Year 5-6 NPDES Annual Report for Berkeley County City of Goose Creek City of Hanahan

I. Annual Report Information (§5.3):

This Annual Report (Years 5-6) for Berkeley County, the City of Goose Creek, and the City of Hanahan reflects progress towards achieving the statutory goal of reducing the discharge of pollutants to the MEP. In October 2015, Berkeley County signed intergovernmental agreements to implement the Minimum Control Measures under the general SMS4 permit for the City of Hanahan and the City of Goose Creek. The required information and data for each of these SMS4s were completed as part of this Annual Report. The intergovernmental agreements are in Appendix H of the Stormwater Management Plan. Since the previous report (Years 3-4), the Berkeley County SWMP has been updated to include implementation services for each respective entity.

II. Obtaining Authority (§1.4):

1. Have there been any areas annexed into your SMS4 area after you received coverage under this general permit? ☒Yes ☐ No

2. If yes, has your SWMP been updated to include these areas and a schedule for BMP implementation in these areas? ☒Yes ☐ No

III. Special Conditions Applicable to Stormwater Discharges to Sensitive Waters

A. General Determination of Receiving Water Conditions and Impacts (§3.1)

1. Has an assessment been conducted to determine if the MS4 discharges to sensitive waters as described in the Permit Part 3? ☒Yes ☐ No

2. Does the SWMP specifically address these sensitive waters through BMP, system design, etc.?
☒Yes ☐ No

3. Does the MS4 discharge to waters classified as Outstanding Resource, Trout, or Shellfish Harvesting? If so, list the waters (3.5): ☐ No ☒Yes

- Berkeley County discharges into Wando River (SFH), Fogarty Creek (SFH), Beresford Creek (SFH), Martin Creek (SFH)
- City of Hanahan discharges into: [*none currently*]
- City of Goose Creek discharges into: [*none currently*]

B. TMDL Monitoring and Assessment Plan (§3.2)

1. Does the MS4 discharge to receiving waters within a TMDL watershed? If yes, list the water body and the pollutant(s) of concern. ☐ No ☒Yes

Berkeley County discharges into:

- Ashley, Cooper, Wando, Charleston Harbor TMDL (DO),
- Sawmill Branch Dorchester Creek (FC),
- Wando River (FC)

City of Hanahan discharges into:

- Cooper, Charleston Harbor TMDL (DO), but no WLA exists for non-point source/stormwater runoff

City of Goose Creek Discharges into:

- Cooper, Charleston Harbor TMDL (DO), but no WLA exists for non-point source/stormwater runoff
- Sawmill Brach Dorchester Creek (FC)

2. Which of the TMDL pollutant(s) of concern listed above have the potential to occur within the MS4?

- Fecal Coliform

3. Report the current stage of development of a monitoring and assessment plan. Mark one or more that most accurately reflects the current status of the program as a whole:

☒ Not started

- Sawmill Branch Dorchester Creek (FC), *Berkeley County was not named as a contributor, nor was it assigned a WLA.*
- Wando River (FC) *Berkeley County was not named as a contributor, nor was it assigned a WLA.*

☒ Research/Development

- Ashley, Cooper, Wando, Charleston Harbor TMDL (DO). *Berkeley County, Goose Creek, and Hanahan were not named as contributors, nor were they assigned a WLA.*
- Sawmill Branch Dorchester Creek (FC), Berkeley County nor Goose Creek were named as a contributor, nor was it assigned a WLA.

☐ Implementation

4. Has the plan been submitted to the Department?

☒ Yes

- City of Hanahan Monitoring & Assessment Plan is contained in Appendix C of 2019 SWMP
- City of Goose Creek Monitoring & Assessment Plan is contained in Appendix C of 2019 SWMP

☒ No, target date for submission: _____

- Berkeley County does not currently have a Monitoring & Assessment Plan because no WLA has been developed to address a TMDL.

5. Has monitoring been conducted for the pollutant(s) of concern in the past reporting year?

☐ Yes (summary of data attached) ☒No, target date to begin monitoring:

Since there are no TMDLs in the Goose Creek and Hanahan Urbanized Areas or into which the UAs drain, the current Monitoring & Assessment Plans for each city provides the standard operating procedures and protocols for potential monitoring. When any TMDLs are developed for the Cities or the County, then a more detailed TMDL-specific Monitoring & Assessment Plan will be developed for each. Monitoring will be initiated no more than 18 months from the effective date of an established TMDL.

6. Are there any updates to the plan for this reporting year?

☒ No ☐ Yes (updates attached)

7. Provide a brief description of the progress made on the plan in this reporting year and evaluate its effectiveness.

Since there are no TMDLs in the MS4 UA or into which the UA drains, the current Monitoring and Assessment Plans for Hanahan and Goose Creek provide the standard operating procedures and protocols for potential monitoring and assessment implementation only.

C. Discharges to Impaired Water Bodies (§3.4)

1. Does the MS4 discharge to receiving waters on the 303(d) list of impaired waters? If yes, list the water body and the pollutant(s) of concern. ☐ No ☒ Yes

When the Berkeley County SWMP was updated, the 2016 303(d) list was the most current list approved by the EPA. The previous Annual Report for Years 3-4 also referenced the 2016 303(d) list. Since the previous report, no stations have been removed or have been added to the list.

Currently, 23 stations are listed for the Urbanized Areas in Berkeley County, Goose Creek, and Hanahan (RL-10104 is listed twice on the 2016 303(d) list, so the actual number of impaired stations is 22).

Many stations that were previously listed had revisions to the projected TMDL dates. These changes are reflected in Tables 4a, 4b and 4c of the SWMP, and summarized below.

Table 1: Location and Cause of Impaired Stations

DESCRIPTION	STATION	USE	CAUSE(S)	LOCATION
WASSAMASSAW SWP AT US 176	CSTL-063	REC	ECOLI	BC
DURHAM CK AT S-08-9 BRIDGE	MD-217	FISH	HG	BC
COOPER RIVER @ BUSHY PARK	MD-042	FISH	HG	BC
BACK RIVER RES IN FOREBAY EQUIDISTANT FROM DAM AND SHORELINES	CSTL-124	AL	DO	BC & GC
FOSTER CREEK AT CHARLESTON CPW WATER INTAKE	MD-240	AL	DO	BC & GC
TAIL RACE CANAL AT US 52 & 17A BELOW LAKE MOULTRIE (SC-033)	CSTL-062	FISH	HG	BC
GOOSE CK AT S-08-136 BRIDGE	MD-039	REC	ENTERO	BC & GC
GOOSE CK RES 2.3 M S OF GOOSE CREEK TOWN CENTER	RL-01008	AL	DO	BC, GC, HH
GOOSE CREEK RESERVOIR 1.0 MI NW OF SPILLWAY NEAR W SHORELINE	RL-03340	AL	CHLA, DO, TP	BC, GC, HH
GOOSE CREEK RESERVOIR 0.55 MI W OF DAM	RL-05412	AL	TP	BC, GC, HH
GOOSE CREEK RESERVOIR 2 MI N OF SPILLWAY	RL-06434	AL	DO	BC, GC, HH
GOOSE CK RESERVOIR 0.6 MI NW OF 2ND POWERLINES US OF BOAT RAMP, NEAR W SHORE BTWN 2 WESTERN EMBAYMENTS	RL-07017	AL	DO	BC, GC, HH
GOOSE CK RESERVOIR MIDLAKE IN LINE WITH NORTHBROOK BLVD	RL-08065	AL	DO, TP	BC, GC, HH
GOOSE CREEK RESERVOIR 0.1 MILE NORTHEAST OF THE JOHN R. BETTIS BOAT LANDING AND 0.1 MILES SOUTHEAST OF ST-033 NEAR THE NORTHEAST BANK.	RL-09081	AL	CHLA, TP	BC, GC, HH
LAKE, GOOSE CK RESERVOIR 1.95MI WEST OF POPPENHEIM CROSSING	RL-10104	REC	ECOLI	BC, GC, HH
LAKE, GOOSE CK RESERVOIR 2.5MI SW OF POPPENHEIM CROSSING	RL-10108	AL	CHLA, DO, TP	BC, GC, HH
GOOSE CREEK RESERVOIR APPROXIMATELY 1.3 MILES UPSTREAM FROM THE DAM. SITE IS LOCATED 100 YARDS SOUTH OF THE MAJOR POINT ON THE EAST BANK IN THE MIDDLE OF THE RESERVOIR.	RL-11118	AL	CHLA, PH, TP	BC, GC, HH
GOOSE CK RESERVOIR APPROX 250 YDS NW OF END OF HANAHAN RD	RL-13132	AL	PH, TP	BC, GC, HH
BERESFORD CREEK 5.3 MI NNE OF WANDO AND COOPER RIVER CONFLUENCE	RO-056092	AL	DO	BC
GOOSE CREEK RESERVOIR 100 M US OF DAM	ST-032	AL	CHLA, TP	BC, GC, HH
GOOSE CK RESERVOIR AT 2ND POWERLINES US OF BOAT RAMP	ST-033	AL	TP	BC, GC, HH
GOOSE CREEK RESERVOIR 2.8 MI NW OF SPILLWAY NEAR OTRANTO	RL-04390	AL	CHLA, DO, TP	BC, GC, HH
LAKE, GOOSE CK RESERVOIR 1.95MI WEST OF POPPENHEIM CROSSING	RL-10104	AL	CHLA, DO, TP	BC, GC, HH

2. Which of the 303(d) pollutant(s) of concern listed above have the potential to occur within the MS4?

- Bacteria (FC, ENTERO and ECOLI)
- Total Phosphorus
- Chlorophyll-a

IV. Storm Water Management Program

A. Ordinance Information (§4.1)

(Insert your website address if the ordinance is posted online. If your ordinance is not posted online, please submit a hard copy with this report.)

Websites

Berkeley County: https://d7e3m5n2.stackpathcdn.com/wp-content/uploads/2019/11/ordinance_14-11-36-Stormwater-Management-Ord-14-11-36.pdf

Hard copy attached:☒

Hanahan: Included with this report in Appendix D of the SWMP

Goose Creek: Included with this report in Appendix D of the SWMP

Please see Appendix D of the 2019 SWMP for the hard copies for the Stormwater Management Ordinances for the County, City of Hanahan, and City Goose Creek.

B. Storm Water Management Plan (SWMP) (§4.1, 4.5)

(Answer the questions below about the SWMP for the current reporting year.)

1. Have you reviewed and updated the SWMP, including changes to any BMP or identified measurable goals that apply to the program elements (§4.5.1, 5.3.4, and Appendix B)?

Berkeley County has completed an annual review of the SWMP in conjunction with the preparation of the Annual Report for the County, City of Goose Creek, and the City of Hanahan. The updated SWMP is included in Appendix A. Appendix B of the SWMP includes items that were changed in the SWMP. In general, changes were made to Minimum Measure Permit Requirement tables to adjust wording for completed items for Berkeley County, City of Goose Creek, and City of Hanahan. Minimum Measure tables include the status of the milestones and updates to the measurable goals.

2. Has a summary of the stormwater activities you plan to undertake during the next reporting cycle been developed and updated (§5.3.3)?

Appendix D of the SWMP document contains the Implementation Schedule, including the deadlines for the MS4s associated with the SWMP.

3. Have there been any changes to the area covered by the MS4? If yes, is this reflected by updates to the SWMP?

☐ No

☒ Yes (explain): Berkeley County lost areas to City of Charleston, City of Summerville, Town of Moncks Corner and City of Goose Creek due to annexation. Also, as of January 2019 Berkeley County expanded the County's regulated area to cover areas previously regulated by Dorchester County after a County boundary line dispute was resolved. The updated MS4 area maps are included in Appendix A of the SWMP.

Goose Creek MS4 has annexed portions of Berkeley County, but the area covered by Berkeley County MS4 has remained the same.

4. Are there any proposed changes to the goals or BMP (best management practices) in the SWMP?

☒ No ☐ Yes (explain):

5. Do you have adequate resources to implement your SWMP?

☒ Yes ☐ No (explain):

Berkeley County established a stormwater utility fee program that is generating monies to address MS4 compliance within the County and Cities of Hanahan and Goose Creek.

6. Provide information below about staffing levels for each Minimum Control Measure (MCM). This information should be presented as the amount of individuals performing duties directly related to each MCM and the estimated percentage of their time spent doing so. If you share responsibility for the MCM with another entity, indicate that in the corresponding spaces.

Berkeley County implemented a stormwater interim fee during the 2014/2015 fiscal year to help fund the Stormwater Management Program. In the years prior to Inter-Governmental Agreements (IGA) with the City of Goose Creek and the City of Hanahan, Berkeley County generated between $1.5M - $1.7M annually. With the recent IGAs the total utility revenues increased to $2.2M – 2.5M annually. The County has adopted a permanent fee and rate structure. The adoption of permanent fee and rate structure has increased total revenue to approximately $4.7M -$5.1M annually. The additional revenue will be utilized to cover an expanding operation and maintenance program, focused on meeting requirements of MCM#5 & MCM#6. Additionally, there will be a focus on repair and replacement of municipally owned and maintained infrastructure. Since the inception of the stormwater utility, the County's revenues have exceeded the programs expenditures. The County has the necessary resources to complete the listed items in their SWMP and meet permit requirements of all permitted entities. A more detailed budget can be provided upon request.

Berkeley County currently has 15 employees in the engineering and stormwater departments whose jobs are directly related to the stormwater management programs focus on requirements of MCM#4. Of the 15 employees, 8 perform activities directly related to stormwater management programs focus on requirements of MCM#3, MCM#4, & MCM#6. Of the 8 employees, 1 employee performs activities directly related to stormwater management programs focus on requirements of MCM#1 & MCM#2. The County currently has a request for 2 new positions within the stormwater program whose job duties will be directly related to the stormwater management program. Berkeley County currently has 35 employees in the roads & bridges/stormwater program, whose jobs are directly related to the stormwater management program. The County has the resources, both with staffing and funding, to carry out the tasks described in their SWMP. All staff and resources are utilized in meeting the requirements for each permitted entities

MCM requirements. Additionally, each municipal entity has 1-2 employees whose support is directly related the stormwater management programs focus on MCM requirements. More information can be provided upon request.

7. Has training been provided to staff as required by the permit in the last reporting year?

☒ Yes (fill in the table below) ☐ No (explain, and provide implementation dates):

Table 2: Summary of Training

Date	**Topics Covered**
Varies	CEPSCI training
08/31/18 – 10/11/18 & 08/12/19-08/29/19	In-house training on IDDE tracking and identification; good housekeeping;
Continuous	IDDE tracking & identification T.V. scroll throughout County facilities
10/23/18, 10/24/2018, 10/24/19	Good housekeeping webinars
Varies	CSPR training

v. Minimum Control Measures (MCM)

A. Sharing Responsibility (§4.4)

1. Is responsibility shared for any minimum measures through an agreement with another entity?
☐ No ☒Yes (*name the entity in the chart below)*

Through the IGA with City of Hanahan and City of Goose Creek, Berkeley County is responsible for MCMs 1-6 for all three entities.

Table 3: Berkeley County Responsibilities:

MCM 1	Ashley Cooper Stormwater Education Consortium (ACSEC)
MCM 2	Ashley Cooper Stormwater Education Consortium (ACSEC)
MCM 3	Berkeley County, per IGA
MCM 4	Berkeley County, per IGA
MCM 5	Berkeley County, per IGA
MCM 6	Berkeley County, per IGA

Table 4: City of Goose Creek Responsibilities:

MCM 1	Responsibility was transferred to Berkeley County via an IGA dated 15 October 2015
MCM 2	Responsibility was transferred to Berkeley County via an IGA dated 15 October 2015
MCM 3	Responsibility was transferred to Berkeley County via an IGA dated 15 October 2015
MCM 4	Responsibility was transferred to Berkeley County via an IGA dated 15 October 2015
MCM 5	Responsibility was transferred to Berkeley County via an IGA dated 15 October 2015
MCM 6	Responsibility was transferred to Berkeley County via an IGA dated 15 October 2015

Table 5: City of Hanahan Responsibilities:

MCM 1	Responsibility was transferred to Berkeley County via an IGA dated 3 November 2015
MCM 2	Responsibility was transferred to Berkeley County via an IGA dated 3 November 2015
MCM 3	Responsibility was transferred to Berkeley County via an IGA dated 3 November 2015
MCM 4	Responsibility was transferred to Berkeley County via an IGA dated 3 November 2015
MCM 5	Responsibility was transferred to Berkeley County via an IGA dated 3 November 2015
MCM 6	Responsibility was transferred to Berkeley County via an IGA dated 3 November 2015

If you have indicated that you are sharing responsibility above in any MCM, answer the questions below:

2. Have you submitted notice to the Department that you are relying on another entity?
☒Yes ☐No *(submit a copy of any agreements that have not previously been sent to the Department)*

The IGAs between Berkeley County, City of Hanahan, and City of Goose Creek are included in Appendix H of the SWMP (Appendix A of this Annual Report) and were initially submitted to the Department in the Year 1-2 NPDES Annual Report.

An agreement with ACSEC included in Appendix G of the Stormwater Management Plan (updated in 2016) and was also submitted with the first annual report (2014-2015).

3. If applicable, provide the date of submission of the agreement(s) to the Department:

- IGA with Hanahan (October 9, 2015) submitted with previous Annual Report (2014-2015) in April of 2016;
- IGA Gosse Creek (October 15, 2015) submitted with previous Annual Report (2014-2015) in April of 2016;
- Executed Contract with Clemson (November 28, 2016) submitted with this Report in Appendix G of the Stormwater Management Plan

4. Are all control measures as stringent as the permit requires?
☒Yes ☐No *(if no, provide an explanation)*_____

5. Did the other entity agree in writing to implement the measure on your behalf?

☒Yes ☐No *(if no, provide an explanation)*_____

6. Did the other entity implement the measure and agree to report on your behalf?

☒Yes ☐No *(if no, provide an explanation)*_____

7. Is the agreement maintained as part of the SWMP?

☒Yes ☐No *(if no, provide an explanation)*_____

8. Have you dissolved any agreements with entities this reporting year?

☒No ☐Yes *(if yes, who?)* _____

B. Minimum Control Measure 1: Public Education and Outreach on Storm Water Impacts (§4.2.1, 5.3)

1. Summarize outreach strategies, goals, and progress for the current reporting year. In the "activities conducted and planned" section, focus on activities that were conducted in the last reporting year and those that are planned for the upcoming reporting year, providing implementation dates. Add rows where needed and attach additional sheets if necessary.

As a result of the IGA between Berkeley County, City of Goose Creek, and the City of Hanahan, the County has committed to implementing, managing, and maintaining a partnership with the Ashley Cooper Stormwater Education Consortium. This partnership is contracted through 2021 with Clemson's Carolina Clear program as necessary to satisfy NPDES MS4 permit requirements for Public Education and Outreach.

Outreach strategies and goals for progress for the current reporting year were developed in 2018 under a strategic plan effort coordinated by ACSEC. See ACSEC's Stormwater Outreach Strategic Plan: 2018-2023 in Appendix E of this Annual report.

Pollutants of concern were divided into three priority areas based on type of pollutants targeted:

- Bacteria Audience Priorities
  - Dog owners who walk their dogs
  - New homeowners with septic tanks
- Litter Audience Priorities
  - Shoppers wanting to use reusable bags but forget to bring them
  - Smokers that do not dispose of cigarette butts in trash
- Nutrient Audience Priorities
  - Home gardeners that perform their own landscaping
  - Landscape professionals that do not currently offer soil testing to clients

ACSEC's progress timelines for activities to be completed, are on a five-year education strategy timeline for execution of each target behavior. The education strategies and five-year target timelines are summarized on pages 10-21 of the Stormwater Outreach Strategic Plan in Appendix E of this Annual Report.

See ACSEC Annual Report of Activities for 2018 and 2019 in Appendix E of this Annual Report for a more detailed listing of activities conducted in the reporting year; please note that the numbers presented by the ACSEC report are generally for the Charleston tri-county area, and are not specific to Berkeley County, City of Hanahan, and City of Goose Creek with the exception of where specifics are cited for each respective entity.

ACSEC utilized several outreach techniques to address these priorities, including:

- Indirect Outreach Methods such as mass-media campaigns that include internet; television; publications; outreach materials; permanent exhibits; and public events (fairs and festivals).
- Direct Outreach Methods such as direct contacts; presentations; signage; flyers; tangible item resources; youth presentations; workshops; trainings and certifications; and conferences.

In addition to efforts through Carolina Clear, Berkeley County also provides public education and outreach through its Facebook page and in partnership with Keep Berkeley Beautiful. More information can be found at the following links:

https://www.facebook.com/KeepBerkeleyBeautiful/

https://www.keepberkeleybeautifulsc.org/

https://www.facebook.com/BCSTORMWATER/

Control Measure 1 Evaluation (§5.3)

1. Evaluate the success of this MCM. Refer to goals implemented and achieved, and adherence to the implementation schedule:

ACSEC programming priorities were identified and developed through the ACSEC Outreach Strategic Plan 2018-2023. The Strategic Plan provides a framework for prioritizing regional issues, developing target outreach methods, and determining program evaluation metrics to improve the delivery and impact of ACSEC efforts. ACSEC established education timelines within the Outreach Strategic Plan. The evaluation of success for goals implemented and achieved are included in the Annual Report of Activities for 2018 and 2019 in Appendix E of this Annual Report. Those actionable items within the Annual Report of Activities are correlated with requirements in the implementation schedule of the Outreach Strategic Plan.

2. Provide an evaluation of where the program needs improvement and explain any actions that will be taken to achieve objectives:

As Berkeley County, City of Hanahan and City of Goose Creek continue to grow and develop, public education and outreach will continue to grow and evolve. The ACSEC Strategic Plan allows for the flexibility to refine and supplement regional efforts as needed to address these changes. Berkeley County will continue to participate in ACSEC activities in order to ensure that the County and Cities will achieve the necessary goals for this Control Measure.

The currently implemented program appears to be reaching all targeted audiences and meeting the requirements within the SWMP. Currently, Berkeley County intends to continue the contract with CUCES/Ashley Cooper Stormwater Education Consortium.

C. Minimum Control Measure 2: Public Involvement/Participation (§4.2.2, 5.3)

1. How can the public find information about the SWMP?

Berkeley County, City of Hanahan, and City of Goose Creek use the same SWMP, and it is referenced on the Berkeley County stormwater webpage:

https://berkeleycountysc.gov/fnd/?goto=Stormwater+Management

2. Summarize public involvement opportunities, goals, and progress for the current reporting year. In the "activities conducted and planned" section, focus on activities that were conducted in the last reporting year and those that are planned for the upcoming reporting year, providing implementation dates. Add rows where needed and attach additional sheets if necessary.

As a result of the IGA between Berkeley County, City of Goose Creek, and the City of Hanahan, the County has committed to implementing, managing, and maintaining a partnership with the Ashley Cooper Stormwater Education Consortium. This partnership is contracted through Clemson's Carolina Clear program as necessary to satisfy NPDES MS4 permit requirements for Public Involvement.

See ACSEC Annual Report of Activities 2018, 2019; and the contract has continued until 2021. Information included as part of Appendix E; please note that the numbers presented by the ACSEC report are generally for the Charleston tri-county area, and are not specific to Berkeley County, City of Hanahan, and City of Goose Creek with the exception of where specifics are cited for each respective entity.

ACSEC utilized a variety of methods for public involvement, including:

- storm drain marking/storm drain mural paintings
- Healthy Pond Series/floating wetlands workshops
- litter sweeps
- oyster reef construction
- rain barrel sales
- native plant sales
- salt marsh buffer installation
- pet waste bag dispenser programs
- youth involvement events
- street interviews on reusable shopping bags
- master rain gardener workshops and installation events
- water quality monitoring

Public involvement activities resulted in a total of 49,430+ direct contacts with public involvement opportunities for this reporting year. All future planned activities for public involvement in the upcoming reporting year are summarized in the ACSEC Outreach Strategic Plan in Appendix E.

Control Measure 2 Evaluation (§5.3)

1. Evaluate the success of this MCM. Refer to goals implemented and achieved, and adherence to the implementation schedule:

ACSEC programming priorities were identified and developed through the ACSEC Outreach Strategic Plan 2018-2023. The Strategic Plan provides a framework for prioritizing regional issues, developing target

outreach methods, and determining program evaluation metrics to improve the delivery and impact of ACSEC efforts. ACSEC established education timelines within the Outreach Strategic Plan. The evaluation of success for goals implemented and achieved are included in the Annual Report of Activities for 2018 and 2019 in Appendix E of this Annual Report. Those actionable items within the Annual Report of Activities are correlated with requirements in the implementation schedule of the Outreach Strategic Plan.

2. Provide an evaluation of where the program needs improvement and explain any actions that will be taken to achieve objectives:

As Berkeley County, City of Hanahan and City of Goose Creek continue to grow and develop, the involvement and participation of the public will continue to grow and evolve. The ACSEC Strategic Plan allows for the flexibility to refine and supplement regional efforts as needed to address these changes. Berkeley County will continue to participate in ACSEC activities in order to ensure that the County and Cities will achieve the necessary goals for this Control Measure.

The currently implemented program appears to be reaching all targeted audiences and meeting the requirements within the SWMP. Currently, Berkeley County intends to continue the contract with CUCES/Ashley Cooper Stormwater Education Consortium.

D. Minimum Control Measure 3: Illicit Discharge Detection and Elimination (IDDE) (§4.2.3, 5.3)

1. How can the public notify the MS4 of suspected illicit discharges?

The public – within the County, City of Hanahan or City of Goose Creek – can call, email or post messages on both the Facebook page and on the stormwater department webpage. Additionally, the City of Hanahan & City of Goose Creek stormwater webpages redirect the public to all the following County contact information. Currently, the City of Goose Creek & the City of Hanahan staff handle all forwarding of complaints from the public to the below County contact information.

- (843) 719-4195
- webswmp@berkeleycountysc.gov
- https://www.facebook.com/BCSTORMWATER/
- https://berkeleycountysc.gov/dept/swmp/discharges/

County contact information via City of Goose Creek

- https://www.cityofgoosecreek.com/government/departments/fire-ems/building-inspections/stormwater-management

County contact information via City of Hanahan

- https://cityofhanahan.com/government/building-and-codes/stormwater-management/

2. Complete the list below for the last reporting year:

- Total number of suspected illicit discharges: **14**
- Total number of illicit discharges found: **14**
- Number of illicit discharges with enforcement escalation (action taken beyond written warning): **none**
- Total number of illicit discharges eliminated: **14**

3. Use the table below to summarize priority areas (and associated rationale for selection) for screening. If these areas have changed since the last reporting year, provide a brief explanation. Add rows where needed and attach additional sheets if necessary.

Table 6: Summary of Priority Areas

Priority Areas	**Rationale for Selection**	**Changed within last reporting year?** *(If so, provide an explanation.)*
1. Municipally owned and/or operated facilities with "hot spot" activities such as vehicle maintenance, storage areas, etc.	Various facilities store refuse, chemicals and other potentially harmful substances. The County has moved several facilities out of proximity of downstream waterbodies and will continue to audit these sites and train staff on proper disposal of potentially hazardous materials.	No.
2. Known areas with repetitive, historical illicit discharges	All identified illicit discharges have been tracked and eliminated at their source within the municipal city limits and unincorporated MS4 boundaries. If the County becomes aware of a reoccurrence of illicit discharges, the site will be inspected in accordance with the "Standard Operating Procedures for Use in Field Investigations for Illicit Discharges"	No.

3. Known areas with a history of illegal dumping	There are currently no areas within the municipal city limits or the unincorporated County MS4 boundaries that have a history of repetitive illegal dumping activities. If the County becomes aware of reoccurrence of illegal dumping activities in a portion of each MS4, these sites will be inspected in accordance with "Standard Operating Procedures for Use in Field Investigations for Illicit Discharges"	No.
4. Known areas with older sewer lines, history of sanitary sewer overflows (SSOs) or known cross-connections	There are currently no areas within the municipal city limits or the unincorporated County MS4 boundaries that have a history of, cross-connection pipes, or repetitive malfunctioning septic systems. However, repetitive SSOs have been identified. The County coordinates with Berkeley County Water and Sanitation, Berkeley County Codes Enforcement, and SCDHEC regarding these issues.	Yes, this area of the priority areas for illicit discharge detection and elimination was updated to include two known repetitive SSOs that are to be inspected in accordance with the County's Standard Operating Procedure for Use in Field Investigation for Illicit Discharges.
5. Areas thought to be causative of pollutants of concern (POC) upstream to sensitive waterbodies and/or impaired monitoring stations	The 2016 303(d) list contains 20 impaired stations within the County's and Cities' MS4 jurisdiction. Additionally, there are three sensitive water stations (SFH classification) and three developed and approved TMDLs within each MS4 area.	Yes, new outfall locations have been identified for screening in upstream locations.

4. Use the table below to summarize IDDE action items, goals, and progress for the current reporting year. In the "activities conducted and planned" section, focus on activities that were conducted in the last reporting year and those that are planned for the upcoming reporting year, providing implementation dates. Add rows where needed and attach additional sheets if necessary.

Table 7: Summary of IDDE Action Items, Goals, and Progress

IDDE Action Item	**Measurable Goal(s)**	**Progress on Goal(s)**	**Activities Conducted and Planned** *(specific implementation dates)*
Update storm sewer map	Continue to update stormwater outfall locations.	☐ In Planning ☒ Ongoing ☐ Completed ☐ Evaluation	2018 & 2019- Staff continue to add new outfall locations to the storm sewer map throughout the reporting years. In the reporting year (2018-2019) a total of 63 outfall locations were added to the map for all three entities. A total of 26

			outfall locations were removed from the map due to incorrect mapping and or moving/removal. For a net total of 37 new outfall locations for all entities.
Field Screening	Conduct field screening of year 5 & 6 screening points	☐ In Planning ☐ Ongoing ☒ Completed ☐ Evaluation	2018 & 2019- Field screening was conducted on a total of 1,614 outfall locations, out of a total of 2,180 known outfall locations throughout all entities.
Field Screening	Conduct Illicit Tracking of Year 5 & 6 potential illicit discharges	☐ In Planning ☐ Ongoing ☒ Completed ☐ Evaluation	2018 & 2019- 5 total illicit discharges were identified via visual field screening activities. 2 illicit discharges were identified after field sampling and analysis. Both illicit discharges were tracked to their source and removed from the system.
Field Screening	Document Illicit Discharges	☐ In Planning ☐ Ongoing ☒ Completed ☐ Evaluation	2018 & 2019 – 16 illicit discharges were identified in the last reporting year for all entities. Of the 16 identified, 2 were identified via outfall screening methods. 14 illicit discharges were complaint driven and identified at their source. All identified illicit discharges were eliminated at their source and documented.
Training	Provide employees with training of IDDE identification and notification information	☐ In Planning ☐ Ongoing ☒ Completed ☐ Evaluation	2018-2019 - Seventeen (17) IDDE and Good Housekeeping trainings were conducted: 346 employees (223 from Berkeley County, 43 from Hanahan, and 80 from Goose Creek) attended the seventeen trainings in 2018 & 2019.

Control Measure 3 Evaluation (§5.3)

1. Evaluate the success of this MCM. Refer to goals implemented and achieved, and adherence to the implementation schedule:

The County, City of Goose Creek and City of Hanahan have achieved all goals for this MCM by identifying & updating priority areas and developing storm system map.

2. Provide an evaluation of where the program needs improvement and explain any actions that will be taken to achieve objectives:

Berkeley County just updated a Field Screening Assessment in 2017 for the County, City of Hanahan, and City of Goose Creek. The following action items were identified for improvement to the IDDE program:

Completed Action Items for Next from Previous Permitting Years:

1. Equipment- the stormwater program should invest in owned supplies such as back packs, measuring tapes, water quality monitoring equipment, etc. – Completed 2017
2. Pollution Prevention- storm drain stenciling should become a widespread effort. - Ongoing since 2017
3. Mapping Resources- Portable GIS/EAM equipped notepads available for field screening. – Completed 2018
4. Mapping Resources- Map known septic systems. – Ongoing since 2018
5. Mapping Resources- Complete a GIS desktop assessment to identify areas of potential illicit discharges for future field screenings. – Ongoing since 2018
6. Equipment- obtain smoke testing equipment and dye injection equipment. – Completed 2018 and ongoing

Action Items for Next 3 – 7 Years:

1. Legal Authority- An up-to-date shared tracking system for all agency access.
5. Staff Capacity- Require confined space entry training for staff.
7. Education & Outreach- develop real-time reporting tools (smart phone app) for public use.
8. Discharge Removal Capability – equip staff with appropriate tools and training to eliminate illicit connections identified during field screenings.
9. Program Budget & Finances- explore cost sharing arrangements with other entities when specific illicit discharges are identified via field screening efforts.
10. Program Budget & Finances- explore grant opportunities for field screening efforts.
11. Pollution Prevention- prioritize areas via known NPDES facilities, hotspot businesses, and age of infrastructure. Then conduct a comprehensive assessment utilizing prioritized locations.
12. Pollution Prevention- utilize storm drain plugs to combat illicit discharges.

E. Minimum Control Measure 4: Construction Site Storm Water Runoff Control (§4.2.4, 5.3)

1. How can the public notify the MS4 of possible noncompliance at construction sites?

The public – within the County, City of Hanahan or City of Goose Creek – can call, email or post messages on both the Facebook page and on the stormwater department webpage. Additionally, the City of Hanahan stormwater webpage redirects the public to all the following County contact information. Currently, the City of Goose Creek staff handle all forwarding of complaints from the public to the below County contact information.

- (843) 719-4195
- webswmp@berkeleycountysc.gov
- https://www.facebook.com/BCSTORMWATER/
- https://berkeleycountysc.gov/dept/swmp/discharges/

County contact information via City of Goose Creek

- https://www.cityofgoosecreek.com/government/departments/fire-ems/building-inspections/stormwater-management

County contact information via City of Hanahan

- https://cityofhanahan.com/government/building-and-codes/stormwater-management/

2. How does the MS4 communicate with construction operators to ensure understanding of requirements and improvements that may be needed?

The County utilizes constructor operator training via on-site pre-construction meetings. Additionally, through all subsequent inspections by Berkeley County Staff, construction operators are educated and trained on proper site construction practices as it pertains to stormwater, BMP, and erosion control practices.

3. Has an enforcement response plan (ERP) been developed and utilized?

☒ Yes ☐ No (*explain):*

4. Complete the list below for the last reporting year:

- Number of new construction sites: **TOTAL = 108** (BC = 72; GC = 20; HH = 16)
- Total number of active construction sites: **TOTAL = 385** (BC = 302; GC = 52; HH = 31)
- Total number of inspections performed: **TOTAL = 5,495** (BC = 4,166; GC = 921; HH = 408)
- Number of sites with unsatisfactory/noncompliant inspection results: **TOTAL = 142** (BC = 91; GC = 30; HH = 21)
- Number of sites with enforcement escalation (action taken beyond written warning): **TOTAL = 9**
- Number of sites inspected past the deadline specified in the permit: **TOTAL = 0**

5. Use the table below to summarize construction site action items, goals, and progress for the current reporting year. In the "activities conducted and planned" section, focus on activities that were conducted in

the last reporting year and those that are planned for the upcoming reporting year, providing implementation dates. Add rows where needed and attach additional sheets if necessary.

Table 8: Summary of Construction Site Action Items, Goals, and Progress

Construction Site Action Item	**Measurable Goal(s)**	**Progress on Goal(s)**	**Activities Conducted and Planned** *(specific implementation dates)*
Erosion Prevention and Sedimentation Control	Provide a tool to assist construction site operators to implement appropriate EPSC BMPs	☐ In Planning ☐ Ongoing ☒ Completed ☐ Evaluation	January 1, 2014 – All construction site operators are provided education and training via pre-construction meetings and subsequently throughout the inspection process, and if necessary, enforcement process. Additionally, materials and documentation for proper implementation of EPSC BMPs are provided on the County website.
Pollution Prevention	Provide a tool to assist construction site operators to implement appropriate Pollution Prevention BMPs.	☐ In Planning ☐ Ongoing ☒ Completed ☐ Evaluation	January 1, 2014- All construction site operators are provided education and training via pre-construction meetings and subsequently throughout the inspection process, and if necessary, enforcement process. Additionally, materials and documentation for proper implementation of Pollution Prevention BMPs are provided on the County website.
Pollution Prevention	Update Stormwater Design Standards Manual	☐ In Planning ☐ Ongoing ☒ Completed ☐ Evaluation	The manual is currently being updated and will require EPSC plans to contain all components of a Stormwater Pollution Prevention Plan as outlined by SCDHEC and the most current Construction General Permit (CGP). Berkeley County's Goose Creek's, and Hanahan's Stormwater Design Standards Manual was updated in September 2014. This document includes pollution prevention requirements.
Update Plan Review Procedures	Review and update plan review procedures to ensure compliance with Stormwater Design Standards Manual	☐ In Planning ☐ Ongoing ☒ Completed ☐ Evaluation	Berkeley County's Goose Creek's, and Hanahan's Stormwater Design Standards Manual was updated in September 2014. This document includes Plan Review procedures. Plan review procedures will be updated concurrently with the Design Standards Manual.
Develop Construction Site and Site Inspection Inventory	Develop a database for construction sites	☐ In Planning ☒ Ongoing ☐ Completed ☐ Evaluation	The database, EnerGOV, is updated annually to reflect inspection inventory.
Update site inspection procedures	Update County Stormwater Design Standards Manual	☐ In Planning ☐ Ongoing	The manual is currently being updated

		☒ Completed ☐ Evaluation	Berkeley County's Goose Creek's, and Hanahan's Stormwater Design Standards Manual was updated in September 2014. This document includes the inspection process and procedures for Berkeley County.
Develop section of Enforcement Response Plan (ERP) for Construction Activities	Develop ERP that clearly identifies types of violations, responses to violations, and enforcement measures	☐ In Planning ☐ Ongoing ☒ Completed ☐ Evaluation	As of December 2014, ERPs contain descriptions of violations related to construction activities. Currently all three entities have ERPs developed for their respective SWMP ordinance under a unified document.
Update Stormwater Management Ordinance	Update ordinance to provide authority to meet and enforce criteria of this MCM	☐ In Planning ☐ Ongoing ☒ Completed ☐ Evaluation	In November 2014, the Berkeley County Ordinance was amended to establish regulations to develop and enforce a Stormwater Management Program. Additionally, both Goose Creek and Hanahan established stormwater management ordinances in 2014.
Train MS4 Staff	Train staff whose primary duties are related to implementing the construction stormwater program	☐ In Planning ☒ Ongoing ☐ Completed ☐ Evaluation	Staff training is a continuous process and is integrated into yearly programming.
Develop Construction Site Operator Education	Implement an effective communication process with construction contractors	☐ In Planning ☒ Ongoing ☐ Completed ☐ Evaluation	Annually- All construction site operators are provided an avenue for effective communication via pre-construction meetings and subsequently throughout the inspection process, and if necessary, enforcement process. Additionally, all construction site operator information is collected prior to construction and updated periodically via phone and email.
Develop Public Involvement Procedures	Implement procedures for receipt and consideration of information submitted by the public	☐ In Planning ☐ Ongoing ☒ Completed ☐ Evaluation	Starting in January 2016, citizens can call, email or post messages on both the Facebook page and on the stormwater department webpage. Additionally, complaint forms are available to the public via Facebook and the webpage.

Control Measure 4 Evaluation (§5.3)

1. Evaluate the success of this MCM. Refer to goals implemented and achieved, and adherence to the implementation schedule:

The County has completed every requirement for this permit; annual items are ongoing.

2. Provide an evaluation of where the program needs improvement and explain any actions that will be taken to achieve objectives:

The County has plans to continue updates to in-house procedures utilizing EnerGOV system, SOP, etc.

F. Minimum Control Measure 5: Post-Construction Storm Water Management (§4.2.5, 5.3)

1. Complete the list below for the last reporting year:

- Number of newly completed construction sites: **TOTAL = 193** (BC = 137; GC = 42, HH = 14)
- Number of inspections performed within 30 days of construction completion: **TOTAL =** 193 (BC = 137; GC = 42, HH = 14)
- Total number of inspections performed: **TOTAL = 77** (BC = 61; GC = 16, HH = 0)
- Number of sites with unsatisfactory/noncompliant inspection results: **TOTAL = 4**
- Number of sites with enforcement escalation (action taken beyond written warning): **TOTAL = 0**

2. Use the table below to summarize post-construction action items, goals, and progress for the current reporting year. In the "activities conducted and planned" section, focus on activities that were conducted in the last reporting year and those that are planned for the upcoming reporting year, providing implementation dates. Add rows where needed and attach additional sheets if necessary.

Table 9: Summary of Post-Construction Action Items, Goals, and Progress

Post-Construction Action Item	**Measurable Goal(s)**	**Progress on Goal(s)**	**Activities Conducted and Planned** *(specific implementation dates)*
Develop Water Quality Design Requirements	Provide design community with design guidance for post-construction BMPs	☐ In Planning ☐ Ongoing ☒ Completed ☐ Evaluation	Berkeley County's Stormwater Design Standards Manual was updated in September 2014. This document addresses post-construction requirements.
Develop Site Performance Standards	Provide design community with performance and design standards for post-construction BMPs	☐ In Planning ☐ Ongoing ☒ Completed ☐ Evaluation	Berkeley County's Stormwater Design Standards Manual is currently being updated and currently addresses performance and design standards for post-construction BMPs.
Revise Plan Review Checklist for Post-Construction SWP3 Submittal Requirements	Develop SWP3 requirements for post-construction site performance standards	☐ In Planning ☐ Ongoing ☒ Completed ☐ Evaluation	Berkeley County's Stormwater Design Standards Manual is currently being updated and includes a requirement to include all components of a SWP3 as outlined by SCDHEC and the most current CGP.
Develop Long-Term Maintenance Requirements for Post-Construction BMPs	Develop a post-construction BMP maintenance agreement form and post-construction BMP maintenance verification form	☐ In Planning ☐ Ongoing ☒ Completed ☐ Evaluation	In 2008 Berkeley County adopted Covenants for Permanent Maintenance of Stormwater Systems and this is included in Appendix B of the Design Standards Manual.
Post-Construction BMP Inventory	Develop an inventory of County permitted post-construction BMPs	☐ In Planning ☒ Ongoing ☐ Completed ☐ Evaluation	The County has an inventory of all County permitted post-construction BMPs constructed since January 1, 2014. This information is stored in the County's project management system, EnerGov and is updated as needed.

