Stormwater Design Standards Manual
Educational Workshop #4:

Modeling Wetland Areas for Conveyance
Submerged Systems
Low Impact Development: A Planning and Design Guide

18 June 2020

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Agenda

- General Manual Information
- Specific Workshop Information
- General Public Q&A
- Technical Information
  - Wetland Systems – Modeling and Baseline Functionality
  - Equalization Pipes and Submerged Systems
  - Low Impact Development in Coastal South Carolina: A Planning and Design Guide
- Technical Q&A

General Manual Information

- Stormwater Design Standards Manual (SWDSM) is a federally mandated requirement of the National Pollution Discharge Elimination System (NPDES) Phase II Stormwater Program
- SWDSM is used by design community to develop designs and used by the City to review, approving, and permitting designs.
- SWDSM has 8 chapters:
    1. Introduction and Legal Authority
    2. Conceptual Overview
    3. Design Requirements
    4. Construction Activity Permitting
    5. Construction Phase
    6. Post-Construction
    7. City Inspection and Enforcement
    8. References
- Originally passed in 2007, first update was completed in 2013
- Newest update goes into effect ***July 1, 2020***

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Specific Workshop Information

- Wetland Systems – Modeling and Baseline Functionality
  - Modeling
  - Baseline Functionality
- Equalization Pipes and Submerged Systems
- Low Impact Development in Coastal South Carolina: A Planning and Design Guide
  - Compliance Worksheet

General Public Questions

Send questions and comments to:

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Stormwater Program Manager
City of Charleston
holtonk@charleston-sc.gov

Wetland Systems

Technical Procedure Document #6

- General Guidelines
- Modeling Wetlands
  - General Parameters
  - Discharging to Wetlands when Performing 1% AEP Analysis
  - Discharging to Adjacent Wetlands with an Easement
  - Discharging to Adjacent Wetlands without an Easement
- Baseline Functionality Documentation

General Guidelines

Technical Procedure Document #6

- Developers/Designers must avoid negatively affecting natural wetlands and preserve the sensitive nature of the wetland environment.
- Should be used for Conveyance Only, use for additional storage will require additional analysis to avoid adverse impacts
- The City will use the analysis to confirm that the wetlands are functioning as a conveyance system and are formally integrated as part of the City's stormwater infrastructure

General Guidelines

Technical Procedure Document #6

- The following guidelines shall be used:

Appropriate water levels must be maintained in all wetlands during dry conditions. In order to determine these levels and the baseline dry condition, it is recommended the designer/developer engage a wetlands scientist to determine baseline functionality. The baseline dry condition water level prior to the development of the site must be maintained post-development.

The developer/designers must confirm and demonstrate that during post-development conditions stormwater conveyance does not cause adverse impacts upstream or downstream of the site.

•The modeling analysis must show that the volume of stormwater conveyed will not cause negative effects, such as over-inundation, and varies in each individual wetland system. It is important to engage a wetland scientist to determine baseline functionality and the Ordinary High Water Mark (OHWM) for the wetland system. In general, the City expects the water surface elevation for a 24-hour AEP to not cause adverse impacts and also the WSE in the wetland to return to OHWM within 24-72 hours.

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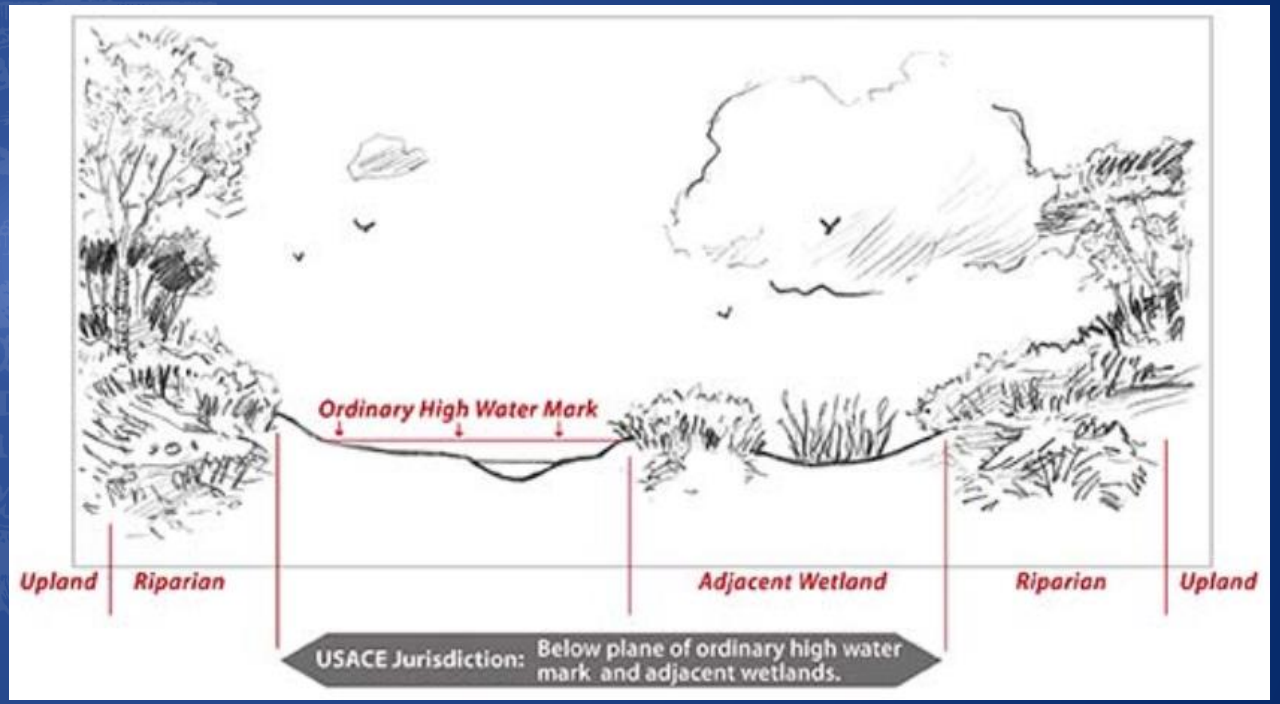
General Parameters

Technical Procedure Document #6

- The following parameters must be used in the model:
  - Individual Wetlands must be modeled with a Curve Number of 98
  - Wetlands must be modeled with an overland roughness coefficient to represent natural vegetation. This information can be obtained from the NRCS Urban Hydrology for Small Watershed - TR-55 technical document.
  - Representative cross-sections should be used to model the conveyance through a wetland system that includes the main channel, the adjacent wetlands, secondary channels, and riparian zone.



