.03"/>	<input type="text" value="9.00"/>	<input type="text" value="0.95"/>	<input type="text" value="18.19"/>
Total SITE Area	<input type="text" value="48.90"/>	<input type="text" value="0.27"/>		<input type="text" value="49.47"/>	<input type="text" value="0.29"/>	

TOTAL POLLUTANT LOADS

	Pre- Development		Post- Development		Max. Reduction Required Below Pre-Development Load
	Ac-Ft cft				
Treatment Volume	<input type="text" value="1.105"/>		<input type="text" value="1.195"/>		<input type="text" value="20.00"/> (%)
	<input type="text" value="48134.89"/>		<input type="text" value="52040.04"/>		
Polutant Load TP	<input type="text" value="30.243"/>		<input type="text" value="32.697"/>		
Polutant Load TN	<input type="text" value="216.354"/>		<input type="text" value="233.907"/>		

Linear Redevelopment Projects Regulation Section A.2d applies

HUC Summary

Total Load Reduction Provided lb/yr. Total Load Reduction Required lb/yr.

Remarks



WHY SWMSOFTVA?

- BMP Selection Criteria
- Design of Structural and Non-Structural BMPs
- Discharge Analysis Included
- Reduced Design Time and Effort
- Standardized Design Procedures
- Easier Reviews and Checks
- Simplified Database Management
- Graphs and Reports in MS Excel Format
- User Friendly, GUI & Extensive HELP



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