Post-Construction BMP Inspections Program	Develop procedures and forms for post-construction BMP installation inspections	☐ In Planning ☐ Ongoing ☒ Completed ☐ Evaluation	Procedures and forms have existed since January 1, 2014 within the County's project management system, EnerGov, and are updated as necessary
Post-Construction BMP Inspections Program	Inspect all County permitted post-construction BMPs within 30 days of construction completion	☐ In Planning ☒ Ongoing ☐ Completed ☐ Evaluation	Since January 2014, the County has been performing inspections and recording them within the project management system, EnerGov.
Post-Construction BMP Inspections Program	Develop procedures and forms for post-construction BMP inspections	☐ In Planning ☐ Ongoing ☒ Completed ☐ Evaluation	Procedures and forms have existed since January 1, 2014 within the County's project management system, EnerGov, and are updated as necessary
Post-Construction BMP Inspections Program	Inspect appropriate construction sites to ensure County permitted post-construction BMPs are maintained and operating properly	☐ In Planning ☒ Ongoing ☐ Completed ☐ Evaluation	Since January 1, 2014 all newly constructed sites utilizing County permitted post-construction BMPs are inspected once annually to ensure proper maintenance and operation and again tri-annually. All sites are tracked through the County's project management system, EnerGov.
Post-Construction BMP Inspections Program	Provide documentation of Post-Construction BMP inspections	☐ In Planning ☒ Ongoing ☐ Completed ☐ Evaluation	Since January 2014, the County has been documenting inspections and recording them within the project management system, EnerGov.

Control Measure 5 Evaluation (§5.3)

1. Evaluate the success of this MCM. Refer to goals implemented and achieved, and adherence to the implementation schedule:

The County has conducted all post-construction inspections on BMPs and has updated EnerGov system to correct minor deficiency from human error.

2. Provide an evaluation of where the program needs improvement and explain any actions that will be taken to achieve objectives:

The County will continue to update in-house procedures utilizing the EnerGov system, Standard Operating Procedures, etc.

G. Minimum Control Measure 6: Pollution Prevention/Good Housekeeping for Municipal Operations (§4.2.6, 5.3)

1. Has a comprehensive assessment of the pollutant discharge potential for all municipally owned facilities been conducted? If not, indicate a status and planned completion date in the chart below.

☒Yes ☐ No ☐ In Progress *(explain):*

2. Have yearly comprehensive inspections been conducted at high priority facilities? If not, indicate a status and planned completion date in the chart below.

☒Yes ☐ No ☐ In Progress *(explain):*

3. Has training been conducted for employees? If not, indicate a status and planned completion date in the chart below.

☒Yes ☐ No ☐ In Progress *(explain):*

4. Use the table below to summarize municipal facility pollution prevention action items, goals, and progress for the current reporting year. In the "activities conducted and planned" section, focus on activities that were conducted in the last reporting year and those that are planned for the upcoming reporting year, providing implementation dates. Ensure that the maintenance and inspection of MS4 catch basins and structural storm water controls are addressed in the chart. Add rows where needed and attach additional sheets if necessary.

Table 10: Summary of Municipal Facility Pollution Prevention Action Items, Goals, and Progress

Pollution Prevention Action Item	**Measurable Goal(s)**	**Progress on Goal(s)**	**Activities Conducted and Planned** *(specific implementation dates)*
Municipal Facility Inventory	Inventory non-permitted municipal facilities	☐ In Planning ☐ Ongoing ☒ Completed ☐ Evaluation	January 2015 - An inventory of non-permitted municipal facilities was completed for each entity and stored in an Excel spreadsheet. The list is updated as facilities are added or removed.
Municipal Facility Inventory	List all municipally owned facilities that are covered under a separate NPDES permit for industrial activities	☐ In Planning ☐ Ongoing ☒ Completed ☐ Evaluation	January 2015- An inventory of municipal-owned facilities covered under separate NPDES permits was completed for each and stored in an Excel spreadsheet. The list is updated as facilities are added or removed.
Assessment of Non-Permitted Municipal Facilities	Conduct analysis to identify potential high-priority facilities	☐ In Planning ☐ Ongoing ☒ Completed ☐ Evaluation	July 2015 – An analysis to identify potential high priority facilities, utilizing a comprehensive list of all county and city owned municipal facilities and any activities which might harm the water quality of stormwater runoff was conducted to create a list of high priority facilities for each entity.
Assessment of Non-Permitted Municipal Facilities	Create site evaluation checklist for facility assessment	☐ In Planning ☐ Ongoing ☒ Completed ☐ Evaluation	July 2015 – A site evaluation checklist was created to use during facility inspection and high priority municipal facilities were listed.
Assessment of Non-Permitted Municipal Facilities	Conduct inspections at municipal facilities and complete evaluation checklist	☐ In Planning ☐ Ongoing ☒ Completed ☐ Evaluation	July 2015 – Inspections of high priority facilities were conducted in 2015 for each entity. A high priority inspection checklist created specifically for high priority facility inspections was utilized to assess each facility.
Assessment of Non-Permitted Municipal	Document site evaluation checklists	☐ In Planning ☐ Ongoing	High priority facilities documented in 2015, via a checklist, were documented

Facilities		☒ Completed ☐ Evaluation	along with the checklist evaluation within Berkeley County records.
Assessment of Non-Permitted Municipal Facilities	List high priority facilities	☐ In Planning ☐ Ongoing ☒ Completed ☐ Evaluation	January 2017- A list of high priority facilities was updated for each entity in the form of an excel sheet and is updated annually through additions or subtractions to and from the lists.
Conduct High Priority Facility Inspections	Create high priority inspection form	☐ In Planning ☒ Ongoing ☐ Completed ☐ Evaluation	January 2015 – A high priority inspection form was created and is used during facility inspections.
Conduct High Priority Facility Inspections	Conduct annual inspections and determine potential pollution generating areas	☐ In Planning ☒ Ongoing ☐ Completed ☐ Evaluation	Annually – High priority facility inspections are conducted for each entity utilizing a high priority inspection form.
Conduct High Priority Facility Inspections	Document facility inspection report forms	☐ In Planning ☒ Ongoing ☐ Completed ☐ Evaluation	Annually – High priority inspections completed in 2018 & 2019 for each entity were documented and are included in the Berkeley County Facility Inspection reports.
Prioritization of Stormwater Management Systems/Structures	Create a maintenance schedule based on the prioritization of the stormwater management systems/structures	☐ In Planning ☐ Ongoing ☒ Completed ☐ Evaluation	The County developed a maintenance schedule for County owned/maintained systems/structures within the County in 2016. The priority ranking scale is developed within the Good Housekeeping Manual that was developed in 2011 and Revised in 2019.
Review and Update Pollution Prevention Measures for Operation and Maintenance Activities	Create a set of pollution prevention measures for municipal operation and maintenance activities	☐ In Planning ☐ Ongoing ☒ Completed ☐ Evaluation	The County developed a set of pollution prevention measures for municipal operation and maintenance activities within the Good Housekeeping Manual that was developed in 2011 and Revised in 2019.
Inspect and Maintain County Owned Structural Controls	Conduct inspections and perform maintenance	☐ In Planning ☒ Ongoing ☐ Completed ☐ Evaluation	Berkeley County will continue to inspect and maintain, wherever and whenever necessary, all County owned or maintained structural stormwater controls.
Pollution Prevention and Good Housekeeping Employee Training	Conduct employee training	☐ In Planning ☒ Ongoing ☐ Completed ☐ Evaluation	Berkeley County will continue to provide training to appropriate employees to ensure pollution prevention and good housekeeping activities are practiced throughout the County's separate departments and that are consistent with the County's current Good Housekeeping Manual.

Control Measure 6 Evaluation (§5.3)

1. Evaluate the success of this MCM. Refer to goals implemented and achieved, and adherence to the implementation schedule:

The County has implemented and successfully completed all requirements for Pollution Prevention/Good Housekeeping, according to the implementation schedule.

2. Provide an evaluation of where the program needs improvement and explain any actions that will be taken to achieve objectives:

The County is focusing on the tracking component of infrastructure/replacement/life cycle and integrating that information into Electronic Asset Management software to track for the County, Hanahan, and Goose Creek. This integrated effort will assist the County in its future planning of capital repair and replacement timelines.

Annual Report Appendix A: Stormwater Management Plan (SWMP)

Berkeley County
City of Goose Creek
City of Hanahan
Stormwater Management Program (SWMP)

Prepared in accordance with SCDHEC NPDES General Permit for Storm Water Discharges from Regulated Small Municipal Separate Storm Sewer Systems (SMS4)
Permit No. SCR030000

Adopted July 1, 2014
Revised December 06, 2019

1003 Highway 52
Post Office Box 6122
Moncks Corner, SC 29461-6120
Telephone: (843) 719-4127

CERTIFICATION OF STORMWATER MANAGEMENT PROGRAM

I certify that Berkeley County has taken the necessary steps to obtain and maintain full legal authority to implement and enforce each of the requirements contained in the NPDES General Permit for Storm Water Discharges from Regulated Small Municipal Separate Storm Sewer Systems (SMS4), Permit Number SCR030000. Items 4.1.4.3(a-d) are addressed within this SWMP.

Johnny Cribb	County Supervisor
Name (Print)	Title

Signature

2/20/20

Date

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List of Acronyms and Abbreviations

BMP	Best Management Practice
CEPSCI	Certified Erosion Prevention and Sediment Control Inspector
CSR	Construction Site Runoff
CUCES	Clemson University Cooperative Extension Service
EPA	Environmental Protection Agency
EPSC	Erosion Prevention and Sediment Control
ERP	Enforcement Response Plan
IDDE	Illicit Discharge Detection and Elimination
IECA	International Erosion Control Association
MEP	Maximum Extent Practicable
MCM	Minimum Control Measure
MS4	Municipal Separate Storm System
NPDES	National Pollutant Discharge Elimination System
NOI	Notice of Intent
PP&GH	Pollution Prevention and Good House Keeping
PCR	Post Construction Runoff
PEO	Public Education and Outreach
PIP	Public Involvement and Participation
SMS4	Small Municipal Separate Storm System
SCDHEC	South Carolina Department of Health and Environmental Control
SOP	Standard Operating Procedure
SWMP	Stormwater Management Program
SWP3	Storm Water Pollution Prevention Plan
TMDL	Total Maximum Daily Load

Berkeley County, Goose Creek and Hanahan
NPDES Stormwater Management Program (SWMP)

1.0 Introduction

This Stormwater Management Program (SWMP) is designed to reduce the discharge of pollutants from Berkeley County's Municipal Separate Storm Sewer System (MS4) to the maximum extent practicable, to protect water quality and to satisfy the appropriate requirements of the Clean Water Act. The contents are expected to change with time due to the iterative process of developing the SWMP recognized by the Environmental Protection Agency (EPA) and the South Carolina Department of Health and Environmental Control (SCDHEC). EPA predicts that it will likely take two to three SMS4 general permit terms (5-year terms) to fully develop and implement the SWMP. The first permit term focused heavily on data collection, organization, development of necessary programs, and initial implementation. During the current second SMS4 general permit cycle, the SWMP was amended based on the observed effectiveness of existing plan components and to address the terms and conditions of the new permit. This document is meant to be a living document that will be reviewed and updated, as necessary, on an annual basis to reflect accomplishments, revisions to plan components, and additions of other or expanded efforts.

There are a number of departments within each government that conduct stormwater-related activities. For Berkeley County, these departments include:

- Codes Enforcement
- Planning
- Engineering
- Roads and Bridges
- Facilities and Grounds
- Sangaree Tax District

For Goose Creek, these departments include:

- Codes Enforcement
- Planning, Engineering
- Facilities & Grounds.

For Hanahan, these departments include:

- Codes Enforcement
- Planning
- Facilities & Grounds.

This SWMP addresses the requirements of the NPDES General Permit for Stormwater Discharges from Regulated Small MS4s; Permit No. SCR030000, effective January 1, 2014 and expiring December 31, 2018, with the conditions of the expired permit, continuing in force under S.C. Code section 1-23-370(b) until the effective date of a new permit . Specific language from the SMS4 general permit has been copied and pasted into this SWMP for consistency. The section numbers used in this SWMP correspond with the general permit section numbers.

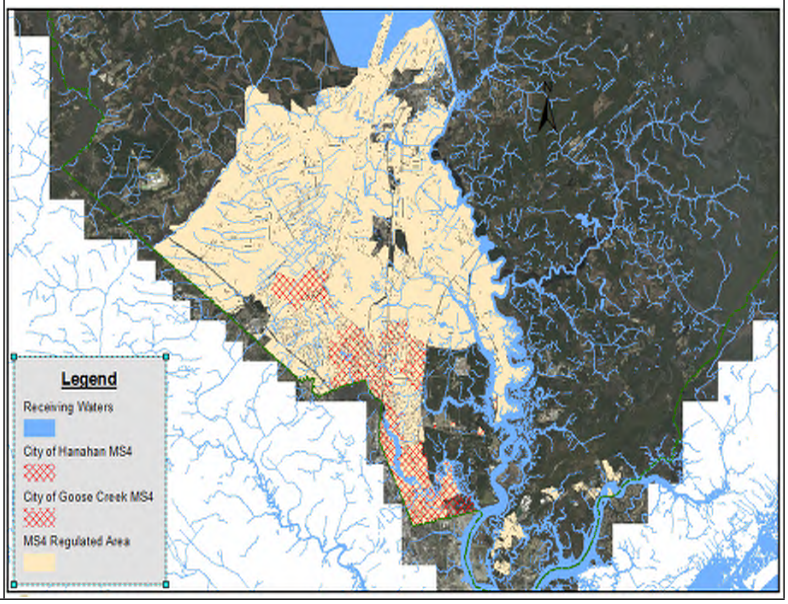
Updates to the SWMP will be included in Appendix B.

In October 2015, intergovernmental agreements between Berkeley County, the City of Hanahan, and the City of Goose Creek were signed. Berkeley County is responsible for the items stated in the agreements (located in Appendix H) and will continue to provide the services stated in those agreements. In the second reporting period (2016-2017), Berkeley County updated this SWMP to address these additional municipalities.

2.0 Notice of Intent (NOI) Information

Notice of Intent information has been provided in three separate tables for Berkeley County, the City of Goose Creek, and the City of Hanahan.

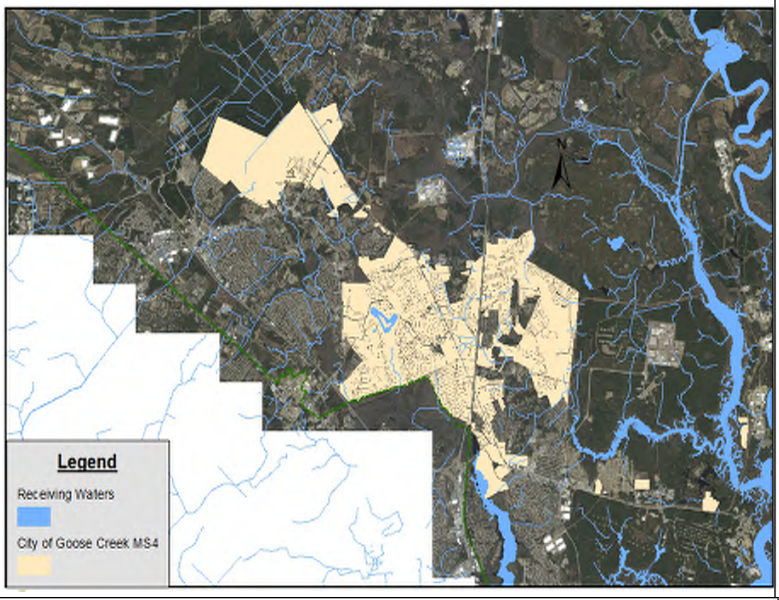
Table 1: Berkeley County NOI Information

General Permit Section	NOI Requirement	Description
2.2.1 INFORMATION ON THE PERMITTEE:		
2.2.1.1	Name of Municipality:	Berkeley County
	Mailing Address:	Johnny Cribb County Supervisor 1003 Highway 52 PO Box 6122 Moncks Corner, SC 29461-6122
	Telephone Number:	(843) 719-4094
2.2.1.2	Public Entity Type:	County
2.2.2 INFORMATION ON THE SMS4:		
2.2.2.1	Map of Berkeley County's MS4 Regulated Area:	SMS4 Location: MS4 Regulated Area SMS4 Center Coordinates: Latitude: N32° 12.38' Longitude: W79° 58.98' MS4 Regulated Area: Approximately 180 square miles (See Appendix A) 

General Permit Section	NOI Requirement	Description
2.2.2.2	Major Receiving Waters:	Lindy Branch, Cooper River**, Back River*, Durham Creek*, Sophia Swamp, Laural Swamp, Daisy Swamp, Canterhill Swamp, Lake Dennis, Lake Hastie, Molly Branch, Stony Branch, Black Tom Bay, Gants Mill Branch, Biggins Creek, California Branch, Cypress Swamp, Sandy Run, Smith Branch, Miller Dam Branch, Felder Branch, Dawson Branch, Kelley Branch, Stanley Branch, Sawmill Branch**, Limehouse Branch, King Branch, Long Branch, Stroberfield Branch, Ancrum Swamp, Tillmans Branch, Poplar Branch, Lake Moultrie*, Mill Branch, Big Run, Wassamassaw Swamp*, Foster Creek*, Goose Creek*, Goose Creek Reservoir*,Prioleau Creek, Martin Creek, Tail Race Canal*, Wando River**
2.2.2.3	Indian Lands:	No portion of Berkeley County's MS4 is located on Indian Country Lands.
2.2.2.4	List of Entities within Berkeley County's SMS4 Area that Operate a Small Separate Storm Sewer System:	There is no small separate storm sewer system operator within the Regulated MS4 area of Berkeley County.
2.2.2.5	Other Governmental Entities:	Clemson University Cooperative Extension Service: Responsible for the public education and outreach and the public participation/involvement components of the NPDES program.
2.2.2.6	BMP Information:	See Section 4.0 for a discussion of the Best Management Practices (BMPs) for each minimum measure. Each minimum measure contains all available information on the BMPs that are to be implemented, their measurable goals, a schedule for their implementation, and the person(s) responsible.

*Listed on the CWA §303(d) list; **Allocated a TMDL

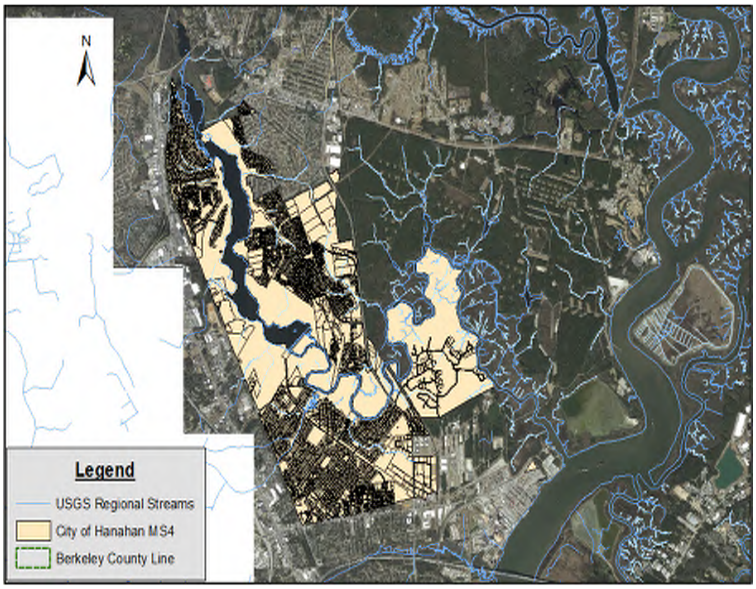
Table 2: City of Goose Creek NOI Information

General Permit Section	NOI Requirement	Description
2.2.1 INFORMATION ON THE PERMITTEE:		
2.2.1.1	Name of Municipality:	City of Goose Creek
	Mailing Address:	Jake Broom, City Administrator 519 North Goose Creek Blvd. P.O. Drawer 1768 Goose Creek, SC 29445
	Telephone Number:	(843) 797-6220 ext. 1113
2.2.1.2	Public Entity Type:	City
2.2.2 INFORMATION ON THE SMS4:		
2.2.2.1	Map of the City of Goose Creek's MS4 Regulated Area:	SMS4 Location: MS4 Regulated Area SMS4 Center Coordinates: Latitude: N32° 58.86' Longitude: W80° 1.96' MS4 Regulated Area: Approximately 15 square miles 
2.2.2.2	Major Receiving Waters:	Back River*, Bluehouse Swamp, Brick Bound Swamp, Cooper River**, Daisy Swamp, Foster Creek*, Goose Creek*, Goose Creek Reservoir*, King Branch, Lindley Branch, Sawmill Branch**
2.2.2.3	Indian Lands:	No portion of the City's MS4 is located on Indian Country Lands.

General Permit Section	NOI Requirement	Description
2.2.2.4	List of Entities within the City of Goose Creek's SMS4 Area that Operate a Small Separate Storm Sewer System:	There is no small separate storm sewer system operator within the Regulated MS4 area of City of Goose Creek.
2.2.2.5	Other Governmental Entities:	Responsibility for all of the City's permit obligations associated with all applicable BMPs was transferred to Berkeley County via an IGA dated 15 October, 2015. These include: • MCM 1: Public Education and Outreach • MCM 2: Public Involvement and Participation • MCM 3: Illicit Discharge Detection and Elimination • MCM 4: Construction Site Stormwater Runoff Control • MCM 5: Post-Construction Stormwater Management • MCM 6: Pollution Prevention/Good Housekeeping for Municipal Operations
2.2.2.6	BMP Information:	See Section 4.0 for a discussion of the Best Management Practices (BMPs) for each minimum measure. Each minimum measure contains all available information on the BMPs that are to be implemented, their measurable goals, a schedule for their implementation, and the person(s) responsible.

*Listed on the CWA §303(d) list; **Allocated a TMDL

Table 3: City of Hanahan NOI Information

General Permit Section	NOI Requirement	Description
2.2.1 INFORMATION ON THE PERMITTEE:		
2.2.1.1	Name of Municipality:	City of Hanahan
	Mailing Address:	Michael Cochran, City Administrator 1255 Yeamans Hall Road Hanahan, SC 29410
	Telephone Number:	(843) 554-4221
2.2.1.2	Public Entity Type:	City
2.2.2 INFORMATION ON THE SMS4:		
2.2.2.1	Map of the City of Hanahan's MS4 Regulated Area:	SMS4 Location: MS4 Regulated Area SMS4 Center Coordinates: Latitude: N32° 54.80' Longitude: W80° 0.19' MS4 Regulated Area: Approximately 11.5 square miles 
2.2.2.2	Major Receiving Waters:	Goose Creek*, Goose Creek Reservoir*,Filbin Creek*, Cooper River**
2.2.2.3	Indian Lands:	No portion of the City's MS4 is located on Indian Country Lands.

General Permit Section	NOI Requirement	Description
2.2.2.4	List of Entities within the City of Hanahan's SMS4 Area that Operate a Small Separate Storm Sewer System:	There is no small separate storm sewer system operator within the Regulated MS4 area of City of Hanahan.
2.2.2.5	Other Governmental Entities:	Responsibility for all of the City's permit obligations associated with all applicable BMPs was transferred to Berkeley County via an IGA dated 3 November, 2015. These include: • MCM 1: Public Education and Outreach • MCM 2: Public Involvement and Participation • MCM 3: Illicit Discharge Detection and Elimination • MCM 4: Construction Site Stormwater Runoff Control • MCM 5: Post-Construction Stormwater Management • MCM 6: Pollution Prevention/Good Housekeeping for Municipal Operations
2.2.2.6	BMP Information:	See Section 4.0 for a discussion of the Best Management Practices (BMPs) for each minimum measure. Each minimum measure contains all available information on the BMPs that are to be implemented, their measurable goals, a schedule for their implementation, and the person(s) responsible.

*Listed on the CWA §303(d) list; **Allocated a TMDL

3.0 Special Conditions Applicable to Permitted Stormwater Discharges to Sensitive Waters

The SMS4 general permit requires that Berkeley County, City of Goose Creek and City of Hanahan determine whether their systems discharge to sensitive waters. For the purpose of the permit, sensitive waters are waters:

- With a Total Maximum Daily Load (TMDL) developed and approved, or established by EPA,
- Included in the most recent SC DHEC Bureau of Water Clean Water (CWA) Section 303(d) list approved by EPA,
- Pursuant to DHEC Water Classifications & Standards (R.61-68) and Regulations (R.61-69) classified as either:
- Outstanding National Resource Waters (ONRW)
- Outstanding Resource Waters (ORW)
- Trout Waters (Natural (TN), Put, Grow, and Take (TPGT) & Put and Take (TPT), or
- Shellfish Harvesting Waters (SFH), and
- In Source Water Protection Areas (SWPA).

3.1 Determination of Receiving Water Conditions and Impacts

The SMS4 general permit requires Berkeley County, City of Goose Creek and City of Hanahan to determine whether their SMS4 discharges to receiving waters within a TMDL watershed or on the most recent SC DHEC's CWA Section 303(d) impaired waters list. To meet this permit requirement, Berkeley County has collected information from SCDHEC on the location of existing TMDLs and impaired waters, as determined from results of the State's monitoring program, that could potentially be impacted by discharges from the SMS4 urbanized areas for Berkeley County, City of Goose Creek and City of Hanahan. Tables 4 and 5 in the sections below provide a list of approved TMDLs and the impaired waterbodies on the 2016 303(d) list that Berkeley County's SMS4 contributes to, either directly or indirectly.

3.2 TMDL Monitoring and Assessment

In compliance with Section 3.2.1 of the SMS4 general permit, TMDL monitoring and assessment plans will be developed for all TMDL waters receiving SMS4 discharges of pollutant(s) of concern, except where Section 3.1.1.2 of the SMS4 general permit is applicable. For TMDLs existing before the effective date of permit coverage, TMDL monitoring and assessment plans will be completed, submitted to SCDHEC, and attached to this SWMP within 12 months of the effective date of permit coverage. For newly established TMDLs, Berkeley County will complete a TMDL monitoring and assessment plan within 12 months of the effective date of the TMDL. As completed, TMDL monitoring and assessment plans will be submitted to SCDHEC and attached to this SWMP in Appendix C. Monitoring will be initiated within 18 months of the effective date of permit coverage for TMDLs

existing before the effective date of permit coverage. For newly established TMDLs, Berkeley County will initiate monitoring activities within 18 months of the effective date of the TMDL.

A list of approved TMDLs for the waterbodies within the regulated MS4 area for Berkeley County, Goose Creek, and Hanahan, and/or which these MS4 areas drain to, can be found in Tables 4a, 4b, and 4c. Berkeley County, Goose Creek and Hanahan were not named as a contributor and were not assigned a waste load allocation in any of the TMDLs listed in Table 4a, 4b, or 4c.

Table 4a: Approved TMDLs within Berkeley County's Regulated MS4 Area

TMDL Watershed	Pollutant of Concern	Monitoring Stations	Effective Date
Ashley-Cooper-Wando-Charleston Harbor	Dissolved Oxygen	MD-115, MD-264, CSTL-102, MD-049, RT-032046, MD-052, RO-09363, CSTL-085, and MD-152	2002 (Original) 2013 (Revision)
Sawmill Branch – Dorchester Creek	Fecal Coliform	CSTL-013, CSTL-043	2003
Wando River	Fecal Coliform	09B-18, 09B-16, 09B-02, 09B-21, 09B-07, 09B-11, 09B-12, 09B-09, 09B-04, 09B-10	2016

Table 4b: Approved TMDLs within the City of Goose Creek's Regulated MS4 Area

TMDL Watershed	Pollutant of Concern	Monitoring Stations	Effective Date
Ashley-Cooper-Wando-Charleston Harbor	Dissolved Oxygen	MD-115, MD-264, CSTL-102, MD-049, RT-032046, MD-052, RO-09363, CSTL-085, and MD-152	2002 (Original) 2013 (Revision)
Sawmill Branch – Dorchester Creek	Fecal Coliform	CSTL-013, CSTL-043	2003

Table 4c: Approved TMDLs within the City of Hanahan's Regulated MS4 Area

TMDL Watershed	Pollutant of Concern	Monitoring Stations	Effective Date

TMDL Watershed	Pollutant of Concern	Monitoring Stations	Effective Date
Ashley-Cooper-Wando-Charleston Harbor	Dissolved Oxygen	MD-115, MD-264, CSTL-102, MD-049, RT-032046, MD-052, RO-09363, CSTL-085, and MD-152	2002 (Original) 2013 (Revision)

3.3 TMDL Implementation and Analysis

In compliance with Section 3.3.2 of the SMS4 general permit, TMDL implementation and analysis plans will be developed for all approved TMDL waters receiving SMS4 discharges of pollutant(s) of concern, except where Section 3.1.1.2 of the SMS4 general permit is applicable. TMDL implementation and analysis plans will be completed and submitted to SCDHEC within 48 months from the effective date of permit coverage, or, for TMDLs established after the effective date of permit coverage, within 48 months of the effective date of the TMDL. The progress on the TMDL implementation and analysis will be included in the Annual Report.

3.4 Discharges to Impaired Waterbodies

Berkeley County will determine whether stormwater discharges from SMS4 system contribute directly or indirectly to the impaired waterbodies listed with monitoring stations in the SC DHEC 303(d) list. BMP applications will be conducted through implementation of the minimum control measures in section 4.2 to protect water quality. The BMP implementation strategies are designed so as not to cause or contribute to violations of water quality standards in water bodies with impaired monitoring stations.

A list of all impaired water bodies receiving discharges from the Berkeley County, City of Goose Creek and City of Hanahan SMS4 can be found in the Tables 5a, 5b, and 5c below, respectively.

Table 5a: 2016 303(d) List of Impaired Stations within Berkeley County's SMS4 Area and/or that the SMS4 Area Drains Into

PRIORITY RANK‡	HUC-12	DESCRIPTION	STATION	CAUSE
3	030502010701	TAIL RACE CANAL AT US 52 & 17A BELOW LAKE MOULTRIE (SC-033)	CSTL-062	HG
3	030502010503	WASSAMASSAW SWP AT US 176	CSTL-063*	ECOLI
3	030502010704	BACK RIVER RES IN FOREBAY EQUIDISTANT FROM DAM AND SHORELINES	CSTL-124	DO
3	030502010706	GOOSE CK AT S-08-136 BRIDGE	MD-039	ENTERO
3	030502010704	COOPER RIVER @ BUSHY PARK	MD-042	HG
3	030502010704	DURHAM CK AT S-08-9 BRIDGE	MD-217	HG
3	030502010703	FOSTER CREEK AT CHARLESTON CPW WATER INTAKE	MD-240	DO
2	030502010706	GOOSE CK RES 2.3 M S OF GOOSE CREEK TOWN CENTER	RL-01008	DO

PRIORITY RANK‡	HUC-12	DESCRIPTION	STATION	CAUSE
2	030502010706	GOOSE CREEK RESERVOIR 1.0 MI NW OF SPILLWAY NEAR W SHORELINE	RL-03340	CHLA, DO, TP†
2	030502010706	GOOSE CREEK RESERVOIR 2.8 MI NW OF SPILLWAY NEAR OTRANTO	RL-04390	CHLA, DO, TP
2	030502010706	GOOSE CREEK RESERVOIR 0.55 MI W OF DAM	RL-05412	TP
2	030502010706	GOOSE CREEK RESERVOIR 2 MI N OF SPILLWAY	RL-06434	DO
2	030502010706	GOOSE CK RESERVOIR 0.6 MI NW OF 2ND POWERLINES US OF BOAT RAMP, NEAR W SHORE BTWN 2 WESTERN EMBAYMENTS	RL-07017	DO
2	030502010706	GOOSE CK RESERVOIR MIDLAKE IN LINE WITH NORTHBROOK BLVD	RL-08065	DO, TP
2	030502010706	GOOSE CREEK RESERVOIR 0.1 MILE NORTHEAST OF THE JOHN R. BETTIS BOAT LANDING AND 0.1 MILES SOUTHEAST OF ST-033 NEAR THE NORTHEAST BANK.	RL-09081	CHLA, TP
3	030502010706	LAKE, GOOSE CK RESERVOIR 1.95MI WEST OF POPPENHEIM CROSSING	RL-10104	ECOLI
2	030502010706	LAKE, GOOSE CK RESERVOIR 1.95MI WEST OF POPPENHEIM CROSSING	RL-10104	CHLA, DO, TP
2	030502010706	LAKE, GOOSE CK RESERVOIR 2.5MI SW OF POPPENHEIM CROSSING	RL-10108	CHLA, DO, TP
2	030502010706	GOOSE CREEK RESERVOIR APPROXIMATELY 1.3 MILES UPSTREAM FROM THE DAM. SITE IS LOCATED 100 YARDS SOUTH OF THE MAJOR POINT ON THE EAST BANK IN THE MIDDLE OF THE RESERVOIR.	RL-11118	CHLA, PH, TP
2	030502010706	GOOSE CK RESERVOIR APPROX 250 YDS NW OF END OF HANAHAN RD	RL-13132*	PH, TP
3	030502010402	BERESFORD CREEK 5.3 MI NNE OF WANDO AND COOPER RIVER CONFLUENCE	RO-056092*	DO
2	030502010706	GOOSE CREEK RESERVOIR 100 M US OF DAM	ST-032	CHLA, TP
2	030502010706	GOOSE CK RESERVOIR AT 2ND POWERLINES US OF BOAT RAMP	ST-033	TP

‡ Priority Rank 2: TMDL to be implemented between 2019-2022

‡ Priority Rank 3: TMDL to be implemented after 2022

*Denotes station added to the 2016 303(d) list

†Denotes change in pollutant of concern from 2014 303(d) list

Table 5b: 2016 303(d) List of Impaired Stations within the City of Goose Creek's SMS4 Area and/or that the SMS4 Area Drains Into

PRIORITY RANK‡	HUC-12	DESCRIPTION	STATION	CAUSE
3	030502010706	GOOSE CK AT S-08-136 BRIDGE	MD-039	ENTERO
2	030502010706	GOOSE CK RES 2.3 M S OF GOOSE CREEK TOWN CENTER	RL-01008	DO
2	030502010706	GOOSE CREEK RESERVOIR 1.0 MI NW OF SPILLWAY NEAR W SHORELINE	RL-03340	CHLA, DO, TP†
2	030502010706	GOOSE CREEK RESERVOIR 2.8 MI NW OF SPILLWAY NEAR OTRANTO	RL-04390	CHLA, DO, TP
2	030502010706	GOOSE CREEK RESERVOIR 0.55 MI W OF DAM	RL-05412	TP
2	030502010706	GOOSE CREEK RESERVOIR 2 MI N OF SPILLWAY	RL-06434	DO
2	030502010706	GOOSE CK RESERVOIR 0.6 MI NW OF 2ND POWERLINES US OF BOAT RAMP, NEAR W SHORE BTWN 2 WESTERN EMBAYMENTS	RL-07017	DO
2	030502010706	GOOSE CK RESERVOIR MIDLAKE IN LINE WITH NORTHBROOK BLVD	RL-08065	DO, TP
2	030502010706	GOOSE CREEK RESERVOIR 0.1 MILE NORTHEAST OF THE JOHN R. BETTIS BOAT LANDING AND 0.1 MILES SOUTHEAST OF ST-033 NEAR THE NORTHEAST BANK.	RL-09081	CHLA, TP
3	030502010706	LAKE, GOOSE CK RESERVOIR 1.95MI WEST OF POPPENHEIM CROSSING	RL-10104	ECOLI
2	030502010706	LAKE, GOOSE CK RESERVOIR 1.95MI WEST OF POPPENHEIM CROSSING	RL-10104	CHLA, DO, TP
2	030502010706	LAKE, GOOSE CK RESERVOIR 2.5MI SW OF POPPENHEIM CROSSING	RL-10108	CHLA, DO, TP
2	030502010706	GOOSE CREEK RESERVOIR APPROXIMATELY 1.3 MILES UPSTREAM FROM THE DAM. SITE IS LOCATED 100 YARDS SOUTH OF THE MAJOR POINT ON THE EAST BANK IN THE MIDDLE OF THE RESERVOIR.	RL-11118	CHLA, PH, TP
2	030502010706	GOOSE CK RESERVOIR APPROX 250 YDS NW OF END OF HANAHAN RD	RL-13132*	PH, TP
2	030502010706	GOOSE CREEK RESERVOIR 100 M US OF DAM	ST-032	CHLA, TP
2	030502010706	GOOSE CK RESERVOIR AT 2ND POWERLINES US OF BOAT RAMP	ST-033	TP

‡ Priority Rank 2: TMDL to be implemented between 2019-2022

‡ Priority Rank 3: TMDL to be implemented after 2022

*Denotes station added to the 2016 303(d) list

†Denotes change in pollutant of concern from 2014 303(d) list

Table 5c: 2016 303(d) List of Impaired Stations within the City of Hanahan's SMS4 Area and/or that the SMS4 Area Drains Into

PRIORITY RANK‡	HUC-12	DESCRIPTION	STATION	CAUSE
3	030502010706	GOOSE CK AT S-08-136 BRIDGE	MD-039	ENTERO
2	030502010706	GOOSE CK RES 2.3 M S OF GOOSE CREEK TOWN CENTER	RL-01008	DO
2	030502010706	GOOSE CREEK RESERVOIR 1.0 MI NW OF SPILLWAY NEAR W SHORELINE	RL-03340	CHLA, DO, TP†
2	030502010706	GOOSE CREEK RESERVOIR 2.8 MI NW OF SPILLWAY NEAR OTRANTO	RL-04390	CHLA, DO, TP
2	030502010706	GOOSE CREEK RESERVOIR 0.55 MI W OF DAM	RL-05412	TP
2	030502010706	GOOSE CREEK RESERVOIR 2 MI N OF SPILLWAY	RL-06434	DO
2	030502010706	GOOSE CK RESERVOIR 0.6 MI NW OF 2ND POWERLINES US OF BOAT RAMP, NEAR W SHORE BTWN 2 WESTERN EMBAYMENTS	RL-07017	DO
2	030502010706	GOOSE CK RESERVOIR MIDLAKE IN LINE WITH NORTHBROOK BLVD	RL-08065	DO, TP
2	030502010706	GOOSE CREEK RESERVOIR 0.1 MILE NORTHEAST OF THE JOHN R. BETTIS BOAT LANDING AND 0.1 MILES SOUTHEAST OF ST-033 NEAR THE NORTHEAST BANK.	RL-09081	CHLA, TP
3	030502010706	LAKE, GOOSE CK RESERVOIR 1.95MI WEST OF POPPENHEIM CROSSING	RL-10104	ECOLI
2	030502010706	LAKE, GOOSE CK RESERVOIR 1.95MI WEST OF POPPENHEIM CROSSING	RL-10104	CHLA, DO, TP
2	030502010706	LAKE, GOOSE CK RESERVOIR 2.5MI SW OF POPPENHEIM CROSSING	RL-10108	CHLA, DO, TP
2	030502010706	GOOSE CREEK RESERVOIR APPROXIMATELY 1.3 MILES UPSTREAM FROM THE DAM. SITE IS LOCATED 100 YARDS SOUTH OF THE MAJOR POINT ON THE EAST BANK IN THE MIDDLE OF THE RESERVOIR.	RL-11118	CHLA, PH, TP
2	030502010706	GOOSE CK RESERVOIR APPROX 250 YDS NW OF END OF HANAHAN RD	RL-13132*	PH, TP
2	030502010706	GOOSE CREEK RESERVOIR 100 M US OF DAM	ST-032	CHLA, TP
2	030502010706	GOOSE CK RESERVOIR AT 2ND POWERLINES US OF BOAT RAMP	ST-033	TP

‡ Priority Rank 2: TMDL to be implemented between 2019-2022

‡ Priority Rank 3: TMDL to be implemented after 2022

*Denotes station added to the 2016 303(d) list

†Denotes change in pollutant of concern from 2014 303(d) list

3.5 Discharges to Classified Waters

For discharges to Classified Waters, BMP applications will be conducted through implementation of the minimum control measures in section 4.2. The BMP implementation strategies will not cause or contribute to violations of water quality standards in water bodies with impaired monitoring stations. Lists of Classified Waters in Berkeley County, Goose Creek, and Hanahan are provided in the tables below.

Table 6a: Discharges to Classified Waters in Berkeley County MS4

Waterbody	Water Quality Classification	Description
Fogarty Creek	SFH	The entire creek tributary to Wando River
Wando River	SFH	That portion from its headwaters to a point 2.5 miles north of its confluence with Cooper River
Beresfords Creek	SFH	The section of creek tributary between Nobles Creek and Nowell Creek
Martin Creek	SFH	The entire creek tributary to Beresfords Creek

Table 6b: Discharges to Classified Waters in Goose Creek MS4

Waterbody	Water Quality Classification	Description
N/A	N/A	The City of Goose Creek does not discharge to waters classified as Outstanding Resource (ORW), Trout (TM. TPGT & TPT) or Shellfish Harvesting (SFH).

Table 6c: Discharges to Classified Waters in Hanahan MS4

Waterbody	Water Quality Classification	Description
N/A	N/A	The City of Hanahan does not discharge to waters classified as Outstanding Resource (ORW), Trout (TM. TPGT & TPT) or Shellfish Harvesting (SFH).

3.6 Discharges to Source Water Protection Areas

For discharges to Source Water Protection Areas (SWPA), BMP applications will be conducted through implementation of the six minimum control measures in Section 4.2 for protection necessary to support its uses. The tables below list the details associated with each regulated MS4 area that discharge to a SWPA; please note that the City of Hanahan does not discharge to any SWPA.

Table 7a: Discharges to Source Water Protection Areas in Berkeley County MS4

Waterbody	Buffer	Intake	Facility
Bushy Park Reservoir	200 ft	S10104	Charleston Commissioners of Public Works

Table 7b: Discharges to Source Water Protection Areas in Goose Creek MS4

Waterbody	Buffer	Intake	Facility
Bushy Park Reservoir	200 ft	S10104	Charleston Commissioners of Public Works

4.0 Stormwater Management Plan (SWMP)

4.1 Permit Requirements

4.1.1 Requirements of the NPDES SMS4 General Permit

Berkeley County has implemented this SWMP to reduce the discharge of pollutants from SMS4 areas for the County, City of Goose Creek and City of Hanahan to the maximum extent practicable to protect water quality.

4.1.2 SWMP Development

On behalf of the City of Goose Creek, City of Hanahan and Berkeley County, the County has revised and updated the written SWMP document and will submit the SWMP to SC DHEC Bureau of Water within six months from the effective date of the newly issued permit.