Source: Wetland Project Permitting Guide (Ventura County Planning Division, 2006)

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Discharging to Wetlands when Performing 1% AEP Analysis

Technical Procedure Document #6

- The following parameters must be used in the model when performing the 1% AEP Analysis:
  - Model Wetlands as conveyance/storage as the site warrants
  - Show that the entire basin does not have adverse impacts for the 1% AEP Storm Event
  - Maximum WSE in post-development should be less or equal to pre-development

Discharging to Adjacent Wetlands with an Easement

Technical Procedure Document #6

- The following parameters must be used in the model when discharging to adjacent wetlands that contain an easement:
  - Model the entire wetland as conveyance
  - Make sure the water level is maintained to pre-development conditions
  - No adverse impacts to downstream system
  - Does not require volume control from the wetland
  - Requires water quality pre-treatment prior to the discharge to the wetland within the project site

Discharging to Adjacent Wetlands without an Easement

Technical Procedure Document #6

- The following parameters must be used in the model when discharging to adjacent wetlands that do not contain an easement:
  - Model the wetland as conveyance within the site
  - Make sure the water level is maintained to pre-development conditions
  - No adverse impacts to downstream system
  - Volume/peak flow must be maintained the same or less than the pre-development conditions
  - Requires water quality pre-treatment prior to the discharge to the wetland within the project site

Wetland Systems – Baseline Functionality Documentation

Technical Procedure Document #6

- The City will use the analysis to confirm that the wetlands are functioning properly and can be formally integrated as a part of the City's stormwater infrastructure and that require maintenance is accommodated
- Must include at a minimum:

Description and Background	Appendices
• Acreage • USGS Quadrangle • Latitude and Longitude • Purpose • Physical Environment Characteristics • Ecological Features • Hydrological Features • Man-made Structures/Improvements	• Location Map • USGS Topographic Map with Tract Boundaries • Photo Location Map • Infrared Soil Map • Ecological Features Map • Flow Map • Photographic Data Sheet • Photographs from Photo Locations

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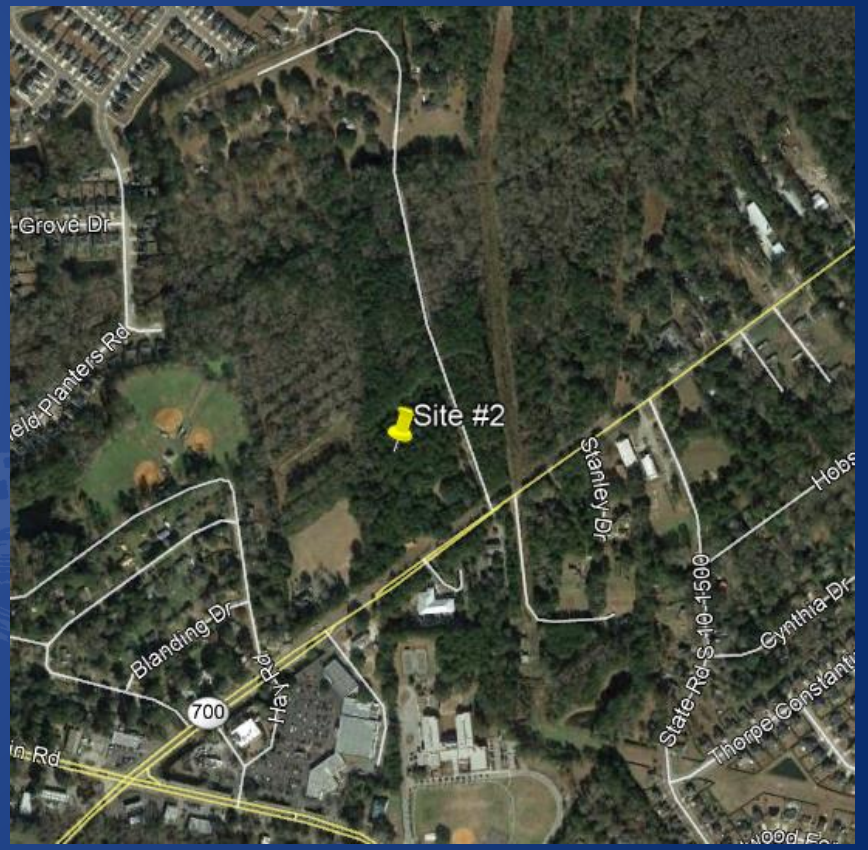
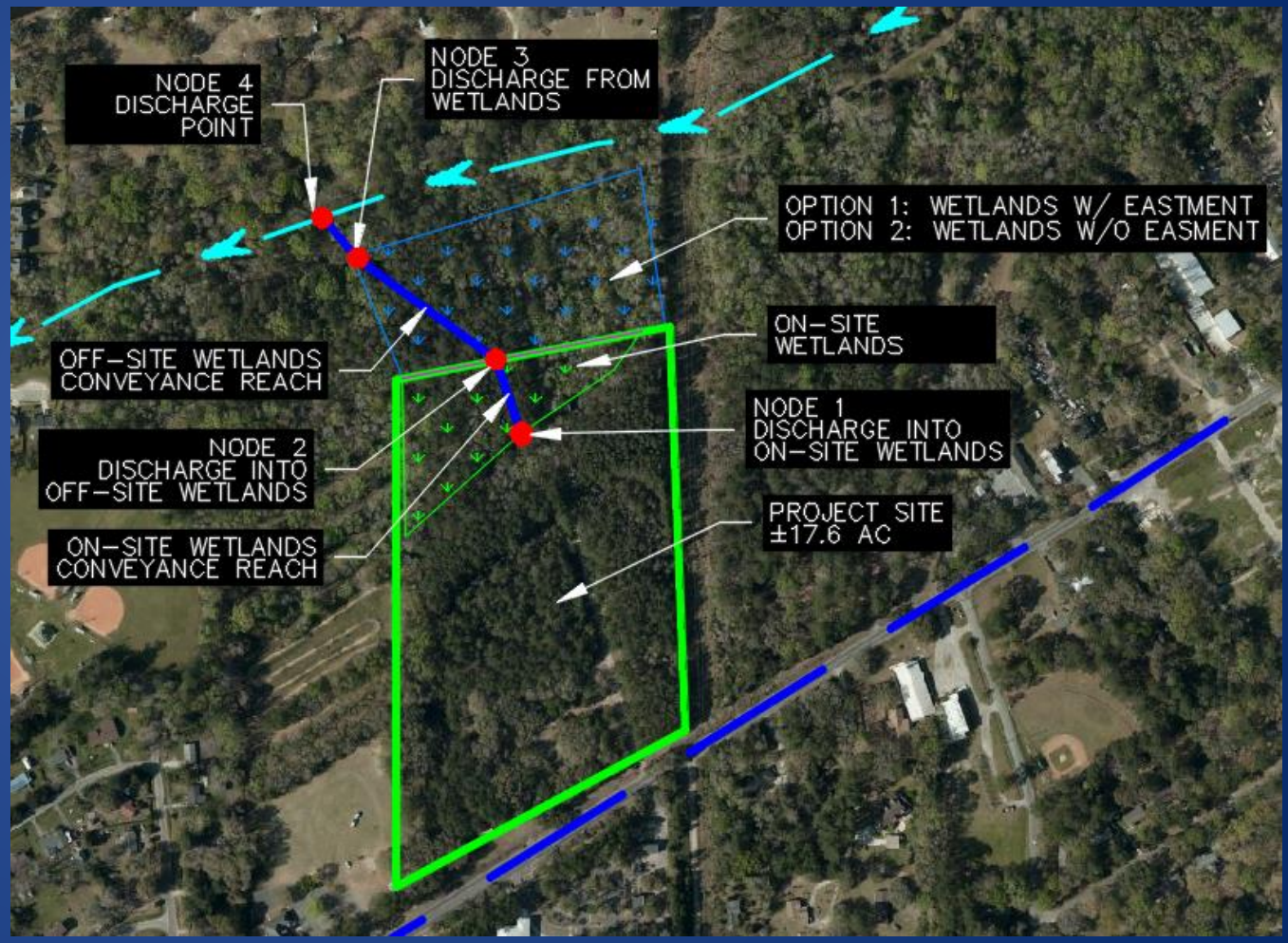
Example Project #1