4.1.3 Contents of the SWMP

Berkeley County, City of Goose Creek, and City of Hanahan have met the minimum requirements for a SWMP by including ordinances, or other regulatory mechanisms, and by providing the legal authority necessary to implement and enforce the requirements of the SMS4 general permit. See Appendix D of the SWMP for the Stormwater Management Ordinances for Berkeley County, City of Goose Creek, and City of Hanahan.

4.1.4 Requirement to Develop Adequate Legal Authority

Within one year from the effective date of the permit, the County reviewed and revised the Stormwater Management Ordinance in order to provide adequate legal authority to control pollutant discharges into and from the SMS4, and to meet the requirements of the SMS4 general permit. In November 2014, the Berkeley County Ordinance was amended to establish regulations to develop and enforce a Stormwater Management Program. Additionally, both Goose Creek and Hanahan have established stormwater management ordinances in place since 2014 and amended in 2018 for conformance with the written Inter-Governmental Agreement (IGA).

At a minimum the legal authority addresses the following:

- Authority to Prohibit Illicit Discharges
- Determination of Allowable Non-Stormwater Discharges
- Authority to Prohibit Spills or Other Releases
- Authority to Require Compliance
- Authority to Require Installation, Implementation, and Maintenance of Control Measures
- Authority to Receive and Collect Information
- Authority to Inspect
- Response to Violations
- Monetary Penalties
- Civil/Criminal Penalties
- Interagency Agreements (if applicable)

A certification statement has been included in this SWMP that certifies Berkeley County has taken the necessary steps to obtain and maintain full legal authority to implement and enforce each of the requirements contained in the NPDES SMS4 general permit for each respective entity. (see Page i).

4.1.5 Enforcement Measures and Tracking

Berkeley County (2014), City of Goose Creek (2015) and City of Hanahan (2014) have developed and implemented an enforcement response plan (ERP) within 12 months from the effective date of this permit. Each ERP sets out Berkeley County's potential responses to violations and addresses repeat and continuing violations through progressively stricter responses as needed to achieve compliance. Amended City of Goose Creek and City of Hanahan ordinances, in 2018, for conformance with the written Inter-Governmental Agreement (IGA), necessitated updates, to all three jurisdictions ERP for a unified approach.

4.1.5.2 Enforcement Tracking:

The County continues to track instances of non-compliance either in hard-copy files or electronically for Berkeley County, City of Goose Creek, and City of Hanahan.

4.1.5.3 Recidivism Reduction:

The County summarizes inspection results by consuetudinary violators and include incentives, disincentives, or an increased inspection frequency at the operator's sites for Berkeley County, City of Goose Creek, and City of Hanahan.

4.1.6 Report Requirements

Berkeley County has submitted the following information in the Annual Report for the County, City of Goose Creek, and City of Hanahan (See Section 5.3 for details).

- The status of implementing the components of the SWMP that are established as permit conditions;
- Proposed changes to the SWMP that are established as permit conditions;
- Revisions, if necessary, to the assessment of controls and the fiscal analysis, including a description of staff resources necessary to meet the requirements of the permit;
- A summary of data, including monitoring data, that is accumulated throughout the reporting year; and,
- A summary describing the number and nature of enforcement actions, inspections, and public education programs.

4.1.7 SWMP Minimum Control Measure Requirements

The Berkeley County SWMP includes the following information for the County, City of Goose Creek and City of Hanahan for each of the six minimum control measures (MCM) described in Section 4.2 of this SWMP in detail:

- Best management practices (BMP) that the County or another entity will implement for each of the MCM;
- Measurable goals for each BMP including, as appropriate, the months and years in which the County will undertake required actions, including interim milestones and the frequency of the action; and,
- Person, or persons, responsible for implementing or coordinating the BMPs for each entities SWMP.

4.1.10 SWMP Modifications

SC DHEC Bureau of Water may notify Berkeley County of the need to modify the SWMP document to be consistent with the permit, in which case Berkeley County will have 90 days to finalize such changes to the plan.

Berkeley County has kept the SWMP document up to date during the term of the permit. Where Berkeley County determined that ordinance modifications were needed to address any procedural, protocol, or programmatic change, such changes were made as soon as practicable, but not later than 360 days. The following table describes schedule, frequency and responsible party for SWMP requirements:

Table 8: SWMP Requirements

SWMP REQUIREMENTS			
Develop and Implement SWMP	**Not Started:** ☐ **In Progress :** ☐ **Completed:** ☒		
	Section: 4.1.2		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Revise and update written SWMP document to be utilized by Berkeley County, City of Goose Creek and City of Hanahan, and submit the SWMP to SC DHEC Bureau of Water.	July 1, 2014	Once	County Engineer
Update: • Berkeley County has periodically updated this SWMP (2014, 2016, 2018, 2019) to reflect the responsibilities it has undertaken on behalf of the County, Goose Creek and Hanahan. The updated SWMP will be submitted to DHEC by April 1, 2020 along with the Annual Report.			
Update Stormwater Management Ordinance	**Not Started:** ☐ **In Progress :** ☐ **Completed:** ☒		
	Section: 4.1.3		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Review and revise the Stormwater Management Ordinance, or adopt any new ordinances or other regulatory mechanisms that provide adequate legal authority to control pollutant discharges into and from the SMS4, and to meet the requirements of the SMS4 general permit.	January 1, 2015	Once	County Engineer
Update: • Berkeley County, Goose Creek and Hanahan have updated their ordinances and copies can be found in Appendix D of the SWMP.			
Enforcement Response Plan (ERP)	**Not Started:** ☐ **In Progress :** ☐ **Completed:** ☒		
	Section: 4.1.5		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Develop & Implement an enforcement response plan (ERP).	January 1, 2015	Once	County Engineer

Update:

- Berkeley County, Goose Creek and Hanahan have updated their ERPs for a unified approach mechanism and a copy can be found in Appendix F of the SWMP.

Update Stormwater Management Plan	**Not Started:** ☐ **In Progress :** ☐ **Completed:** ☒ **Section: 4.1.10**		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Review and revise the SWMP document as necessary to keep it up to date during the term of the permit.	Throughout the Permit Term	Annually	County Engineer

Update:

- Berkeley County has periodically updated this SWMP (2014, 2016, 2018, 2019) to reflect the responsibilities it has undertaken on behalf of the County, Goose Creek and Hanahan. The updated SWMP will be submitted to DHEC by April 1, 2020 along with the Annual Report.

4.2 Minimum Control Measures

In compliance with SMS4 general permit requirements; this SWMP includes a description of the six minimum control measures (MCMs) and details on the development and implementation of the plan to address MCM requirements. The details on each minimum measure include the measurable goals for each proposed BMP, the implementation schedule for the BMP (implementation date and frequency), and the responsible person(s) to implement the BMP.

4.2.1 Public Education and Outreach (Minimum Measure #1)

4.2.1.1 Minimum Measure #1 Permit Requirements

In order to meet the requirements of Minimum Measure #1, Berkeley County has partnered with Clemson University and utilizes Clemson University Cooperative Extension Service's (CUCES) Carolina Clear program to focus on the development and implementation of educational programs designed to inform the public (both in the County and City of Goose Creek and City of Hanahan) about the impacts that stormwater discharges could have on local waterbodies and the steps that the public can take to reduce pollutants in stormwater runoff. The County will continue its agreement with Clemson University in order to efficiently reach as many citizens as economically possible through public education and outreach efforts. See Appendix G for Contract.

Table 9: Minimum Measure #1 Permit Requirements

4.4.1.1.1 The pollutant(s) of concern (POC) within the watershed areas of Berkeley County, Goose Creek and Hanahan:
Bacteria (ENTERO and ECOLI) – Ashley River, Cooper River, Wando River **Litter –** Ashley River, Cooper River, Wando River **Nutrients (TP and N) –** Ashley River, Cooper River, Wando River
4.4.1.1.2 Description of the POC(s) listed above:
Enterococci (ENTERO) and *Escherichia coli* (ECOLI) impairments can be a result of various sources including but not limited to: Failing Septic and Wastewater Systems and Animal Waste being transported through runoff during storm events. Total Phosphorus (TP) impairments can be a result of various sources including but not limited to: Wastewater Treatment Operations, Urban Runoff that includes fertilizers and pet yard waste, Runoff from pastures and croplands, and waterfowl. Nitrogen (N) impairments can be a result of various sources including but not limited to: Wastewater Treatment Operations, Urban Runoff that includes fertilizers and pet yard waste, Runoff from pastures and croplands, and waterfowl. Litter impacts are the result of single-use plastics not properly disposed of, improper disposal of cigarette butts from smokers, illegal dumping activities, and improper cover of trash/debris while vehicles are in transport.
4.4.1.1.3 Programs targeted at high priority community issues with the potential to decrease the POC's effect on water quality:
On behalf of Goose Creek, Hanahan, and the County MS4 areas, Berkeley County utilizes Clemson University's Cooperative Extension Service's Carolina Clear Program to assist in meeting the requirements of Minimum Measure 1 and 2. The Contract can be found in Appendix G.
4.4.1.1.4 The audience(s) that is believed to have an influence on the POC identified and that is believed to have an influence on the goals and objectives identified:
On behalf of Goose Creek, Hanahan, and the County MS4 areas, Berkeley County utilizes Clemson University's Cooperative Extension Service's Carolina Clear Program to assist in meeting the requirements of Minimum Measure 1 and 2. The Contract can be found in Appendix G.
4.4.1.1.5 The message(s) directed at the target audience(s) listed above to achieve the program goals and objectives:
On behalf of Goose Creek, Hanahan, and the County MS4 areas, Berkeley County utilizes Clemson University's Cooperative Extension Service's Carolina Clear Program to assist in meeting the requirements of Minimum Measure 1 and 2. The Contract can be found in Appendix G.

4.4.1.1.6	Education campaign(s) and materials:
	On behalf of Goose Creek, Hanahan, and the County MS4 areas, Berkeley County utilizes Clemson University's Cooperative Extension Service's Carolina Clear Program to assist in meeting the requirements of Minimum Measure 1 and 2. The Contract can be found in Appendix G.
4.4.1.1.7	Distribution of campaign materials:
	On behalf of Goose Creek, Hanahan, and the County MS4 areas, Berkeley County utilizes Clemson University's Cooperative Extension Service's Carolina Clear Program to assist in meeting the requirements of Minimum Measure 1 and 2. The Contract can be found in Appendix G.
4.4.1.1.8	Quantitative and/or qualitative formative assessment of programs:
	On behalf of Goose Creek, Hanahan, and the County MS4 areas, Berkeley County utilizes Clemson University's Cooperative Extension Service's Carolina Clear Program to assist in meeting the requirements of Minimum Measure 1 and 2. The Contract can be found in Appendix G.
4.4.1.1.9	Utilization of public input into the development of this program:
	On behalf of Goose Creek, Hanahan, and the County MS4 areas, Berkeley County utilizes Clemson University's Cooperative Extension Service's Carolina Clear Program to assist in meeting the requirements of Minimum Measure 1 and 2. The Contract can be found in Appendix G.
4.4.1.2.10	Implementation of program goals and objectives:
	On behalf of Goose Creek, Hanahan, and the County MS4 areas, Berkeley County utilizes Clemson University's Cooperative Extension Service's Carolina Clear Program to assist in meeting the requirements of Minimum Measure 1 and 2. The Contract can be found in Appendix G.
4.4.1.1.11	Process for annual adjustment of program based upon program assessment:
	On behalf of Goose Creek, Hanahan, and the County MS4 areas, Berkeley County utilizes Clemson University's Cooperative Extension Service's Carolina Clear Program to assist in meeting the requirements of Minimum Measure 1 and 2. The Contract can be found in Appendix G.

Minimum Measure #1 BMP Implementation

Evaluation of the success of this minimum measure will be through careful analysis of the measurable goals for each BMP included in this minimum measure. Table 10 describes the components of Berkeley County's, Goose Creek's, and Hanahan's Public Education and Outreach program:

Table 10: Best Management Practices - Minimum Measure #1

PUBLIC EDUCATION AND OUTREACH BMPS			
Contractual Agreement with Clemson University	**Not Started:** ☐ **On-going :** ☒ **Completed:** ☐		
	Section: 4.2.1.1		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Continue County's Contract with Clemson University to implement a public education/outreach program for the MS4 regulated areas in Berkeley County, Goose Creek, and Hanahan.	Throughout Permit Term	Annually	County Engineer and CUCES's Carolina Clear Program
Measurable Goal:			
• A program that provides public education concerning water quality issues in the MS4 regulated area of Berkeley County, Goose Creek and Hanahan.			
Measurable Goal Update:			

• Berkeley County is continuing their agreement with Clemson University's Carolina Clear Program to address MCM #1 and MCM #2. The Annual Report includes items completed in 2018 and 2019. This report is in Appendix E of the 2020 Annual Report.			
Support Ashley-Cooper Stormwater Education Consortium	**Not Started:** ☐ **On-going :** ☒ **Completed:** ☐ **Section: 4.2.1.1.3**		
Milestone(s)	**Schedule/Deadline**	**Frequency**	**Responsible Party**
Berkeley County will support the Ashley-Cooper Stormwater Education Consortium by: participating in meetings/workshops, promoting/advertising events, distributing water quality awareness campaign items, and providing other general assistance as resources allow.	Throughout Permit Term	Annually	County Engineer
Measurable Goal:			
• Support Ashley-Cooper Stormwater Education Consortium.			
Measurable Goal Update:			
• Berkeley County is continuing to support the Ashley-Cooper Stormwater Consortium to address MCM #1 and MCM #2. The Annual Report includes items completed in 2018 and 2019. This report is in Appendix E of the 2020 Annual Report.			

4.2.2 Public Involvement/Participation (Minimum Measure #2)

4.2.2.1 Minimum Measure #2 Permit Requirements

Berkeley County has collaborated with CUCES's Carolina Clear to efficiently reach as many citizens in the County, Goose Creek, and Hanahan as economically possible through public involvement and participation efforts. CUCES's Carolina Clear provides the citizens of Berkeley County, Goose Creek, and Hanahan opportunities to participate in activities and events relating to water quality preservation and water quality education.

Table 11: Minimum Measure #2 Permit Requirements

4.2.2.1.1	Create opportunities for citizens to participate in the implementation of stormwater controls:
	CUCES's Carolina Clear program provides opportunities for citizen participation in the implementation of stormwater controls in Berkeley County, Goose Creek, and Hanahan.
4.2.2.1.2	Accessing information on this SWMP:
	Berkeley County includes the SWMP on the County's Stormwater Management webpage.
4.2.2.1.3	Incorporate written procedures for implementing the public involvement/participation (PIP) MCM in the SWMP:
	Berkeley County (on behalf of the County, Goose Creek, and Hanahan) will continue to implement its written procedures (Contract) with Clemson University to Implement a Public Involvement and Participation Program

Minimum Measure #2 BMP Implementation

The measurable goals for each BMP for the Public Participation and Involvement minimum measure will be used to evaluate the success of each BMP. Table 12 describes the components of the Public Involvement/Participation program for Berkeley County, Goose Creek, and Hanahan:

Table 12: Best Management Practices – Minimum Measure #2

Opportunities for Citizen Participation	**Not Started:** ☐ **On-going :** ☒ **Completed:** ☐		
	Section: 4.2.2.1.1		
Milestone(s)	**Schedule/ Deadline**	**Frequency**	**Responsible Party**
Contract with Clemson University to implement a public involvement/participation program for Berkeley County, Goose Creek, and Hanahan.	Throughout Permit Term	Annually	County Engineer and CUCES's Carolina Clear Program
Measurable Goal:			
• A program that will provide the citizens of Berkeley County, Goose Creek, and Hanahan opportunities to participate in activities and events relating to water quality preservation and water quality education.			
Measurable Goal Update:			
• Berkeley County has continued the contract with Carolina Clear, and is involved with the Ashley-Cooper Stormwater Consortium. Through these resources, the County has provided opportunities for citizen participation in the County, Goose Creek, and Hanahan.			
Provide Access to Information for the SWMP	**Not Started:** ☐ **In Progress :** ☐ **Completed:** ☒		
	Section: 4.2.2.1.2		
Milestone(s)	**Schedule/ Deadline**	**Frequency**	**Responsible Party**
Ensure the public can easily find information about the SWMP.	Deadline: July 1, 2016	Once during permit term	County Engineer
Measurable Goal:			
• Berkeley County will include the SWMP on the County's webpage.			
Measurable Goal Update:			
•The County has a SWMP section on their website and uploaded the SWMP to the website by July 1, 2016. The SWMP information is located at: https://berkeleycountysc.gov/fnd/?goto=Stormwater+Management and includes Goose Creek and Hanahan.			

Written Procedures for Implementing MCM#2	Not Started: ☐ On-going : ☒ Completed: ☐		
	Section: 4.2.2.1.3		
Milestone(s)	**Schedule/ Deadline**	**Frequency**	**Responsible Party**
Berkeley County will continue implementing the public education and involvement MCM.	Throughout Permit Term	Annually	County Engineer and CUCES's Carolina Clear Program
Measurable Goal:			
• Signed Contract with Clemson University/Carolina Clear.			
Measurable Goal Update:			
• Berkeley County has continued their contract with Carolina Clear, and is involved with the Ashley-Cooper Stormwater Consortium. Through these resources, the County has provided opportunities for citizen participation for the County, Goose Creek, and Hanahan.			

4.2.3 Illicit Discharge Detection and Elimination (Minimum Measure #3)

4.2.3.1 Minimum Measure #3 Permit Requirements

Berkeley County will locate and eliminate illicit discharges in the County, Goose Creek, and Hanahan by continuing to implement a program in accordance with the SMS4 general permit requirements. The County has developed selection criteria to establish priority areas and identify the priority areas. The basis for selection of each priority area is documented. Outfalls located within the priority areas are visited to check for dry weather flow. Outfalls with dry weather flow are screened to identify potential illicit discharges. Prior to illicit tracking activities, the County has reviewed and updated the existing Standard Operating Procedures for Use in Field Investigation for Illicit Discharges (SOP) document as necessary for illicit tracking procedures.

Table 13: Minimum Measure #3 Permit Requirements

4.2.3.2.1	Development of the storm sewer system map:
	Berkeley County has developed a storm sewer system map for the County, Goose Creek, and Hanahan showing the location of known outfalls, and names and locations of all waters of the United States that receive discharges from those outfalls. The storm sewer map is updated as needed to show new outfalls due to new developments.
4.2.3.2.2	Identification of priority areas:
	Berkeley County has developed selection criteria to establish priority areas and identify the priority areas in the County, Goose Creek, and Hanahan. The County documented the basis for its selection of each priority area and created a list of all priority areas identified in the system no later than 12 months after the effective date of permit coverage. A list of the priority area is updated *annually* to reflect changing priorities and is available for review by the permitting authority.
4.2.3.2.3.a	Field screening to detect illicit discharges: Conduct Field Screening
	Berkeley County will conduct dry weather field screening and / or analytical monitoring, when necessary, to identify the source of illicit discharges in the County, Goose Creek, and Hanahan. At a minimum, Berkeley County: • identifies all field screening points within the priority areas where field screening and potential analytical monitoring will take place. A list of screening points has been developed.

The County also conducts field screening and any necessary analytical monitoring outside the priority areas at known non-stormwater discharges. The areas and the schedule for conducting the screening, and field screening points are identified annually.

- reviews and updates the SOP document for dry weather screening procedures to include:
  - A description of which screening methods will be used and a description as to why it is appropriate;
  - A description of field screening equipment with respective methodologies for use; and
  - All dry weather screening activities will be conducted after 72-hours of continuous dry conditions following at least 0.10 inch of rainfall.

The elimination of all illicit discharges are documented. The SOP document has been reviewed and updated to develop documentation procedures as described in section 4.2.3.2.5/6

4.2.3.2.3.b Field Screening Assessment:

Berkeley County has assessed the effectiveness of the Field Screening component of the IDDE program for the County, Goose Creek, and Hanahan for the third annual report to determine if the level of effort is adequate in attaining the effective prohibition of non-stormwater discharges into the MS4. Where updates are found to be necessary, Berkeley County will make such changes and include them as part of the re-notification required under Part 2.5 of Permit SCR030000.

4.2.3.2.3.c Procedures for notifying another MS4 of an illicit discharge:

For non-traditional MS4 permittees, if illicit connections or illicit discharges are observed related to another operator's municipal storm sewer system then Berkeley County will notify the other operator as soon as practical but no later than 3 business days.

4.2.3.2.3.d Addressing a notification of an illicit discharge by another operator:

Berkeley County will follow appropriate procedures when notified of an illicit discharge by another MS4 operator.

4.2.3.2.4/5 Tracing the source of an illicit discharge:

- Berkeley County has reviewed and updated its IDDE SOP document, applicable in Goose Creek and Hanahan, for procedures for conducting illicit tracking and elimination.
- After becoming aware of an illicit discharge, Berkeley County will initiate an investigation(s) to attempt to identify and locate the source of any continuous or intermittent non-stormwater discharge on as soon as practical but no later than 3 business days.
- Berkeley County will report immediately the occurrence of any dry weather flow believed to be an immediate threat to human health of the environment to SC DHEC Emergency Response, 1-888-481-0125.
- Illicit Discharges suspected of being sanitary sewage and/or significantly contaminated will be considered a high priority and will be reported to appropriate public utility owner within 24 hrs.
- Investigations of illicit discharges suspected of being cooling water, wash water, or natural flows may be delayed until after all discharges suspected of having the potential for adversely impact either human health or water quality have been investigated, eliminated, and/or resolved.
- At a minimum, Berkeley County will document the date(s) the illicit discharge was observed; the results of the investigation; any follow-up of the investigation; and the date the investigation was closed.

4.2.3.2.6 Determining the source of the illicit discharge:

Berkeley County will determine and document through their investigations the source of all confirmed illicit discharges in the County, Goose Creek, and Hanahan. If the source of the

suspected illicit discharge is found to be a suspected non-compliance with an NPDES permit, the appropriate SCDHEC Regional Office will be notified.

a. If an illicit discharge is found, but within six (6) months of the beginning of the investigation neither the source nor the same non-stormwater discharge has been identified/observed, then Berkeley County will maintain written documentation for review by the permitting authority.
b. If the observed discharge is intermittent, Berkeley County will document that a minimum of three (3) separate investigations were made to observe the discharge when it was flowing. If these attempts are unsuccessful, Berkeley County will maintain written documentation for review by the permitting authority. However, since this is an ongoing program, Berkeley County will periodically recheck these suspected intermittent discharges.

4.2.3.2.7 Corrective Action plan to eliminate illicit discharges:

Once the source of the illicit discharge in the County, Goose Creek or Hanahan has been determined, Berkeley County will:

a. Notify the responsible party of the problem as soon as practical but no later than 3 business days.
b. Require the responsible party to conduct all necessary corrective actions to eliminate the non-stormwater discharge within 30 days. When, and if, elimination will take longer than 30 days, Berkeley County will require responsible parties to submit a plan with a schedule for elimination.
c. Conduct a follow-up investigation and field screening, consistent with Part 4.2.3.4/5 of this SWMP, to verify that the discharge has been eliminated.
d. Document their follow-up investigations.
e. Follow the SWMP ERP and include the resulting enforcement actions in the subsequent report.

4.2.3.2.8 Public reporting mechanism:

Berkeley County has established an illicit reporting hotline for the public and staff to report illicit discharges in the County, Goose Creek, and Hanahan.

The County has established and implemented citizen request response procedures in the illicit tracking procedures document created for section 4.2.3.2.4/5. This includes:

a. Development of a written spill/dumping response procedure for responding to public notices of illicit discharges, the various responsible agencies and their contacts, and who would be involved in illicit discharge incidence response.
b. Procedures for inspections in response to complaints and follow-up inspections as needed to ensure that corrective measures have been implemented by the responsible party to achieve and maintain compliance.

4.2.3.2.9 Employee training:	
	Berkeley County will implement a training program for all appropriate municipal staff, which, as part of their normal job responsibilities, may come into contact with, or otherwise observe, an illicit discharge or illicit connection to the storm sewer system. This BMP will be implemented through training for Pollution Prevention in Section 4.2.6.5

Minimum Measure #3 BMP Implementation

In order to meet the requirements of Minimum Measure #3, Berkeley County has listed BMPs that focus on the detection and elimination of illicit discharges into the SMS4 for the County, Goose Creek, and Hanahan. In order to provide a summative document for the various IDDE permit requirements, Berkeley County reviewed and updated the existing IDDE SOP document and IDDE Priority Areas document to include the following sections: map of priority areas, list of screening points in the priority area, dry weather screening procedures, illicit tracking procedures, illicit elimination procedures, and IDDE documentation procedures. Evaluation of the success of this minimum measure is based on the level of implementation of the BMPs included in this minimum measure. The table describes the components of the County's Illicit Discharge Detection and Elimination (IDDE) program.

In order to meet the requirements of Minimum Measure #3, Berkeley County will:

- Update the Storm Sewer Map
- Identify Priority Areas for Illicit Discharges
- Identify Screening Points
- Update Field Screening and Illicit Tracking Procedures
- Assess Field Screening Procedures
- Conduct Field Screening (Dry Weather Screening)
- Conduct Illicit Tracking
- Eliminate Illicit Discharges
- Document Illicit Discharge Investigations
- Provide Employee Training on Illicit Discharge Identification

Table 14 describes the components of Berkeley County's, Goose Creek's, and Hanahan's Illicit Discharge Detection and Elimination (IDDE) program.

Table 14: Best Management Practices – Minimum Measure #3

IDDE BMPs			
Update Storm Sewer Map	**Not Started:☐ In Progress :☐ Completed:☒**		
	Section: 4.2.3.2.1		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Update the storm sewer map showing the location of all outfalls and names and locations of all waters of the United States that receive discharge from those outfalls.	Throughout Permit Term	Annually	County Engineer
Measurable Goal:			
• To provide a complete inventory of SMS4 outfalls for use in performing illicit discharge detection and elimination, and potential stormwater monitoring.			
Measurable Goal Update:			
• Berkeley County has an updated storm sewer map for the County, Goose Creek, and Hanahan. This map will be updated as necessary.			
Identify Priority Areas	**Not Started:☐ On-going :☐ Completed:☒**		
	Section: 4.2.3.2.2		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
• Develop selection criteria to establish priority areas and document the basis for selection of each priority area. • Create list of all priority areas • The list will be updated annually.	January 1, 2015	Annually	County Engineer
Measurable Goal:			
• The priority list will be used to set the boundaries for SMS4 Dry-Weather Screening for the given permit year and the County will create prioritized areas.			
Measurable Goal Update:			
• Berkeley County has updated the Priority Areas to consolidate Priority Areas for Berkeley County, City of Goose Creek and City of Hanahan. The new list was compiled in an effort to effectively and efficiently assess each MS4's concerns. Priority areas are listed below.			
• Priority Area 1: Municipally owned and/or operated facilities with "hot spot" activities, such as vehicle maintenance, storage areas, etc. • Priority Area 2: Known areas with repetitive, historical illicit discharges • Priority Area 3: Known areas with a history of illegal dumping • Priority Area 4: Known areas with older sewer lines, history of sanitary sewer overflows (SSOs), or known cross-connections • Priority Area 5: Areas thought to be causative of pollutants of concern (POC) upstream to sensitive waterbodies and/or impaired monitoring stations.			

Develop Field Screening & Illicit Tracking Procedures	Not Started: ☐ In Progress : ☐ Completed: ☒ Section: 4.2.3.2.3a/3c/3d/4/5/7/8		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Develop Illicit section for the ERP. Review and update the SOP document to include: • A description of the screening methods to be used • A description of field screening equipment with respective methodologies to be used • Procedures for notifying another MS4 of an illicit discharge • Procedures for addressing notifications from another MS4 of an illicit discharge • A map of the priority area (updated annually) • A schedule for screening • List of outfalls to be screened in priority area (updated annually) • Field screening documentation procedures • Illicit tracking procedures • Illicit discharge elimination procedures • Illicit discharge reporting procedures • Illicit discharge documentation procedures • Procedures for responding to public notices of illicit discharge • Corrective action plan	January 1, 2015	Once during permit term	County Engineer
Measurable Goal: • The Field Screening and Illicit Tracking procedures will provide the methodology in which outfall screening and illicit tracking will be conducted.			
Measurable Goal Update: • The illicit discharge ERPs can be found in Appendix F and the Standard Operating Procedures for Use in Field Investigation for Illicit Discharges can be found in Appendix E.			

Conduct Field Screening	Not Started: ☐ On-going : ☒ Completed: ☐ Section: 4.2.3.2.3a		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Conduct dry weather flow screening at outfalls in the priority areas and at dry weather discharges.	January 1, 2017	Annually	County Engineer
Measurable Goal: • The Field Screening activities are used to identify potential illicit discharges.			
Measurable Goal Update: • Berkeley County continues to conduct field screenings for the MS4 areas in the County, City of Goose Creek and City of Hanahan.			

Field Screening Assessment	Not Started: ☐ In Progress : ☐ Completed: ☒		
	Section: 4.2.3.2.3b		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Create a report assessing the effectiveness of the Field Screening program in the third annual report.	January 1, 2017	Once during permit term	County Engineer
Measurable Goal:			
• The Field Screening Assessment document will determine the effectiveness of the program, and potentially provide recommendations for changes in field screening procedures.			
Measurable Goal Update:			
• The County has provided a review of the Field Screening for the County, Goose Creek, and Hanahan in Table 7 of the Annual Report.			

Conduct Illicit Tracking	Not Started: ☐ On-going : ☒ Completed: ☐		
	Section: 4.2.3.2.4/5		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Conduct illicit tracking at outfalls identified as potential illicit discharges by the field screening effort	January 1, 2017	As Needed	County Engineer
Measurable Goal:			
• Determine source and eliminate illicit discharges.			
Measurable Goal Update:			
• The County continues to track illicit discharges for the County, Goose Creek, and Hanahan. A summary of all illicit discharges has been included in the Annual Report (16 illicit discharges were identified in the last reporting year).			

Document Illicit Discharge Investigations	Not Started: ☐ On-going : ☒ Completed: ☐		
	Section: 4.2.3.2.5/6		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Create a document for illicit discharge tracking and elimination activities to include: • Date(s) the illicit discharge was observed • Results of the illicit investigation • Results of any follow-up investigations; • Date the investigation was closed. • Source of illicit discharge • Documentation for unresolved illicit tracking investigations in which no source is located.	January 1, 2017	As Needed	County Engineer
Measurable Goal:			
• Document of Illicit Tracking and Elimination activities.			
Measurable Goal Update:			
• During the current permit cycle (January 2014- December 2019) four (4) illicit discharges have been identified via field screening activities while one-hundred one (101) field screenings have occurred via complaint mechanisms. Of the one-hundred one (101), all have either been tracked to their source and eliminated or determined to be an invalid. A total of 7 enforcement actions were escalated past written notice.			

Develop a Written Spill/Dumping Response Procedure	**Not Started:** ☐ **In Progress :** ☐ **Completed:** ☒		
	Section: 4.2.3.2.8.a		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Develop a written spill/dumping response procedure for responding to public notices of illicit discharges, the various responsible agencies and their contacts, and who would be involved in illicit discharge incidence response.	January 1, 2017	Once	County Engineer
Measurable Goal:			
• Written spill/dumping response procedures.			
Measurable Goal Update:			
• The procedures for the County, Goose Creek, and Hanahan are included in the Standard Operating Procedures for Use in Field Investigation for Illicit Discharges found in Appendix E.			

Develop Public Reporting Mechanism	**Not Started:** ☐ **In Progress :** ☐ **Completed:** ☒		
	Section: 4.2.3.2.8		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Promote, publicize, and facilitate a reporting mechanism for the public and staff to report illicit discharges and establish and implement citizen request response procedures.	January 1, 2015	Once	County Engineer
Measurable Goal:			
• Provide a means for the public to report potential illicit discharges.			
Measurable Goal Update:			
• Berkeley County advertises an email address and phone number on their Stormwater Management Program Components webpage and Stormwater Facebook page. Additionally, the webpage contains an electronic fillable complaint form for public input. These options allow the public and staff to report potential illicit discharges in the County, Goose Creek, and Hanahan.			

Employee Training	**Not Started:** ☐ **On-going :** ☒ **Completed:** ☐		
	Section: 4.2.3.2.9		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Provide internal staff training for identifying potential illicit discharges.	January 1, 2015	Ongoing	County Engineer
Measurable Goal:			
• Provide training to appropriate staff for identifying potential illicit discharges			
Measurable Goal Updates:			
• Seventeen (17) IDDE and Good Housekeeping trainings were conducted in 2018 & 2019: • 346 employees (223 from Berkeley County, 43 from Hanahan, and 80 from Goose Creek) attended the seventeen trainings in 2018 & 2019.			

4.2.4 Construction Site Stormwater Runoff Control (Minimum Measure #4)

4.2.4.1 Minimum Measure #4 Permit Requirements

Berkeley County will review and update the existing construction stormwater management program by implementing BMPs in order to meet the SMS4 general permit requirements. The County will update appropriate design requirements, the Stormwater Design Standards Manual, Stormwater Ordinance and corresponding plan review procedures. Site inspection procedures will be updated to conform to the SMS4 general permit requirements, and an enforcement response plan (ERP) will be developed to determine how the County will use specific type of responses to address various types of violations.

Table 15: Minimum Measure #4 Permit Requirements

4.2.4.4.1 Regulatory requirement for erosion and sediment controls:
Below is a copy of the relevant sections of the existing ordinance which requires erosion and sediment controls as well as sanctions to ensure compliance. Ordinance section requiring erosion and sediment controls for Berkeley County, City of Goose Creek and City of Hanahan can be found in • Berkeley County Stormwater Management Ordinance Section 3.2 Design and Engineering Standards Ordinance section for sanctions to ensure compliance for Berkeley County City of Goose Creek and City of Hanahan can be found in • Berkeley County Stormwater Management Ordinance Section 6.1 Enforcement A copy of the Ordinances for Berkeley County, City of Goose Creek, and City of Hanahan can be found in Appendix D.
4.2.4.4.2 Requirements for erosion and sediment controls and soil stabilization practices:
Berkeley County will provide requirements for the County, City of Goose Creek and City of Hanahan for construction site operators to implement appropriate BMP such as, a. Erosion and Sediment Controls, and b. Soil Stabilization Practices
4.2.4.4.3 Requirements for pollution prevention measures:
Berkeley County will provide requirements for the design, installation and maintenance of effective pollution prevention measures for construction site operators to: a. Minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water and other wash waters. Wash waters must be treated in a sediment basin or alternative control that provides equivalent or better treatment prior to discharge. b. Minimize the exposure of building materials, building products, construction wastes, trash,

landscape materials, fertilizers, pesticides, herbicides, detergents, sanitary waste and other materials present on site to precipitation and to stormwater runoff that may cause adverse impacts to water quality, and,

c. Minimize the discharge of pollutants from spills and leaks and implement chemical spill and leak prevention and response procedures.

d. The following discharges from sites are prohibited:

i. Wastewater from washout of concrete, unless managed by an appropriate control;
ii. Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds and other construction materials;
iii. Fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance; and,
iv. Soaps or solvents used in vehicle and equipment washing.

4.2.4.4.4 Requirements for Stormwater Pollution Prevention Plans (SWP3):

Berkeley County will require each operator of a construction activity to prepare and submit a Stormwater Pollution Prevention Plan (SWP3) prior to the disturbance of land for the County, Goose Creek, and Hanahan SMS4 for review and approval.

4.2.4.5 Review of SWP3:

Berkeley County's plan review procedures will at a minimum meet the following:

a. Make clear to operators of construction activity that they are prohibited from commencing construction activity until they receive of written approval of the plans.

b. Approve SWP3 that complies with the technical requirements of Berkeley County's Stormwater Design Standards Manual requirements and requirements of the NPDES General Permit for Storm Water Discharges from Construction Activities, SCR100000.

c. The SWP3 must include the rationale used for selecting control measures, including how the control measure protects a waterway or stormwater conveyance.

d. Berkeley County will use qualified individuals, knowledgeable in the technical review of SWP3 to conduct reviews.

e. Document the review of each SWP3 plan using a checklist or similar process.

f. Procedures for SWP3 review, including the review of pre-construction site plans, for construction activity that discharge pollutant(s) of concern to TMDL waters and to waters on the 303(d) List of Impaired Waters, the SWP3 must identify potential water quality impacts the permitted discharges may have. The SWP3 shall limit sediment discharges to the MEP, shall protect water quality. Procedures for SWP3 review shall:

    i. Incorporate consideration of potential water quality impacts,
    ii. Include the review of construction site plans,
    iii. For construction projects that disturb less than 25 acres, carefully evaluate all selected BMPs and their ability to control the pollutant(s) of concern.
    iv. For construction projects that disturb 25 acres or more, require a written quantitative and qualitative assessment showing that the selected BMP will control the discharge of the pollutant, or pollutants, of concern from construction and post construction within a TMDL watershed, or to a water on the 303(d) List of Impaired Waters, and,
    v. Require that SWP3 prepared by construction activity applicants for SMS4 review and approval must demonstrate that stormwater discharges will neither cause nor contribute to a violation of water quality standards.

4.2.4.6 Site inspections:

a. Berkeley County will maintain an inventory of all active construction projects for the County, Goose Creek and Hanahan. The inventory will be continuously updated as new projects are permitted and projects are completed. The inventory will contain relevant contact information for each project (e.g., name, address, phone, etc.), the size of the project and area of disturbance. Berkeley County will make the inventory available to SC DHEC upon request. As part of this inventory,

    i. Berkeley County will track the number of inspections for the inventoried construction

sites throughout the reporting period to verify that the sites are inspected at the minimum frequencies required, and,

ii. Document inspections and enforcement activities for each site in the inventory.

b. Berkeley County will implement procedures for inspecting construction projects in the County, City of Goose Creek, and City of Hanahan in accordance with the frequency listed in the SMS4 General Permit.

c. Berkeley County will adequately inspect all phases of construction for the County, Goose Creek, and Hanahan. At a minimum, inspections must occur following installation of initial BMPs, during active construction, and after final site stabilization.

d. Berkeley County will have trained and qualified inspectors for the County, Goose Creek, and Hanahan. Berkeley County will also continue to follow, and revise as necessary, written procedures outlining the inspection and enforcement procedures.

Inspections of construction sites must, at a minimum:

i. Check for coverage under SCR100000 by requesting a copy of any application or Notice of Intent (NOI), the stamped approved stormwater pollution prevention plan or other relevant application form during initial inspections.

ii. Review the applicable stormwater pollution prevention plan and conduct a thorough site inspection to determine if control measures have been selected, installed, implemented, and maintained according to the plan.

iii. Assess compliance with Berkeley County's, Goose Creek's, and Hanahan's ordinances and permits related to stormwater runoff, including the implementation and maintenance of designated minimum control measures.

iv. Assess the effectiveness of control measures.

v. Visually observe and record non-stormwater discharges, potential illicit connections, and potential discharge of pollutants in stormwater runoff.

vi. Provide a written or electronic inspection report generated from findings in the field.

4.2.4.7 Enforcement Response Plan (ERP):
Berkeley County, City of Goose Creek, and City of Hanahan will develop Enforcement Response Plans (ERPs). The ERP will contain descriptions of how each MS4 will use specific type of responses to address various types of violations. The ERP will include, but is not limited to: a. Types of response; i. Verbal warnings, ii. Written notices, and iii. Escalated enforcement measures such as citations, fines, stop work orders, etc. b. Specific strategies for escalating enforcement response, where necessary, to address persistent, repeat or escalating violations. c. Ensure ERPs are reasonably effective in reducing pollutant discharges to the MEP and to protect water quality.
4.2.4.8 MS4 staff training:
Berkeley County, will ensure that all staff, whose primary job duties are related to implementing the construction stormwater program, including permitting, plan review, construction site inspections, and enforcement, are trained to conduct these activities for the County, Goose Creek, and Hanahan.
4.2.4.9 Construction site operator and public involvement:
4.2.4.9.a Construction operator education:
Berkeley County, will develop and implement an effective communication process with construction contractors to educate them on areas in which improvements are needed and to enforce any required actions for the County, Goose Creek, and Hanahan.
4.2.4.9.b Public involvement:
Berkeley County will implement procedures for receipt and consideration of information submitted by the public for the County, Goose Creek, and Hanahan. This will be coordinated with the public participation program.

Minimum Measure #4 BMP Implementation

In order to meet the requirements of Minimum Measure #4, Berkeley County has listed BMPs that focus on the reduction of pollutants in stormwater runoff to the SMS4 from construction activities that result from a land disturbance greater than or equal to one acre, or any land disturbing activity within ½ mile of a receiving waterbody (but not for single family homes which are not part of a subdivision development that result in any land disturbance less than five acres). Evaluation of the success of this minimum measure will be through careful analysis of the measurable goals for each BMP included in this minimum measure. Measurable goals for each BMP were selected by formulating attainable goals for the various BMP implementation steps or tasks. In order to meet the requirements of Minimum Measure #4, Berkeley County will:

- Update Pollution Prevention BMP Requirements
- Review and Update, as necessary, the SWP3 Submittal & Review Requirements
- Update SWP3 Review Procedures for Discharges to Impaired Waters
- Update and Maintain a Construction Site and Site Inspection Inventory
- Update Site Inspection Procedures
- Develop Section of ERP for Construction Activities
- Update the County's Stormwater Design Standards Manual
- Update the County's Stormwater Management Ordinance
- Develop and Implement Effective Communication Procedure with Construction Operator
- Develop and Implement Procedures for Receipt and Consideration of Information Submitted by the Public

Table 16 describes the components of the Berkeley County's, Goose Creek's, and Hanahan's construction site stormwater runoff control program:

Table 16: Best Management Practices - Minimum Measure #4

CONSTRUCTION SITE STORMWATER RUNOFF CONTROL BMPs			
Erosion Prevention and Sediment Control (EPSC) Requirements	**Not Started:** ☐ **In Progress :** ☐ **Completed:** ☒		
	Section: 4.2.4.4.2		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Update the Stormwater Management Design Standards Manual to include requirements for Erosion and Sediment Controls and Soil Stabilization Practices.	January 1, 2016	Once during permit term	County Engineer
Measurable Goal:			
• Provide a tool to assist construction site operators to implement appropriate EPSC BMPs.			
Measurable Goal Update:			
• All construction site operators are provided education and training via pre-construction meetings and subsequently throughout the inspection process, and if necessary, in the enforcement process. Additionally, materials and documentation for proper implementation of EPSC BMPs are provided on the County website.			

Pollution Prevention Requirements	Not Started: ☐ In Progress : ☒ Completed: ☐		
	Section: 4.2.4.4.3		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Update the Stormwater Management Design Standards Manual to include requirements for Pollution Prevention Measures listed in Section 4.2.4.4.3 of Table 18.	January 1, 2016	Once during permit term	County Engineer
Measurable Goal:			
• Provide a tool to assist construction site operators to implement appropriate Pollution Prevention BMPs			
• Update Stormwater Management Design Standards Manual for Submittal requirement 4.2.4.4.4			
Measurable Goal Update:			
• Berkeley County's Goose Creek's, and Hanahan's Stormwater Design Standards Manual is in the process of being updated. Pollution Prevention requirements are currently located in Section 2.2.2.1.3.w-z in Appendix J.			
Update Plan Review Procedures	Not Started: ☐ In Progress : ☐ Completed: ☒		
	Section: 4.2.4.5		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Update the Stormwater Management Design Standards Manual to include SWP3 approval requirements that comply with the technical requirements of the effective NPDES General Permit for Storm Water Discharges from Construction Activities, SCR100000, or establish alternative technical criteria that are equally, or more, protective of water quality. Update the Stormwater Management Design Standards Manual to include procedures for SWP3 review, including the review of pre-construction site plans, for construction activity that discharge pollutant(s) of concern to TMDL waters and to waters on the 303(d) List of Impaired Waters must identify potential water quality impacts the permitted discharges may have. The SWP3 shall limit sediment discharges to the MEP, and shall protect water quality.	January 1, 2016	Once during permit term	County Engineer
Measurable Goal:			
• Review and update plan review procedures to ensure compliance with stormwater design standards and to address the pollutants of concern for construction activities.			
Measurable Goal Update:			
• Berkeley County's Goose Creek's, and Hanahan's Stormwater Design Standards Manual was updated in September 2014. This document includes Plan Review procedures.			

Develop Construction Site and Site Inspection Inventory	Not Started: ☐ On-going : ☒ Completed: ☐ Section: 4.2.4.6(a)		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Maintain an inventory of all active construction projects to include information for: • Relevant contact information • The size of the project • Area of disturbance • Number of inspections by Berkeley County for each construction site • Inspection results and enforcement activities	January 1, 2016	Ongoing	County Engineer
Measurable Goal:			
• Develop a database for construction sites to provide general site information and ensure appropriate site inspections are conducted by the construction operator. The database will be available for review upon request.			
Measurable Goal Update:			
• Berkeley County maintains an inventory of active construction projects for Berkeley County Goose Creek, and Hanahan in a database.			

Update Site Inspection Procedures	Not Started: ☐ In Progress : ☐ Completed: ☒ Section: 4.2.4.6(b-d)		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Update the Stormwater Management Design Standards Manual (or other document) for site inspection procedures to include: • Updated inspection frequency requirements • Procedures for inspecting all phases of construction • Ensuring coverage under SCR100000 • Determining if control measures have been selected, installed, implemented, and maintained according to the SWP3 • Ensuring compliance with Berkeley County's ordinances and design manuals • Assessing the effectiveness of control measures • Addressing and documenting non-stormwater discharges • Electronic inspection documentation procedures	January 1, 2016	Once during permit term	County Engineer
Measurable Goal:			
• Update County Stormwater Management Design Standards Manual.			
Measurable Goal Update:			
• Berkeley County's Goose Creek's, and Hanahan's Stormwater Design Standards Manual was updated in September 2014. The inspection process and procedures for Berkeley County is in Section 4.1.2. in Appendix J.			

Develop Section of ERP for Construction Activities	**Not Started:** ☐ **In Progress :** ☐ **Completed:** ☒		
	Section: 4.2.4.7		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Develop enforcement responses for permit violations, SWP3 violations, and EPSC BMP installation, operation, and maintenance violations.	January 1, 2015	Once during permit term	County Engineer
Measurable Goal:			
• Develop an enforcement response plan to clearly identify types of violations, response to violations, and enforcement measures. The response plan will be made available to construction site operators and SCDHEC.			
Measurable Goal Update:			
• Berkeley County, Goose Creek and Hanahan have developed unified Enforcement Response Plan which includes a section on construction/permitting violations. The ERPs can be found in Appendix F.			

Update Stormwater Management Ordinance	**Not Started:** ☐ **In Progress :** ☐ **Completed:** ☒		
	Section: 4.2.4.7		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Berkeley County, Goose Creek and Hanahan will update their Stormwater Management Ordinance to meet the criteria in this MCM.	January 1, 2015	Once during permit term	County Engineer
Measurable Goal:			
• Update the Stormwater Management Ordinance.			
Measurable Goal Update:			
• The Stormwater Management Ordinances for Berkeley County, Goose Creek and Hanahan provide the appropriate authority to meet and enforce the criteria of this MCM, and are included in Appendix D of this SWMP.			

Train MS4 Staff	**Not Started:** ☐ **On-going :** ☒ **Completed:** ☐		
	Section: 4.2.4.8		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Berkeley County, Goose Creek, and Hanahan will ensure that all staff, whose primary job duties are related to implementing the construction stormwater program, including permitting, plan review, construction site inspections, and enforcement, is trained to conduct these activities.	January 1, 2016	Throughout permit term	County Engineer
Measurable Goal:			
• Train staff whose primary job duties are related to implementing the construction stormwater program.			
Measurable Goal Update:			
• The County's Stormwater Inspectors are CEPSCI certified and are offered CEPSCI Certification or Recertification Training when needed. The goal is for all stormwater engineers to obtain Stormwater Plan Reviewer Certification. The majority of the staff has been certified and certification/recertification is offered to new hires. CEPSCI certified inspectors must be recertified every 5 years. This training is provided by Clemson.			

Develop Construction Site Operator Education	Not Started: ☐ On-going : ☒ Completed: ☐ Section: 4.2.4.9.a		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Berkeley County, Goose Creek, and Hanahan will develop and implement an effective communication process with construction contractors to educate them on areas in which improvements are needed and to enforce any required actions.	January 1, 2016	Annually	County Engineer
Measurable Goal: • Implement an effective communication process with construction contractors.			
Measurable Goal Update: • Berkeley County inspectors and engineers hold pre-construction meetings with construction site operators. This allows the County to have an open and effective communication process and discuss items that may arise and ways to prevent enforcement actions.			

Develop Public Involvement Procedures	Not Started: ☐ In Progress : ☐ Completed: ☒ Section: 4.2.4.9.b		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Berkeley County will implement procedures for receipt and consideration of information submitted by the public.	January 1, 2016	Annually	County Engineer
Measurable Goal: • Implement procedures for receipt and consideration of information submitted by the public.			
Measurable Goal Update: • Berkeley County advertises an email address and phone number on their Stormwater Management Program Components webpage. These allow the public and staff to report information. Additionally, forwarding information to Berkeley County's contact information is made available on Goose Creek's and Hanahan's websites and provided by municipal staff.			

4.2.5 Post-Construction Stormwater Management for New Development and Redevelopment (Minimum Measure #5)

4.2.5.1 Minimum Measure #5 Permit Requirements

The post construction stormwater management program is designed to give Berkeley County the authority to require structural and non-structural stormwater quality BMPs on sites being developed in the MS4 areas in the County, City of Goose Creek, and City of Hanahan. Berkeley County currently provides design requirements to control stormwater discharges from new development and redeveloped sites. Berkeley County will review and update the post construction program by developing additional or revising existing site performance standards and ensuring post construction BMPs are inspected and maintained appropriately.

Table 17: Minimum Measure #5 Permit Requirements

4.2.5.1 Post-construction stormwater management program:
Berkeley County will provide water quality design requirements for the MS4 areas in the County, Goose Creek, and Hanahan to control stormwater discharges from new development and redeveloped sites that disturb at least one acre (including projects that disturb less than one acre that are part of a larger common plan of development or sale, LCP) that discharge into an SMS4. The requirements apply to private and public development sites, including roads.
4.2.5.2 Site performance standards:
In accordance with Section 4.2.5.2 of the SMS4 general permit, Berkeley County will produce a set of site performance standards which will be applied to all new development and redevelopment sites discharging to the SMS4 areas in the County, Goose Creek, and Hanahan, which disturb greater than or equal to one acre. These standards will ensure that projects approximate pre-development conditions to the MEP to protect water quality.
4.2.5.3 Site plan review:
To ensure that all applicable new development and redeveloped sites conform to the performance standards required in Section 4.2.5.2, Berkeley County will implement project review, approval, and enforcement procedures. Berkeley County will conduct site plan reviews of all new development and redeveloped sites which will disturb greater than or equal to one acre and discharge to Berkeley County, Goose Creek, and Hanahan MS4s (including sites that disturb less than one acre that are part of a LCP). The site plan review will specifically address how the project applicant meets the performance standards and how the project will ensure long-term maintenance of post construction BMP.
4.2.5.4 Long-term maintenance of post-construction stormwater control measures:
All structural stormwater control measures installed and implemented to meet the site performance standards will be maintained in perpetuity. Berkeley County will ensure the long-term maintenance of structural stormwater control measures installed in the County, Goose Creek, and Hanahan. Berkeley County will require that property owners or operators of any new development or redeveloped site in the MS4 areas in the County, Goose Creek, and Hanahan subject to the site performance standards will provide verification of maintenance for the approved structural stormwater control measures used to comply with the performance standards.

4.2.5.5 Inventory of post-construction stormwater control measures:
Berkeley County will maintain an inventory of all post-construction structural stormwater control measures installed and implemented at new development and redeveloped sites, including both public and private sector sites located within the permit areas for the County, Goose Creek, and Hanahan. At a minimum, the inventory shall contain all BMP constructed since the effective date starting with the effective date of this permit.
4.2.5.6 Inspections and enforcement:
4.2.5.6.1 Inspection procedures:
To ensure that all stormwater control measures are operating correctly and are being maintained as required consistent with its applicable maintenance agreement, Berkeley County will conduct inspections of each project site, for the County, Goose Creek, and Hanahan, covered under the performance standards listed in the Stormwater Design Standards Manual, at least one time during the permit term.
4.2.5.6.2 Post-construction notification:
Within 30 days of completion of construction of any project required to meet the performance standards, Berkeley County will conduct a post construction inspection, for the County, Goose Creek, and Hanahan, to verify that BMP have been installed as per approved plans.
4.2.5.6.3 Inspection reports:
Berkeley County will document its inspection findings for the MS4 areas in the County, City of Goose Creek and City of Hanahan in an inspection report. Berkeley County will document and maintain records of inspection findings and enforcement actions and make them available for review by the permitting authority.

Minimum Measure #5 BMP Implementation

In order to meet the requirements of Minimum Measure #5, Berkeley County will:

- Review and Update Water Quality Design Requirements
- Review and Update Site Performance Standards
- Revise Plan Review Checklist & Stormwater Design Standards Manual for Post Construction SWP3 Submittal Requirements
- Develop Long Term Maintenance Requirements for Post Construction BMPs
- Create Post Construction BMP Inventory
- Develop Post Construction BMP Inspection Procedures
- Conduct Initial Post Construction BMP Installation Inspections
- Conduct Post Construction BMP Maintenance and Operation Inspections
- Document Post Construction BMP Inspections

Table 18 describes the components of Berkeley County's, Goose Creek's, and Hanahan's Post-Construction stormwater management plan:

Table 18: Best Management Practices – Minimum Measure #5

POST-CONSTRUCTION STORMWATER MANAGEMENT BMPS			
Develop Water Quality Design Requirements	**Not Started:** ☐ **In Progress :** ☐ **Completed:** ☒		
	Section: 4.2.5.1		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Develop post-construction program requirements to be implemented in the Stormwater Design Standards Manual to control stormwater discharges from new development and redeveloped sites.	January 1, 2016	Once during permit term	County Engineer
Measurable Goal:			
• Provide design community with design guidance for Post Construction BMPs			
Measurable Goal Update:			
• Berkeley County's Stormwater Design Standards Manual was updated in September 2014. This document addresses post-construction requirements and is in Appendix J.			
Develop Site Performance Standards	**Not Started:** ☐ **In Progress :** ☒ **Completed:** ☐		
	Section: 4.2.5.2		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Update Storm Water Design Standards Manual to include Post Construction Site Performance Standards	January 1, 2017	Once during permit term	County Engineer
Measurable Goal:			
• Provide design community with performance and design standards for Post Construction BMPs			
Measurable Goal Update:			
• Berkeley County's Stormwater Design Standards Manual in Appendix J includes site performance standards. Additionally, the Design Standards Manual in Appendix J is in the process of additional updates being developed and adopted after SCDHEC's finalized CGP update. These updates will include revisions to performance and design standards for Post Construction BMPs.			
Revise Plan Review Checklist for Post Construction SWP3 Submittal Requirements	**Not Started:** ☐ **In Progress :** ☒ **Completed:** ☐		
	Section: 4.2.5.3		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Revise the Plan Review Checklist to include SWP3 submittal requirements for Post Construction Site Performance Standards.	January 1, 2017	Once during permit term	County Engineer
Measurable Goal:			
• Develop SWP3 requirements for Post Construction Site Performance Standards.			
Measurable Goal Update:			

- Berkeley County's Stormwater Design Standards Manual in Appendix J includes SWP3 submittal requirements for post construction site performance standards in Appendix C of the Design Standards Manual. Additionally, the Design Standards Manual in Appendix J is in the process of additional updates being developed and adopted after SCDHEC's finalized CGP update. These updates will include performance and design standards for Post Construction BMPs.

Develop Long Term Maintenance Requirements for Post Construction BMPs	**Not Started:** ☐ **In Progress :** ☐ **Completed:** ☒		
	Section: 4.2.5.4		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Update the long-term maintenance agreement form for post construction BMPs to be signed by the property owner. Develop maintenance verification process to ensure post construction BMPs are properly maintained.	January 1, 2016	Update As Needed	County Engineer

Measurable Goal:

- Develop a post construction BMP maintenance agreement form and a post construction BMP maintenance verification process.

Measurable Goal Update:

- The County requires a maintenance covenant that can be found on the County's website at: https://d7e3m5n2.stackpathcdn.com/wp-content/uploads/2020/01/Covenants.pdf
- The County Stormwater Inspectors schedule periodic post-construction inspections to ensure that privately owned post-construction BMPs are properly maintained.

Post Construction BMP Inventory	**Not Started:** ☐ **On-going :** ☒ **Completed:** ☐		
	Section: 4.2.5.5		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Develop an inventory of all County permitted post-construction BMPs constructed since the effective date of permit SCR030000 (January 1, 2014).	January 1, 2015	Annually	County Engineer
Update County permitted post-construction BMP inventory.	Throughout Permit Term Beginning in Year 2	Annually	County Engineer

Measurable Goal:

- Develop an inventory of County permitted Post-Construction BMPs.

Measurable Goal Update:

- The County has an inventory of all permitted post-construction BMPs constructed since January 1, 2014 in the County, Goose Creek and Hanahan. This is stored in the County's project management system, EnerGov and is updated as needed.

Post-Construction BMP Inspections Program	**Not Started:** ☐ **On-going :** ☒ **Completed:** ☐		
	Section: 4.2.5.6		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Develop procedures and forms for post-construction BMP installation inspections.	January 1, 2015	Once during permit term	County Engineer

Conduct post-construction BMP inspections on County permitted post-construction BMPs within 30 days of construction completion to ensure BMP is installed per approved plans.	Throughout Permit Term Beginning in Year 2	Annually	County Engineer
Develop procedures and forms for post-construction BMP maintenance inspections.	January 1, 2015	Once during permit term	County Engineer
Conduct post-construction BMP inspections on County permitted post-construction BMPs to ensure BMPs are maintained properly after the County is notified through a Notice of Termination (NOT).	Throughout Permit Term Beginning in Year 2	Once during permit term	County Engineer
Document and maintain records of inspection findings and enforcement actions and make them available for review by the permitting authority.	Throughout Permit Term Beginning in Year 2	Annually	County Engineer
Measurable Goal:			
• Develop procedures and forms for Post-Construction BMP installation inspections and include procedures in this document.			
• Inspect all County permitted post-construction BMPs within 30 days of construction completion.			
• Develop procedures and forms for Post-Construction BMP maintenance inspections and include procedures in this document.			
• Inspect appropriate construction sites to ensure County permitted post-construction BMPs are maintained and operating correctly.			
• Provide documentation of Post-Construction BMP inspections.			
Measurable Goal Update:			
• In the last reporting year, the County has conducted 77 post-construction BMP inspections (61 in the County, 16 in Goose Creek, and 0 in Hanahan).			

4.2.6 Pollution Prevention / Good Housekeeping (Minimum Measure #6)

4.2.6.1 Minimum Measure #6 Permit Requirements

In order to meet the requirements of Minimum Measure #6, Berkeley County will implement a range of BMPs targeted to reduce pollutants from County and City-Owned facilities and storm sewer systems. A County, Goose Creek, and Hanahan inventory of municipal facilities was developed, and each facility was assessed for the potential pollutant discharges. Based on the assessment, a list of high priority facilities has been developed, and annual inspections will be conducted at the high priority facilities. Berkeley County prioritized the County, Goose Creek, and Hanahan owned and /or operated stormwater management systems and implemented a maintenance schedule. All County and City-Owned structural controls (stormwater BMPS) will continue to be inspected and maintained. In addition, the County will continue to review and update, as necessary, the pollution prevention measures for operation and maintenance activities. Berkeley County will continue to provide training to County, Goose Creek, and Hanahan appropriate employees to ensure pollution prevention and good housekeeping activities are practiced throughout the County's, Goose Creek's, and Hanahan's separate departments and that are consistent with the current Good Housekeeping Manual.

Table 19: Minimum Measure #6 Permit Requirements

4.2.6.1	Development of a municipal facility and stormwater control inventory:
	Berkeley County will update and maintain an inventory of municipally-owned and stormwater controls that are not covered under a separate general or individual NPDES permit (i.e. industrial, solid waste, etc.) for the County, City of Goose Creek, and City of Hanahan. Examples of these types of facilities may include but are limited to composting facilities, equipment storage and maintenance facilities, landscape maintenance on municipal property, material storage yards, public buildings, golf courses, public work yards, recycling facilities, salt storage facilities, municipally owned and/or maintained structural stormwater controls. Berkeley County will also include a list of industrial facilities owned or operated by the County, City of Goose Creek or City of Hanahan that are subject to SCDHEC NPDES General Permit for Storm Water Discharges associated with Industrial Activity (SCR000000) or individual NPDES permits for discharges of storm water associated with industrial activity that ultimately discharge to the SMS4. The SCDHEC permit number or a copy of the Industrial NOI form for each facility will be included.
4.2.6.2	Municipally-owned or operated facility assessment:
4.2.6.2.1	Comprehensive assessment of pollutant discharge potential:
	Berkeley County will develop a comprehensive assessment of all municipally-owned or operated facilities for the County, City of Goose Creek, and City of Hanahan identified in Part 4.2.6.1 at least once during the permit term and include it in the permit reapplication for their potential to discharge pollutants in stormwater.
4.2.6.2.2	Identification of high priority facilities:
	Berkeley County will identify “high-priority” facilities for the County, City of Goose Creek, and City of Hanahan that have a high potential to generate stormwater pollutants.
4.2.6.2.3	Documentation of comprehensive assessment results:
	Berkeley County will document the results of the assessments and maintain copies of all site evaluation checklists used to conduct the comprehensive assessment for the County, City of Goose Creek and City of Hanahan. The documentation will include the results of Berkeley County’s initial assessment, any identified deficiencies and corrective actions taken.

4.2.6.3	Annual comprehensive inspections of high priority facilities:
	Starting no later than 24 months from the effective date of coverage and at least once per year thereafter, a comprehensive inspection of "high priority" facilities (Part 4.2.6.2.2), including all stormwater controls, must be performed by Berkeley County on County, City of Goose Creek, and City of Hanahan facilities. Specific attention will be given to waste storage areas, dumpsters, vehicle and equipment maintenance/fueling areas, material handling areas, and similar potential pollutant-generating areas. The yearly inspection results will be documented, and records will be maintained by Berkeley County. The inspection report will also include any identified deficiencies and the corrective actions taken to fix the deficiencies.
4.2.6.4	Storm sewer system maintenance activities – MS4 maintenance:
4.2.6.4.1	Assessment/prioritization of stormwater management systems/structures:
	Berkeley County will prioritize municipally owned and /or operated storm water management systems / structures for the County, City of Goose Creek and City of Hanahan, and implement a maintenance schedule.
4.2.6.4.2	Municipal activities and operation:
	Berkeley County will review and update a set of pollution prevention measures for the County, City of Goose Creek and City of Hanahan that, when applied during municipal O&M activities, will reduce the discharge of pollutants in stormwater. Municipal operation and maintenance activities to be considered include but are not limited to; pavement and rights-of-way maintenance, bridge maintenance, cold weather operations, and municipally sponsored events.
4.2.6.4.3	Maintenance of municipally-owned and/or maintained structural stormwater controls:
	Berkeley County will inspect, and maintain, wherever and whenever necessary, all County and municipally owned or maintained structural stormwater controls. Berkeley County will also maintain all County and municipally owned green infrastructure practices through regularly scheduled maintenance activities.

4.2.6.5	Employee training and education requirements:
	Berkeley County will develop an annual employee training program for appropriate employees in the County, City of Goose Creek and City of Hanahan involved in implementing pollution prevention and good housekeeping practices. This annual training will include a general stormwater education component, any new technologies, operations, or responsibilities that arise during the year, and the Permit Requirements that apply to the staff being trained. A description of the program will be maintained for review by the permitting authority. Berkeley County will also identify and track all personnel requiring training and records must be maintained. Training will begin within the first year from the effective date of permit authorization.
4.2.6.6	Requirements for contractor oversight:
	Contractors hired by Berkeley County, Goose Creek or Hanahan to perform municipal maintenance activities will be contractually required to comply with all of Berkeley County's stormwater control measures, good housekeeping practices, and facility-specific stormwater management procedures. Berkeley County will provide oversight of contractor activities to ensure that contractors are using appropriate control measures and procedures.

Minimum Measure #6 BMP Implementation

In order to meet the requirements of Minimum Measure #6, Berkeley County will:

- Develop a Municipal Facility Inventory
- Conduct Assessment of Non-Permitted Municipal Facility & Identify High Priority Facilities
- Conduct High Priority Facility Inspections
- Prioritization Stormwater Management Systems/Structures
- Review and Update Pollution Prevention Measures for Operation and Maintenance Activities
- Inspect and Maintain County-Owned Structural Controls (stormwater BMPs)
- Conduct Pollution Prevention and Good House Keeping Employee Training

Table 20 describes the components of Berkeley County's, Goose Creek's, and Hanahan's pollution prevention/good housekeeping for municipal operations program:

Table 20: Best Management Practices – Minimum Measure #6

POLLUTION PREVENTION / GOOD HOUSEKEEPING BMPS			
Municipal Facility Inventory	**Not Started:** ☐ **In Progress :** ☐ **Completed:** ☒		
	Section: 4.2.6.1		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Develop an inventory of all County & City-owned facilities and stormwater controls that are not covered under a separate NPDES permit In addition, develop a list of all municipally owned facilities that are covered under a separate NPDES permit for industrial activities.	January 1, 2015	Once during the permit term	County Engineer
Measurable Goal:			
• An inventory of non-permitted municipal facilities			
• A list of all municipally owned facilities that are covered under a separate NPDES permit for industrial activities.			
Measurable Goal Update:			
• An inventory of non-permitted municipal facilities was completed and is stored in an Excel spreadsheet.			
• A list of all municipally owned facilities that are covered under a separate NPDES permit for industrial activities in the County, Goose Creek and Hanahan is stored in an Excel spreadsheet.			
Assessment of Non-Permitted Municipal Facilities	**Not Started:** ☐ **In Progress :** ☐ **Completed:** ☒		
	Section: 4.2.6.2		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Conduct an analysis based on type of facility/use, locations to waterbody, County & City owned BMPs to rank County & City facilities.	July 1, 2015	Once during permit term	County Engineer
Based on the results of the analysis, identify high priority facilities.	July 1, 2015	Once during permit term	County Engineer
Create a site evaluation checklist that will be used to conduct an assessment of all facilities.	July 1, 2015	Once during permit term	County Engineer
Conduct facility site inspections with evaluation checklist at each facility identified in the inventory from Section 4.2.6.1.	January 1, 2017	Once during permit term	County Engineer
Document results of facility evaluations.	January 1, 2017	Once during permit term	County Engineer
Measurable Goal:			
• An analysis to identify potential high priority facilities.			
• A site evaluation checklist for facility assessment.			
• Conduct inspections at municipal facilities and complete site evaluation checklist.			

- Documentation of site evaluation checklists.
- A list of high priority facilities.

Measurable Goal Update:

- Using the comprehensive list of all municipal facilities and any activities at each location which might harm the water quality of stormwater runoff, a list of high priority facilities was created.
- A site evaluation checklist was created to use during facility inspections and high priority municipal facilities were listed.

Conduct High Priority Facility Inspections	**Not Started:** ☐ **On-going :** ☒ **Completed:** ☐ **Section: 4.2.6.3**		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Create a high priority inspection report template with sections for identified deficiencies and corrective action taken for each site inspection.	January 1, 2016	Once during permit term	County Engineer
Conduct and document annual facility site inspections including evaluations of potential "pollutant generating" areas.	Throughout Permit Term Beginning in Year 3 (January 1, 2016)	Annual	County Engineer

Measurable Goal:

- A high priority facility inspection report form.
- Conduct annual inspections and determine potential "polluting generating" areas at high priority facilities.
- Documentation of facility inspection report forms.

Measurable Goal Update:

- A high priority inspection form was created and used during facility inspections.
- Inspections of the high priority facilities for the County, Goose Creek, and Hanahan were conducted in November of 2018, and May & October of 2019. Some inspection have already occurred in 2020, while additional inspections are scheduled to occur in 2020.
- The high priority inspections completed in 2018 and 2019 for the County, Goose Creek, and Hanahan were documented and are included in the Berkeley County Facility Inspection reports.

Prioritization of Stormwater Management Systems/Structures	**Not Started:** ☐ **In Progress :** ☐ **Completed:** ☒ **Section: 4.2.6.4.1**		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Prioritize storm water management systems / structures and develop and implement a maintenance schedule.	July 1, 2016	Once during permit term	County Engineer

Measurable Goal:

- Create a maintenance schedule based on the prioritization of the storm water management systems / structures

Measurable Goal Update:

- A maintenance schedule was created and is updated as necessary, by staff conducting the maintenance, via Electronic Asset Management software.

Review and Update Pollution Prevention Measures for Operation and Maintenance Activities	**Not Started:** ☐ **In Progress :** ☐ **Completed:** ☒ **Section: 4.2.6.4.2**		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Review and Update a written set of pollution prevention measures for municipal operation and maintenance activities.	July 1, 2016	Once during permit term	County Engineer

Measurable Goal:

- Create a set of pollution prevention measures for municipal operation and maintenance activities.

Measurable Goal Update:

- Pollution prevention measures for municipal operation and maintenance activities are described in the Good Housekeeping Manual (revised April 2018).

Inspect and Maintain County Owned Structural Controls	**Not Started:** ☐ **On-going :** ☒ **Completed:** ☐ **Section: 4.2.6.4.3**		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Conduct inspections and perform necessary maintenance for County owned structural controls	January 1, 2016	As necessary	County Engineer

Measurable Goal:

- Conduct inspections and perform maintenance.

Measurable Goal Update:

- County and municipality-owned structural controls are inspected and maintained as necessary.

Pollution Prevention and Good House Keeping Employee Training	**Not Started:** ☐ **On-going :** ☒ **Completed:** ☐ **Section: 4.2.6.5**		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Conduct pollution prevention and good housekeeping employee training.	January 1, 2015	Annually	County Engineer

Measurable Goal:

- Conduct employee training.

Measurable Goal Update:

- Seventeen (17) IDDE and Good Housekeeping trainings were conducted in 2018 & 2019:
- 346 employees (223 from Berkeley County, 43 from Hanahan, and 80 from Goose Creek) attended the seventeen trainings in 2018 & 2019.

4.4 Sharing Responsibility

In October 2015, intergovernmental agreements between Berkeley County, the City of Hanahan, and the City of Goose Creek were signed. Berkeley County is responsible for the items stated in the

agreements (located in Appendix H) and will continue to provide the services stated in those agreements. In the second reporting period (2016-2017), Berkeley County updated this SWMP to address these additional municipalities. Updates to the SWMP in the third reporting period (2018-2019) are inclusive of the municipalities of Goose Creek and Hanahan.

4.5 Reviewing and Updating Storm Water Management Plans

Table 21: Reviewing and Updating SWMP

SWMP REQUIREMENTS			
Update Storm Water Management Plan	**Not Started:** ☐ **In Progress :** ☐ **Completed:** ☒		
	Section: 4.5.1 & 4.5.2		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Review and update the SWMP document to keep it up to date during the term of the permit.	Throughout the permit term	Annually	County Engineer
Storm Water Management Plan Updates Required by SCDHEC	**Not Started:** ☒ **In Progress :** ☐ **Completed:** ☐		
	Section: 4.5.3		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
SCDHEC requested changes to the SWMP	TBD	As Required	County Engineer

This SWMP is a living document and will be updated and revised throughout the permit term. In accordance with Section 4.5.2 of the SMS4 general permit, additions (but not subtracting or replacing) components to the SWMP will be made at any time with a written notification made to SCDHEC.

Any changes intended to replace an ineffective or unfeasible BMP with an alternate BMP will be requested and submitted in written form to SCDHEC at any time. Unless denied SCDHEC, changes proposed in accordance with the criteria below will be deemed approved and may be implemented sixty (60) days from submittal of the request. If request is denied, SCDHEC will send Berkeley County, Goose Creek, or Hanahan a written response giving a reason for the decision. The modification requests must include the following:

- An analysis of why the BMP is ineffective or infeasible (including cost prohibitive),
- Expectations on the effectiveness of the replacement BMP, and
- An analysis of why the replacement BMP is expected to achieve the goals of the BMP to be replaced.

Additionally, SCDHEC may request Berkeley County, Goose Creek, or Hanahan to make changes to the SWMP at any time to:

- Address documented impacts on receiving water quality caused, or contributed to, by discharges from the SMS4;
- Include more stringent requirements necessary to comply with new Federal statutory or regulatory requirements; or

- Include such other conditions deemed necessary by the Department to comply with the goals and requirements of the Clean Water Act.
- Changes requested by SCDHEC must be made in writing, set forth the time schedule for Berkeley County, City of Goose Creek, and City of Hanahan to develop the changes, and offer the Berkeley County, City of Goose Creek, and City of Hanahan the opportunity to propose alternative plan changes to meet the objective of the requested modification. All changes required by SCDHEC will be made in accordance with South Carolina Water Pollution Control Permits Regulation 61-9 124.5, 122.62, or as appropriate 122.63.

5.0 Monitoring, Record Keeping, and Reporting

5.3 Reporting

Table 22: Reporting

REPORTING			
1st Report	**Not Started:** ☐ **In Progress :** ☐ **Completed:** ☒		
	Section: 5.3		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Complete and Submit 1st Report (covering years 1 and 2)	April 1, 2016	Once	County Engineer
2nd Report	**Not Started:** ☐ **In Progress :** ☐ **Completed:** ☒		
	Section: 5.3		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Complete and Submit 2nd Report (covering years 3 and 4)	July 4, 2018	Once	County Engineer
3rd Report	**Not Started:** ☐ **In Progress :** ☐ **Completed:** ☒		
	Section: 5.3		
Milestone(s)	**Schedule**	**Frequency**	**Responsible Party**
Complete and Submit 3rd Report (covering years 5 and 6)	April 1, 2020	Once	County Engineer

Unless DHEC requires more frequent reports, reports will be submitted based on the following schedule:

1. The first report covering years 1 and 2 must be submitted to the Department twenty-seven (27) months after the effective date of the permit.

2. The following report, covering years 3 and 4 shall be submitted 180 days before the permit expiration date as part of the renotification.

3. While, and if the expired permit is continued, Reports are due every year on the anniversary date of the expired permit.

All reports shall be sent to the address below unless the Department instructs permittees to submit via alternate mechanisms (i.e. electronic mechanisms):

SCDHEC Bureau of Water
Water Pollution Compliance & Enforcement
2600 Bull Street
Columbia, SC 29201-1708

All reports will include:

- The status of the County's, Goose Creek's, and Hanahan's compliance with permit conditions, an assessment of the appropriateness of the identified BMP under Part 4, progress towards achieving the statutory goal of reducing the discharge of pollutants to the MEP, and the measurable goals for each of the minimum control measures;

- Results of information collected and analyzed, if any, during the reporting period, including monitoring data used to assess the success of the plan at reducing the discharge of pollutants to the MEP;

- A summary of the storm water activities the County, Goose Creek, and Hanahan plans to undertake during the next reporting cycle (including an implementation schedule);

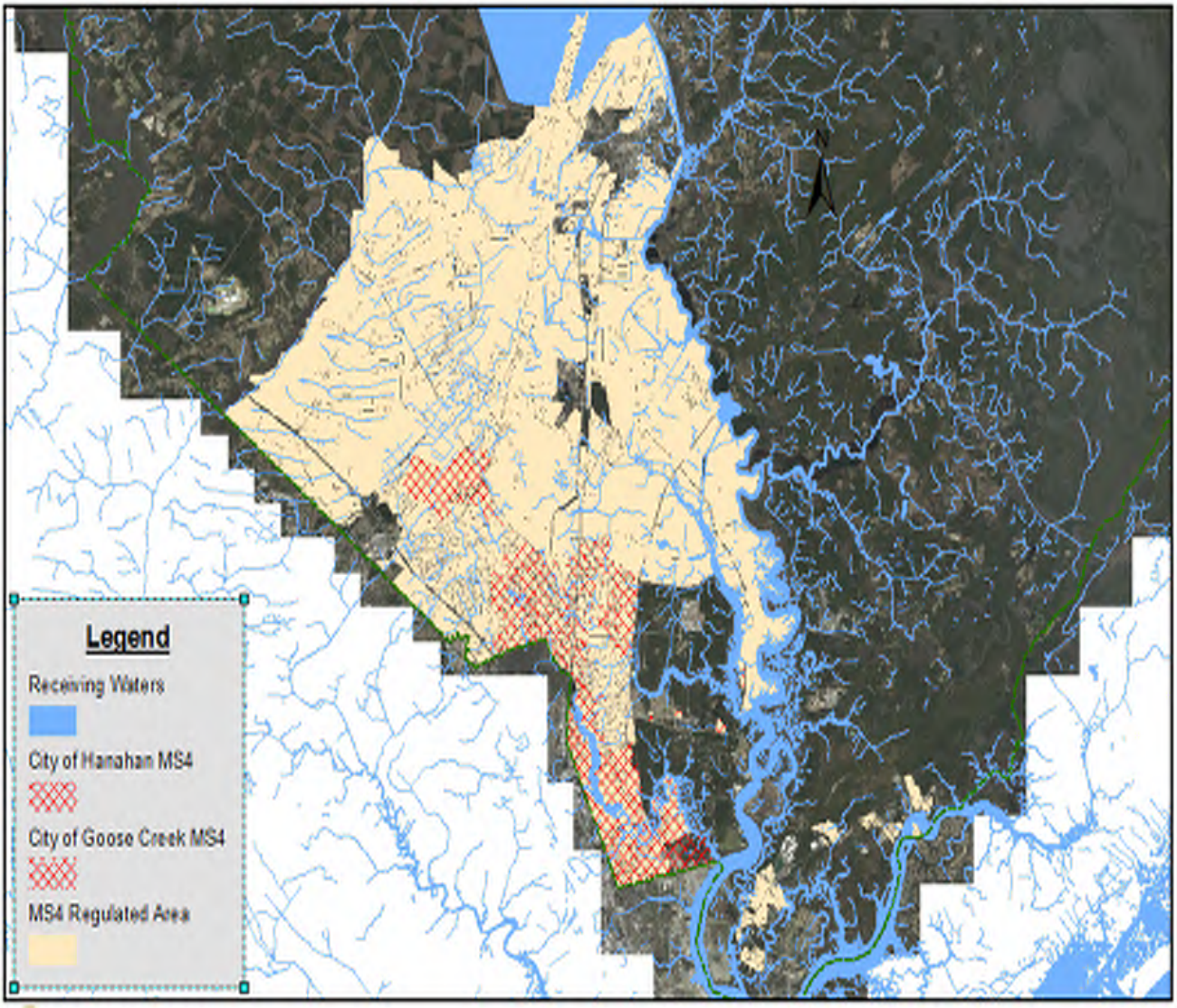
- Proposed changes to the County's, Goose Creek's, and Hanahan's SWMP, including changes to any BMP or any identified measurable goals that apply to the plan elements; and

- Notice that the County, Goose Creek, and Hanahan are relying on another entity to satisfy some of the SMS4 general permit obligations (if applicable).

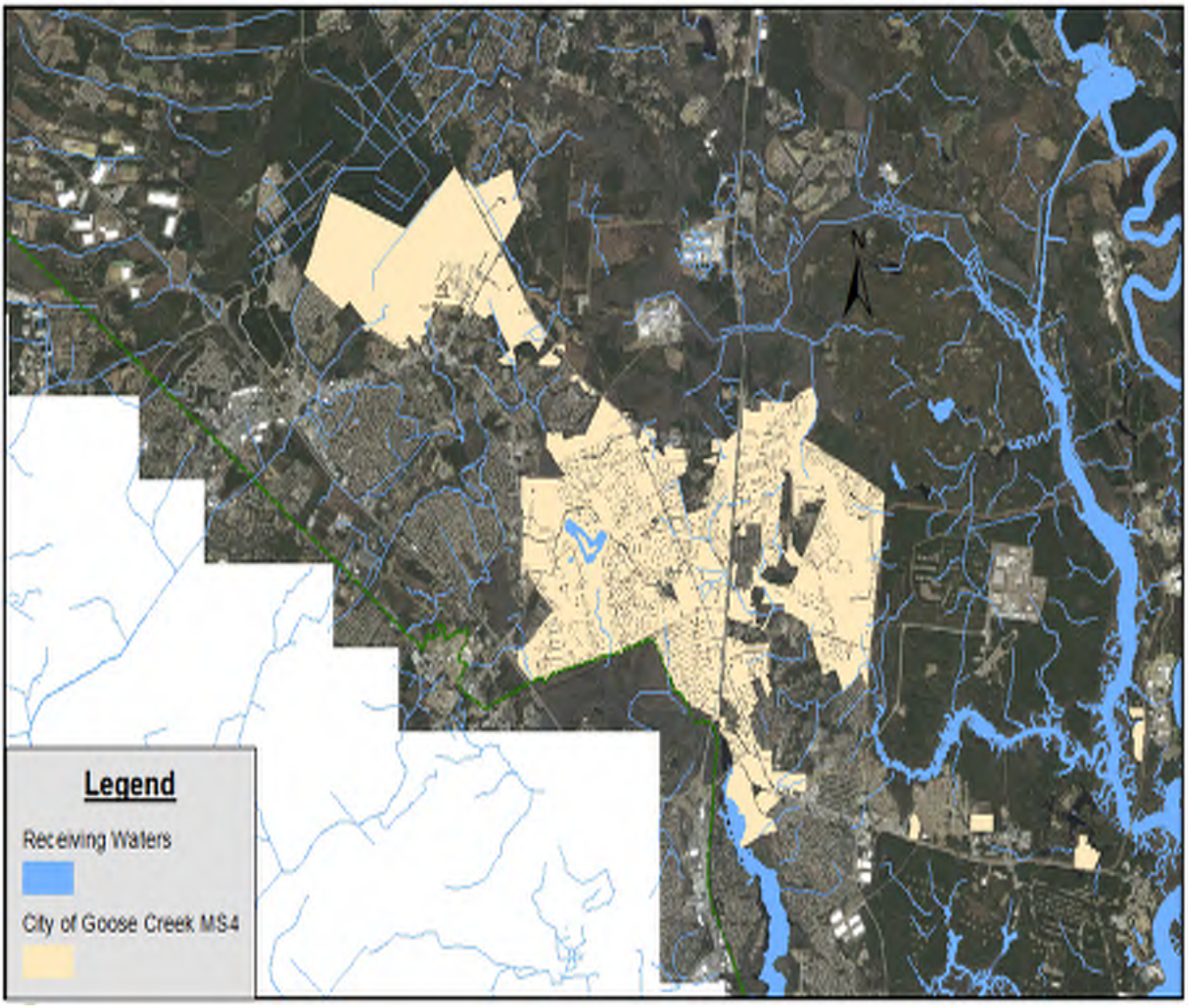
- Information requested in the SMS4 general permit including, but not limited to: sections 1.4.7, 3.1.1.1, 3.2.1.1, 3.2.1.2.2, 3.3.6, 4.1.6 and in the additional conditions applicable to NPDES MS4 permits contained in Appendix B of the SMS4 general permit

Appendix A: MS4 Regulated Areas

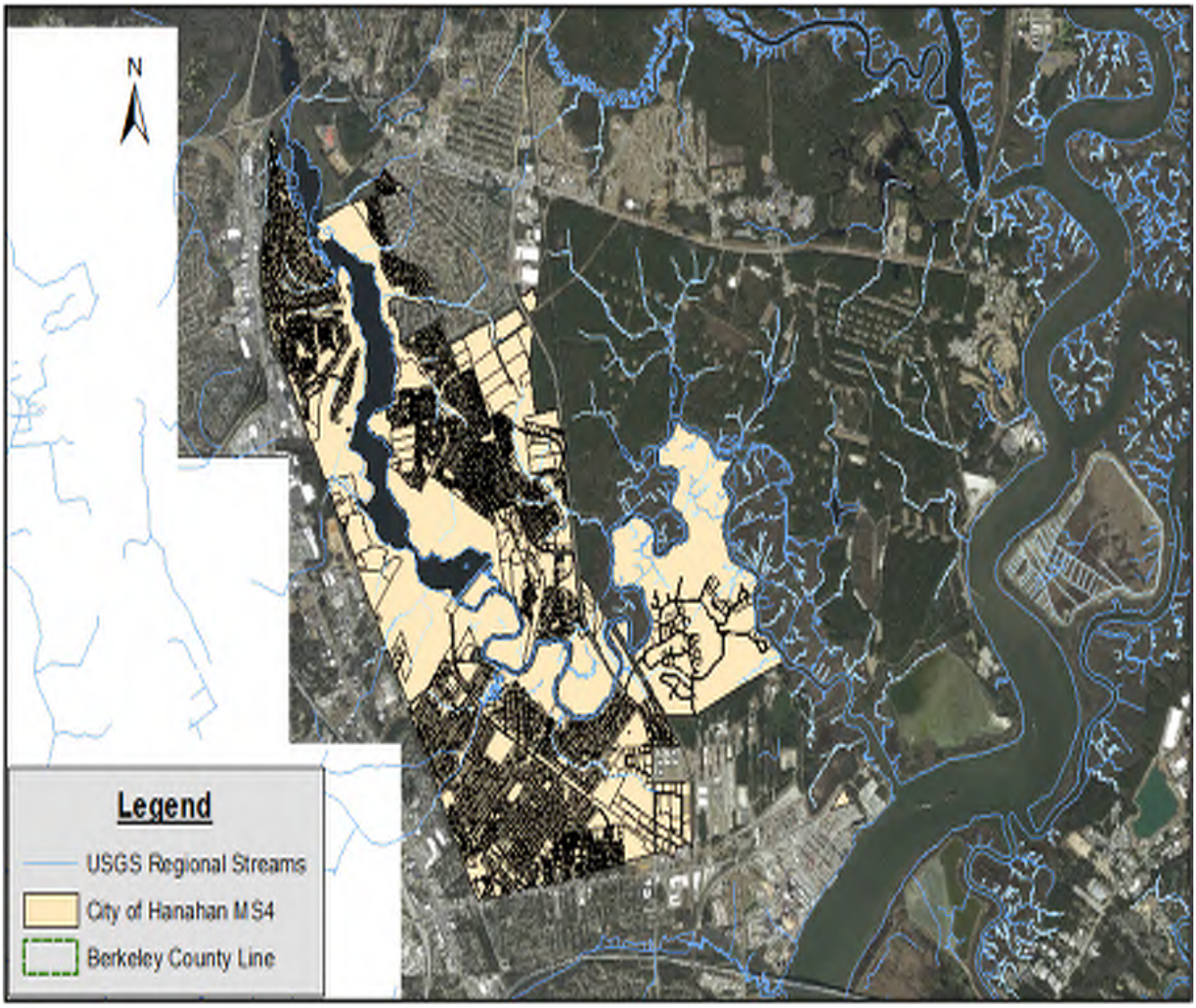
Berkeley County MS4



City of Goose Creek MS4



City of Hanahan MS4



Appendix B: SWMP Updates

Date	Description of Update or Revision
December 2019	Update language throughout document and appendices to synthesize and consolidate information for Berkeley County, City of Goose Creek, and City of Hanahan.
	Updates to the Minimum Measures Tables to reflect current status of each milestone and associated timelines.
	Amending Measurable Goal Updates to provide descriptions of what items have been completed and what progress has been made in achieving the goal of reducing the discharge of pollutants to the MEP.
	Appendices have been updated to reflect revised/updated documentation.
	BMPs were adjusted to provide an accurate description of what has been completed to date.
	References to documents have been modified to show inclusion of new appendices.