- 56 New residential lots, 3 commercial tracks, and HOA green space.
- Total Project Site Area = 17.6 ac
- Disturbed Area = 14.9 ac
- Pre-developed Conditions = Sparsely wooded area, predominantly pine
- Post-developed Conditions = Impervious residential area
- Outfall from detention pond to existing wetlands
- This site is located on Johns Island



Example Project 1 - Wetlands Modeling

- Determine discharge point into wetlands
- On-Site Wetlands:
  - Establish cross section of conveyance reach
  - Maintain water level within wetlands
- Adjacent Wetlands with Easement:
  - Establish cross section of conveyance reach
  - Maintain water level/peak flow to pre-developed conditions.
- Adjacent Wetlands without Easement:
  - Establish cross section of conveyance reach
  - Maintain water level and volume/peak flow to pre-developed conditions.



Submerged Systems

Technical Procedure Document #7

- Design Requirements
- Design Exception

Submerged Systems – Design Requirements

Technical Procedure Document #7

- 2020 SWDSM Section 3.11 and Section 3.4.6.1.4
- Requires a design exception
- The following design criteria shall be used:

Isolator boxes must be installed at both ends of a conduit designed to be submerged to facilitate draining and maintenance

For pipe runs of greater than 600 feet, the maximum distance between isolator boxes is 600 feet.

Maintenance Access points are required every 200 feet (SWDSM Section 3.4.6.1.13).

The minimum pipe size shall be 24 inches in diameter

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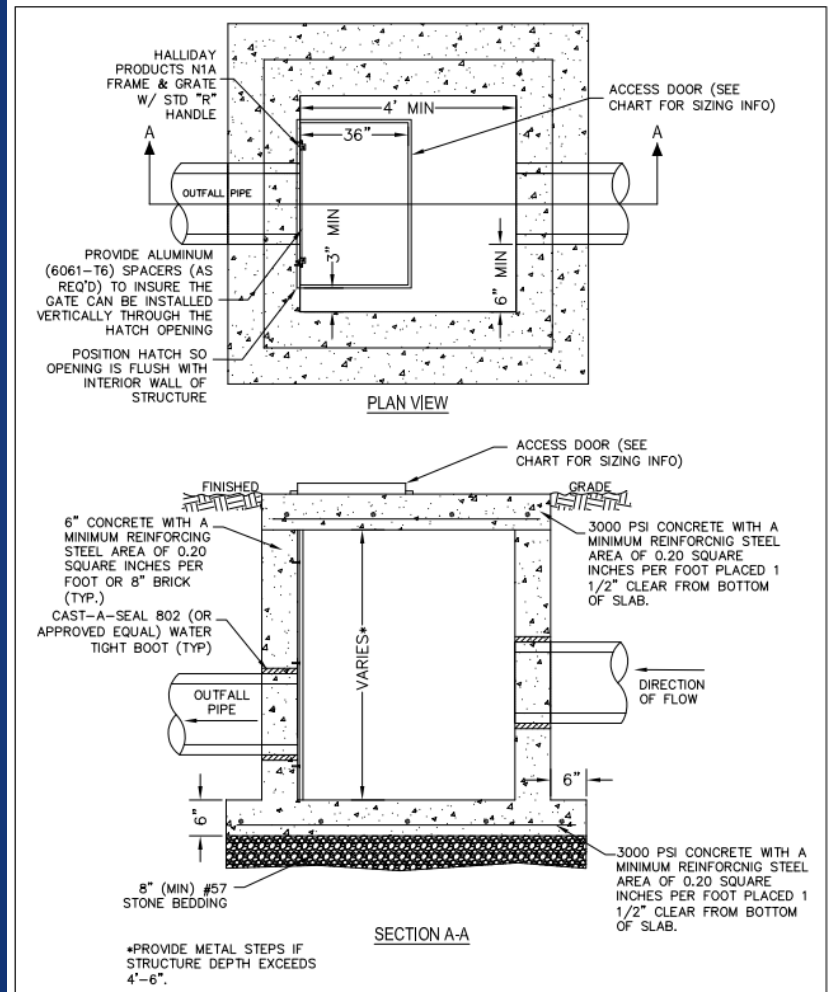
Submerged Systems – Isolator Box Detail

Technical Procedure Document #7



ISOLATION STRUCTURE	TOWN OF MT. PLEASANT STANDARD	SCALE: NTS	SD-9
		DATE DRAWN	JUNE 2009
		REVISED DATE	

PIPE SIZE	GATE SIZE	ACCESS DOOR SIZE	HP MODEL #*
18"	30"W x 3'H 30"W x 4'H 30"W x 5'H	36"x42"	F1R3642
24"	36"W x 4'H 36"W x 5'H	36"x42"	F1R3642
36"	48"W x 5'H 48"W x 6'H	36"x54"	F1R3654
48"	60"W x 6'H 60"W x 7'H	36"x66"	F1R3666