Appendix C: TMDL Monitoring and Assessment Plans

Berkeley County does not have any WLAs currently assigned to the SMS4 area and therefore are not monitoring and do not have a TMDL Monitoring and Assessment Plan.

The City of Hanahan and City of Goose Creek have their own TMDL Monitoring and Assessment Plan.

City of Goose Creek
TMDL Monitoring and Assessment Plan

December 2014

Introduction

The purpose of this Total Maximum Daily Load (TMDL) Monitoring and Assessment Plan is to establish the procedures and protocols that the City of Goose Creek will utilize when, and if, a non-point source related TMDL is approved in a watershed into which the City's municipal separate storm sewer system (MS4) discharges. Currently the only existing approved TMDL in the Goose Creek area is the Charleston Harbor, Cooper, Ashley and Wando Rivers Dissolved Oxygen (DO) TMDL, however the wasteload allocation (WLA) for that TMDL is for continuous non-stormwater discharges (i.e. industrial and wastewater treatment plant discharges) only. The Charleston Harbor TMDL states that "available data and modeling indicate that regulated and unregulated stormwater nonpoint sources do not contribute to the allowable DO depression" and the TMDL does not contain any wasteload allocations for non-point source/stormwater runoff. The City does understand that there could be other TMDLs developed in the future for which there will need to be a monitoring and assessment plan and will therefore implement the following procedures within twelve (12) months of the EPA-approval or effective date of a new TMDL.

TMDL Monitoring and Assessment Plan

The monitoring plan to measure the pollutant levels discharged from SMS4 outfalls to waters subject to any future TMDLs shall include:

a. A schedule for monitoring activities to be initiated no more than eighteen (18) months from the effective date of the TMDL.
b. Requirements to monitor the pollutants of concern (POC), on a frequency necessary to determine statistically significant seasonal pollutant loads baseline, with duration of not less than two (2) years. Minimum frequency and representativeness are stipulated as follows:
    i. Samples and measurements taken for the purpose of the TMDL Monitoring Plan shall:
        (1) Be representative of the SMS4 discharges,
        (2) Be reasonably distributed in time, while maintaining representative sampling,
        (3) Not be terminated for the purpose of preventing the analysis results from a permit or water quality violation,
        (4) Describe and consider frequency, mass and/or rate of discharge, as appropriate, and,
        (5) Be expressed in terms of units or measurements consistent with the requirements contained in the wasteload allocations (WLA).
    ii. The information contained in the TMDL Monitoring Plan shall include:
        (1) Monitoring locations, appropriate for representative data collection
        (2) Explanation of why monitoring is being conducted for selected locations
        (3) A description of whether the location(s) are representative and contribute to pollutant loads,
        (4) An indication the seasons during which sampling is intended,
        (5) The pollutant of concern, or its surrogate(s), as a sampling parameter,
        (6) Description of the sampling equipment, and,
        (7) A rationale supporting the proposed monitored location(s) as reflective of water quality concerns to the maximum extent practical (MEP).
    iii. The TMDL monitoring plan shall focus on the pollutant of concern, or its surrogates, to characterize the quality and quantity of the SMS4 permitted discharges to evaluate the progress toward the WLA and/or Water Quality

Standards (WQS) attainment by implementing one, or a combination, of the following strategies to the MEP:
(1) In-stream monitoring, and/or
(2) Outfall monitoring.

Monitoring location(s) should be selected based on one, all, or a combination of the following basis:
(1) Percent (%) of MS4 area draining to the WQMS, at least 25%,
(2) Collection of a representative contributing watershed,
(3) Inclusion of the entire TMDL watershed within the MS4.

iv. Established field and sampling protocols shall be followed when characterizing MS4 discharges, such as:
(1) Guidance for collecting samples under the stormwater permitting program while fulfilling NPDES stormwater sampling needs is provided in the NPDES Stormwater Sampling Guidance Document (EPA 833-8-92-001) and it is incorporated by reference herein. It can be found by visiting, http://www.epa.gov/npdes/pubs/owm0093.pdf
(2) Technical assistance and support for MS4 subject to NPDES program regulations for storm water point source discharges can be found in the Guidance Manual for the Preparation of NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems (EPA-833-B-92-002) and it is incorporated by reference herein. Visit, http://www.epa.gov/npdes/pubs/owm0246.pdf

v. The City may collect composite samples using different protocols than those indicated above with respect to the time duration subject to the approval of SC DHEC.

vi. Where field analysis does not involve analytical methods approved under 40 CFR 136, the City shall provide a description of the method used including the name of the manufacturer of the test method along with the range and accuracy of the test.

vii. When no analytical method is approved, the City may use any suitable method but must provide a description of the method.

viii. For each monitoring location selected in above, samples of stormwater discharges shall be collected at a minimum of once per season per year.

ix. Samples collected for laboratory analysis for all wet weather flows discharged from the SMS4, shall be analyzed for the POC, or surrogates, in the TMDL.

x. For SMS4 discharges to tidal influenced waters, alternative accepted sampling protocols may be used to collect the samples. A description of the methodology used shall be provided as required by SC-R 61-9 122.26(d)(1)(iv)(D) & (d)(2)(iii). Adherence to the MEP is expected. Documentation of any deviation is required.

c. Biological monitoring may be appropriate at some locations to demonstrate the recovery of biological communities after implementation of stormwater control measures. Monitoring locations in receiving waters must be at least both upstream and downstream of major MS4 discharges, with a frequency of at least annual basis for the permit term. Regardless of, the monitoring type, representativeness of the location, pollutant(s) of concern and/or parameters to be sampled, description of sampling equipment and sampling frequency of ambient waters should be strategically designed to demonstrate the level of progress made towards meeting the applicable WLA and addressing impairments in the receiving and/or in downstream waters;

d. For each pollutant of concern, the City shall report on the progress of the characterization of the relative pollutant levels from various SMS4 discharges to

TMDL waters. Resulting data shall be included in every annual report following the commencement of monitoring for TMDL pollutant characterization.

Assessment of achieving the WLA/WQS will consist of the following:

a. Process and schedule for assessing the monitoring data to prioritize areas of the SMS4 that will be targeted for implementation of BMPs,
b. Process and schedule for selection of appropriate BMPs that will implement the WLA to the MEP, will protect water quality, and will satisfy the appropriate water quality requirements of the Clean Water Act, and,
c. Updates to TMDL Monitoring and Assessment Plans to be submitted in each annual report.
d. Progress on the TMDL Monitoring and Assessment Plan shall be documented in the Annual Report.

TMDL Implementation and Analysis

The City shall initiate the monitoring described above. Any monitoring data and information generated from the previous year of the monitoring program to satisfy the provisions of the MS4 Permit will be made available to SC DHEC upon request.

The City shall complete and submit TMDL Implementation Plans for approved TMDLs within 48 months from the new TMDL effective date.

TMDL Implementation Plans submitted to SC DHEC Bureau of Water shall describe the following:

a. Assessment of the monitoring data. Where long-term data is available, this assessment should include an analysis of the data to show trends;
b. Prioritization of areas targeted for BMP implementation and underlying rationale;
c. Structural and nonstructural BMPs to address the WLA. The City will include a brief explanation of why the BMPs are selected (e.g., expected load reductions or percent of capture); and,
d. Schedule for completing BMP implementation as soon as practicable. The schedule shall describe all of the BMP implementation activities that are expected to occur during the current and the next permit term. In addition to the BMP implementation activities that are expected to occur during the current permit cycle, the TMDL Implementation Plan shall include proposed monitoring to be used to evaluate the effectiveness of the BMP and facilitate the iterative revision of the BMP Implementation Plan to achieve progress towards addressing the TMDL's WLA as long as the intended uses are not supported.

The City shall implement those elements of the TMDL Implementation Plan that are scheduled to occur within the term of the MS4 permit. Progress on the TMDL Implementation and Analysis shall be documented in the Annual Report.

Should there be no water quality improvement of the discharges from permitted SMS4 resulting from BMP implementation, the City understands that they may be required to implement additional control measures or make changes to the TMDL implementation plan.

City of Hanahan

TMDL Monitoring and Assessment Plan

December 2014

Introduction

The purpose of this Total Maximum Daily Load (TMDL) Monitoring and Assessment Plan is to establish the procedures and protocols that the City of Hanahan will utilize when, and if, a non-point source related TMDL is approved in a watershed into which the City's municipal separate storm sewer system (MS4) discharges. Currently the only existing approved TMDL in the Hanahan area is the Charleston Harbor, Cooper, Ashley and Wando Rivers Dissolved Oxygen (DO) TMDL, however the wasteload allocation (WLA) for that TMDL is for continuous non-stormwater discharges (i.e. industrial and wastewater treatment plant discharges) only. The Charleston Harbor TMDL states that "available data and modeling indicate that regulated and unregulated stormwater nonpoint sources do not contribute to the allowable DO depression" and the TMDL does not contain any wasteload allocations for non-point source/stormwater runoff. The City does understand that there could be other TMDLs developed in the future for which there will need to be a monitoring and assessment plan and will therefore implement the following procedures within twelve (12) months of the EPA-approval or effective date of a new TMDL.

TMDL Monitoring and Assessment Plan

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b. Requirements to monitor the pollutants of concern (POC), on a frequency necessary to determine statistically significant seasonal pollutant loads baseline, with duration of not less than two (2) years. Minimum frequency and representativeness are stipulated as follows:

   i. Samples and measurements taken for the purpose of the TMDL Monitoring Plan shall:

      (1) Be representative of the SMS4 discharges,
      (2) Be reasonably distributed in time, while maintaining representative sampling,
      (3) Not be terminated for the purpose of preventing the analysis results from a permit or water quality violation,
      (4) Describe and consider frequency, mass and/or rate of discharge, as appropriate, and,
      (5) Be expressed in terms of units or measurements consistent with the requirements contained in the wasteload allocations (WLA).

   ii. The information contained in the TMDL Monitoring Plan shall include:

      (1) Monitoring locations, appropriate for representative data collection
      (2) Explanation of why monitoring is being conducted for selected locations

(3) A description of whether the location(s) are representative and contribute to pollutant loads,
(4) An indication the seasons during which sampling is intended,
(5) The pollutant of concern, or its surrogate(s), as a sampling parameter,
(6) Description of the sampling equipment, and,
(7) A rationale supporting the proposed monitored location(s) as reflective of water quality concerns to the maximum extent practical (MEP).

iii. The TMDL monitoring plan shall focus on the pollutant of concern, or its surrogates, to characterize the quality and quantity of the SMS4 permitted discharges to evaluate the progress toward the WLA and/or Water Quality Standards (WQS) attainment by implementing one, or a combination, of the following strategies to the MEP:

(1) In-stream monitoring, and/or
(2) Outfall monitoring.

Monitoring location(s) should be selected based on one, all, or a combination of the following basis:

(1) Percent (%) of MS4 area draining to the WQMS, at least 25%,
(2) Collection of a representative contributing watershed,
(3) Inclusion of the entire TMDL watershed within the MS4.

iv. Established field and sampling protocols shall be followed when characterizing MS4 discharges, such as:

(1) Guidance for collecting samples under the stormwater permitting program while fulfilling NPDES stormwater sampling needs is provided in the NPDES Stormwater Sampling Guidance Document (EPA 833-8-92-001) and it is incorporated by reference herein. It can be found by visiting, http://www.epa.gov/npdes/pubs/owm0093.pdf
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v. The City may collect composite samples using different protocols than those indicated above with respect to the time duration subject to the approval of SC DHEC.
vi. Where field analysis does not involve analytical methods approved under 40 CFR 136, the City shall provide a description of the method used including the name of the manufacturer of the test method along with the range and accuracy of the test.

vii. When no analytical method is approved, the City may use any suitable method but must provide a description of the method.

viii. For each monitoring location selected in above, samples of stormwater discharges shall be collected at a minimum of once per season per year.

ix. Samples collected for laboratory analysis for all wet weather flows discharged from the SMS4, shall be analyzed for the POC, or surrogates, in the TMDL.

x. For SMS4 discharges to tidal influenced waters, alternative accepted sampling protocols may be used to collect the samples. A description of the methodology used shall be provided as required by SC-R 61-9 122.26(d)(1)(iv)(D) & (d)(2)(iii). Adherence to the MEP is expected. Documentation of any deviation is required.

c. Biological monitoring may be appropriate at some locations to demonstrate the recovery of biological communities after implementation of stormwater control measures. Monitoring locations in receiving waters must be at least both upstream and downstream of major MS4 discharges, with a frequency of at least annual basis for the permit term. Regardless of, the monitoring type, representativeness of the location, pollutant(s) of concern and/or parameters to be sampled, description of sampling equipment and sampling frequency of ambient waters should be strategically designed to demonstrate the level of progress made towards meeting the applicable WLA and addressing impairments in the receiving and/or in downstream waters;

d. For each pollutant of concern, the City shall report on the progress of the characterization of the relative pollutant levels from various SMS4 discharges to TMDL waters. Resulting data shall be included in every annual report following the commencement of monitoring for TMDL pollutant characterization.

Assessment of achieving the WLA/WQS will consist of the following:

a. Process and schedule for assessing the monitoring data to prioritize areas of the SMS4 that will be targeted for implementation of BMPs,

b. Process and schedule for selection of appropriate BMPs that will implement the WLA to the MEP, will protect water quality, and will satisfy the appropriate water quality requirements of the Clean Water Act, and,

c. Updates to TMDL Monitoring and Assessment Plans to be submitted in each annual report.

d. Progress on the TMDL Monitoring and Assessment Plan shall be documented in the Annual Report.

TMDL Implementation and Analysis

The City shall initiate the monitoring described above. Any monitoring data and information generated from the previous year of the monitoring program to satisfy the provisions of the MS4 Permit will be made available to SC DHEC upon request.

The City shall complete and submit TMDL Implementation Plans for approved TMDLs within 48 months from the new TMDL effective date.

TMDL Implementation Plans submitted to SC DHEC Bureau of Water shall describe the following:

a. Assessment of the monitoring data. Where long-term data is available, this assessment should include an analysis of the data to show trends;

b. Prioritization of areas targeted for BMP implementation and underlying rationale;

c. Structural and nonstructural BMPs to address the WLA. The City will include a brief explanation of why the BMPs are selected (e.g., expected load reductions or percent of capture); and,

d. Schedule for completing BMP implementation as soon as practicable. The schedule shall describe all of the BMP implementation activities that are expected to occur during the current and the next permit term. In addition to the BMP implementation activities that are expected to occur during the current permit cycle, the TMDL Implementation Plan shall include proposed monitoring to be used to evaluate the effectiveness of the BMP and facilitate the iterative revision of the BMP Implementation Plan to achieve progress towards addressing the TMDL's WLA as long as the intended uses are not supported.

The City shall implement those elements of the TMDL Implementation Plan that are scheduled to occur within the term of the MS4 permit. Progress on the TMDL Implementation and Analysis shall be documented in the Annual Report.

Should there be no water quality improvement of the discharges from permitted SMS4 resulting from BMP implementation, the City understands that they may be required to implement additional control measures or make changes to the TMDL implementation plan.

Appendix D: Stormwater Management Ordinance

BERKELEY COUNTY COUNCIL

Daniel W. Davis - Supervisor & Chairman
Dennis L. Fish - Vice Chairman (District No. 5)

COMMITTEE CHAIRMEN

District 1
Phillip Farley
Committee on
Land Use &
Development

District 2
Timothy J. Callanan
Committee on
Finance

District 3
Kenneth E. Gunn, Jr.
Committee on
Justice &
Public Safety

District 4
Cathy S. Davis
Committee on
Water & Sanitation

District 5
Dennis L. Fish
Committee on
Human Resources &
Purchasing

District 6
Jack H. Schurlknight
Committee on
Human Services

District 7
Caldwell Pinckney, Jr.
Committee on
Community Services

District 8
Steve C. Davis
Committee on
Facilities & Code
Enforcement

December 2, 2014

Ms. Kace Smith
Berkeley County Deputy Supervisor/Finance
P.O. Box 6122
Moncks Corner, SC 29461

Re: Ordinance No. 14-11-36, to amend Ordinance No. 07-07-44, an ordinance establishing regulations to develop and enforce a Stormwater Management Program to reduce the discharge of pollutants associated with stormwater runoff and Berkeley County's Storm Sewer System.

Dear Ms. Smith:

You will find enclosed a certified copy of the above referenced ordinance adopted by Berkeley County Council at a Regular Meeting of Council on November 24, 2014.

If any additional information is required, please do not hesitate to give our office a call.

With kind regards,

Catherine R. Windham
Clerk to Council

Enclosure: as stated

Copy w/enclosure to:
Mr. Frank Carson, County Engineer
Mary P. Brown – For Filing

14-11-36

Berkeley County

Stormwater Management Ordinance

14-11-36

STORMWATER MANAGEMENT ORDINANCE

TABLE OF CONTENTS

Bill No. 14-37

ORDINANCE NO. 14-11-38

AN ORDINANCE TO AMEND ORDINANCE NO. 07-07-44, AN ORDINANCE ESTABLISHING REGULATIONS TO DEVELOP AND ENFORCE A STORMWATER MANAGEMENT PROGRAM TO REDUCE THE DISCHARGE OF POLLUTANTS ASSOCIATED WITH STORMWATER RUNOFF AND BERKELEY COUNTY'S STORM SEWER SYSTEM.

WHERAS, Berkeley County Council adopted a Stormwater Management Ordinance for Berkeley County, on July 24, 2007;

WHEREAS, uncontrolled stormwater runoff may have significant, adverse impact on the health, safety and general welfare of Berkeley County and the quality of life of its citizens; and

WHEREAS, Berkeley County is required by federal and State law to obtain a National Pollutant Discharge Elimination System (NPDES) permit from the South Carolina Department of Health and Environmental Control for stormwater discharges from Berkeley County's stormwater systems; and

WHEREAS, the NPDES permit requires that Berkeley County develop, implement, and enforce a stormwater management program in its regulated area designed to reduce the discharge of pollutants from its small municipal separate storm sewer systems to the maximum extent practicable, to protect water quality, and to satisfy the appropriate water quality requirements of the Clean Water Act.

NOW, THEREFORE BE IT ENACTED by Berkeley County Council, in a meeting duly assembled, that Ordinance No. 07-07-44, is amended and revised as follows:

DIVISION 1
GENERAL PROVISIONS

Section 1.1 Title

This ordinance shall be known as the "Stormwater Management Ordinance of Berkeley County, South Carolina."

Section 1.2 Authority

This ordinance is adopted pursuant to the authority conferred upon Berkeley County by the South Carolina Constitution, Act No. 194 of the Acts and Joint Resolutions of 1971 enacted by the General

Assembly of the State of South Carolina, approved April 23, 1971, in 1976 South Carolina Code of Laws Sections 4-9-30, 4-9-40, 5-7-30, and 5-7-60.

Section 1.3 Jurisdiction

The boundaries and jurisdiction of this Ordinance shall encompass those portions of unincorporated Berkeley County defined as the "regulated area" and such additional areas lying inside the corporate limits of other governments as approved by Berkeley County Council.

Section 1.4 Findings

Berkeley County Council makes the following findings:

(a) Uncontrolled stormwater runoff may have significant, adverse impact on the health, safety and general welfare of Berkeley County and the quality of life of its citizens. The potential impacts of uncontrolled stormwater can lead to the degradation of water quality and general riverine ecosystem through excessive or illegal pollutant discharges, erosion, and flooding thereby limiting or removing its designated and potential uses.

(b) Berkeley County is required by federal law [33 U.S.C 1342(p) and 40 CFR 122.26] and by State law [S. C. Code Reg. 61-9 122.32 & 122.33] to obtain a National Pollutant Discharge Elimination System (NPDES) permit from the South Carolina Department of Health and Environmental Control ("SCDHEC") for stormwater discharges from Berkeley County's stormwater systems. The NPDES General Permit for Storm Water Discharges from Regulated Small Separate Storm Sewer Systems (SMS4), SCR030000, requires that Berkeley County develop, implement, and enforce a stormwater management program (SWMP) in its regulated area designed to reduce the discharge of pollutants from its small municipal separate storm sewer systems (SMS4) to the maximum extent practicable (MEP), to protect water quality, and to satisfy the appropriate water quality requirements of the Clean Water Act.

Section 1.5 Purpose

(a) It is the purpose of this ordinance to protect, maintain, and enhance water quality and the environment of Berkeley County and the short-term and long-term public health, safety, and general welfare of the citizens of Berkeley County. This ordinance is also designed to minimize property damage by establishing requirements and procedures to control the potential adverse effects of increased stormwater runoff and related pollutant loads associated with both future development and existing developed land. Proper management of stormwater runoff will further the purpose of this Ordinance to insure a functional drainage system, reduce the effects of development on land and stream channel erosion, attain and maintain water quality standards, enhance the local environment associated with the drainage system, reduce local flooding, maintain to the maximum extent practical pre-developed runoff characteristics of the area in terms of flow rate, volume and pollutant concentration, and facilitate economic development through residential, commercial, and industrial construction and development while mitigating associated pollutant, flooding, erosion, and drainage impacts.

(b) It is further the purpose of this ordinance to direct the development and implementation of a Stormwater Management Program (SWMP) and to establish legal authority which authorizes or enables Berkeley County at a minimum to:

(1) Comply with State and Federal requirements related to stormwater management developed pursuant to the Clean Water Act;

(2) Prohibit illicit connections and discharges to Berkeley County stormwater management systems and facilities and waters of the State;

(3) Control to the maximum extent practical the discharge of spills, dumping, or disposal of materials other than stormwater to Berkeley County stormwater management systems and facilities and waters of the State;

(4) Address specific categories of non-stormwater discharges and similar other incidental non-stormwater discharges listed in the SWMP;

(5) Require that violators cease and desist illicit discharges of stormwater in violation of any ordinance, permits, contracts or orders;

(6) Require installation, implementation, and maintenance of control measures from owners/operators of construction sites, new development and redevelopment to minimize the discharge of pollutants to the MEP and to protect water quality;

(7) Require from operators of construction sites, new or redeveloped land, including industrial and commercial facilities information including, but not limited to, specific requirements to control construction and post-construction discharges of pollutants in stormwater;

(8) Enforce, penalize, stop work, and require compliance for controlling pollutants from construction sites, new or redeveloped land, including industrial and commercial facilities;

(9) Where necessary, require stormwater discharge rate and volume control during and following development, redevelopment, or construction;

(10) Define and implement procedures of site plan review and site inspection of all applicable construction projects within regulated areas of Berkeley County;

(11) Control the discharge from Berkeley County stormwater management systems and facilities of pollutants in such quantity that water quality standards are met or to otherwise address post-construction, long-term water quality. This includes the necessary means needed to comply with State and Federal regulations regarding stormwater management quantity and quality;

(12) Define procedures for addressing citizen complaints of stormwater-related issues within Berkeley County;

(13) Provide for adequate long term operation and maintenance of Best Management Practices (BMPs);

(14) Prior to applying for approval of construction activities within the Regulated Area of Berkeley County that require DHEC construction general permit coverage, the County must receive notification from DHEC's Office of Ocean and Coastal Resource

Management (OCRM) that states the proposed project is consistent with the Coastal Zone Management Plan;

(15) Carry out inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions and Ordinance requirements including the prohibition on illicit discharges to Berkeley County stormwater management systems and facilities and waters of the State;

(16) Enter private property for the purpose of inspecting any facilities, equipment, practices, or operations related to Stormwater discharges to determine whether there is compliance with conditions in ordinances, permits, contracts or orders;

(17) Encourage the use of non-traditional strategies to control stormwater discharges;

(18) Encourage the creation of stream buffers and preservation of natural spaces to provide areas that could be used for flood storage, stormwater treatment and control, and recreation. Such areas may be required in special protection areas needed to protect, maintain, or enhance water quality and protect property from flooding problems;

(19) Develop, implement, and enforce action plans to address pollutant load reductions required in impaired waterbodies and to work towards compliance with Total Maximum Daily Loads (TMDLs) established by EPA or SCDHEC and to work towards meeting water quality standards.

(20) Enable enforcement of all said authorizations.

(c) It is still further the purpose of this ordinance to establish authority for the County Engineer for determining consistency of construction projects with the Berkeley County SWMP.

Section 1.6 Construction and Scope

(a) The provisions of this Ordinance shall apply throughout those portions of unincorporated Berkeley County defined as the "regulated area" and such additional areas lying inside the corporate limits of other governments as approved by Berkeley County Council. The County Council will approve the designation of the "regulated area".

(b) The Berkeley County Engineer or his designee shall be primarily responsible for the coordination and enforcement of the provisions of this Ordinance and the SWMP.

(c) The application of this Ordinance and the provisions and references expressed herein shall be the minimum stormwater management requirements and shall not be deemed a limitation or repeal of any other ordinances of Berkeley County or powers granted to Berkeley County by the State of South Carolina statues, including, without limitation, the power to require additional or more stringent stormwater management requirements. If site characteristics on new development and/or redevelopment indicate that complying with these minimum requirements will not provide adequate designs or protection for local property, residents, or the environment, the property owner, operator, or person responsible for land disturbing activities shall be required to provide additional and appropriate management practices, control techniques, system design, and engineering methods to attain an adequate level of protection.

Section 1.7 Severability

Should any word, phrase, clause or provision of this ordinance be declared invalid or unconstitutional by a court of competent jurisdiction, such declaration shall not affect this ordinance as a whole or any part hereof except that specific provision declared by such court to be invalid or unconstitutional.

Section 1.8 Rules of Language and Interpretation

(a) The word "shall" is mandatory; the word "may" is permissive.

(b) The particular shall control the general.

(c) Words used in the present tense shall include the future, and words used in the singular include the plural, and the plural the singular, unless the context clearly indicates the contrary.

(d) All public officials, bodies and agencies to which reference is made are those of Berkeley County, unless otherwise indicated.

Section 1.9 Relationship with Other Laws, Regulations and Ordinances

Whenever the provisions of this Ordinance impose more restrictive standards than are required in or under any other law, regulation or ordinance, the requirements contained in this article shall prevail. Whenever the provisions of any other law, regulation or ordinance require more restrictive standards than are required in this article, the requirements of such law, regulation or ordinance shall prevail.

Section 1.10 Amendments

Berkeley County Council, may, in its discretion and following procedures specified by State law, amend or change this Ordinance or adopt additional regulations or resolutions to implement this Ordinance, implement the SWMP, or to otherwise further the goal of protecting the quality of the waters into which Berkeley County stormwater management systems and facilities outfall.

Section 1.11 Conflicting Ordinances Repealed

All ordinances or parts of ordinances related to stormwater management in conflict with the provisions of this Ordinance are hereby repealed. This Ordinance shall prevail in any and all conflicts with guidelines, manuals, or other publications pertaining to stormwater management.

Section 1.12 Definitions

"Applicant" is a person, firm, governmental agency, partnership, or any other entity who seeks to obtain approval under the requirements of this Ordinance and who will be responsible for the land disturbing activity and related maintenance thereof.

"As-built drawings" are revised construction drawings that show in the installed location of the new facilities on a project, including the stormwater system. This term and "record drawings" shall be synonymous.

"Best Management Practices (BMPs)" are any structural or non-structural measure or facility used for the control of stormwater runoff, be it for quantity or quality control. BMPs also includes schedules of activities, prohibitions of practices, maintenance procedures, treatment requirements, operating procedures, and other management practices to control site runoff, spillage or leaks, sludge or waste disposal, drainage from raw material storage, or otherwise prevent or reduce the pollution of waters of the State.

"Construction" or "Construction Activity" is a land-disturbing activity involving clearing, grading, excavating, transporting, filling, or any other activity which results in a change in the natural cover or topography that may cause erosion and contribute to sediment and alter the quality and quantity of stormwater runoff.

"Design Manual" refers to the Berkeley County Stormwater Design Standards Manual.

"Developer" means any person, or others who act on his own behalf, who is required to submit an application for approval of construction activities and is thereafter responsible for maintaining compliance with this Ordinance and conditions of the approved application.

"Easement" is an authorization by a property owner to the general public, a corporation, or a certain person or persons for the use of any designated part of his property for a specific purpose.

"Erosion" means the wearing away of the land surface by the action of wind, water, gravity, ice, or any combination of those forces.

"Flood/flooding" is a temporary rise in the level of water which results in the inundation of areas not ordinarily covered by water.

"Hazardous material" is any item or agent (biological, chemical, physical) which has the potential to cause harm to humans, other living organisms, or the environment, either by itself or through interaction with other factors.

"Illicit connection" means a man-made conveyance connecting an illicit discharge directly to a Berkeley County stormwater management system or facility that results in a discharge that is not composed entirely of stormwater runoff except discharges pursuant to an NPDES permit (other than the NPDES MS4 permit for Berkeley County).

"Improper disposal" means any disposal other than through an illicit connection that results in an illicit discharge, including, but not limited to the disposal of used oil and toxic materials resulting from the improper management of such substances.

"Illicit discharge" or "Illegal discharge" is defined in South Carolina Water Pollution Control Permits Regulation 61-9 122.26(b)(2) and refers to any discharge to a Berkeley County stormwater management system or facility or waters of the State that is not composed entirely of stormwater except (a) discharge pursuant to an NPDES permit (other than the NPDES MS4 Permit for Berkeley County) and (b) discharges resulting from the fire-fighting activities.

"Low Impact Development (LID)" means an approach to land development (or re-development) that works with nature to manage stormwater as close to its source as possible.

"Maintenance" means any action necessary to preserve stormwater system component, including conveyances, facilities and BMPs in proper working condition, in order to serve the intended purposes set forth in this ordinance and to prevent structural failure of such components.

"MS4" means municipal separate storm sewer system and includes all conveyances or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains) which is (a) owned or operated by Berkeley County; (b) designed or used for collecting or conveying stormwater; (c) not a combined sewer system; and (d) not part of a Publicly Owned Treatment Works (POTW).

"New Development" or "Re-Development" means any of the following actions undertaken by any person, including, without limitation, any public or private individual or entity:

(a) division of a lot, tract, or parcels or other divisions by plat or deed;

(b) the construction, installation, or alteration of land, a structure, impervious surface or drainage facility;

(c) clearing, scraping, grubbing or otherwise significantly disturbing the soil, vegetation, mud, sand or rock of a site; or

(d) adding, removing, exposing, excavating, leveling, grading, digging, burrowing, dumping, piling, dredging, or otherwise disturbing the soil, vegetation, mud, sand or rock of a site.

"NPDES" means National Pollutant Discharge Elimination System.

"NPDES MS4 permit" means the General Permit for Storm Water Discharges from Regulated Small Separate Storm Sewer Systems (SMS4), SCR030000, issued by SCDHEC pursuant to the Clean Water Act and the federal stormwater discharge regulations (40 CFR 122.26) that allows for restricting pollutant loads as necessary to meet water quality standards.

"Operator" means the person who has operational control of the property, including an operator or person who is in charge of any activity related to land disturbance, construction or post construction stormwater quality or quantity.

"Outfall" or "Discharge point" means a point source as defined by section 122.2 of SC Regulation 61-9 at the point where a Berkeley County stormwater management system or facility discharges to waters of the State and does not include any conveyances connecting two municipal separate storm sewers, or pipes, tunnels or other conveyances which connect segments of the same stream or other waters of the State and are used to convey waters of the State.

"Owner" means the property owner, or any person who acts in his own behalf, that submits an application for approval to disturb land or vegetation or encroachment and the person, if so designated by default or on legal documents, as the responsible party for maintenance of a stormwater system(s) and facility(s).

"Person" means any individual, public or private corporation, political subdivision, association, partnership, corporation, municipality, State or Federal agency, industry, firm, trust, estate, any other legal entity whatsoever, or an agent or employee thereof.

"Pollutant" is defined at §122.2 of SC Regulation 61-9 as dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged into water. Typical construction site pollutants include sediment, oil and grease, pesticides and fertilizers, pollutants from construction wastes, and pollutants from construction materials.

"Property Owner" means the legal owner of the property.

"Receiving waters" or "receiving water body" refers to any lakes, bays, sounds, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Atlantic Ocean within the territorial limits of the State of South Carolina, and all other bodies of surface or underground water, natural or artificial, public or private, inland or coastal, fresh or salt.

"Regulated Area" refers to the boundaries of Berkeley County's urbanized areas as determined by Decennial Census Data from the United States Bureau of the Census. Regulated Area also includes any portion of the County that is so designated by Berkeley County Council. The Regulated Area designated by Berkeley County Council is established by the map, titled "Berkeley County Regulated Area Map", dated November 24, 2014. This map may be amended from time to time by Berkeley County Council. Any amendments to this map for the purpose of removing properties from annexation do not require the approval of County Council.

"Regulation" means any regulation, rule or requirement prepared by and/or adopted by Berkeley County Council pursuant to this Ordinance.

"Spill" means any accidental or purposeful discharge of any pollutants, hazardous materials, or other substance which is otherwise potentially detrimental to the designated use of a receiving water.

"SWMP" means Berkeley County Stormwater Management Program, which may describe the components to be used by Berkeley County to control stormwater discharges, address flooding, and meet water quality standards discharged from the Berkeley County stormwater management systems and facilities.

"Stormwater" is defined at South Carolina Water Pollution Control Permits Regulation 61-9 122.26(b)(13) and means stormwater runoff, snowmelt runoff, and surface runoff and drainage.

"Stormwater management" means the collection, conveyance, storage, treatment and disposal of stormwater runoff in a manner to meet the objectives of this ordinance and its terms, including, but not limited to, measures that control the increased volume and rate of stormwater runoff and water quality impacts caused by manmade changes to the land.

"Stormwater management systems and facilities" means those natural and man-made channels, swales, ditches, swamps, rivers, streams, creeks, branches, reservoirs, ponds, drainage ways, inlets, catch basins, pipes, head walls, storm sewers, lakes and other physical works, properties, and improvements which transfer, control, convey, or otherwise influence the movement of stormwater runoff, be it for quantity or quality control.

"TMDL" is a Total Maximum Daily Load wasteload allocation designation. It is a regulatory value developed to represent the amount of a pollutant that a waterbody can incorporate while meeting water quality standards. TMDL is further defined as the legal document developed by EPA and SCDHEC designating the pollutant load a permitted discharge is allowed to input into a waterbody. It is a

calculation of the maximum amount of a specific pollutant that a waterbody can receive and still meet water quality standards. It is the sum of the allowable loads or allocations of a given pollutant from all contributing point (wasteload allocation (WLA)) and nonpoint (load allocation (LA)) sources. It also incorporates a margin of safety and consideration of seasonal variation. For an impaired waterbody, the TMDL document specifies the level of pollutant reductions needed for waterbody use attainment. TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure.

"Variance" means the modification of the minimum stormwater management requirements contained in this Ordinance and the SWMP for specific circumstances where strict adherence to the requirements would result in unnecessary hardship and not fulfill the intent of this Ordinance.

"Watercourse" is any natural or man-made conveyance used to transport runoff from one location to the next.

"Watershed" is a drainage area or drainage basin contributing to the flow of stormwater to a single point into a receiving watercourse or water body."

"Waters of South Carolina, or Waters of the State" means lakes, bays, sounds, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Atlantic Ocean within the territorial limits of the State, and all other bodies of surface or underground water, natural or artificial, public or private, inland or coastal, fresh or salt, which are wholly or partially within or bordering the State or within its jurisdiction and all waters of the United States within the political boundaries of the State of South Carolina. Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA are not waters of the South Carolina. This exclusion applies only to manmade bodies of water which neither were originally created in waters of South Carolina (such as disposal areas in wetlands) nor resulted from the impoundment of waters of South Carolina.

"Waters of the United States, or Waters of the U.S." means:

(a) All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
(b) All interstate waters, including interstate "wetlands";
(c) All other waters such as interstate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, wet meadows, or natural ponds the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters:
    (1) Which are or could be used by interstate or foreign travelers for recreational or other purposes;
    (2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
    (3) Which are used or could be used for industrial purposes by industries in interstate commerce;
(d) All impoundments of waters otherwise defined as waters of South Carolina under this definition;
(e) Tributaries of waters identified in paragraphs (a) through (d) of this definition;
(f) The territorial sea; and
(g) Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition.

"Water Quality" means those characteristics of stormwater runoff that relate to the physical, chemical, biological, or radiological integrity of water.

"Water Quantity" means those characteristics of stormwater runoff that relate to the rate and volume of the stormwater runoff.

Section 1.13 Reserved

DIVISION 2
ORGANIZATION AND ADMINISTRATION

Section 2.1 Berkeley County Stormwater Management Program (SWMP)

The SWMP being developed by Berkeley County to implement the purposes of this Ordinance shall serve as the basis for directing Berkeley County's efforts to control stormwater and to comply with all applicable State and federal regulatory and permitting requirements. The SWMP and any modifications and/or revisions to the SWMP are incorporated by reference and is hereby a part of this Ordinance. The SWMP requirements and any modifications and/or revisions to the SWMP are to be complied with and shall be enforced in accordance with the provisions of this Ordinance.

Section 2.2 Coordination with Other Agencies

The County Engineer may coordinate Berkeley County's activities with other federal, State, and local agencies that manage and perform functions relating to the protection of receiving waters through written agreement.

Section 2.3 Right of Entry

(a) The County Engineer or his designee shall have right-of-entry on or upon the property of any person subject to this Ordinance. The County Engineer or his designee shall, upon showing satisfactory credentials, be provided ready access to the necessary parts of the premises for the purposes of inspecting, monitoring, sampling, inventorying, examining and copying of records, and performing any other duties necessary to determine compliance with this Ordinance.

(b) Where the property owner or operator has security measures in force requiring proper identification and clearance before entry onto the premises, the person shall make necessary arrangements with the necessary parties so that, upon presentation of suitable identification, the County Engineer or his designee will be permitted to enter without delay for the purposes of performing such responsibilities identified in (a).

Section 2.4 Reserved

DIVISION 3
STORMWATER QUANTITY AND QUALITY MANAGEMENT REQUIREMENTS

Section 3.1 Regulations

(a) The County Engineer shall be responsible for day to day coordination, implementation, and enforcement of this Ordinance and the SWMP as well as the long-term management of the

County's drainage. Without limitation, the County Engineer shall have the following authority:

(1) To issue any approval, certification, or license that may be required to comply with this Ordinance.

(2) To deny a connection to a Berkeley County stormwater management system or facility, if State requirements and this Ordinance are not met.

(3) To enact and amend the Berkeley County Stormwater Designs Standards Manual (Design Manual). The Design Manual may be used to convey design and engineering standards, construction management processes and procedures, and other aspects necessary for compliance with this Ordinance.

The Design Manual shall be amended by staff with approval of the County Engineer.

(4) To require the submittal of an application for all applicable construction activities that result in construction activities with a land disturbance area of greater than or equal to one (1) acre, or other sites as deemed necessary by the Stormwater Design Standards Manual.

These applications must include a plan to control stormwater pollutants and other components detailed in Berkeley County's Stormwater Design Standards Manual.

(5) To require the development of stormwater management and sediment/erosion control plans for all applicable new and re-development projects and enforcement of these plans.

(6) To approve applicable construction activities and to require as a condition of such approvals, structural or non-structural controls, practices, devices, operating procedures, or other mechanisms to protect public and private property from flooding and erosion and attain TMDL-mandated pollutant load reductions and water quality standards.

(7) To require performance bonds as necessary of any person to secure that person's compliance with approval, certificates, licenses, or authorizations issued by the County Engineer pursuant to this Ordinance, the SWMP and Federal and State laws. The County Engineer shall develop a process that organizes the closure of bonds and construction projects to accommodate development phases and property ownership transfers.