*HALLIDAY PRODUCT OR APPROVED EQUAL

ISOLATION STRUCTURE	TOWN OF MT. PLEASANT STANDARD	SCALE: NTS	SD-9A
		DATE DRAWN	JUNE 2009
		REVISED DATE	

Submerged Systems – Design Exception

Technical Procedure Document #7

- 2020 SWDSM Section 4.10
- A design exception may be granted by the City if there is an exceptional circumstance applicable to the site exists, such that the adherence to the provisions of the SWDSM will not fulfill the intent on the SWDSM.
- The City understands that the need for an exception may not be known during planning stages and only may be evident after a portion of the design is completed. The City intends to work with developer/designer during the design process to find a resolution
- A written request will be required by the City and must contain:
  - Specific exception sought
  - Reason for exception
  - Supporting Data
  - An explanation why the exception should be granted by the City

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Submerged Systems – Design Exception

Technical Procedure Document #7

- 2020 SWDSM Section 3.4.6.1.4
- Additional information required for the design exception for submerged systems includes:
  - Pretreatment accommodation for sediment
  - Description of the proposed construction method to replace system (including dewatering and excavation without the need for shoring)
  - Description of the maintenance method for the submerged pipes and isolator boxes (this must include drawdown and maintenance methods must be able to be completed in a day)
- Once a design exception is fully approved, it must be fully documented and included on the title sheet of the approved stamped construction and project record drawings

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Low Impact Development in Coastal South Carolina: A Planning and Design Guide

Technical Procedure Document #8

- What is Low Impact Development (LID)?
- Principles of LID
- Benefits
- What is included in the Low Impact Development in Coastal South Carolina: A Planning and Design Guide (LID Design Guide)
  - Regulatory Strategies
  - Neighborhood Planning Considerations
- Implementation of LID Design Guide
  - Integration into Existing Developments
  - Stormwater Best Management Practices (BMPs)
  - Compliance Calculator

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Low Impact Development in Coastal South Carolina: A Planning and Design Guide – What is LID?

Technical Procedure Document #8

- Integrated, comprehensive approach to land development or redevelopment that works with nature to manage stormwater as close to the source as possible
- Aims to mimic the natural hydrology of an area through the use of Stormwater BMPs
- Uses techniques that promote evaporation, infiltration, localized storage, and runoff treatment
- General idea – have more smaller BMPs throughout a development that:
  - Increases water quality
  - Increases aesthetic appeal
  - Decrease stormwater runoff

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Low Impact Development in Coastal South Carolina: A Planning and Design Guide – Principles of LID

Technical Procedure Document #8

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Low Impact Development in Coastal South Carolina: A Planning and Design Guide – Benefits

Technical Procedure Document #8

Developers

- Reduced cost from land clearing, grading, infrastructure (streets, curbs, gutters, sidewalks), stormwater management, and environmental impact fees
- Potential for increased lot yields and marketability

Municipalities

- Protects native flora and fauna
- Balances urban growth with environmental protection
- Reduces municipal infrastructure
- Reduces system-wide operation and maintenance costs
- Reduces runoff and flooding
- Fosters Public/Private Partnership

Home Buyers and Residents

- Preserves and protects amenities that increases property value
- Lower energy costs due to increased shade from trees
- Reduced flooding
- Saves money through water conservation

Environment

- Preservation of ecological and biological systems
- Reduced water supply demand
- Protects site and regional water quality
- Reduces impact on local terrestrial and aquatic flora and fauna
- Preserves Trees and natural vegetation
- Improves air quality
- Reduces urban head stress
- Reduces sewer overflows

Social

- Enhanced aesthetics
- Stimulates economic development
- Creates “green” jobs
- Encourages more greenways
- Educates the public on their role in stormwater management
- Reduce flooding

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Low Impact Development in Coastal South Carolina: A Planning and Design Guide – What is Included

Technical Procedure Document #8

- Regulatory Strategies
  - City of Charleston has the authority from SC DHEC to maintain the municipal separate storm sewer system (MS4) with city limits
  - Projects in an MS4 must be designed, constructed, and maintained to control rainfall on-site, and prevent the first flush (1 inch) discharge runoff from the site's disturbed area to the adjacent property
- Neighborhood Planning Considerations
  - Use innovative community and subdivision designs – compact development
  - Incorporate more LID BMPs to control stormwater and improve aesthetic appeal

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Low Impact Development in Coastal South Carolina: A Planning and Design Guide – Implementation

Technical Procedure Document #8

- Integration into Existing Developments
  - LID can be incorporated through retrofitting and redevelopment
  - The Retrofit Reconnaissance Investigation Manual (Schueler et al, 2007)
  - LID is an option for upgrading deteriorating and aging infrastructure
- Stormwater Best Management Practices (BMPs)
  - 2020 SWDSM Section 3.12 – refers to the LID Design Guide (Chapter 4)

1. Bioretention
2. Permeable Pavement Systems
3. Stormwater Infiltration
4. Green Roofs
5. Rainwater Harvesting
6. Impervious Surface Disconnection
7. Open Channel Systems
8. Stormwater Filtering Systems
9. Dry Detention Practices
10. Wet Detention Practices
11. Stormwater Wetlands

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Low Impact Development in Coastal South Carolina: A Planning and Design Guide – Example

Technical Procedure Document #8

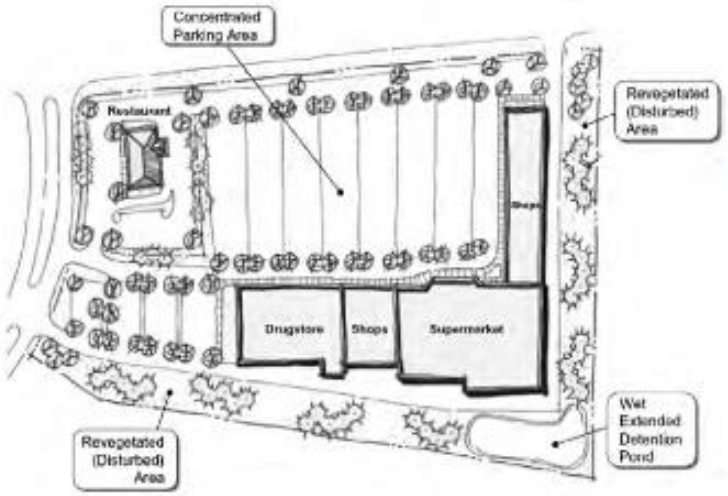

Figure 3.3-7. Conventional Parking Lot Layout (RI DEM, 2011)
Conventional parking designs clear the entire site, that later needs to be revegetated, and creates one massive area for parking.