(8) To conduct all activities necessary to carry out the SWMP and other requirements included in this Ordinance, and to pursue the necessary means and resources required to properly fulfill this responsibility.

(9) To require appropriate post construction best management practices and appropriate continued maintenance of those best management practices.

(10) To require maintenance bonds as necessary to ensure the long-term maintenance of stormwater management best management practices.

(11) To determine appropriate fees, to impose penalties, and to take necessary and appropriate actions to enforce this Ordinance.

(12) To require encroachment permits as necessary.

Section 3.2 Prohibitions and Exemptions

No person shall (1) develop any land; (2) engage in any industry or enterprise; (3) construct, operate or maintain any landfill, hazardous waste treatment, disposal or recovery facility, or any other industrial or related facility; (4) dispose of any hazardous material or toxic substance or other pollutant; or (5) otherwise allow the transport of sediment and other pollutants associated with stormwater runoff beyond their property boundaries without having provided for compliance with this Ordinance.

In cases where an imminent threat to the health or safety of the general public or the environment is suspected, the County Engineer or his designee shall perform an assessment to determine if immediate action is necessary. Such assessment may be made with or without the consent of the owner or operator. If such consent is refused, the County Engineer or his designee may utilize the enforcement measures authorized in this Ordinance to remove such threat. In such cases, the owner or operator, as the case may be, shall reimburse the County for its direct and related expenses. If the owner or operator, as the case may be, fails to reimburse the County, the County is authorized to file a lien for said costs against the property, file an action in magistrate or civil court for recovery of incurred expenses, and enforce such actions in magistrate or civil court.

The following development activities are exempt from the provisions of this Ordinance.

(a) Land disturbing activities undertaken on forestland for the production and harvesting of timber and timber products and conducted in accordance with best management practices and minimum erosion protection measures established by the South Carolina Forestry Commission pursuant to Section 48-18-70 of the 1976 Code of Laws of South Carolina, as amended.

(b) Land disturbing activities on agricultural land for production of plants and animals, including but not limited to: forages and sod crops, grains and feed crops, tobacco, cotton, and peanuts; dairy animals and dairy products; poultry and poultry products; livestock, including beef cattle, sheep, swine, horses, ponies, mules, or goats, including the breeding and grazing of these animals; bees, fur animals, and aquaculture. The construction of an agricultural structure that requires the disturbance of one or more acres, such as, but not limited to, broiler houses, machine sheds, repair shops, coops, barns, and other major buildings shall require the submittal and approval of necessary application materials as outlined in the Design Manual prior to the start of the land disturbing activity.

(c) Linear utility installation activities that are covered under their own DHEC approved utility general permit requiring associated assurance of proper stormwater management.

(d) Activities undertaken by persons who are otherwise regulated by the provisions of Chapter 20 Title 48, the South Carolina Mining Act.

(e) Discharges of dredged or fill material into waters of the United States which are regulated under section 404 of the Clean Water Act (CWA).

Section 3.3 Design and Engineering Standards

Design and engineering standards must define the desired level of quality and performance for stormwater management systems on all applicable construction activities in order to meet the purpose

of this Ordinance. The standards establish the minimum technical requirements needed to express compliance through calculations, maps and drawings, or others as necessary.

The County Engineer is authorized to develop and adopt policies, criteria, specifications, and standards for the proper implementation of the requirements of this Ordinance, Federal and State laws, and the SWMP, and to provide a sound technical basis for the achievement of stormwater management, including water quality and quantity objectives. These standards may be presented in the Stormwater Design Standards Manual.

It shall be the responsibility of the property owner, operator, or person responsible for land disturbing activities to provide adequate controls to meet the design and engineering standards.

Section 3.4 Application Approval Process

The entire application process and requirements as described in the Design Manual must be adhered to for all applicable construction activities.

It shall be the responsibility of the applicant (property owner, operator, or person responsible for construction activities) to provide a complete application package that meets the requirements of this Ordinance, the SWMP, and other State and Federal regulations.

Section 3.5 Stormwater Design Standards Manual

The County Engineer is authorized to develop and adopt a Stormwater Design Standards Manual. The Design Manual may include design standards, procedures and criteria for conducting hydrologic, hydraulic, pollutant load evaluations, and downstream impact for all components of the stormwater management system. Although the intention of the manual is to establish uniform design practices, it neither replaces the need for engineering judgment nor precludes the use of information not presented. Other accepted engineering procedures may be used to conduct hydrologic, hydraulic and pollutant load studies if approved by the County Engineer.

The Design Manual, shall contain at a minimum the following components:

(a) Required application and approval procedures for all applicable construction activities;

(b) Construction completion and closeout processes;

(c) Hydrologic, hydraulic, and water quality design criteria (i.e., design standards) for the purposes of controlling the runoff rate, volume, and pollutant load. Suggested reference material shall be included for guidance in computations needed to meet the design standards;

(d) Information and requirements for new and re-development projects in special protection areas necessary to address TMDLs, known problem areas and other areas necessary to protect, maintain, and enhance water quality and the environment of Berkeley County and the public health, safety, and general welfare of the citizens of Berkeley County.

(e) Construction document requirements;

(f) Minimum easement requirements;

(g) Required and recommended inspection schedules and activities for all components of the stormwater management system, including construction-related BMPs.

The Design Manual shall be updated periodically to reflect the advances in technology and experience gathered with time.

Section 3.6 Ownership and Berkeley County Participation

(a) Property owners are responsible for maintaining stormwater quantity and quality facilities and all conveyance structures located on their property. Prior to the issuance of any approval of construction plans or applications required by the Design Manual, the property owner shall execute a legal document entitled "Covenants for Permanent Maintenance of Stormwater Systems". The property owner shall record the Covenants in the Office of the Berkeley County Register of Deeds. The location of the facility, the recorded location of the Covenants document, and a statement of the property owner's responsibility for maintenance shall be included and also shown on a plat. In the case of an operator other than the property owner, a copy of a maintenance agreement between the operator and the property owner shall be included with the Covenants, defining the operators' duties and responsibilities and that the property owner shall be responsible for maintenance activities upon the termination of the agreement.

(b) The property owner shall grant to Berkeley County a perpetual, non-exclusive, transferable easement, beginning or ending at a public street or other access point that allows for public inspection and emergency repair of all components of the drainage system, including all conveyances and all water quantity and quality control facilities. At the request of the County Engineer or his designee, the property owner shall grant to Berkeley County right-of-ways.

(c) Stormwater quantity and quality control facilities shall be located so that required easements can be effectively used and ownership and maintenance responsibility can be clearly defined in deeds and plats.

(d) Berkeley County shall be responsible for maintenance activities for stormwater collection/conveyance systems associated with County accepted public roads and County projects.

(e) For projects that are not County accepted public road projects, Berkeley County may in its sole discretion either accept or decline ownership and maintenance of all or part of a stormwater system.

(f) The minimum maintenance requirements will be performed at necessary intervals by the property owner or operator during construction and for as long as a stormwater management system or component is in use. Failure to perform such activities will constitute a violation of this Ordinance.

(g) If a facility or any portion of the stormwater system is not being maintained as required, the County Engineer or his designee will notify the property owner or operator in writing. If the property owner or operator fails to repair or maintain the facility within the allotted time, the County Engineer may authorize the work to be performed by the County or others. In such cases, the property owner or operator shall reimburse the County for its direct and related expenses. If the property owner or operator fails to reimburse the County, the County is

authorized to file a lien for said costs against the property, file an action in magistrate or civil court for recovery of incurred expenses, and enforce such actions in magistrate or civil court.

(h) A property owner or operator may hire or contract others to perform necessary maintenance actions, but Berkeley County will hold the person named in the Covenants as the responsible party should legal actions described in (g) be necessary.

(i) When the County Engineer or his designee determines that additional storage capacity or pollution reduction beyond that required by the applicant for on-site stormwater management is necessary in order to enhance or provide for the public health, safety and general welfare, to correct unacceptable or undesirable existing conditions or to provide protection in a more desirable fashion for future development, Berkeley County may:

(1) require that the applicant grant any necessary easements over, through or under the applicant's property to provide access to or drainage for such a facility;

(2) require that the applicant obtain from the owners of property over, through or under where the stormwater management facility is to be located, any easements necessary for the construction and maintenance of same;

Section 3.7 Maintenance, Construction, Inspection, and Closeout

Maintenance of the stormwater management system is critical for the achievement of its purpose of controlling stormwater runoff quantity and quality and the short-term and long-term public health, safety, and general welfare of the citizens of Berkeley County.

(a) A maintenance plan for the stormwater management system shall be included as part of the submittal required by the Design Manual to perform a construction activity, and must address activities to be conducted during and after construction. As part of the maintenance plan, the property owner or operator of such facility shall specifically agree, through recordation of Covenants, to be responsible for keeping the system and facilities in working order. The County Engineer shall develop procedures to provide reasonable assurance that maintenance activities are performed for both Berkeley County and privately maintained systems. The County Engineer shall also define procedures for transferring maintenance responsibilities to another entity.

(b) The County Engineer shall define procedures for conducting site inspections during construction and after construction until a stormwater management system or facility is no longer in use. Such inspections may be performed by County staff or an approved inspector. Berkeley County has the authority to levy fees for inspections and re-inspections as described in the Stormwater Design Standards Manual.

(c) As required in the Design Manual, the applicant shall submit his own maintenance and inspection schedules to be implemented during construction and for as long as a stormwater management system or facility is in use. Required and recommended schedules for BMP maintenance and inspection are to be provided in the Design Manual.

(d) If the construction is to be phased, no stage work, related to the construction of stormwater management facilities shall commence until the preceding stage of work is completed in accordance with any approved construction plans or applications required by the Design

Manual. The procedure for construction phases beginning and ending and what constitutes such conditions shall be developed.

(e) The applicant shall notify the County Engineer or his designee before commencing any work and upon completion of any phase or designated component of the site. Notification schedules shall be provided for in the Design Manual. All self-inspections, maintenance actions, BMP replacements, and changes to the approved application shall be documented and presented upon request to the County Engineer or his designee.

(f) The construction project completion and closeout process must be completed prior to any of the following actions, as applicable:

(1) The use or occupancy of any newly constructed components of the site.

(2) Final acceptance of any road into the official Berkeley County road inventory or designation of road owner and associated stormwater management system.

(3) Release of any bond held by Berkeley County.

(4) Approval and/or acceptance for recording of maps, plats, or drawings, the intent of which is to cause a division of a single parcel of land into two or more parcels, and/or acceptable bonding is provided.

Section 3.8 Watercourse Protection

Every person owning or operating property through which a watercourse passes shall keep and maintain that part of the watercourse within the property free of trash, debris, and other obstacles that would pollute, contaminate, or significantly retard the flow of water through the watercourse. In addition, the owner or operator shall maintain existing privately owned structures within or adjacent to a watercourse so that such structures will not become a hazard to the use, function, or physical integrity of the watercourse.

To assist in the compliance with State and Federal laws and regulations, the County Engineer may develop special protection areas which require additional control of stormwater quality and quantity than provided by minimum design standards. Such areas may consist of watersheds corresponding to established TMDLs, known flooding problems and pollution impairments, or other areas necessary to protect, maintain, and enhance water quality and the environment of Berkeley County and the public health, safety, and general welfare of the citizens of Berkeley County. These areas can be expected to change with time as development continues and as federal and state law demands.

New stormwater systems created as the result of any new and re-development project shall be connected to the existing drainage system in a manner so as not to degrade the integrity of the existing system, whether natural or manmade, and shall have demonstrated this prior to project closeout. Discharge points shall be confined to connections with an existing natural or man-made drainage system. When there is a direct stormwater discharge into collection systems not owned and maintained by Berkeley County, the owners of these systems shall maintain the right to disapprove new connections to their system.

Section 3.9 Notification of Spills

Notwithstanding other requirements of law, as soon as any person responsible for a facility or the facility's operation and maintenance, or responsible for emergency response for a facility or operation has information of any known or suspected release of materials which are resulting or may result in illegal discharges or pollutants discharging into stormwater, the storm drain system, or waters of the State, said person shall take all necessary steps to discover, contain, and cleanup any such releases. The person shall also take immediate steps to protect against future recurrences of the discharge. In the event of such a release of hazardous materials, including but not limited to oils, greases, engine fluids and fuels, chemicals, herbicides and pesticides, and fertilizers, said person shall immediately notify all necessary agencies of the occurrence. This shall include E911, Berkeley County Emergency Preparedness, and the County Engineer. Such notifications of hazardous spills shall be confirmed by written notice addressed and mailed to the County Engineer within five (5) business days of the spill event. In the event of a release of non-hazardous materials, said person shall record an on-site written record of the spill. The owner or operator of such facility shall retain an onsite written record of any and all spills that will include information on cleanup measures taken and the actions to prevent its recurrence. Such records shall be retained for at least five (5) years. Failure to provide notification of a release as provided above is a violation of this ordinance.

Section 3.10 Cleanup Procedures

Berkeley County may develop spill procedures on how spills are cleaned up, and who is responsible for the cleanup in terms of the activities to be performed and cost of such actions.

Section 3.11 Reserved

DIVISION 4
DETECTION AND ELIMINATION OF ILLICIT CONNECTIONS AND ILLICIT DISCHARGES AND IMPROPER DISPOSAL

Section 4.1 Illicit Connections, Illicit Discharges, and Improper Disposal

(a) It is unlawful for any person to connect any pipe, open channel, or any other conveyance system that discharges anything except stormwater or other approved discharges into a Berkeley County stormwater management system or waters of the State.

(b) It is unlawful for any person to continue the operation of any such illicit connection regardless of whether the connection was permissible when constructed. Improper connections in violation of this ordinance must be disconnected and redirected, if necessary, to the satisfaction of the County Engineer or his designee and any other federal, state, or local agencies or departments regulating the discharge.

(c) It is unlawful for any person to throw, drain, or otherwise discharge to a Berkeley County stormwater management system or facility or to waters of the State or to cause, permit, or allow a discharge that is composed of anything except stormwater or unpolluted water which is approved by the County Engineer.

(d) The County Engineer shall develop procedures for detecting, tracking, and eliminating illicit discharges and improper disposals to the stormwater system.

(e) The County Engineer or his designee may require controls for or exempt the following discharges from the prohibition provision in (a), (b), and (c) above, provided that a reasonable determination is made that they are not a significant source of pollution:

(1) Unpolluted industrial cooling water, but only under the authorization and direction of the County Engineer or his designee and if an appropriate Industrial NPDES permit is in place.

(2) Water line flushing, diverted stream flows, rising ground waters, and uncontaminated pumped ground waters, and uncontaminated ground water infiltration.

(3) Discharges from potable water sources, foundation drains, air conditioning condensation, landscape irrigation, springs, water from crawl space pumps, footing drains, lawn watering, individual car washing, dechlorinated swimming pool discharges, flows from riparian habitats and wetlands, and street wash water.

(4) Discharges or flows from fire fighting.

(f) The County Engineer may develop procedures for allowing other non-stormwater discharges.

Section 4.2 Detection of Illicit Connections, Illicit Discharges, and Improper Disposal

(a) The County Engineer shall take appropriate steps to detect and eliminate illicit connections and illicit discharges to Berkeley County stormwater management systems and facilities, including the adoption of a program to screen illicit discharges and identify their source or sources, perform inspections, and levy fines if not removed.

(b) County staff shall take appropriate steps to detect and eliminate improper disposal. These steps may include programs to screen for disposal, programs to provide for public education and public information, inspection, levying fines, and other appropriate activities to facilitate the proper management and elimination of improper disposal.

Section 4.3 Waste Disposal Prohibitions

No person shall throw, deposit, leave, maintain, keep, or permit to be thrown, deposited, left, or maintained, in or upon any public or private property, driveway, parking area, street, alley, sidewalk, component of the storm drain system, or waters of the State, any refuse, rubbish, garbage, litter, pet fecal matter, or other discarded or abandoned objects, articles, and accumulations, so that the same may cause or contribute to pollution. Yard debris, including natural foliage, may be deposited in the public right of way but not in or on any stormwater conveyance structures, including inlets and gutters, but only if a collection service is available. Wastes in proper waste receptacles may be placed in the street for collection, but again only if collection by or through Berkeley County is in place. No waste or yard debris shall be placed in the street without such a collection service.

Section 4.4 Reserved

DIVISION 5
MONITORING AND INSPECTIONS

Section 5.1 Monitoring

The County staff may monitor the quantity and concentration of pollutants in stormwater discharges from the areas and/or locations designated in Berkeley County's SWMP.

Section 5.2 Inspections

(a) The County Engineer or his designee, bearing proper credentials and identification, may enter and inspect all properties for regular inspections, periodic investigations, monitoring, observation measurement, enforcement, sampling and testing, to effectuate the provisions of this ordinance and the SWMP programs. Such inspections may be made at active construction sites or at any stormwater management system or facility in perpetuity. The County Engineer or his designee shall duly notify the owner of said property or the representative on site and the inspection shall be conducted at reasonable times.

(b) Upon refusal by any property owner to permit an inspector to enter or continue an inspection, the inspector shall terminate the inspection or confine the inspection to the areas where no objection is raised. The County Engineer or his designee shall document the refusal and the grounds for such and promptly seek appropriate compulsory process.

(c) In the event that the County Engineer or his designee reasonably believes that discharges from the property into a Berkeley County stormwater management system or facility may cause an imminent and substantial threat to human health or the environment, the inspection may take place at any time and without notice to the owner of the property or a representative on site. The inspector shall present proper credentials upon reasonable request by the owner or representative.

(d) Inspection reports shall be maintained in a file located in the Engineering Department's office.

(e) At any time during an inspection or at such other times as the County Engineer or his designee may request information from an owner or representative, the owner or representative may identify areas of his facility or establishment, material, or processes that contain or might reveal a trade secret. If the County Engineer or his designee has no clear and convincing reason to question such identification, all material, processes and information obtained within such areas shall be conspicuously labeled "CONFIDENTIAL -- TRADE SECRET." The trade secret designation shall be freely granted to any material claimed to be such by the owner or representative unless there is clear and convincing evidence for denying such designation. In the event the County Engineer or his designee does not agree with the trade secret designation, the material shall be temporarily designated a trade secret and the owner or representative may request an appeal of the Engineering Department's decision in the manner in which all such appeals are handled in this ordinance.

Section 5.3 Reserved

DIVISION 6
ENFORCEMENT, PENALTIES, AND ABATEMENT

Section 6.1 Enforcement

(a) The County Engineer or his designee may initiate an enforcement action when violations of this Ordinance occur, including:

(1) When the County Engineer or his designee finds that work done for new development and re-development fails to conform to any approved applications or plans as required by the Design Manual, or finds that the approved work has not been done;
(2) When the County Engineer or his designee determines that an owner or operator has failed to maintain a stormwater management facility;

(3) When the County Engineer or his designee determines that an owner of any property is causing or partially causing flooding, erosion, or non-compliance with water quality standards or this Ordinance.

(b) The County Engineer or his designee shall direct conformity to approvals and this Ordinance by written Notice of Violation (NOV). The NOV shall serve as a legal requirement to remove the violation(s). The written NOV shall be provided to the owner or the person responsible for land disturbing activities, illicit connections, illicit discharges, and improper disposals, stating the nature of the violation, the amount of time in which to correct deficiencies, the date on which an inspection will be made to make sure that corrective action has been performed, and the proposed penalty structure if corrective action is not taken by the inspection date. It shall be sufficient notification to deliver the notice to the person to whom it is addressed, or to deposit a copy of such in the United States Mail, properly stamped, certified and addressed to the address used for tax purposes or the address provided on submittals required by the Design Manual. The NOV may address the entire site or a specific portion of the site so as not to unduly impede the development of areas being managed for the control of stormwater runoff and associated pollutants.

(c) After the issuance of the NOV, the County Engineer or his designee is hereby given the authority to proceed with enforcement actions which may include:

(1) Issuing a written order to comply, to suspend work, or to revoke the approval issued;

(2) Seeking redress through legal action;

(3) Withholding the release of permanent electric power to the site or certificate of occupancy;

(4) Withholding or revoking other permits related to the site; and/or

(5) Levying fines.

(d) The County Attorney is hereby directed to take all legal actions necessary to correct situations described in (a), (b) and (c), including actions that are necessary to remove from the property such objectionable conditions constituting non-compliance with this Ordinance.

(e) Nothing contained in this Ordinance shall impair the right or ability of the County Attorney to exercise any and all other remedies available, of-law or in equity, including without limitation, the pursuit of injunctive relief, under emergency circumstances where there exists the danger of bodily injury or death.

(f) The authorized enforcement agency or its appointed agent may obtain injunctive relief to enjoin violations of the provisions of this Ordinance, and any person damaged as a result of

such violations may, upon a proper showing of such damages, obtain payment therefore by a civil action.

(g) This Ordinance may be enforced by any other remedy of law or equity that the County Attorney is authorized to pursue, to include the authorities and powers conferred to local governments by the General Assembly of South Carolina. The penalties and other remedies provided in this Ordinance are cumulative and not exclusive, and may be independently and separately pursued against the same person for the activity constituting a violation of this Ordinance. The enforcement of any remedy provided herein shall not prevent the enforcement of any other remedy or remedies in other provisions of this Code or other laws and regulations.

Section 6.2 Fines

Any person violating any provision of this ordinance shall be subject to a fine of not more than one thousand dollars ($1,000) for each violation. Each separate day of violation constitutes a new and separate violation. Notice of civil penalty shall be provided via the issuance of a uniform summons.

Section 6.3 Additional Legal Measures

(a) Where Berkeley County is fined and/or placed under a compliance schedule by the State or federal government for a violation(s) of its NPDES permit, and Berkeley County can identify the person(s) who caused such violation(s) to occur, Berkeley County may pass through the penalty and cost of compliance to that person(s).

(b) The County Attorney may institute injunctive, mandamus or other appropriate action or proceedings at law or equity, including criminal conviction, for the enforcement of this Ordinance or to correct violations of this Ordinance, and any court of competent jurisdiction shall have the right to issue restraining orders, temporary or permanent injunctions, mandamus or other appropriate forms of remedy or relief.

Section 6.4 Criminal Penalties

In addition to any applicable civil penalties, any person who willfully, with wanton disregard, or intentionally violates any provision of this Ordinance shall be guilty of a misdemeanor and upon conviction shall pay a fine of not more than $500.00 or imprisoned for not more than thirty (30) days. Each day of violation shall constitute a new and separate offense.

Section 6.5 Corrective Action

In the event a violation of this Ordinance has not been corrected within the applicable time period for correction, Berkeley County, or its contractor, may enter upon the lot or parcel of land and correct the violation, and the costs incurred as a result of such action (including inspection, administration, labor and equipment costs) shall be collected from the bond, if in place and sufficient to cover such costs, or shall become a lien upon the property and shall be collected in the same manner as Berkeley County taxes are collected.

Section 6.6 Stop Work Order

The County Engineer, his designee, or other authorized personnel may issue a stop work order if it is found that a construction activity is being conducted in violation of this Ordinance.

The stop work order may allow or require correction of Notice of Violation (NOV) issues, but shall otherwise stop all other construction related activities. A stop work order may carry with it civil penalties as well. Any person in violation of a stop work order is subject to payment of all fees, bonds, and penalties prior to the lifting of the stop work order.

Section 6.7 Approval Suspension and Revocation

Any approved plans or applications required by the Design Manual may be suspended or revoked if one or more of the following violations have been committed:

(a) Violations of the conditions in any approved plans or applications required by the Design Manual;

(b) Construction is not in accordance with the approved plans;

(c) Non-compliance with correction notice(s) or stop work order(s);

(d) The existence of an immediate danger to a downstream area (in the judgment of the County Engineer or his designee);

(e) Other violations of this Ordinance.

Section 6.8 Reserved

DIVISION 7
VARIANCES

Section 7.1 Variance Criteria

The County Engineer may grant a variance only upon a determination that:

(a) The variance will not be detrimental to the public health, safety, and general welfare of the County, and

(b) The variance will not adversely affect the reasonable development of adjacent property, and

(c) The variance is justified because of topography or other special conditions unique to the property involved, and the variance is not requested due to mere inconvenience or financial disadvantage, and

(d) The variance is consistent with the objectives of this Ordinance and will not have the effect of nullifying the intent or purpose of this Ordinance, or any other pertinent County or State regulations.

A written request for a variance shall be required and shall state the specific variance sought and the reasons, with supporting data, a variance should be granted. The request shall include all information necessary to evaluate the proposed variance.

Section 7.2 Reserved

DIVISION 8
APPEALS

Section 8.1 Appeals Process

Any person aggrieved by a decision, Notice of Violation, or denial of a variance by the County Engineer or his designee may appeal the same by filing a written notice of appeal with the Berkeley County Council within fifteen (15) days of the issuance of said decision, Notice of Violation, or denial of a variance. The Berkeley County Council will review the appeal and will either reverse or preserve the previous decision. In either case, a notice of appeal from the Berkeley County Council will state the reason for their appeal decision.

The Berkeley County Council shall hear such appeals in a quasi-judicial capacity within forty-five (45) days, at the next regularly scheduled meeting or such other time as may be mutually agreed upon and will render a decision within ten (10) working days after the appeal has been heard.

If Berkeley County Council fails or neglects to repeal the said decision, Notice of Violation, or denial of a variance within sixty (60) days of the appeal request, the appeal of the said decision, Notice of Violation, or denial of a variance is automatically granted.

Any person aggrieved by the decision of the Berkeley County Council may appeal the decision to the Berkeley County Circuit Court in accordance with its rules and procedures.

Section 8.2 Reserved

DIVISION 9
CHARGES AND FEES

Section 9.1 Stormwater Management Utility Fee

Berkeley County has implemented a Stormwater Management Utility and established Stormwater Management Utility Fees and Classifications to help fund implementation of this Stormwater Management Ordinance and its associated programs.

Section 9.2 Stormwater Plan Review Fee

Costs associated with stormwater plan review of land development construction documents other than those routinely performed by the County staff will be assessed a fee to compensate for the cost in labor, equipment, and materials expended in the conduct of the review. Stormwater plan review fees have been established by Resolution and revision of such fees shall be approved by Berkeley County Council.

Section 9.3 Stormwater Inspection Fee

Costs associated with stormwater inspection and re-inspections for land development or construction activities other than those routinely performed by the County Staff as part of compliance monitoring will be assessed a fee to compensate for the cost in labor, equipment, and materials expended in the conduct of the inspection. In addition, post-construction maintenance inspection fees may be assessed by the County Engineer. Stormwater inspection and re-inspection fees have been established by Resolution and revision of such fees shall be approved by Berkeley County Council.

Section 9.4 Connection to Conveyances

The County shall have the right to establish a schedule of appropriate fees for any person or property owner establishing a new discharge to Berkeley County stormwater management systems or facilities. Application fees shall be established on the basis of facility classes relating to the quantity and quality of approved discharge. Establishment and revision of such fees shall be established by Resolution and revision of such fees shall be approved by Berkeley County Council

Section 9.5 Reserved

14-11-36

THE WITHIN ORDINANCE SHALL BECOME EFFECTIVE IMMEDIATELY UPON ITS ADOPTION BY BERKELEY COUNTY COUNCIL.

ADOPTED this 24th day of **November 2014.**

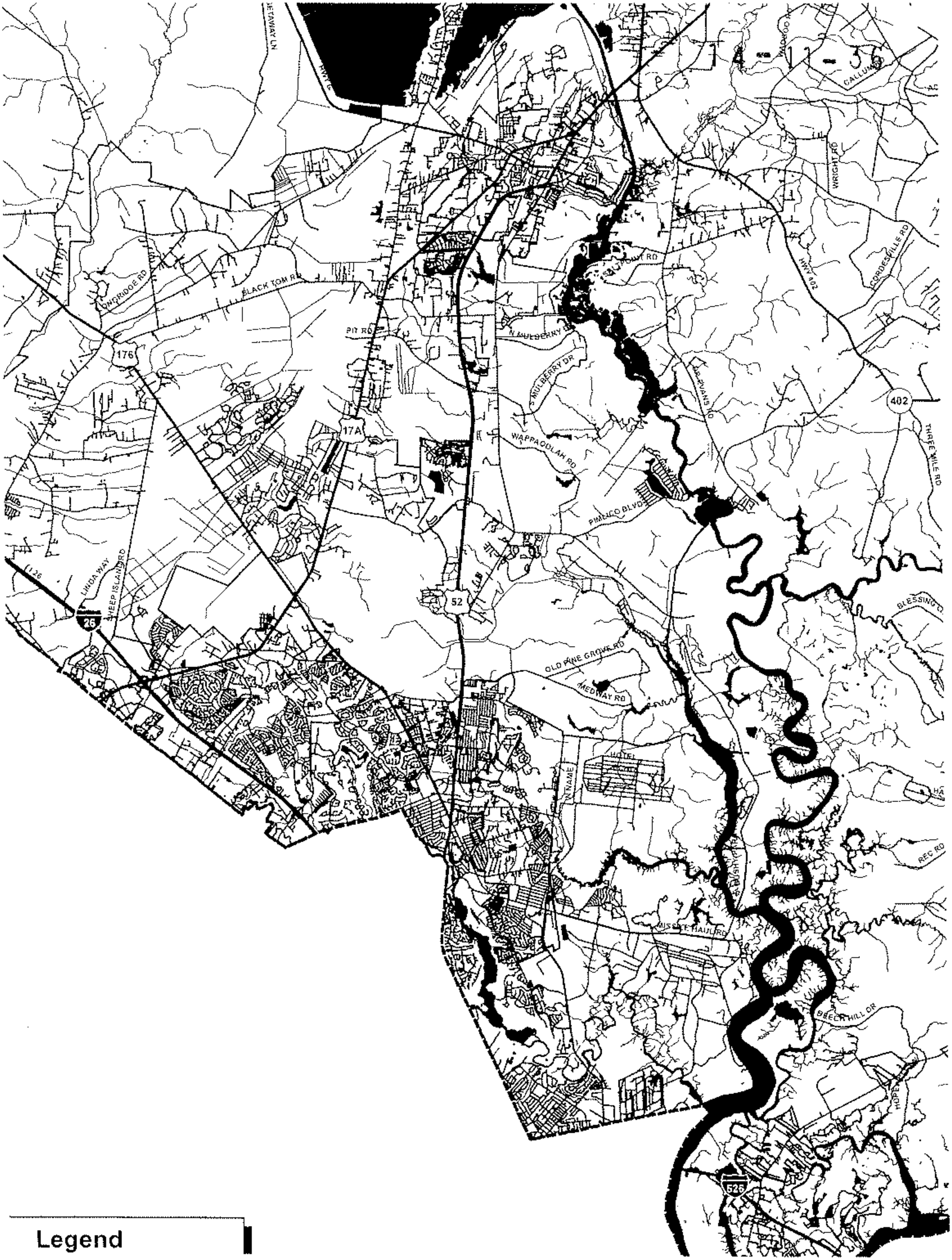
BERKELEY COUNTY, SOUTH CAROLINA

DANIEL W. DAVIS, CHAIRMAN
Berkeley County Council

Attest:

Catherine R. Windham
Clerk of County Council

First Reading:	September 22, 2014
Second Reading:	October 27, 2014
Public Hearing:	November 24, 2014
Third Reading:	November 24, 2014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WRIGHT RD
CORDESVILLE RD
HWY 402
402
THREE MILE RD
BLACK TOM RD
PIT RD
S MULBERRY DR
176
17A
WAPPAOOLAH RD
PIMLICO BLVD
52
126
LINDA WAY
SHEEP ISLAND RD
26
OLD PINE GROVE RD
MEDWAY RD
BEECH HILL DR
526
REC RD
Legend

14-11-36

MEMBERS OF COUNTY COUNCIL

PHILLIP FARLEY Voting YES

DENNIS L. FISH Voting YES

TIMOTHY J. CALLANAN Voting YES

JACK H. SCHURLKNIGHT Voting YES

KENNETH E. GUNN, JR. Voting YES

CALDWELL PINCKNEY, JR. Voting

CATHY S. DAVIS Voting

STEVE C. DAVIS Voting

Certified True and Correct Copy of Original Record

Kelly J. Lovette, MMC
City Clerk, City of Goose Creek, South Carolina

ORDINANCE NO: 18-024

AN ORDINANCE

AN ORDINANCE TO AUTHORIZE BERKELEY COUNTY TO ENFORCE THEIR STORMWATER MANAGEMENT PROGRAM WITHIN THE MUNICIPAL LIMITS AND TO REPEAL AND RESCIND ANY PROVISIONS WITHIN CHAPTER 50 OF ORDINANCE NUMBER 07-017, ESTABLISHED ON 11-13-2007 FOR THE CREATION OF A STORMWATER MANAGEMENT PROGRAM ORDINANCE, WHICH ARE IN CONFLICT WITH ANY PROVISIONS OF THE BERKELEY COUNTY STORMWATER MANAGEMENT ORDINANCE 14-11-36, AND ALL SUBSEQUENT REVISIONS OR AMENDMENTS OF ORDINANCE 14-11-36

WHEREAS, on October 15, 2015, the City of Goose Creek entered into an Intergovernmental Agreement with Berkeley County authorizing the County to charge a stormwater fee to residents within the city limits in exchange for managing stormwater drainage within the city limits; and

WHEREAS, the County reviews construction plans, inspects construction sites, maintains stormwater ditches and performs stormwater capital improvements projects within the city limits pursuant to the terms of the Agreement; and

WHEREAS, in order to maintain uniformity across jurisdictional lines to make consistent enforcement possible, the City wishes for its stormwater ordinance to mirror the County's stormwater ordinance; and

WHEREAS, the City hereby repeals and rescinds provisions within the City of Goose Creeks' Code of Ordinances Chapter 50 of Ordinance sections 50.011 to 50.999, with the exception of 50.127 authorizing the City of Goose Creek to develop and authorize additional stormwater fees.

The City hereby adopts as new section 50.09 of its Code of Ordinances:

Incorporation and Adoption of Berkeley County Stormwater Management Ordinance

The City of Goose Creek hereby adopts and incorporates by reference the Berkeley County Stormwater Management Ordinance 14-11-36 and shall automatically incorporate any revisions to the Berkeley County Stormwater Management Ordinance enacted thereafter.

All ordinances in conflict with this ordinance are hereby repealed.

This ordinance shall be effective on the date of final reading.

INTRODUCED the 11th day of September 2018.

DONE the 9th day of October 2018.

Mayor Gregory S. Habib

Attest:
Kelly J. Lovette, MMC, City Clerk

Mayor Pro Tem Kevin M. Condon

Councilmember Debra Green-Fletcher

Councilmember Brandon L. Cox

Councilmember Corey McClary

Councilmember Jerry Tekac

Councilmember Gayla S.L. McSwain

ORDINANCE NO. 5-2018

AN ORDINANCE AMENDING THE CITY OF HANAHAN'S STORMWATER MANAGEMENT ORDINANCE

WHEREAS, the City of Hanahan had entered into an Inter-Governmental Agreement with Berkeley County; and,

WHEREAS, the City of Hanahan has agreed to allow Berkeley County to enforce their Stormwater Management Program within the municipal limits; and

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF HANAHAN, SOUTH CAROLINA:

Amend the Hanahan Stormwater Management Ordinance with the addition of the following text.

Title Amendment

"An Ordinance to authorize Berkeley County to enforce their Stormwater Management Program within the municipal limits and to repeal and rescind any provisions within Ordinance Number 9-2014, established on 12-09-2014 for the creation of a Stormwater Management Program Ordinance, which are in conflict with any provisions of the Berkeley County Stormwater Management Ordinance 14-11-36, and all subsequent revisions or amendments of Ordinance 14-11-36, this 11th day of September, 2018 until the Inter-Governmental Agreement – NPDES Stormwater Discharge Permit Compliance and Other Stormwater Related Services, signed into agreement on the 9th day of October, 2015, is properly terminated by either party."

Adopted and approved this the 11TH day of September, 2018.

Minnie Newman, Mayor

ATTEST:

Kim Peters, Clerk of Council

Introduced by: Johnny Cribb

First Reading and Public Hearing: August 14, 2018

Second Reading: September 11, 2018

Appendix E: Standard Operating Procedures for Use In Field Investigation for Illicit Discharges

Final

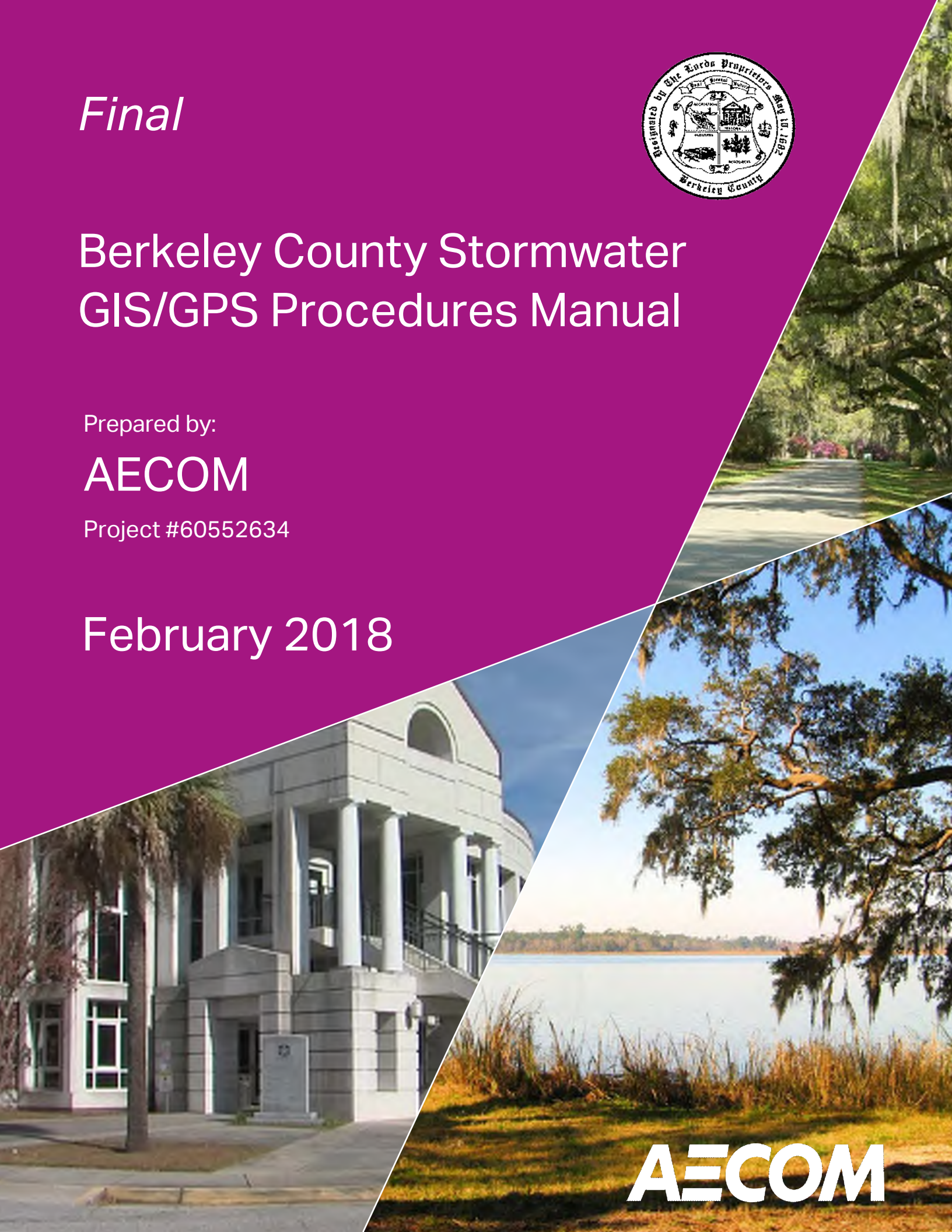
Berkeley County Stormwater GIS/GPS Procedures Manual

Prepared by:

AECOM

Project #60552634

February 2018



FINAL

Berkeley County Stormwater

GIS/GPS Procedures Manual

Berkeley County, South Carolina

2 February 2018

Prepared by:

AECOM

Project #60552634

Record of Revisions

DESCRIPTION OF REVISION	DATE	PREPARED BY
Original Manual (retired)	2012-2016	Woolpert, Inc.
New Manual	February 2018	AECOM

Statement of Limitations

This report and the intellectual property herein has been prepared for the sole utilization of Berkeley County. Any unauthorized use, modification or copying, whole or in part, without the written consent of Berkeley County and AECOM may be considered copyright infringement.

Table of Contents

List of Tables

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Section 1 Overview

1.1 Introduction and Purpose of GIS/GPS Procedures Manual

This GIS/GPS procedures manual was developed to serve as a comprehensive guide for stormwater infrastructure mapping and asset inventory in Berkeley County (County). The County owns and/or maintains stormwater infrastructure throughout the County. The County is a permitted Small Municipal Separate Storm Sewer System (MS4) under delegated authority from South Carolina Department of Health and Environmental Control (SCDHEC) and also operates a stormwater utility to serve the needs of its citizens. The County uses a Geographic Information System (GIS) to manage stormwater infrastructure data and outfall screening data.

This Manual covers the collection, storage and analysis of stormwater GIS data within the County. The manual has been customized specifically to align with the County's stormwater database structure. Use of standard procedures, clear and specific terminology, accurate equipment, and consistent methods are necessary to produce quality results and avoid introduction of error. The manual has been prepared to ensure consistent data collection and processing regardless of who performs the work or the location in the County. Quality stormwater GIS data provides a foundation of technical information which the County can use to evaluate the stormwater system, identify and prioritize projects and maintenance efforts, conduct modeling, make decisions and prepare for the future.

1.2 Terminology

Stormwater Terminology – This manual establishes standard terminology to describe stormwater structures, which facilitates better communication amongst the County staff and contractors, and enables information sharing between the County and adjacent municipalities. In addition to guiding stormwater GIS data collection and management, the manual was developed to serve as a training document, to orient new staff to the County's stormwater system. The standard terminology and orientation information can be found in *Appendix A, Stormwater GIS Data Dictionary* and *Appendix B, Stormwater Inventory Illustrated Guide*.

GIS Terminology – Each individual, real world object composing the stormwater infrastructure, known as a **feature** or **asset**, will be mapped and assigned a unique identifier code known as an **AssetID** (numeric code) in the database. Descriptive information, known as **attributes**, will be collected for each asset. Attributes collected in the field are primarily measurements such as dimensions, and observations such as type, shape or configuration, and material. Some attributes have a pre-determined list of possible choices known as a **domain**. Domains simplify field data collection and prevent data entry errors since the attributes are selected from a drop-down menu in GIS. Additional attributes may be calculated in the office using the data collected in the field.

Similar features are grouped together into a **feature class** based on common geometry; a feature class is defined as point features, line features or polygons. Several feature classes that describe similar data are grouped together into a **feature dataset**. Two or more related datasets are grouped to form a **feature database**.

1.3 Database History and Conversion

The County began building their stormwater GIS database in 2012. The 2012 effort began with outfall screening and conducted mapping and inventory upstream of outfalls. The County contracted for stormwater mapping in 2014 and again in 2016. The 2014 effort again focused on mapping upstream of outfalls; the 2016 effort was full system inventory. In addition to the field mapping, the County obtained stormwater mapping data from nearby municipalities (Goose Creek and Hanahan), some of which was field data and some which was digitized from other sources. Some of the Goose Creek and Hanahan data overlapped (either duplicated, or contradicted) the County's data. In total the County had four source datasets, and three additional shapefiles which contained some duplicate and some unique information. All seven data sources had variations in the data structure which made it impossible to combine and use them in a single database. Additionally, some of the data had been collected using a proprietary software to which the County did not have access, and the data structure was partially dependent upon this proprietary software. As a result, the County contracted again in 2017 to have all of these legacy data sources combined into a single database.

The database conversion effort had two objectives. First, to create a coherent, custom data structure (schema) that could merge all of the County's existing data (inventory data and outfall screening data), and store it in a manner that meets GIS best practices standards and uses ESRI standard software for display and analysis of the data. Second, to replace the obsolete stormwater GIS procedures manual. This new manual updates office and field procedures, improves database documentation and provides clear and specific definitions and description of all features, attributes and domains, for consistent data collection.

The new schema provides a significant improvement in capability for the County. The database is structured to capture either survey grade or mapping grade global positioning satellite (GPS) data. The database structure contains the information needed to conduct hydraulic and hydrologic (H&H) modeling. A geometric network has been built, linking all of the assets into a single system. The new structure provides flexibility for the database to be used to map modern stormwater best management practices (BMP), manufactured treatment devices (MTD), permeable pavement and cisterns as they come into more frequent usage. The data structure can also be adapted in the future to include conditional assessment data, routine maintenance inspections or compliance-related data.

Migration and merging required significant data cleanup and subsequent editing due to the multiple different data structures and inconsistent data collection of the legacy data sources. These inconsistencies within, and among, the source datasets, were exacerbated by overlapping, duplicate or contradictory assets or attributes, and incorrect or unclear

naming of the features, attributes, and domains, such that some of the source data had been categorized improperly. Such nomenclature issues were corrected and assets were re-categorized using the definitions provided in *Appendix A, Data Dictionary* and *Appendix B, Illustrated Guide*.

While all valid migrated data was kept in the merged database, some of the former domain options were eliminated to reduce the potential for error in future data collection. Similarly, certain attributes containing migrated data were kept but made un-editable, so that data would not be added to that attribute in the future. This will direct future data collection to occur in the proper feature class and attributes. Berkeley County's legacy stormwater data had very limited metadata. Metadata was created when the legacy data sources were merged into a single database in 2017.

In many cases, source data was scattered across multiple feature classes and had to be migrated into a single feature class. For example, for linear features, upstream or downstream attributes were stored with the upstream or downstream node (point feature) rather than with the line, so this upstream/downstream data had to be reassigned from the node to the line feature. Significant movement of data from one feature class to another was required in order to group like features appropriately and make the data usable.

Stormwater inventory and outfall screening photos are stored in one of three methods in the County's database. The 2014 photos are stored in linked picture tables (Conveyance_Picture, Node_Picture, StructureBMP_Picture). The 2016 photos are stored in the Feature Class tables, with attributes (Photo_Filename; Photo_Path; and Photo_Relpath) containing a hyperlink to an external directory storage location. The 2017 database conversion added the ability to store photos directly in the database, since most field mobile collection software is set-up to take a photo and load it directly into a geodatabase. The final database and schema were issued in February 2018, along with this new GIS-GPS Procedures Manual.

Data migration and merging also revealed numerous issues with unique asset identification (ID) codes. There were duplicate IDs, missing IDs, and IDs in different formats (alphanumeric vs. numeric) which initially prevented consolidation. The County directed duplicate IDs to be maintained so long as they occurred in separate watershed areas. Missing IDs were generated, and alphanumeric IDs were stored in a LegacyID field with new numeric IDs generated to replace them. Development of the new GIS data structure and migration of GIS data into the new structure coincided with a new Enterprise Asset Management System (EAM) coming online for Berkeley County. GIS is the authoritative (underlying) data source, and several adaptations were required in order for the GIS data to be able to feed into the EAM. This required creation of a second unique identifier so the two databases can communicate.

1.4 Mapping, Inventory and Watershed Areas

The County may undertake system mapping and inventory or outfall screening efforts using County staff, other municipal staff, or may contract with an engineering or survey company to conduct this work. Mapping and inventory may be first time data capture, or may update

existing data in areas with recent changes in the stormwater system. Each mapping effort may collect all of the possible information for each type of asset, or the scope may be limited to populate only certain data fields. Regardless, the procedures in this manual should be followed to ensure consistency.

The County has divided its infrastructure areas by watershed, and refers to each watershed by name or by the United States Geologic Survey (USGS) 12-digit hydrologic unit code (HUC-12). Watershed Name, HUC12 and Receiving Water attributes are included in each feature class, and are populated for each infrastructure asset. Watershed name, HUC12 and Receiving Water information can also be found on SCDHEC's watershed website. The location of each infrastructure asset with respect to a receiving water is important in determining design and construction requirements for stormwater infrastructure in that area, as well as in tracking environmental compliance.

The County collects and/or stores and manages stormwater infrastructure GIS data throughout the County's jurisdiction, permitted MS4 boundary and utility service areas. This include towns, cities and private lands within the County. Due to varying circumstances of ownership and maintenance easements or agreements, each infrastructure asset can be recorded with separate "Owned By" and "Maintained By" entities. This enables easier tracking and sharing of information in overlap areas. The role of neighboring municipalities is discussed in the following sections.

1.5 Cooperating Agencies and Stakeholders

The County has a number of municipalities within and adjacent to its borders. The Town of Moncks Corner, Town of Goose Creek and City of Hanahan are located within the County, and the County has an Intergovernmental Agreement (IGA) with Goose Creek and Hanahan to manage the stormwater programs for these municipalities, including mapping their stormwater infrastructure, and conducting outfall screening. Daniel Island also lies within Berkeley County, although large portions are located within the City of Charleston. Charleston County and the City of North Charleston border Berkeley County to the south. Dorchester County and the Town of Summerville border Berkeley County to the west. Watershed boundaries and drainage patterns do not necessarily align with municipal boundaries, and in some areas, the County's mapping and inventory efforts may involve one or more of these bordering municipalities or other entities.

Berkeley County Water and Sanitation (BCWS), Charleston Water System (CWS) and South Carolina Department of Transportation (SCDOT) may also be involved in stormwater mapping, inventory or other drainage projects in the County. BCWS and CWS own the drinking water and wastewater infrastructure that is often found in the same rights-of-way as the stormwater infrastructure. These utilities are involved in planning of future projects where utility conflicts may arise. SCDOT owns and maintains drainage infrastructure along the SCDOT right of way. Coordination is needed for maintenance, traffic control and in planning future drainage projects which may involve SCDOT right of way.

Cooperating Agencies and Stakeholders are shown in Table 1-1. Coordination and Communication amongst these groups are discussed in Section 1.6.

Table 1-1 Cooperating Agencies and Stakeholders

BERKELEY COUNTY	CHARLESTON COUNTY	DORCHESTER COUNTY	OTHER ENTITIES
Town of Moncks Corner	City of North Charleston	Town of Summerville	Residential Stakeholders
Town of Goose Creek			Commercial Stakeholders
City of Hanahan	City of Charleston		Industrial Stakeholders
Berkeley County Water and Sanitation			Charleston Water System (CWS)
--			Dept of Transportation (SCDOT)

In addition to municipalities and other government entities, community stakeholders may be involved in Berkeley County stormwater mapping and inventory efforts. These represent private property owners who may have a drainage easement or provide access to the County's stormwater system. Community stakeholders include residents and homeowner associations in the neighborhoods located in the mapping area, and business owners in the commercial and industrial districts of the mapping area. Members of the public who may be interested in or impacted by future drainage projects form the final group of stakeholders.

1.6 Coordination and Communication

The County will serve as the lead for all communication and coordination with adjacent municipalities, other entities and stakeholders. At the beginning of each mapping, inventory or screening effort, the County will hold a kickoff meeting in order to initiate communication and coordination. The objective of a kickoff meeting is to identify key points of contact from the County, adjacent municipalities, other government entities, and private or commercial entities, as applicable, and to assign roles and responsibilities for coordination tasks. Communication channels for field notification and interfacing with the public should be established at the kickoff meeting. Equipment and software questions may also be addressed. The County will determine which agencies and stakeholders should be involved for each mapping area. The County is the final authority for any decision making required.

A coordination matrix identifying communication and responsibilities should be completed to ensure all parties are involved in the relevant tasks. Tasks which may require coordination include: GIS and data management; access to private property or easements; safe work plan; traffic control for the purpose of data collection; field notifications; and communication with the public. Several of these topics are discussed in greater detail in Section 2. A template coordination matrix is shown in Table 1-2.

Table 1-2 Coordination Matrix Template

COORDINATION ELEMENT	KEY POINTS OF CONTACT
GIS and Data Management	
Access to Private Property or Easements	
Communication with Public	
Field Notifications	
Traffic Control	

Public communication may be part of the mapping and inventory process. Communication may be needed to inform the public of the efforts being undertaken in their community or to obtain input from residents and businesses in the mapping area. Public notifications may be via newspaper announcement, the County's website, email distribution, neighborhood mailers or door hangers, or other method as deemed appropriate by the County for each particular mapping area. The means and timing of the public notification, as well as should be decided at the kickoff meeting. The purpose of the notification is to introduce the mapping and inventory effort, and provide information regarding the areas of work, schedule, how to identify field personnel, safety precautions and other information regarding field data collection which will be visible to the public. A template *Public Notification Letter* on County letterhead is included in *Appendix C*.

Field personnel will adhere to following requirements:

- Drive marked vehicles and wear safety vests with the organization logo in order to be easily identified by members of the public
- Carry a copy of the County's notification letter in order to answer questions if approached by members of the public.
- The field team leader will visit schools 24-48 hours prior to arrival for mapping and inventory in order to coordinate access to school grounds and ensure school administrators are aware of the survey work.
- Respect members of the public and their property at all times.
- If a citizen's questions or concerns are not sufficiently answered by the County's letter, field personnel will defer the public to the County's Stormwater Program Manager or designated representative, as directed by the County.
- Take note of name, date, time, location, contact information, property location and subject matter for any significant communications with the general public or other stakeholders. This information may be provided to the designated County representative in order to address issues during field work.

Section 2 Field Data Collection

2.1 Overview of Data Collection and Terminology

This manual describes two types of field data to be captured in GIS. The majority is geared towards full **stormwater system mapping and asset inventory**. These procedures may also be used to collect **outfall inventory and screening** data. The term **mapping** refers to the collection of GPS coordinates to describe the location of the infrastructure. The term **inventory** refers to the collection of characteristics (attribute data) to describe each item of infrastructure. The term **outfall** refers to the location where stormwater is released, or discharged, to a receiving water.

GIS data to be collected for infrastructure mapping and asset inventory is shown in Table 2-1. GIS data to be collected for outfall screening is shown in Table 2-2. A series of data tables showing the full structure of the feature classes, attributes and domains which may be collected in Berkeley County's stormwater database is found in *Appendix A, Stormwater GIS Data Dictionary.*

Table 2-1 Stormwater System Inventory Data

COLLECTION/CONVEYANCE	FEATURE CLASS TYPE	REFERENCES
Inlets	Point	Section 2.8 Section 2.9 Table 2-9 Table 3-1 *Appendix A- Stormwater GIS Data Dictionary, Part I* *Appendix B- Stormwater Inventory Illustrated Guide*
Manholes/Junctions		
Outlet Structures		
Orifices - table		
Weirs - table		
Outlet End Structures - Component		
Discharge Points (includes Outfalls)		
Driveway Culvert Points (legacy)		
Pipes	Line	
Culverts		
Channels		
End Structures – Component		
TREATMENT PRACTICES		
Structural BMPs	Polygon	
Manufactured Treatment Devices (MTD)	Point	
Permeable Pavement	Polygon	
Cisterns	Point	
SUPPORTING		
Elevations	Point	
MS4 Grid	Line	
Virtual Drainline	Line	
Network Junctions	Network	

Table 2-2 Outfall Screening Data

ILLICIT DISCHARGE DETECTION AND ELIMINATION	TYPE	REFERENCES
Illicit Discharge Tracking	Point Features	*Appendix A- Stormwater GIS Data Dictionary, Part II*
Illicit Discharge Source		
NPDES Screening	Table	*IDDE Manual*

Procedures for mapping outfalls, and the locations of illicit discharges and upstream sources, are covered in the GIS/GPS Manual. Details regarding the County's **Illicit Discharge Detection and Elimination** (IDDE) program, including the regulatory definition of an outfall, can be found in the Berkeley County IDDE Manual. The IDDE Manual explains field procedures for conducting outfall screening observations, collecting samples and tracking illicit discharges upstream to their source. The IDDE Manual ties back to this GIS/GPS Manual for recording that outfall data.

2.2 Mapping Grade vs. Survey Grade

The County will determine the required accuracy at the beginning of each mapping, inventory or screening effort. Field GPS data can be collected at varying levels of accuracy depending on the intended use of the data. Mapping grade GPS equipment can locate a point to within a range of 3 to 15 ft. Survey grade GPS equipment can locate a point to within a range of 0.1 ft to <3 ft. For stormwater infrastructure, survey grade data collection is necessary in order to be able to use the data for design or to conduct hydraulic or hydrologic modeling. Accurate invert elevation is critical for successful design and modeling. Mapping grade data collection is sufficient for locating infrastructure on a basemap and collecting inventory information. A vertical coordinate (invert elevation) is not collected for mapping grade data collection.

Stormwater System Mapping and Asset Inventory – Use survey grade GPS to verify or capture the horizontal and vertical (X,Y,Z) coordinates of all assets to within ≤ 0.1 ft horizontally and ≤ 0.1 ft vertically. Verify or complete attribute data for each asset. If the X,Y,Z coordinate cannot be captured with GPS, an automatic level or Total Station will be used to collect the position and elevation data within the listed tolerances. Multiple control point checks should be performed throughout the day in order to verify continued accuracy of data collection.

Outfall Inventory and Screening – Use mapping grade GPS to verify or collect the horizontal (X,Y) coordinate of all outfalls to within an accuracy of ≤ 3 m (9.84 ft) horizontally. Verify existing outfalls and locations, map new outfalls, and collect/complete attribute data for the assets. For outfalls with an observed potential illicit discharge, collect an IDDETrack point, complete the attribute data, then track the discharge upstream. Verify existing mapped infrastructure or map new infrastructure to mapping grade and collect attribute data along the path to the discharge source. At an identified source, collect an IllicitDischargeSource point and complete the attribute data.

GPS and survey equipment are addressed in the following sections.

2.3 Accuracy

Accuracy of data collection and production of quality results are dependent upon consistent use of hardware of an established standard, and up-to-date software, as well as standard procedures as described elsewhere in this manual. Table 2-3 lists the equipment, software, and accuracy for the GPS and topographic survey equipment that will be used to collect position data. Accuracy values published by the equipment manufacturers represent ideal conditions and may not always be achieved in field conditions.

Table 2-3 GPS and Survey Equipment and Accuracy

GPS AND SURVEY EQUIPMENT	
Mapping Grade GPS	Horizontal Accuracy: ≤ 3m (9.84 ft) Vertical Accuracy : N/A
Survey Grade GPS Base Station and Rover	Horizontal Accuracy: ≤ 10 mm (0.0.0328 ft) Vertical Accuracy : ≤ 15 mm (0.0492 ft)
GPS Tablet and Software	Wireless Lan, Built-in GPS and Camera ESRI software
Survey Total Station	Accuracy (Angle): ± 3 second Accuracy (Distance): 1.5 mm + 2 ppm
Automatic Level	Accuracy 1 km DR Level: 2 mm

Accuracy values are published for each equipment model by the manufacturer.

Survey grade assets will have horizontal accuracy of ≤ 0.1 ft and vertical accuracy of ≤ 0.1 ft ft. Mapping grade assets will have horizontal accuracy of ≤ 9.84 ft. Field data collection should be supervised by a licensed professional land surveyor (PLS) to ensure that data is properly referenced to geodetic and tidal benchmarks for accurate representation of data in the County's database. Where GPS cannot achieve position data to meet the accuracy requirements established in this manual, a differential level and Total Station will be used.

Table 2-4 lists the minimum standards for geodetic survey accuracy of utility systems, including stormwater.

Table 2-4 Minimum Accuracy Standard for Geodetic Survey of Utilities

TYPE	RELATIVE ACCURACY (95% CONFIDENCE)	MAX PDOP	MIN # OF SATELLITES	SITE CALIBRATION
Static	GNSS 0.078 v 1:50,000	5	4	N
Property Corner	Positions 0.078 v 1:20,000	5	4	N
RTK GNSS	0.078 v 1 PPM dist from Base	3	5	Y
VRS GNSS	0.078	3	5	N

PDOP - Point Dilution of Precision
VDOP - Vertical Dilution of Precision
HDOP - Horizontal Dilution of Precision
RTK - Real Time Kinematic
VRS - Virtual Reference Station
GNSS - Global Navigation Satellite System

2.4 Datum, Coordinate System, Benchmarks and Base Station

Datum – The County uses the North American Datum NAD83 (2011) for horizontal coordinate reference and the North American Vertical Datum NAVD88 for vertical coordinate reference. Data will be published in South Carolina State Plane Coordinates (SC SPC) in units of International Feet (iFoot).

Benchmarks – Benchmarks will be used for survey grade data collection. Benchmarks will comply with minimum standards for geodetic surveying as described below. At the beginning of each mapping area, benchmark locations will be selected at accessible locations free of traffic and other circumstances that could damage or displace a GPS antenna. Benchmark sites will also be void of visible multipath conditions that exist above a 10 degree signal mask above the horizontal horizon. The location marker will be a MAG nail in a hard, permanent, stable material or a countersunk 5/8" diameter, 2 ft long rebar driven 1 inch below grade.

The field team will create a local benchmark reference network that meets or exceeds the NGS benchmark protocol standards for a second order-class I (1:50,000) for horizontal control and a first order-class I (0.5 ft or less) for vertical data. Benchmarks will have a relative accuracy of ≤ 0.05 ft within the mapping area. Benchmarks will be dispersed throughout the mapping area in locations conducive to both Static and RTK GPS operations.

Base Station – A base station may be set up as part of the benchmark network for survey grade data collection. The base station should be set up and removed daily in the nearby work area to ensure the highest accuracy possible. Correct base station setup will be verified by staking to a benchmark within the network. The tie equality and data errors will be recorded by taking a field check point and recoding the inverse in the field book. If the error is > 0.1 ft horizontally (HDOP) or vertically (VDOP), then the system will not be considered adequately set up and will need to be re-evaluated for error in the setup, multipath potential in the surroundings, satellite constellation geometry, and atmospheric conditions. If conditions outside of the setup impact the work, then a delay will be required until conditions correct. Once GPS RTK equipment is set up and operation within tolerance has been verified, the field team will proceed to complete the planned work.

Table 2-5 contains a summary of requirements regarding datum and benchmarks.

Table 2-5 Geodetic Data Collection Requirements

GEODETIC SURVEY STANDARDS	BERKELEY COUNTY STANDARDS
Horizontal Control datum	NAD83
Vertical Control datum	NAVD88
Coordinate System (Projection)	SPCS, South Carolina zone
Units	International Feet (1 inch=2.54 cm)
Benchmarks	Geodetic and Tidal
Benchmark/Base Station Accuracy	≤ 0.05 ft

2.5 Field Preparation Activities

In order to prepare for field deployment, the field team will conduct the following activities:

- Review existing GIS data, maps and aerial imagery
- Locate geodetic monuments using online resources (survey grade)
- Select benchmark locations and create benchmark network (survey grade)
- Conduct field reconnaissance
- Determine route/coverage strategy
- County will provide advance notice to property owners
- Check/calibrate all field equipment
- Check weather and rainfall forecast
- Daily safety tailgate meetings
- Weekly planning and review of field issues

Many of these field preparation activities will be repeated as the field team moves from one portion of the mapping area to another; however, the benchmark network may remain fixed.

2.6 Field Equipment

Table 2-6 provides a list of the primary field equipment needed in order to collect field data, access and mark locations, and ensure safe field activities. Magnetic locators may be used to locate paved over or buried structures, however metal detectors may respond to ferrous iron not associated with the stormwater system. Structures should not be mapped on the basis of Magnetic locator response alone.

Table 2-6 Field Equipment

OTHER FIELD EQUIPMENT	
Pole-mounted zoom digital camera	Capture high resolution videos and images inside structures
Pipe Mic	Measure pipe invert
Magnetic locator	Locate buried or paved over ferrous (iron) structures
Survey level rod	Measure elevations where GPS cannot obtain signal
Survey wheel	Measure distance
Flash light with clamp or tether	View interior of structures
Vehicles	Truck with strobe lights and rooftop flasher for traffic safety
Stylus pens	For use with GPS and pole camera tablets
Survey kit (tape, flags, stakes, etc.)	Mark assets or locations
Paint pens	Label AssetID on each structure
Shovels	Clear structure prior to measurement
Manhole hook	Lift or move manhole cover or inlet grate
Bush ax	Clear heavy vegetation to gain access to feature
Signage (Survey Crew Ahead, etc.)	Warn oncoming traffic of surveyors adjacent to roadways
Orange cones	Safety equipment
Personal Protective Equipment (PPE)	Safety equipment, clothing and boots

2.7 Workflows

Field efforts and workflows for the field team will vary depending upon the type of data collection and equipment to be used. Use of a mobile software tablet with onboard digital camera simplifies field and office efforts. A pole-mounted high-resolution digital camera with zoom and video capabilities may be used to capture video or still photos from inside stormwater structures. The latest version of the GIS database should be downloaded onto the tablet daily prior to going to the field and this data should be updated and/or supplemented throughout the day. At the end of each field day, the data should be uploaded to the working folder. Field team members will be assigned specific roles and responsibilities in order to ensure consistency and reduce field errors.

New assets will be assigned a temporary AssetID (99xxxxxxxxx) in the field and will be renumbered with a permanent AssetID using a geoprocessing tool in the office. A geoprocessing tool can also be used to update the location and coordinate of existing assets in the database with corrected coordinates and to maintain the connectivity of the network. Workflows may include returning to assets that were not accessible or were submerged at high tide. Workflows may also include collecting data that may have been missed or which requires verification based upon routine quality control checks.

The following tables provide a detailed work breakdown structure for each type of data collection in order to ensure consistent results for the field team at each location. Table 2-7 identifies the task list for Outfall Inventory and Screening. Table 2-8 identifies the task list for full system mapping and inventory. Tasks are numbered to be performed in a set order for maximum efficiency. Tasks are identified as office or field. Office tasks are performed before leaving for the field or after returning from the field.

Table 2-7 Outfall Inventory and Screening Daily Task List

TASK #	TASK DESCRIPTION	OFFICE OR FIELD
01.01	Charge Equipment	Office
01.02	Start mobile GIS tablet and GPS	Office
01.03	Download database, latest version	Office
01.04	Check Equipment Settings	Office
01.05	Safety Tailgate meeting	Field
01.06	Locate Outfall / Verify AssetID	Field
01.07	Set up Safe Work Zone (as needed)	Field
01.08	Select or Create Feature	Field
01.09	Paint Asset ID	Field
01.10	Take photos/Videos	Field
01.11	Enter or Update Attribute data	Field
01.12	Conduct sampling as needed	Field
01.13	Return Cover / Grate or Close Doors	Field
01.14	Remove Survey Flags and Stakes	Field
01.15	If no Illicit Discharge, move to next outfall and repeat Task 01.06 to 01.14	Field
01.16	If Illicit Discharge, collect IDDETrack point and enter attributes	Field
01.17	Move to Next Asset upstream and repeat Task 01.06 to 01.14	Field
01.18	Continue to repeat Task 01.17 until locating the illicit discharge source	Field
01.19	Collect IllicitDischargeSource point and enter attributes	Field
01.20	Repeat from Task 01.06	Field
01.21	End of Day Upload Data to GIS database	Office
01.22	End of Day Save Photos and Videos to Working Folder	Office

Table 2-8 Full System Mapping and Inventory Daily Task List

TASK #	TASK DESCRIPTION	OFFICE OR FIELD
02.01	Charge Equipment	Office
02.02	Start mobile GIS tablet and GPS	Office
02.03	Check Satellite Almanac	Office
02.04	Download database, latest version	Office
02.05	Set up Base Station and Check Equipment Settings	Field
02.06	Safety Tailgate Meeting	Field
02.07	Locate Monument, Complete Control Point Check	Field
02.08	Verify GPS Accuracy	Field
02.09	Locate Asset / Verify Asset ID	Field
02.10	Set up Safe Work Zone (as needed)	Field
02.11	Select or Create Feature	Field
02.12	Paint Asset ID	Field
02.13	Take Photos/Videos	Field
02.14	Collect or Update Coordinates	Field
02.15	Enter or Update Attribute Data	Field
02.16	Paint Point of Measurement for Invert Depth	Field
02.17	Measure Invert Depth(s) and Dimensions	Field
02.18	Return Cover / Grate or Close Doors	Field
02.19	Remove Survey Flags and Stakes	Field
02.20	Move to Next Asset and Repeat from Task 2.09	Field
02.21	Locate Monument at Mid-Day, Complete Control Point Check	Field
02.22	Verify GPS Accuracy at Mid-Day	Field
02.23	Locate Monument at End of Day, Complete Control Point Check	Field
02.24	Verify GPS Accuracy at End of Day	Field
02.25	End of Day Retrieve Base Station	Field
02.26	End of Day Upload Data to GIS database	Office
02.27	End of Day Save Photos and Videos to Working Folder	Office

2.8 Field Observations and Measurements

Attributes (measurements or descriptors) will be collected for each feature and stored using ESRI mobile software. Some of the attributes are collected directly by the GPS. Others must be measured in the field. The rest are observed values such as type, shape, material, presence/absence of a specific characteristic, yes/no observations, etc. Field measurements may be difficult or impossible to obtain for certain treatment practices. These measurements are more easily obtained from as-built drawings or manufacturers information. Some attributes, like slope, are calculated in the office using field measurements.

Table 2-9 identifies which attributes are collected directly in GIS, which are measured, and which are discerned from drawings or manufacturer information. Applicable feature classes are listed for each. See Section 2.9 for information regarding field data collection for each feature class. See Section 3.3 for information on how invert elevation and other attributes are

calculated using field measurements. The last column in each of the feature class tables in *Appendix A, Part I* provides instructions for measuring dimensions and elevations. Pictorial examples and diagrams in *Appendix B, Part II* demonstrate proper measurement of elevations and depths.

PROCEDURES FOR ELEVATIONS AND DEPTHS

For survey grade mapping, the depth and elevation measurements are significant. Procedures for collecting these field measurements are described below. Definitions for bold terms are found after the table. The most important elevation is the **invert elevation**, for use in calculations, design and modeling. If possible, it is desirable to collect the invert elevation directly with GPS. This includes features such as pipes and culverts with open entrances, open channels and BMPs. If the invert is not accessible due to the configuration of the feature, sediment/debris obstructing the invert, or the GPS signal is blocked, a surface elevation should be collected from a central, marked point and the depth (also called a measure-down) should be recorded.

For closed structures, (such as inlets, manholes/junctions, outlets, underground detention chambers, MTDs or cisterns) and pipes intersecting these structures, the invert elevation may not be accessible and a **rim elevation** and a **depth to invert** measurement will be required. For riser outlets with multiple openings, it may be necessary to collect measure-downs for secondary or tertiary entrances (weir notches or orifices). If the rim elevation is not accessible, such as for some inlet or outlet structures with a slab or ceiling above the entrance, a **top elevation** should be collected and the **depth to rim** recorded. Then the depth to invert is measured down from the rim. Examples include a curb inlet, box top inlet or box-top riser outlet. Some structures, such as cisterns and underground MTDs, the top elevation and depth to invert is measured, as there may not be a rim (entrance for stormwater) from the top.

Where pipes are recessed in a closed structure, a Pipe Mic will be used to measure the depth to invert. The Pipe Mic will be attached to a fiberglass precision survey level rod with a calibrated scale in 0.01 ft increments and a bullseye level. The combined error of the setup will be ± 0.03 ft. If the cover, lid or grate is removed, this thickness should be included in the depth measurement.

Where pipes or culverts intersect channels or BMPs, the invert may be inaccessible due to sediment/debris or presence of a tide valve, or the invert may be accessible but the signal may be blocked due to canopy cover. In these situations, **a top of pipe elevation** should be collected if there is no headwall, and a depth to invert be measured from the top of pipe. If there is a headwall, the **headwall elevation** should be collected at the top-center of the headwall and the depth to top of pipe should be measured, followed by the depth to invert.

For permeable pavement, the **pavement depth** is recorded. These measurements will be more easily obtained from an as-built drawing.

Table 2-9 Attribute Measurements

FIELD GPS	DIRECTLY COLLECTED IN GPS	APPLICABLE FEATURE CLASSES
Latitude, Longitude (X,Y Coordinate)	Location determined by GPS	*- All feature classes*
Elevation	Invert Elevation (Z Coordinate)	*- Pipes or culverts intersecting open channels or BMPs* *- Channels* *- Some BMPs*
	Rim Elevation	*- Manholes/ junction boxes* *- Some inlet and outlet structures* *- Pipes intersecting these structures*
	Top Elevation top of structure or top of pipe	*- Some inlet and outlet structures with slabs above the entrance* *- Pipes and culverts with no headwall* *- Pipes with tide valves* *- Underground BMPs, MTDs* *- Cisterns* *- Permeable Pavement*
	Headwall Elevation	*- Pipes and culverts with headwalls* *- Pipes with tide valves*
	Top of Bank Elevation Bottom of Bank Elevation	*- Channels* *- BMPs (dry ponds)*
	Normal Water Surface Elevation	*- BMPs (wet ponds)*
Length	Autogenerated for linear features	*- Pipes, Culverts, Channels*
Perimeter	Autogenerated for polygon features	*- BMPs, Permeable Pavement*
Area	Autogenerated for polygon features	*- BMPs, Permeable Pavement*
FIELD MEASUREMENTS	**HOW MEASUREMENT IS COLLECTED**	**APPLICABLE FEATURE CLASSES**
Depth to Invert	Pipe Mic / Survey Level Rod	*- Interior of inlet, manhole/ junction box, outlet structure, underground detention BMP, MTD or cistern, and intersecting pipes*
	Survey Level Rod	*- Pipes or culverts intersecting open channels or BMPs* *- Channels* *- BMPs* *- Top of underground detention, MTD or cistern* *- Permeable Pavement*
Depth to Rim	Tape Measure	*- Some inlet and outlet structures*
Depth to Top of Pipe	Tape Measure	*- Pipes and culverts with headwalls*
Pavement Depth	Probe rod or as-built	*- Permeable Pavement*
Diameter	Tape Measure	*- Circular structures or openings (outlets structures, inlet or manhole covers, orifices, pipes, culverts, cisterns, underground detention chambers)*

Dimensions **Length** **Width** **Height**	Tape Measure or Survey Tape	*- Square or rectangular structures or openings (inlet entrance, junction box dimensions, riser, orifice, weir notch, overflow spillway, gate, weir, non-circular pipes, box culverts, width of channels, MTDs, BMPs, some cisterns, permeable pavement)*
OFFICE MEASUREMENTS	**HOW MEASUREMENT IS OBTAINED**	**APPLICABLE FEATURE CLASSES**
Depth to Invert and/or **Dimensions**	As-built drawings Operations and Maintenance Manuals	*- Permeable Pavement* *- BMPs (Bioretention, Infiltration Basin, Sand Filter)* *- MTDs* *- Cisterns*

DEFINITIONS

Invert Elevation – This elevation is the low point of the feature, for example: the bottom of a catch basin, manhole, or outlet structure; the lowest point of a channel cross-section or BMP (pond); or the elevation of the bottom of the curve of a pipe entrance or exit. The invert elevation may also be the elevation at the design depth of the permeable media for an infiltration BMP (permeable pavement, bioretention, infiltration basin, sand filter).

Rim Elevation – This terminology is typically used in wastewater to describe the elevation of the manhole cover. The term has been expanded to include stormwater manholes, as well as the elevation of the entrance of water to a typical grate inlet. In this manual, rim elevation will also be used to describe the primary entrance where the largest volume of water enters the inlet or outlet structure. For outlet structures with multiple entrances, the rim elevation is the largest opening. The rim elevation and depth to invert are used to calculate the invert elevation for the bottom of the structure, as well as any connecting pipes.

Top Elevation – This elevation may be the top of an inlet or outlet structure which has a slab or ceiling above the entrance which prevents directly collecting an invert elevation or a rim elevation. Top elevation may also be the top of a pipe or culvert without a headwall, or the top of a pipe which has a tide valve preventing direct collection of the invert elevation. Top elevation may also describe the top-center of a cistern, or the top-center surface of an underground detention BMP, MTD chamber or permeable pavement.

Headwall Elevation – The top-center elevation of a headwall at the end of a pipe or culvert.

Top of Bank Elevation – The elevation at top of the embankment alongside an open channel or around the perimeter of a BMP (pond).

Toe of Bank – The elevation at the bottom, or toe, of the embankment, inside an open channel or BMP. The invert of a channel is typically, although not always, lower than the toe of the embankment. The toe of bank may not be accessible in wet ponds or constructed wetlands.

Normal Water Surface Elevation – The normal elevation of the water impounded in a wet pond. This elevation should be measured at least three days after a rain event in order to ensure that the pond has drained back to the normal elevation.

Depth to Invert – The method of measuring invert depth will vary for certain features types. For closed structures, depth to invert is the vertical distance from the rim or entrance down to the bottom of the structure. For pipes or culverts intersecting channels or BMPs, the depth to invert is the vertical distance from the top of pipe down to the invert of the pipe or culvert. For infiltration BMPs, the depth to invert is the depth of the permeable media for an infiltration BMP (permeable pavement, bioretention, infiltration basin, sand filter).

Depth to Rim – Vertical distance from a top slab or ceiling of an inlet or outlet structure to the rim of that structure.

Depth to Top of Pipe – Vertical distance from a headwall down to the top of a pipe or culvert.

Diameter – This attribute should only be used for circular features. The diameter attribute records the inner diameter. If the pipe or culvert is damaged or deflected, the original size should be recorded and the deflection should be noted in the condition assessment.

Dimensions – Length, width and height attributes record dimension measurements for square or rectangular features, or square or rectangular openings through which water flows. The fields to be used will vary for certain features. For example, *a curb inlet* will use height and length, while a *grate-top inlet* will use length and width, and a *combination inlet* will use all three. Channels and BMPs may not have uniform dimensions (for example, channel width varies at different sections, and BMP ponds are rarely perfectly round). Dimension measurements should be taken to record the representative value rather than the extreme value. If dimensions for large features such as channels, BMPs or wide emergency spillways cannot be efficiently measured in the field, they can be calculated in the office.

2.9 Stormwater System Mapping and Asset Inventory

The following paragraphs provide map and inventory guidelines, special considerations for each feature class, and identify which feature classes do not require field data collection. Photographs of each feature type, including various configurations and materials, are included in *Appendix B, Stormwater Inventory Illustrated Guide*.

MAP AND INVENTORY GUIDELINES

Primary Function – If a certain feature appears to be serving two purposes, that feature will be mapped according to its primary function. For example, if an inlet is also serving as a junction box, it will be mapped as an inlet. If a pipe or culvert is also part of the outlet for a BMP, it will be mapped as a pipe or culvert. Sometimes an item of stormwater infrastructure, will be modified for use in a configuration different from the traditional use. For example, a pipe may serve as a riser instead of a conveyance, or a junction box may serve as an energy

dissipator. Although these situations are not common, it is necessary to determine the function in order to properly characterize the asset.

Attribute Selection – When describing a feature, the focus will be on collecting information that will be most useful for design and maintenance of the system. For situations where more than one domain choice is applicable, choose the domain value which has more impact on the performance or condition of the system. For example, a pipe which is *Projected from Fill* and which also has an *energy dissipator*, has two possible choices from the End Structures domain. *Energy dissipator* should be selected, as it is more important to the function of the pipe.

FULL SYSTEM INVENTORY FEATURE CLASSES

Inlets – There are several types or configurations of inlets which may be identified. Inlet types which will be collected are: *curb inlets*, *grate inlets*, *drop inlets*, *combination inlets*, *box top inlets, curb cuts, roof drains (directly connected downspouts)* and *beehive inlets*.

Manholes/Junctions – Manholes and junction boxes perform the same function, a node structure connecting upstream and downstream pipes and providing access for maintenance or repairs. The primary difference is the shape – round for manholes, square or rectangular for junctions. Often, the type and/or shape of the cover are also different. Some manholes and junction boxes have baffles to divert flows, or a lowered bottom to capture sediment.

Outlets – This feature class is set up with a subtype structure. First the outlet subtype is selected, and this governs which attributes are available to populate for each subtype. There are 8 possible outlet structure subtypes; 4 configurations of risers and 4 other outlet structures (weir, orifice, gate, spillway). Some riser outlet structures have multiple entrances for water. These are not mapped with separate GPS points. Only the high flow entrance is mapped. Secondary weir and orifice openings on a riser are recorded in the linked Orifice or Weir table, as appropriate. Older BMPs may only have a primitive emergency spillway as the outlet structure. Some BMPs may only have an outflow pipe; in this case, it will be mapped in the Pipes feature class rather than with the Outlets. Refer to *Appendix B, Part II* for additional details regarding the collection of depth measurements and invert elevations for outlet structures.

Discharge Points (Outfalls) – The term discharge refers to any location where stormwater is released from closed conduit to open drainage. Discharge points occur throughout a watershed and in the upper reaches of the stormwater system. Outfalls are the last discharge point at the end of the stormwater flow path before the stormwater enters Waters of the US. There can only be one outfall per drainage area. Outfalls may be identified in the office as the last feature at the end of the drainage pathway, or may be identified by field outfall inventory and screening. Procedures for field outfall inventory and screening are found in Berkeley County's IDDE Manual. The term outfalls has a specific regulatory definition, and this information can also be found in the IDDE Manual. The Discharge Point Type identifies the underlying asset where the discharge occurs, and may be *pipe, culvert, channel, emergency spillway* or *bridge (scupper).* Outfalls are identified using the NPDES (yes/no) field, so that

outfalls are a subset of the discharge points feature class. Many of the attributes in this feature class duplicate data stored in the feature class for the respective pipe, channel, etc. where the discharge point is located. Thus, for a desktop exercise, the GPS coordinate and relevant attributes can be copied from the appropriate underlying asset to the discharge points feature class, in order to avoid duplication of data in two feature classes. The IDDE Dataset (IDDETrack and IllicitDischargeSource feature classes) as well as the NPDESScreen table are linked to the Discharge Points feature class by the AssetID and these are used to store outfall inventory and screening data collected under the IDDE SOP.

Pipes – Pipes may intersect with upstream/downstream structures (inlets, manholes/junctions, outlets, underground BMPs, MTDs or cisterns) or they may intersect with an open channel or BMP at one or both ends. For a pipe intersecting a structure (inlet, manhole/junction, outlet): identify the end structure *Flared End, Mitered End* or *Projected from Fill* if applicable. For a pipe intersecting a channel or BMP: identify the end structure (*headwall*, *wingwalls*, *rip-rap*, *tide valve*, etc.). Pipe material may be identified using a zoom video if needed.

Culverts – Culverts differ from pipes in that they are open at both ends and convey water underneath a road, railroad tracks, trails or other embankments. Culverts may intersect with an open channel or BMP basin at one or both ends. Identify the end structure (*headwall*, *wingwalls*, *rip-rap*, etc.). Culvert material may be identified using zoom video if needed. Driveway culverts will be mapped as a line feature. Legacy driveway culvert data is stored in a point feature class, however this feature class should not be used for new data collection.

Channels – Channels must be a minimum of 1 ft deep and 6 ft long in order to qualify as a channel for mapping purposes. (Trench drains are often less than 1 ft deep but still qualify for mapping if meeting the dimensions.) A new reach or segment of the channel will begin when: the bed material changes; the slope changes sharply; dimensions change significantly; the angle changes more than 30^{o}; or at the intersection with another channel. Channels will be mapped with at least one upstream and one downstream cross-section. The cross-sections will be surveyed according to the channel shape (U, V, trapezoid, etc.) identified in GIS. Top of bank, toe of bank and invert elevation will be captured along the channel. Top and toe elevations will be used to calculate side slope.

BMPs – Structural BMPs in this database are primarily aboveground basins which control volume and flow rate of stormwater. BMP Type includes *wet ponds*, *dry ponds*, *constructed wetlands*, *underground detention*, *stilling basin*, and several infiltration BMPs, *infiltration basin*, *bioretention*, and *sand filter*. Constructed wetlands may be former natural wetlands or ponds which have been converted into a BMP. BMPs will be mapped with top of bank elevation and at normal pool elevation for wet ponds and constructed wetlands. For dry ponds, the toe of bank elevation will be captured around the interior of the BMP. Pairs of top and toe elevations will be used to calculate side slope. Dry pond depth will be measured at the lowest point, if possible. Outlet structure(s) and conveyances (including underdrain pipe) into and out of the BMP will be mapped in the appropriate feature classes. The number of inflows and outflows will be counted. As-built drawings or manufacturer information may be needed in order to obtain some of the attributes for the underground and infiltration BMPs.

Manufactured Treatment Devices – MTDs are primarily flow-through treatment systems housed in an underground vault. MTD Type defines the targeted pollutant or treatment mechanism, and includes *hydrocarbon*, *sediment*, *trash*, *granular activated carbon*, *oil water separator*, *tree box filter*, or *multiple*. As-built drawings or manufacturer information may be needed in order to obtain some of the attributes for the underground MTDs.