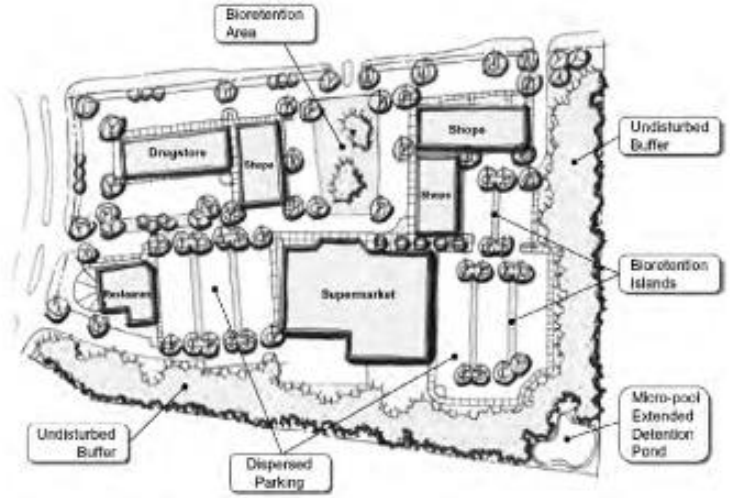

Figure 3.3-8. Parking Lot Layout Using LID Techniques (RI DEM, 2011)
The LID design leaves undisturbed buffers of native vegetation, incorporates landscaped islands that treat stormwater, and disperses the parking into smaller areas.

Table 1.2-3. Comparison of unit costs for materials for Boulder Hills LID Subdivision (UNH, 2011). Note the road for this development was porous asphalt.

Item	Conventional	LID	Difference
Site Preparation	$23,200.00	$18,000.00	-$5,200.00
Temp. Erosion Control	$5,800.00	$3,800.00	-$2,000.00
Drainage	$92,400.00	$20,100.00	-$72,300.00
Roadway	$82,000.00	$128,000.00	$46,000.00
Driveways	$19,700.00	$30,100.00	$10,400.00
Curbing	$6,500.00	$0.00	-$6,500.00
Perm. Erosion Control	$70,000.00	$50,600.00	-$19,400.00
Additional Items	$489,700.00	$489,700.00	$0.00
Buildings	$3,600,000.00	$3,600,000.00	$0.00
Project Total	$4,389,300.00	$4,340,300.00	-$49,000.00

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Low Impact Development in Coastal South Carolina: A Planning and Design Guide – Compliance Calculator

Technical Procedure Document #8

- Created by the Center of Watershed Protection
- Allows designer to quickly analyze a site with multiple LID options
- Calculator is NOT a model – it is a planning tool to help find the best set of LID BMPs for a development
- Detailed Instructions are in Appendix A of the LID Design Guide
- Website: http://www.northinlet.sc.edu/compliance-calculator-for-sms4-and-statewide-regulations-april-2014/

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Compliance Calculator – Site Data

Coastal South Carolina LID Compliance Spreadsheet

	data input cells
	calculation cells
	constant values

	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

Site Data

Site Name:

Indicate Pre-Development Land Cover and Runoff Curve Numbers in the Site's Disturbed Area

	Area (acres)										
Cover Type	Soil Type A	CN	Soil Type B	CN	Soil Type C	CN	Soil Type D	CN	Total	% Cover	Rv
Forest Cover/Open Space		30		55		70		77	0.00	0%	0
Turf Cover		39		61		74		80	0.00	0%	0
Impervious Cover		98		98		98		98	0.00	0%	0
Total	0.00		0.00		0.00		0.00		0.00	0%	0.00

Indicate Post-Development Land Cover in the Site's Disturbed Area

	Area (acres)										
Cover Type	Soil Type A	CN	Soil Type B	CN	Soil Type C	CN	*	CN	Total	% Cover	Rv
Forest Cover/Open Space		30		55		70		77	0.00	0%	0
Turf Cover		39		61		74		80	0.00	0%	0
Impervious Cover		98		98		98		98	0.00	0%	0
Total	0.00		0.00		0.00		0.00		0.00	0%	0.00

Is Site Located Within 1/2 Mile of a Coastal Receiving Water?	No
Is Site Located Within 1,000 sf of a Shellfish Bed?	No
Is Site Within a Regulated SMS4?	No

Resulting Rules for Stormwater Treatment and Runoff Reduction

	Treatment Volume (cf)	Equivalent Design Storm (in.)	Treatment Mechanism
Treatment Volume	0	N/A	None
Practice-Dependent Water Quality Volumes (For State Regulations)			
LID Practices and Infiltration	N/A	N/A	N/A
Ponds with a Permanent Pool	N/A	N/A	N/A
Ponds without a Permanent Pool	N/A	N/A	N/A

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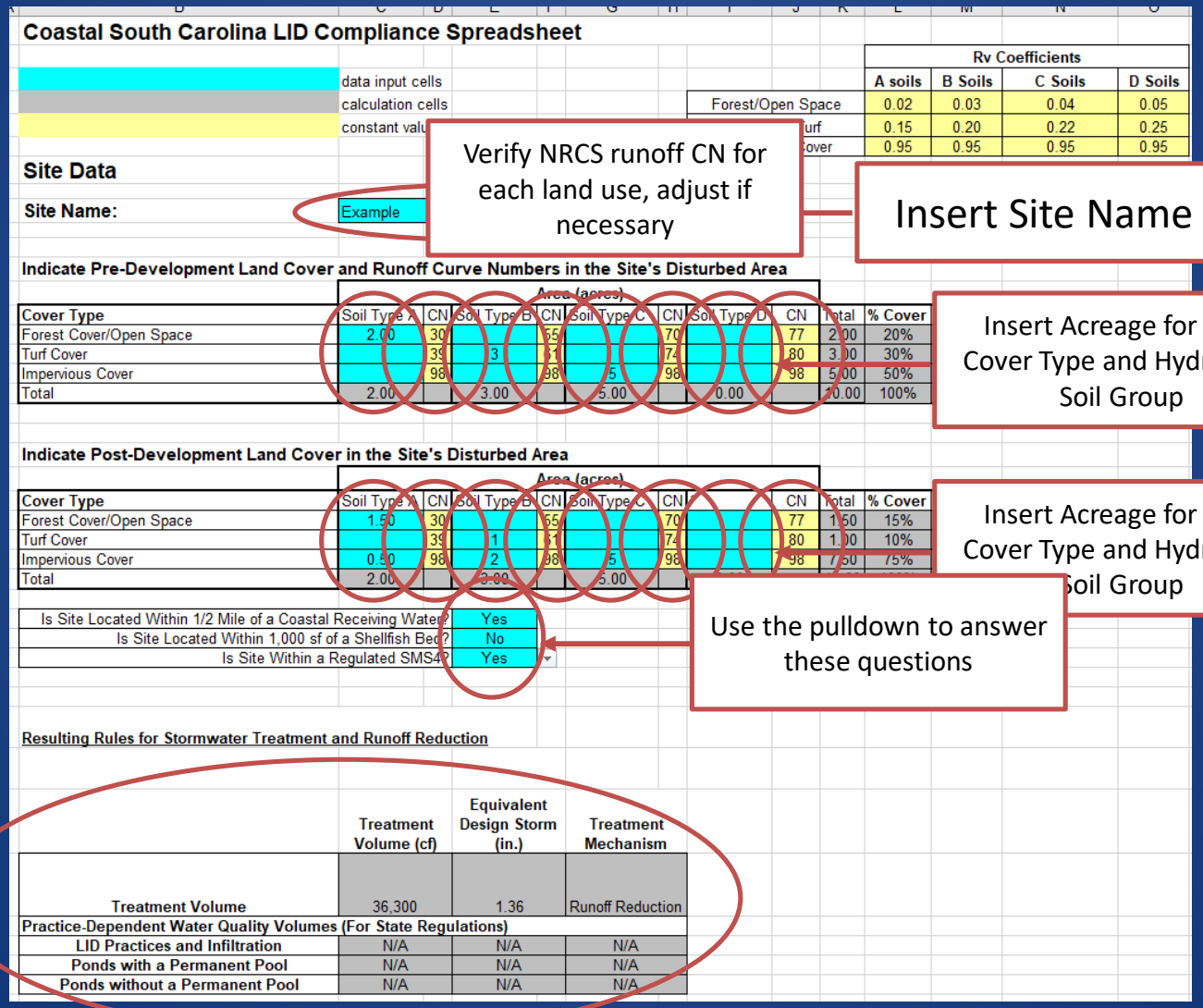
Compliance Calculator – Site Data Example



Coastal South Carolina LID Compliance Spreadsheet

	Rv Coefficients			
	A soils	B Soils	C Soils	D Soils
Forest/Open Space	0.02	0.03	0.04	0.05
Turf	0.15	0.20	0.22	0.25
Cover	0.95	0.95	0.95	0.95

data input cells
calculation cells
constant valu

Site Data

Site Name: Example

Verify NRCS runoff CN for each land use, adjust if necessary

Insert Site Name

Indicate Pre-Development Land Cover and Runoff Curve Numbers in the Site's Disturbed Area

	Area (acres)									
Cover Type	Soil Type A	CN	Soil Type B	CN	Soil Type C	CN	Soil Type D	CN	Total	% Cover
Forest Cover/Open Space	2.00	30		55		70		77	2.00	20%
Turf Cover		39	3	61		74		80	3.00	30%
Impervious Cover		98		98	5	98		98	5.00	50%
Total	2.00		3.00		5.00		0.00		10.00	100%

Insert Acreage for Each Cover Type and Hydrologic Soil Group

Indicate Post-Development Land Cover in the Site's Disturbed Area

	Area (acres)									
Cover Type	Soil Type A	CN	Soil Type B	CN	Soil Type C	CN	Soil Type D	CN	Total	% Cover
Forest Cover/Open Space	1.50	30		55		70		77	1.50	15%
Turf Cover		39	1	61		74		80	1.00	10%
Impervious Cover	0.50	98	2	98	5	98		98	7.50	75%
Total	2.00		3.00		5.00					

Insert Acreage for Each Cover Type and Hydrologic Soil Group

Is Site Located Within 1/2 Mile of a Coastal Receiving Water?	Yes
Is Site Located Within 1,000 sf of a Shellfish Bed?	No
Is Site Within a Regulated SMS4?	Yes

Use the pulldown to answer these questions

Resulting Rules for Stormwater Treatment and Runoff Reduction

	Treatment Volume (cf)	Equivalent Design Storm (in.)	Treatment Mechanism
Treatment Volume	36,300	1.36	Runoff Reduction
Practice-Dependent Water Quality Volumes (For State Regulations)			
LID Practices and Infiltration	N/A	N/A	N/A
Ponds with a Permanent Pool	N/A	N/A	N/A
Ponds without a Permanent Pool	N/A	N/A	N/A

Compliance Calculator - BMPs

Coastal South Carolina LID Compliance Spreadsheet

BMPs

	Forest Cover Draining to BMP	Turf Cover Draining to BMP	Impervious Cover Draining to BMP	Sv Provided by BMP (cubic feet)	Water Quality Credits (cf)						Downstream BMP
	Area (acres)	Area (acres)	Area (acres)		Volume from Direct Drainage	Volume from Upstream Practices	Total Volume Captured by BMP	Credit	Volume Credited	Remaining Water Quality Volume	
Bioretention - Enhanced					#VALUE!	0	#VALUE!	100%	#VALUE!	#VALUE!	
Bioretention - Standard					#VALUE!	0	#VALUE!	60%	#VALUE!	#VALUE!	
Permeable Pavement - Infiltration					#VALUE!	0	#VALUE!	100%	#VALUE!	#VALUE!	
Permeable Pavement - Standard					#VALUE!	0	#VALUE!	50%	#VALUE!	#VALUE!	
Infiltration					#VALUE!	0	#VALUE!	100%	#VALUE!	#VALUE!	
Green Roof					#VALUE!	0	#VALUE!	100%	#VALUE!	#VALUE!	
Rainwater Harvesting					#VALUE!	0	#VALUE!	100%	#VALUE!	#VALUE!	
Disconnection to A/B or Amended Soils					#VALUE!	0	#VALUE!	50%	#VALUE!	#VALUE!	
Disconnection to C/D Soils					#VALUE!	0	#VALUE!	25%	#VALUE!	#VALUE!	
Disconnection to Forest Cover/Open Space					#VALUE!	0	#VALUE!	75%	#VALUE!	#VALUE!	
Grass Channel in A/B or Amended Soils					#VALUE!	0	#VALUE!	20%	#VALUE!	#VALUE!	
Grass Channel in C/D Soils					#VALUE!	0	#VALUE!	10%	#VALUE!	#VALUE!	
Dry Swale					#VALUE!	0	#VALUE!	60%	#VALUE!	#VALUE!	
Wet Swale					#VALUE!	0	#VALUE!	100%	#VALUE!	#VALUE!	
Regenerative Stormwater Conveyance (RSC)					#VALUE!	0	#VALUE!	100%	#VALUE!	#VALUE!	
Filtration					#VALUE!	0	#VALUE!	100%	#VALUE!	#VALUE!	
Dry Detention Practice					#VALUE!	0	#VALUE!	0%	#VALUE!	#VALUE!	
Wet Detention Pond					#VALUE!	0	#VALUE!	100%	#VALUE!	#VALUE!	
Wetland					#VALUE!	0	#VALUE!	100%	#VALUE!	#VALUE!	
Totals		0.00	0.00	0.00	#VALUE!				#VALUE!		

	Target Water Quality Volume (cf)	Water Quality Volume (cf)	Target Achived?
Water Quality Volume Target	0	#VALUE!	#VALUE!

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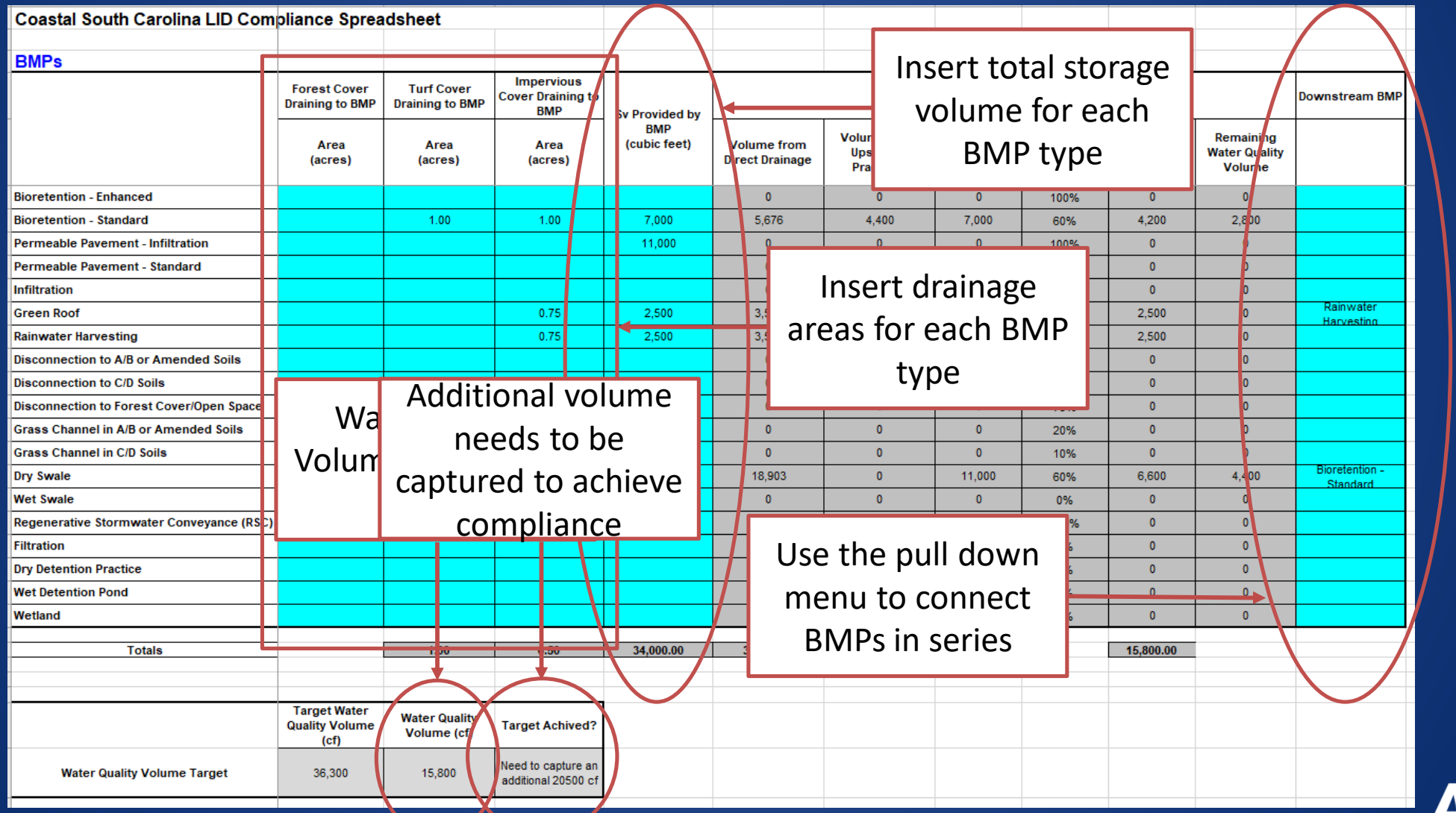
Compliance Calculator - BMPs



Coastal South Carolina LID Compliance Spreadsheet

BMPs

	Forest Cover Draining to BMP	Turf Cover Draining to BMP	Impervious Cover Draining to BMP	Sv Provided by BMP (cubic feet)	Volume from Direct Drainage	Volu Ups Pra				Remaining Water Quality Volume	Downstream BMP
	Area (acres)	Area (acres)	Area (acres)								
Bioretention - Enhanced					0	0	0	100%	0	0	
Bioretention - Standard		1.00	1.00	7,000	5,676	4,400	7,000	60%	4,200	2,800	
Permeable Pavement - Infiltration				11,000	0	0	0	100%	0	0	
Permeable Pavement - Standard									0	0	
Infiltration									0	0	
Green Roof			0.75	2,500	3,9				2,500	0	Rainwater Harvesting
Rainwater Harvesting			0.75	2,500	3,9				2,500	0	
Disconnection to A/B or Amended Soils									0	0	
Disconnection to C/D Soils									0	0	
Disconnection to Forest Cover/Open Space									0	0	
Grass Channel in A/B or Amended Soils					0	0	0	20%	0	0	
Grass Channel in C/D Soils					0	0	0	10%	0	0	
Dry Swale					18,903	0	11,000	60%	6,600	4,400	Bioretention - Standard
Wet Swale					0	0	0	0%	0	0	
Regenerative Stormwater Conveyance (RSC)								%	0	0	
Filtration								%	0	0	
Dry Detention Practice								%	0	0	
Wet Detention Pond									0	0	
Wetland								%	0	0	
Totals		1.00	1.50	34,000.00	3				15,800.00		

	Target Water Quality Volume (cf)	Water Quality Volume (cf)	Target Achived?
Water Quality Volume Target	36,300	15,800	Need to capture an additional 20500 cf

Insert total storage volume for each BMP type

Insert drainage areas for each BMP type

Wa Volum

Additional volume needs to be captured to achieve compliance

Use the pull down menu to connect BMPs in series

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Compliance Calculator – Channel and Flood Protection

Coastal South Carolina LID Compliance Spreadsheet

Channel and Flood Protection Calculations

	2-year storm	10-year storm	25-year storm	100-year storm
Target Rainfall Event (in)	4.20	6.50	7.90	10.30

Site Area (acres)	0.00
Runoff Reduction Provided by BMPs	#VALUE!

Based on the use of stormwater BMPs, the spreadsheet calculates an adjusted Runoff Volume and Adjusted Curve Number.

Pre-Development Conditions

Land Area		A Soils	B Soils	C Soils	D Soils	
Forest Cover	Area (ac)	0.0	0.0	0.0	0.0	
	CN	30	55	70	77	
Turf Cover	Area (ac)	0.0	0.0	0.0	0.0	
	CN	39	61	74	80	
Impervious Cover	Area (ac)	0.0	0.0	0.0	0.0	
	CN	98	98	98	98	
					Weighted CN	S
					0	1000.00

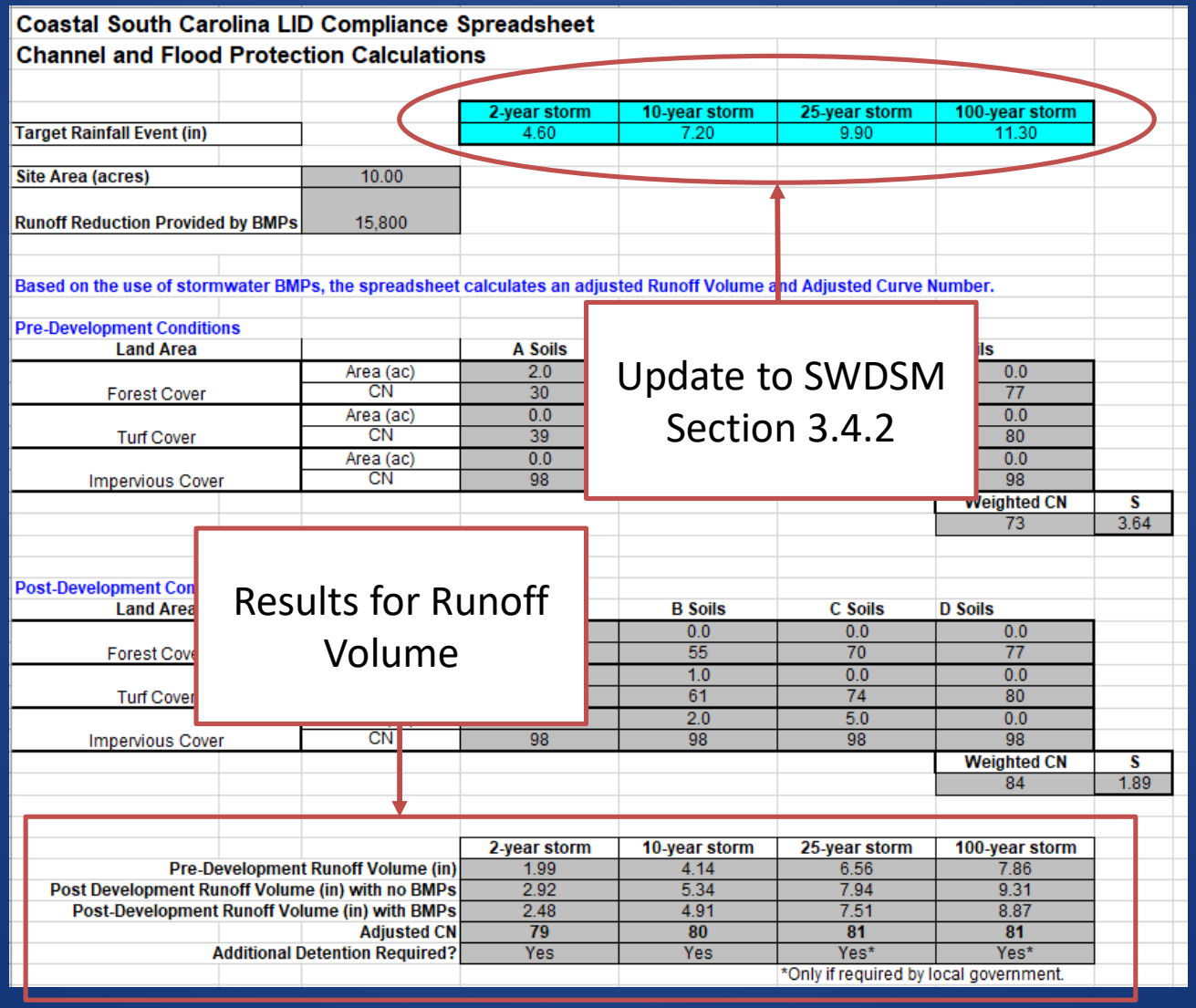
Post-Development Conditions

Land Area		A Soils	B Soils	C Soils	D Soils	
Forest Cover	Area (ac)	0.0	0.0	0.0	0.0	
	CN	30	55	70	77	
Turf Cover	Area (ac)	0.0	0.0	0.0	0.0	
	CN	39	61	74	80	
Impervious Cover	Area (ac)	0.0	0.0	0.0	0.0	
	CN	98	98	98	98	
					Weighted CN	S
					0	1000.00

	2-year storm	10-year storm	25-year storm	100-year storm
Pre-Development Runoff Volume (in)	0.00	0.00	0.00	0.00
Post Development Runoff Volume (in) with no BMPs	0.00	0.00	0.00	0.00
Post-Development Runoff Volume (in) with BMPs	#VALUE!	#VALUE!	#VALUE!	#VALUE!
Adjusted CN	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**
Additional Detention Required?	#VALUE!	#VALUE!	#VALUE!	#VALUE!
			*Only if required by local government.	

AECOM

Compliance Calculator – Channel and Flood Protection



Coastal South Carolina LID Compliance Spreadsheet
Channel and Flood Protection Calculations

	2-year storm	10-year storm	25-year storm	100-year storm
Target Rainfall Event (in)	4.60	7.20	9.90	11.30

Site Area (acres)	10.00
Runoff Reduction Provided by BMPs	15,800

Based on the use of stormwater BMPs, the spreadsheet calculates an adjusted Runoff Volume and Adjusted Curve Number.

Pre-Development Conditions

Land Area		A Soils	ils
Forest Cover	Area (ac)	2.0	0.0
	CN	30	77
Turf Cover	Area (ac)	0.0	0.0
	CN	39	80
Impervious Cover	Area (ac)	0.0	0.0
	CN	98	98

Weighted CN	S
73	3.64

Update to SWDSM Section 3.4.2

Post-Development Con

Land Area			B Soils	C Soils	D Soils
Forest Cov			0.0	0.0	0.0
			55	70	77
Turf Cover			1.0	0.0	0.0
			61	74	80
Impervious Cover			2.0	5.0	0.0
	CN	98	98	98	98

Weighted CN	S
84	1.89

Results for Runoff Volume

	2-year storm	10-year storm	25-year storm	100-year storm
Pre-Development Runoff Volume (in)	1.99	4.14	6.56	7.86
Post Development Runoff Volume (in) with no BMPs	2.92	5.34	7.94	9.31
Post-Development Runoff Volume (in) with BMPs	2.48	4.91	7.51	8.87
Adjusted CN	**79**	**80**	**81**	**81**
Additional Detention Required?	Yes	Yes	Yes*	Yes*

*Only if required by local government.

Technical Q&A

Send questions and comments to:

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