Permeable Pavement – Permeable Pavement Type includes *pavement*, *pavers* or a *grid system*. Further description is provided with the material attribute. As-built drawings or manufacturer information may be needed in order to obtain some of the attributes for the subsurface infiltration zone below the permeable pavement. Underdrain pipe, if present, will be mapped in the pipes feature class.

Cisterns – Cistern types are *aboveground tank*, *underground tank*, and *rain barrel*. As-built drawings or manufacturer information may be needed in order to obtain some of the attributes for cisterns.

End Structures – Several feature classes have an attribute to identify end structures, also known as Structure Type domain. End structures are identified as a component of the relevant feature, however the component is not mapped with a separate GPS point. These components are found at the end of linear features (pipes, culverts and channels). End structures include: *headwalls, wingwalls*, *scour slabs*, *rip-rap*, *gate structures*, *tide valves, energy dissipators* and *bars/racks*. If there is more than one end structure (for example, both *wingwalls* and a *scour slab*), choose the most significant and note other end structures in the comments field.

Outlet End Structures – The Outlet Structure Type domain is specific to the Outlet Structures feature class. It is similar to, and derived from, the End Structures domain list. These components are typically associated with risers (*bars/rack/screen*, *solid top*, *grate top*) although there are several domain options (*headwall*, *scour slab*, *rip-rap*) which may be part of other outlet subtypes. The component is not mapped with a separate GPS point. It is possible to record both an end structure and an outlet end structure in the outlets feature class.

OUTFALL INVENTORY AND SCREENING FEATURE CLASSES

IDDETrack – The downstream location of any observed potential illicit discharge is stored in this point feature class. A GPS coordinate is collected coincident with the outfall coordinate. It is not necessary to collect multiple IDDETrack points along the pathway of the illicit discharge. The geometric network will connect the flow pathway from the source point to the discharge point. Assets found along the discharge pathway will be mapped and inventoried in the appropriate feature class. Illicit discharge information should not be included in those inventory feature classes. Several attributes are included to record the outfall screening date, reporting trigger, and several status fields. Some of these may be populated in the office. There is a 1 to many relationship, allowing for multiple rounds of outfall screening to be recorded for a single AssetID, thereby maintaining a compliance record of observed discharges.

IllicitDischargeSource – If the discharge is determined to be illicit and can be tracked to its source, a GPS coordinate is collected at the upstream source location. Only one source should be identified for each recorded discharge. Several attributes are included to describe the source, the status, the property owner and date. Some of these may be populated in the office. There is a 1 to many relationship, allowing for multiple rounds of outfall screening to be recorded for a single AssetID, thereby maintaining a compliance record of illicit discharge sources.

NPDESScreen (table) – This table is linked to the Discharge Points feature class via the AssetID. Outfall screening visual observations, sampling results, weather information, rainfall, tide and discharge rate are stored in this table. There are also several Condition and Blockage attributes. There is a 1 to many relationship, allowing for multiple sets of sampling results to be linked back to a single AssetID, thereby allowing for a historical sampling record of observed and sampled discharges at each outfall.

SUPPORTING FEATURE CLASSES

Elevations – All surface topographic point data collected for channels and BMPs will be housed in the Elevations feature class. Each point is identified using the Elevation Type attribute. This includes channel cross-sections, embankments and water surface elevation of BMP basins, benchmarks, top of curb, bottom of curb, or other notable points. Locations of cross-sections are identified using the *Cross-Section Location* domain option. The Elevations feature class will contain XYZ coordinate data and the associated Elevation Type only; no other attributes or calculations should be stored here. These points can be used to calculate the bottom slope, side slope and depth reported in the channels and BMPs feature class tables. These elevations can be used with LiDAR data, for modeling or design purposes.

Stormwater Network Junctions and **Virtual Drain Line** – These feature classes are used to build the geometric network and create connectivity between the features. They do not directly require field data collection. The Enabled (Yes/No) attribute in each feature class identifies whether that asset has been included in the geometric network.

MS4GRID – This feature class provides an index grid which was customized to Berkeley County's MS4 watersheds. The grid is used in map production to provide an index of map tiles. The grid is also used in analysis and queries to specify an asset located in that grid cell.

2.10 Photographing Features

Photographs are taken in order to document each asset in the County's stormwater inventory. These photos can be used to verify field data during office quality control checks and to quickly reference a site without requiring a visit. A high resolution pole-mounted camera may also be used to take zoom videos inside stormwater structures and along channels and BMPs. Still photos can be captured from the zoom videos. Acceptable file types for photos and videos should be verified with the County. The AssetID label on each

structure or a labeled survey flag may be included in each photo/video and file name for easy identification and proper linking in the database.

The following process should be followed to photograph features:

- Identify feature and paint AssetID on the structure, if possible.
- If AssetID cannot be painted on structure, place labeled survey flag instead.
- Take photograph(s) of asset (Close-ups, Area, Internal, Issue).
- Take zoom video of the interior of inlets, manholes/junctions, outlets, pipe connections and culverts, as well as open channels and BMPs. Extract zoom photographs from video as needed. Videos may be omitted for the interior of point features (inlets, manholes/junctions, outlets) less than 4 ft deep.
- Use the defined naming convention to name each photo.
- If photos/videos are stored in a Berkeley County network directory, assign hyperlink of directory address to the "Photo_Path" attribute.
- If photos/videos are stored directly in the GIS database tables, link the photos to the corresponding Asset ID. This is performed automatically when photos are taken with a GIS mobile software tool.

Table 2-10 provides a list of the minimum photos/videos for identification of each feature type. More photos can be taken if necessary. Table 2-11 contains a brief explanation of each type of photo/video. The photo and video naming convention is described in the following text, and examples are given in Table 2-12.

Table 2-10 Feature Identification and Screening Photos

FEATURES (ASSETS)	PHOTO/VIDEO
Inlets **Manholes/Junctions** **Outlets**	Close-up Area Internal Zoom / video
Pipes **Culverts** **Channels**	Close-up Area Zoom / video
Discharge Points	According to the feature type
Structural BMPs **Permeable Pavement**	Close-up Area * Zoom / video * Internal
Manufactured Treatment Devices **Cisterns**	Close-up Area * Internal * Zoom / video

** Internal photos and zoom videos may not be possible or necessary for some configurations.*

Table 2-11 Description of Photos

PHOTO / VIDEO	DESCRIPTION
Close-Up Photo (C)	Purpose is to show the top, exterior, entrance or exit of a feature. Close-up may also be used to document notable characteristics or components.
Area Photo (A)	Purpose is to identify characteristics near structure, and help personnel to locate structure/area. Asset in the foreground, with local area in the background for point features (Inlets, Junctions/Manholes, Outlets, MTDs, Cisterns). Asset in the foreground with photographs oriented upstream and downstream for linear features (Pipes, Culverts, Channels). Series of photographs taken from single vantage point around perimeter of asset for polygon features (BMPs, Permeable Pavement).
Internal Photo (I)	Interior of structure is the primary subject of photo. Photograph taken standing above structure looking down into underground structures (Inlets, Junctions/Manholes, Outlets, Underground Detention BMPs, MTDs, Cisterns) . Purpose is to show configuration and condition of asset, materials and sizes.
Issue Photo (S)	Purpose is to document a maintenance or access issue. These photos may be a close-up, area or internal view of the problem, as appropriate, but should be labeled as an Issue photo.
Zoom Video (V) **Zoom Photo (Z)**	Video is taken from the upstream and downstream vantage point of linear features (Pipes, Culverts, Channels), the interior of underground detention or MTDs in underground vaults, and around perimeter of large polygon features (BMPs, Permeable Pavement).

PHOTO AND VIDEO NAMING CONVENTION

Stormwater features should adhere to the naming convention shown below. Examples are listed in Table 2-12.

Asset Inventory Photo Names

AssetID + Photo Code + Photo# + Date
(Point features and polygons)

AssetID + Flow Direction + Photo Code + Photo# + Date
(Linear Features)

- AssetID may be assigned automatically for photos taken with the ESRI mobile software.

- The appropriate photo code label should be selected for each photo as it is taken. Photo codes are: C, A, I, S.
- Photos should be numbered sequentially starting with 01.
- Date is presented in Year-Month-Day (YYYYMMDD) format for ease in file sorting and tracking.
- Flow direction should be included for linear features (pipes, culverts, channels). Flow direction (UP, DN) is the direction of the photo taken from the vantage point of a linear feature (i.e., UP is looking upstream, and DN is looking downstream).
- Flow direction may be difficult to discern in the field, particularly if the features are dry. Flow direction should be determined using the available basemap data, pipe diameter increasing in the downstream direction, and visual field indicators such as flow lines and sediment or leaf pack deposition.

Zoom Photo/Video Names

AssetID + Zoom Code + Photo/Video# + Date
(Point features and polygons)

AssetID + Clock Position + Zoom Code + Photo/Video# + Date
(Pipes accessed via a point feature)

AssetID + Flow Direction + Zoom Code + Photo/Video# + Date
(Culverts and channels)

- AssetID may be entered manually for photos/videos taken with a pole camera.
- AssetID for pipes will be assigned according to the AssetID of the point feature into which the pole camera is inserted. Pipe photos and videos will be renamed using the correct pipe AssetID during post-processing.
- The appropriate zoom code label will be used for each zoom photo and video. Zoom codes are: Z, V.
- Clock position will be used to identify the location of a pipe intersecting a point feature (inlet, manhole/junction/outlet). From the surface, looking down into the point feature, pipes are labeled 1 through 12, with 6 o'clock as the outflow, downstream direction.
- Flow direction (UP/DN) will be included for linear features (culverts and channels). UP/DN will be added for pipe features during post-processing re-naming.
- If there appear to be multiple outflow pipes, choose the largest diameter pipe or the middle of a multi-barrel configuration as the downstream, 6 o'clock position.
- AssetID and the time and date stamp will be included on all zoom photos and videos. This marking is permanent and may not match the file name if the AssetID is re-assigned after the image is taken.

Table 2-12 Naming Convention for Photo and Video Files

PHOTO / VIDEO	CODE	NAMING CONVENTION	EXAMPLE
Close-Up Photo	C	*AssetID + C + Photo# + Date*	AssetID_C01_YYMMDD AssetID_C02_YYMMDD AssetID_C03_YYMMDD
Area Photo	A	*AssetID + A + Photo# + Date* *AssetID + Flow Direction + A + Photo# + Date*	AssetID_A01_YYMMDD AssetID_DN_A01_YYMMDD AssetID_UP_A02_YYMMDD
Internal Photo	I	*AssetID + I + Photo# + Date*	AssetID_I01_YYMMDD
Issue Photo	S	*AssetID + S + Photo# + Date* *AssetID + Flow Direction + S + Photo# + Date*	AssetID_S01_YYMMDD AssetID_DN_S01_YYMMDD
Zoom Video	V	*AssetID + V + Video# + Date* *AssetID + Clock Position + V + Video# + Date* *AssetID + Flow Direction + V + Video# + Date*	AssetID_V01_YYMMDD AssetID_6_V01_YYMMDD→ PIPE AssetID_12_V01_YYMMDD→ PIPE AssetID_DN_V01_YYMMDD
Zoom Photo	Z	*AssetID + Z + Photo# + Date* *AssetID + Clock Position + Z + Photo# + Date* *AssetID + Flow Direction + Z + Photo# + Date*	AssetID_Z01_YYMMDD AssetID_6_Z01_YYMMDD → PIPE AssetID_9_Z01_YYMMDD → PIPE AssetID_DN_Z01_YYMMDD

IMAGE FILE PROCESSING

Post-processing in the office may be used to re-label or re-number the photos and videos as needed. Pipe photos and videos will be renamed using the correct pipe AssetID during post-processing. Flow direction will also be added. Discharge Point photos will be copied from the relevant feature class and linked to the Discharge Point feature class. Photos taken with a different device or at a different time will be manually labeled and linked in the correct table of the database, or hyperlinked to the correct external directory. Photos may be extracted from zoom videos during field work or during post-processing.

2.11 Encountering Obstacles in the Field

A number of obstacles may arise during field activities which may complicate field data collection. The following is a list of potential obstacles and alternatives encountered during field data collection. The selected alternative must achieve an equivalent level of data accuracy and completeness.

GPS signal is blocked - If tree canopy or other overhead obstacle blocks the GPS signal, or the GPS coordinate cannot meet the required residuals at the asset, the field team shall do as follows:

Survey Grade (horizontal residual < 0.1 ft, vertical residual < 0.1 ft):

The field team should move to a nearby open area and GPS in two control points. The control points should be on either side of the asset if possible or at least 200 ft apart and within 500 ft of the asset. A robotic or total station can then be used to locate the asset with traditional topographic survey methods. If additional control points are needed, then closed loops with closure of Class A (1:10,000) or less are required to meet the transverse loop protocol. The surveyed coordinate of the blocked asset point will be entered into the GIS to replace any values that may have existed on the blocked asset point.

For Mapping Grade (horizontal residual < 3 m (9.84 ft):

The field team should move to a nearby open area to set an offset point. This point can be marked with a paint spot or survey pin flag, and noted in the Comments field. A survey wheel and a hand-bearing compass can be used to measure the distance and bearing to the blocked asset point. This information should be recorded in a field book and used to calculate the mapping grade horizontal coordinate of the blocked asset point. Alternatively, the field team may manually place the point in GIS using the best estimated location from the aerial image, and note in the Comments field. The coordinate can be extracted from the aerial.

Asset is obstructed – Data collection may be difficult to complete if the structure is blocked by sediment, debris, standing water, vegetation, etc. Obstructions limit collection of invert elevation, invert depth, diameter measurement, visual observations of the interior, and stormwater samples for outfall screening. See Section 2.12 for further detail.

Location is inaccessible – Data collection may be difficult to complete if infrastructure is located in areas that cannot be entered or for structures with heavy covers. See Section 2.13 for further detail.

Mapping features are located in street and require traffic control – If data collection cannot be completed due to traffic safety concerns, the location will be noted. Arrangements will be made for traffic control along each corridor, as needed, and the field team will return to the location and collect all of the missing data from that corridor as scheduled by the County in coordination with SCDOT. See Section 2.14 for further detail.

High tide prevents accurate data collection in tidally influenced areas of system – Route planning and scheduling should account for tide schedules in tidally influenced areas of the stormwater system, particularly at the outfalls. The field team will collect GPS coordinates if possible and safe to do so. Outfall screening will be conducted at low tide. Outfalls which are submerged even at low tide should be noted in the "Flow" field of the NPDES Screening table.

Structure encountered which is not in the Data Dictionary or Illustrated Guidance – The database structure accounts for all typical stormwater system structures and components likely to be found in Berkeley County. The majority of unusual features should fit into the existing data structure according to the defined form and function of the feature. Comments may be used to further characterize an unusual feature. Unusual features which do not easily

fit into the data structure should be noted, photographed and discussed with the Project Manager. If an unusual feature is encountered in large numbers, this may warrant a change to the data structure. This will be determined by Berkeley County on a case by case basis. It is preferable to maintain a streamlined and consistent database structure with infrequent changes to the data structure if possible.

2.12 Maintenance or Function Issues

At some locations it may be difficult to complete mapping and inventory due to maintenance issues. Maintenance issues are temporary problems that can be resolved relatively quickly with equipment such as a backhoe or vacuum truck, or with manual labor. A collapsed structure is a longer term problem, which requires a greater level of effort to resolve than a maintenance issue. Maintenance issues may include:

- Accumulated sediment or debris in structures
- Standing water or sludge in structures
- Heavy overgrowth of vegetation

In order to maximize efficiency, the field team will attempt to resolve minor maintenance issues on their own. Data collection will proceed if the field team can clear the structure with less than 5 minutes of digging or clearing vegetation with a bush axe. If the field team is unable to collect data due to maintenance issues, they will collect a GPS point as close as possible, and mark this location. The particular Maintenance issue will be identified using the "Needs Maintenance" field in GIS and one or more "Issue" photos will be taken to document the maintenance needed. If the structure cannot be easily cleared, the field team will collect as many attributes as possible and note the limitation in the Comments field. The interior of the structure needs to be clear in order to collect survey-grade invert elevations.

A maintenance tracking spreadsheet will be exported from the GIS database for all features that have maintenance issues and will be provided at the end of the mapping effort. The spreadsheet will have the X,Y Coordinate, AssetID, Issue description ("Needs Maintenance" field), Comments, Location and Date.

2.13 Access Issues

Some locations may be difficult to access for the purpose of mapping. This includes locations where it is difficult to gain entry to the stormwater asset, or where heavy equipment (such as a track hoe with lifting chain) would be required to remove an inlet or manhole cover in order to collect data on the interior of a structure. Circumstances preventing access may include:

- Fencing or locked gate
- Manhole cover or inlet grate paved over or stuck

- Concrete box-top inlets or oversized manhole or inlet covers requiring heavy equipment to lift
- Owner denies entry to private residential, commercial or industrial property
- Other constraints which make the site unsafe for the field team, including site-specific conditions or aggressive dogs

If the field team is unable to gain entry to a location due to physical or other constraints, they will collect a GPS point as close as possible and mark this location. The circumstance preventing access will be identified using the "Accessible" field in GIS and one or more "Issue" photos will be taken to document the problem. For inlets, manholes or junctions requiring heavy equipment to lift the cover, the County may provide or facilitate access. If access cannot be gained, the field team will collect as many attributes as possible and note the limitation in the Comments field. Access to the interior of the structure is needed in order to collect survey-grade invert elevations.

The County will coordinate access to private residential, commercial or industrial areas with the property owner. If field personnel need to enter onto the developed property of others, an attempt to contact the property owner will also be made on-site. Field teams will carry a copy of a letter on County letterhead describing the work, in order to present to property owners and gain access to private land. A template *Public Notification Letter* is found in *Appendix C*.

An access tracking spreadsheet will be exported from the GIS database for all features that have access issues and will be provided to the County at the end of the mapping effort. The spreadsheet will have the X,Y Coordinate, AssetID, Issue description ("Accessible" field), Comments, Location and Date.

2.14 Field Safety and Traffic Safety

Site specific Field Safety and Traffic Safety Plans may be developed and implemented for each mapping and inventory effort to provide safe operating procedures, guidelines, and practices for field personnel. Safe Work Plans must contain the minimum health and safety requirements for field personnel to conduct work in the safest possible manner, consistent with applicable policy, procedures and work practices. For contracted work, the County may review and require amendments in accordance with County requirements.

At a minimum, the Safe Work Plan must include the following elements:

- Hazard Assessment – Prior to beginning work, significant hazards will be identified and measures will be undertaken to mitigate risks. Field personnel will hold Daily Tailgate Safety Meetings and update the Task Hazard Assessment daily based on the likely hazards in that day's work area.

- Fitness for Duty – Field personnel will arrive at work fit for duty and capable of performing their job responsibilities in a safe, secure, productive and effective manner.
- Training and Qualifications – Field personnel will be qualified and trained to perform their responsibilities. Field safety and traffic safety will be overseen by a competent person.
- Personal Protective Equipment (PPE) – Field personnel will wear and use minimum required PPE for each work location, weather condition or other relevant situation.
- Site Controls – The supervisor will identify safe work zones and appropriate signs, signals and barricades as needed for each mapping area.
- Safety Briefing – A safety briefing will be conducted at the beginning of field activities, after more than two weeks break from field activities, after a significant change in site conditions or field activities, and whenever new staff report to the mapping area. The field team will conduct a daily safety tailgate meeting prior to beginning the work day.
- Emergency Response – Hospital or clinic locations nearest the mapping area will be identified prior to beginning field activities. Communication and incident reporting procedures will be established and key points of contact will be listed in the plan.

The Safe Work Plan will evaluate working conditions (traffic, weather, wildlife or other natural hazards, lighting, time of day, isolated areas, etc.), identify hazards, and specify mitigation measures and PPE required for those working conditions. Where there is a perceived danger or risk with continuing work in any situation, field personnel will retreat to a safe location and report the situation to the supervisor immediately. Table 2-13 identifies the primary hazards, mitigation and PPE anticipated for mapping efforts.

Table 2-13 Significant Hazard Identification, Mitigation and PPE

HAZARD	MITIGATION	PPE
Traffic *live and moving vehicles or equipment*	Pull vehicles as far off the road as possible. Activate four-way hazard lights. Park in a location which blocks personnel from oncoming traffic. Maintain safe distance from moving vehicles/ equipment, visual contact with drivers and operators. Stage activities away from vehicles and paths of travel. Use signs, cones and a flagman as needed to warn oncoming traffic. Avoid turning back on traffic. Do not enter the roadway except to cross the road. Make road crossings perpendicular to traffic flow. If more than two lanes, make road crossings in a vehicle.	High visibility vests Steel toe boots Hard hats and safety glasses (as needed)
Driving and Vehicles	Maintain alertness of traffic conditions, shoulder obstacles and pedestrians when moving from one mapping location to the next. Use hazard lights to warn vehicles to follow at a distance. Wear seat belts regardless of the distance of travel. Mitigate glare.	Seat belts Sunglasses
Heat or Sun Exposure	Use the Buddy system. Conduct heat stress and/or cold stress monitoring. Implement a heat/cold stress management/prevention plan. Take additional breaks, spend more time in the shade or inside a building or vehicle, and drink water frequently. Move indoors during thunder and lightning or extreme winds.	Hat Sunglasses Sunscreen Water
Natural Biological Hazards *Wildlife (such as snakes or alligators); hazardous insects or plants (such as mosquitoes, ticks, poison oak/ivy)*	Use disposable (Tyvek) coveralls, insect repellent (24% DEET or similar), light colored clothing, field/snake boots, and barrier creams. Conduct frequent tick checks. Thoroughly clean field clothing and equipment. Check for snakes and alligators in or near ponds, channels and culverts prior to entry.	Long pants and shirts Snake boots Insect deterrents
Working in or near Water *Water more than 3 ft deep, fast moving stream, or water body with soft bottom creating entrapment hazard*	Use caution when approaching stream banks and ponds. Use pole to determine water depth prior to wading. Do not wade in water above knee-depth unless approved to do so. Move in an upstream direction. Avoid fast moving water and wading after storms.	Footwear appropriate to the site, Personal Floatation Device
Slips, Trips and Falls	Evaluate work area and access routes for potential hazards. Eliminate hazards, erect barricades or place warning signs, cones, survey flag or paint.	Footwear appropriate to the site
Manual Lifting *Manhole covers, inlet grates, debris*	Use a manhole lifter to aid in removing manhole covers and inlet grates. Do not attempt to lift oversized covers or grates without assistance or heavy equipment. Use leather work gloves to protect hands and wear steel toe boots to protect feet in case of dropped cover or grate.	Leather gloves Manhole lifter Steel toe boots

A Traffic Safety Plan addresses the minimum Traffic Protection and Traffic Control requirements for conducting mapping and inventory (survey) operations on highways and roads. Traffic safety measures will be implemented throughout the field work, and will include use of parked vehicle(s) with flashing lights, signage, and cones in order to warn drivers and protect field personnel. Formal Traffic Control will be on an as-needed basis to be determined during the planning phase for specific road segments. Field personnel will identify in advance the specific areas where traffic control will be required. Traffic control measures will be determined and implemented prior to data collection on these road segments. A template *Traffic Safety Plan* is found in *Appendix D.* At a minimum, a Traffic Safety Plan will include the following elements:

- Signage
- Vehicle parking
- Flashing lights
- PPE
- Flagman
- Buddy system
- Situational awareness
- Weather conditions
- Escape route
- Loading/unloading
- Entry to roadway

When required, formal traffic control will be coordinated through the County, SCDOT and police/sheriff as needed in order to enable the field team to access areas within the travel lanes, medians, or shoulder areas which cannot be safely mapped and inventoried without lane diversion(s) or closure(s). Traffic Control measures will be compliant with *the SCDOT Work Zone Safety Guidelines for the South Carolina Department of Transportation, Municipalities, Counties, Utilities, and Contractors* (2013 or latest version), which presents guidelines for work zone traffic control on short-term stationary and short duration work sites (roads and streets) in rural and small urban areas. A Traffic Control Zone consists of:

- Advance Warning Area – tells traffic what to expect ahead
- Transition Area – moves traffic out of its normal path
- Buffer Space – provides protection for traffic and workers
- Work Space – for workers and equipment
- Termination Area – allows traffic to resume normal driving

Field personnel will follow the life-preserving principles and watch out for their fellow workers, drivers and pedestrians to ensure that everyone returns home safe at the end of the day.

2.15 Notifications

Notification points of contact will be determined according to the coordination matrix in Table 1-2. The field team will make the following notifications as needed during field activities:

Emergency Notifications – The field team will call 911/sheriff dispatch immediately if they find weapons or other evidence of criminal activity. The field team will provide notice if they observe active illicit discharges or sanitary sewer overflows. The field team will provide notice if they observe a serious maintenance issue or defect that is likely to produce flooding or dangerous conditions in the immediate future.

Routine Notifications – The field team will provide notice of any unusual interactions with the public, issues encountered in the field, or difficulties in collecting data.

MS4 Compliance Notifications – The field team will provide notice if they observe apparent but not active illicit connections/illicit discharges, or active construction site discharges.

For contracted work, the field team will communicate with the project manager and the project manager will relay the communication to the appropriate County staff. For work performed in-house, County staff will direct internal communication as appropriate for the situation. For notifications involving other utilities, the County will provide further notification to BCWS or CWS as appropriate.

2.16 Field Quality Control Measures

Quality assurance (QA) and quality control (QC) measures should be implemented as part of daily activities. Daily office QA measures will include equipment checks, vehicle checks, and battery charging prior to field work. Daily field QC will be focused on GPS equipment accuracy. This will include checking setup of field data collection equipment in the morning, checking setup of the Base Station (if being used), and completing necessary control point checks with a nearby benchmark (and the Base Station, if being used). Daily field QC measures will also include daily checks to ensure all required fields have been completed in the GIS. These tasks are included in the Work Breakdown Structure in Table 2-7 and Table 2-8.

The field team will maintain a list of any features, if uncertain of feature classification, appropriate narrative comments, or other questions which may need to be evaluated by the project manager. Field GPS and topographic survey data collected will be reviewed by the survey manager for quality and compliance with GPS/survey accuracy (HDOP, VDOP) standards. Deficiencies will be corrected. When all data collection is complete, the PM will review the dataset and ensure the GIS data is complete and accurate and all required QA/QC procedures were implemented. Additional GIS data quality checks are described in Sections 3.9 and 3.10.

2.17 Limitations

This manual covers the collection of stormwater infrastructure GIS data of the stormwater system within the County boundaries. Mapping of stormwater infrastructure or BMPs on private property will be conducted with owner notification and access to private property will be coordinated by the County. Mapping and assessment may be limited to specific feature classes, attributes and domain values, as directed by the County. These will be determined at the beginning of each mapping effort and selected from *Appendix A, Stormwater GIS Data Dictionary*.

This manual does not cover the following related field activities:

- Subsurface utility location;
- Smoke or dye testing of pipe connections;
- CCTV inspection of pipes;
- Confined space entry;
- Use of boats or submerged wading to access wet pond risers, etc.;
- Extensive maintenance required to collect data (Section 2.12);
- Use of heavy equipment to open/access stormwater structures (Section 2.13);
- Inaccessible areas due to fences, walls, safety concerns, etc. (Section 2.13);
- Mapping of dumping, construction site discharges, or other water quality issues not associated with outfalls

Any other issues or unique circumstances will be handled according to the team coordination and communication procedures in Section 1.6.

Section 3 Data Management

3.1 Berkeley County GIS Requirements

The Berkeley County GIS is a regional geographic information resource that provides for the business needs of Berkeley County Government, Berkeley County GIS Consortium (including the Cities of Goose Creek and Hanahan) and the general public. A variety of GIS datasets are maintained in this database, including stormwater data. The County uses this data for many purposes including asset inventory, maintenance, project planning and review, public outreach, management and decision making. Data downloads are available to Berkeley County GIS Consortium members. Data produced using this manual will be uploaded to the Berkeley County GIS after quality control reviews have been completed.

The following items prescribe the basic requirements in order to meet the County's GIS standard. Stormwater data collection must follow the requirements in this section. Additional detail regarding the database structure, naming convention, data management and other GIS topics are covered in the remainder of Section 3.

Database - At the beginning of each mapping, inventory or outfall screening effort, the County will provide a copy of the official ESRI ArcGIS geodatabase to be used as the basis for all deliverables. The delivered geodatabase must contain the same network, feature classes, fields, tables, etc. as the original geodatabase provided by the County, and must be cumulative (containing data from all previous deliverables). The ESRI ArcGIS software used in the deliverables should be the same version as provided by the County. Older versions may be acceptable; newer versions are not acceptable. There should be no changes to the structures of any of the contents of the geodatabase (feature classes, tables, etc.) unless approved by the County.

Fields – The feature classes in the geodatabase delivered must contain only those attributes present in the original geodatabase provided by the County. There should be no changes unless approved by the County. Fields must retain their original definitions (type, length).

Domains – Some attributes have predefined domain values which standardize the appropriate codes for those fields. These may be coded value domains or range domains, and are defined in the geodatabase provided by the County. Attributes must match the defined domain values. Notify the County if a domain value is found in high frequency during field work that does not appear in the domain list.

Stormwater Network – The stormwater network provided by the County is an ESRI geometric network consisting of pipe and related features in a stormwater system dataset. All network datasets, rules and configurations present in the original geometric network must be preserved in deliverables. The geometric network is stored in the feature dataset (Stormwater_Net) and the rules and configurations which define the connectivity can be found in the geometric network properties. Addition or deletion of assets requires update of the geometric network without changing the underlying properties.

3.2 GIS Data Structure

Data Model – The County's Stormwater feature dataset is based upon the Local Government Information Model (LGIM). The stormwater feature dataset has been modified to suit the County's stormwater data requirements. A variety of infrastructure will be discovered during ongoing mapping processes. Additionally, continued growth and development in the County will result in construction of more modern BMPs and stormwater facilities. As such, the geodatabase has been modified in order to ensure that the data structure will be sufficient to allow the County to adequately describe and store stormwater data in the future.

Feature Numbering - A unique identifier called the **AssetID** is assigned for each infrastructure feature. The AssetID consists of a 12-digit numeric code. Numbering begins with 000000000001 and continues sequentially as assets are mapped throughout the County. Each AssetID is tied to a **GISOBJID**, which is an EAM Servicer unique numeric identifier for use with the County's EAM system. The County populates the GISOBJID in GIS before the GIS data is read into the EAM. The County uses the **GISOBJID** as the unique identifier, rather than the underlying AssetID. The **LegacyID** field tracks assets which were re-numbered from the County's previous stormwater database.

The AssetID will be used as the primary linkage field in GIS. All assets existing in the database have an AssetID assigned. Stormwater datasets, attachment tables and relationship classes are linked by the AssetID. For newly discovered assets, a temporary number will be assigned in the field (*number starting at 990000000001*). The temporary number for new assets will be replaced with the next available sequential number. AssetIDs for structures which have been demolished will be retired.

Stormwater Data Structure - The County's stormwater GIS database consists of two datasets and several additional data tables, linked together by relationship tables. All of the feature and attribute information and associated photo documentation will be captured in the County's Stormwater dataset, organized by feature class. All of the outfall screening data, including associated photo documentation, will be captured in the County's IDDE dataset.

The lists of feature classes, attributes and domains in both the Stormwater System Inventory (Stormwater dataset) and Outfall Screening (IDDE dataset) are provided in *Appendix A, Stormwater GIS Data Dictionary*. The County's Stormwater geodatabase structure is presented in Figure 3-1.

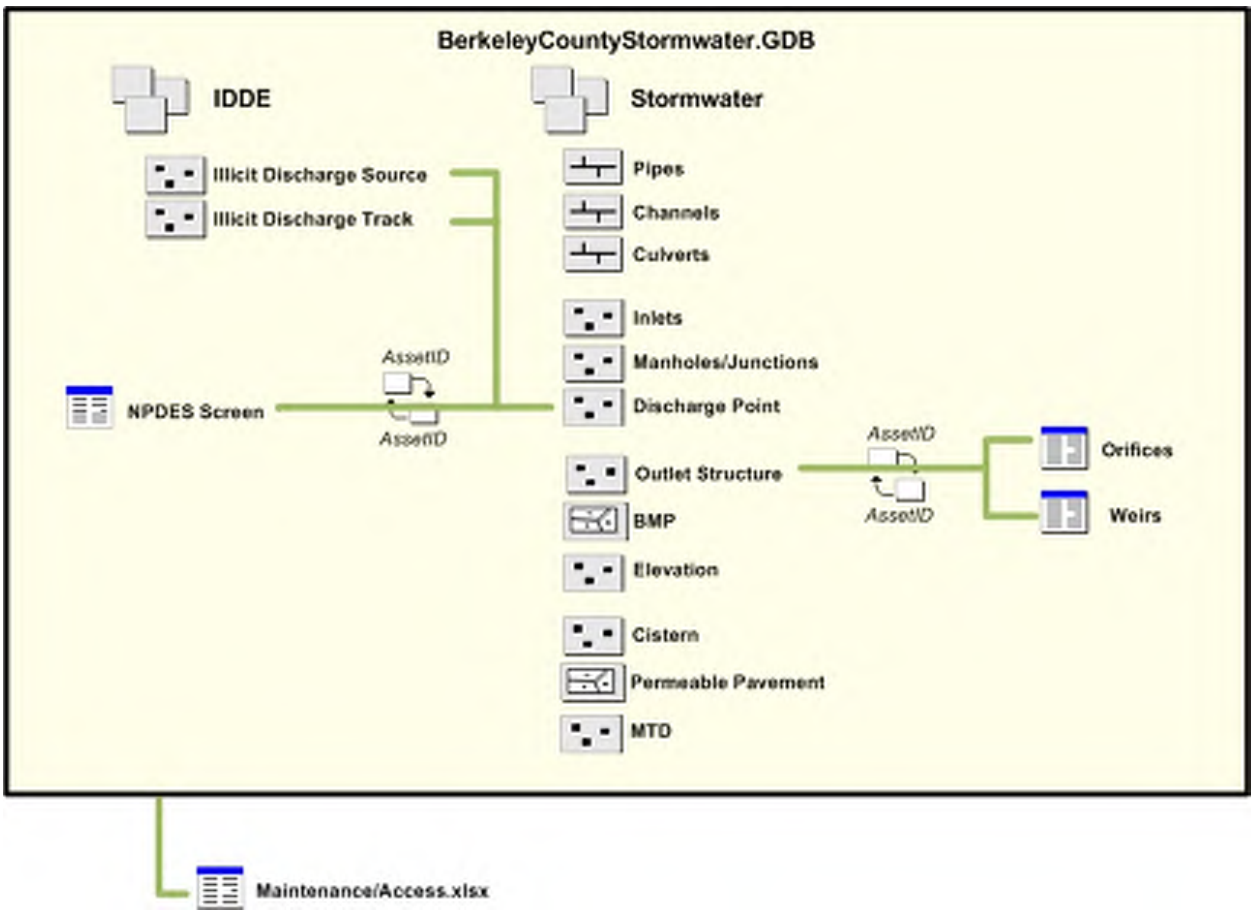


Figure 3-1 Berkeley County Stormwater GIS Data Structure

3.3 GIS Calculations and Processing

A number of attributes will be populated in the office with calculations or geoprocessing tools using the field measured values. Table 3-1 below provides a list of the attributes which will be calculated. Applicable feature classes are shown for each calculation.

Table 3-1 Attribute Calculations and Processing

ATTRIBUTE	HOW ATTRIBUTE IS CALCULATED	APPLICABLE FEATURE CLASSES
Latitude (X-Coordinate)	Calculate using survey grade GPS points and ESRI geoprocessing tools	*All feature classes*
Longitude (Y-Coordinate)	Calculate using survey grade GPS points and ESRI geoprocessing tools.	*All feature classes*
Invert Elevation (Z-Coordinate)	Calculate using survey grade vertical coordinate: *Rim Elev - Depth to Invert* *Top Elev - Depth to Rim - Depth to Invert* *Top of Pipe - Depth to Invert* *Headwall Elev - Depth to Top of Pipe - Depth to Invert* *Top of Bank Elev - Depth to Invert* *Top Elev – InvertDepth* *Top Elev – Height* *Top Elev – PavementDepth*	*Closed structures and connecting pipes* *Pipes w/ Tide Valves* *Pipes and Culverts w/ or w/o Headwalls* *Channels, BMPs* *MTDs* *Cisterns* *Permeable Pavemt*
Rim Elevation	Calculate using survey grade GPS point: *Top Elev - Depth to Rim* Rim Elevation Equivalencies: Rim Elev = Top Elev for grate top inlet, drop inlet Rim Elev = Top Elev for circular riser, square grate top riser, square combo riser and emergency overflow spillway; perforated riser will not have a Rim Elev if capped Rim Elev = Top Elev = Invert Elev for curb cuts Rim Elev = Invert Elev for weir plate, orifice plate, gate structure and emergency spillway	*Closed structures (inlets, manholes, junctions, outlets, MTDs, underground detention)*
Invert Depth	Calculate using survey grade GPS point: *Top of Bank Elev – Invert Elev* *Top Elev – Invert Elev*	*Structural BMPs* *Channels* *MTDs*
Cover Depth	Calculate using survey grade GPS point: *Rim Elev – Depth to Invert + Diameter* *Top Elev – Depth to Invert + Diameter* Average of upstream and downstream values	*Pipes, Culverts*
Bottom Slope	Calculate using survey grade GPS point: *Upstream Invert Elev - Downstream Invert Elev/ Length*	*Pipes, Culverts, Channels*
Side Slope	Calculate using survey grade GPS point: *(Top of Bank Elev –Toe of Bank Elev) / Vertical Distance from Top to Toe* Average value of embankment sections	*Channels, BMP basins*
AssetID	Use geoprocessing tool for AssetID corrections	*All feature classes*

Coordinates – Digitized data may have an X,Y coordinate and an invert elevation (attribute) populated; however, the invert elevation is not associated with the underlying coordinate. Once the location has been mapped, the survey grade data will replace the mapping grade X,Y coordinate with an XYZ coordinate, and the Z-coordinate will overwrite the invert elevation attribute field.

Invert Elevation (Z Coordinate) – Calculated for every feature where the GPS elevation cannot be collected directly in the field. Invert elevation is calculated by subtracting the depth from the surface elevation, as shown in the table. For pipes which intersect a structure (inlets, manholes/junctions, outlets), the rim elevation will be used from the upstream/downstream structure in order to calculate invert elevation. The top elevation, depth to rim and rim elevation will be stored in the appropriate feature class for that structure. The measured depth to invert and calculated invert elevation will be reported in the pipes feature class. For inlet or outlet structures with a top slab or ceiling above the entrance, and for pipes and culverts with headwalls, an additional depth measurement must be made in order to use a common elevation (rim, or top of pipe, respectively) from which to subtract. This enables calculations to be performed in a batch.

Rim Elevation – Calculated for closed structures (e.g., curb inlets, box top inlets, box top risers) where the GPS elevation cannot be collected directly in the field. Rim elevation is calculated by subtracting the depth to rim from the top elevation. As shown in the table, the rim elevation is equal to the top elevation for certain types of inlets (grate top and drop inlets), risers (circular, square grate-top, and square combo), emergency overflow spillways and curb cuts. Additionally, the rim elevation is equal to the invert elevation for curb cuts, weir plates, orifice plates, gate structures and emergency spillways. Rim elevation is also used for MTDs and underground detention chambers.

Invert Depth – Calculated for structural BMPs (wet pond, dry pond, infiltration basin, wetlands, bioretention, underground detention, stilling basin, sand filter). The invert depth is the lowest point of the retention area, calculated by subtracting the invert elevation from the top of bank elevation. Also calculated for MTDs. The invert depth is the depth at the lowest point of the MTD, calculated by subtracting the invert elevation from the top elevation.

Cover Depth – Calculated for pipes which intersect an inlet, manhole or junction box at both ends. Rim elevation will be used to calculate the cover depth, by subtracting the depth to invert and then adding the pipe diameter. Average cover depth will be calculated by averaging the upstream and downstream values. Pipes and culverts which intersect open channels do not have upstream or downstream structures and therefore need a surface elevation at the upstream and downstream ends from which to calculate cover depth.

Bottom Slope – Calculated for linear features (pipes, culverts, channels) using the difference of the upstream and downstream invert elevations (low point of the channel), divided by the length of the linear feature. The length is autogenerated in GIS using the upstream and downstream coordinates.

Side Slope – Calculated for channels and BMP basins. For channels and dry BMPs (ponds), side slope will be calculated using the difference in top of bank and toe of bank elevations divided by the vertical distance between top of bank and toe of bank. For wet BMPs (ponds), side slope will be calculated using the difference in top of bank elevation and normal water surface elevation. For channels, both a left slope and a right slope are calculated, each as the average of an upstream and downstream side slope. For BMP basins, the side slope should be the average or representative value of the side slope around the edge of the BMP.

3.4 Units of Measure

Units of Measure (UOM) are assigned for each numeric measurement attribute field in the GIS database. These units of measure are standardized for the survey coordinate system as well as for each attribute measured in the field or calculated in the office. Use of UOMs and established precision standards ensures that data is presented in a consistent manner and helps to prevent errors resulting from combining data with different units, for purposes of future modeling or analysis. Table 3-2 provides UOMs for attributes in the stormwater database.

Table 3-2 Units of Measure for Each Type of Attribute

ATTRIBUTE	UNIT OF MEASURE
Invert Depth	Feet rounded to the nearest 10th
Elevations	Feet rounded to the nearest 10th
Diameter	Inches rounded to the nearest inch
Width	Feet rounded to the nearest 10th
Height	Feet rounded to the nearest 10th
Slope	Unitless decimal
Side Slope	Unitless decimal
Length	Feet rounded to the nearest 10th
Perimeter	Feet rounded to the nearest 10th
Area	Square Feet rounded to the nearest 10th

**Associated Length, Perimeter, and Area that are required and automatically calculated by GIS are not rounded but set to the precision of the database.*

3.5 Comments Field

The Comments field supports mapping and data analysis, and provides additional information about the feature beyond what is described in the other attributes. This field may be used to describe:

- A unique design characteristic;
- An unusual circumstance encountered during data collection;
- Analysis or calculation performed in order to arrive at an attribute value;
- Situations where the feature was only partially mapped or partial attribute information completed;
- Provide details when "other" or "combination" is selected for an attribute; or
- To hold temporary status information as the field work progresses.

Any temporary status information, such as maintenance or access issues, should be exported to the maintenance and accessibility tracking spreadsheets and removed from the final GIS database deliverable. The Comments field is not a catch-all and should not be used in lieu of accurately completing the required attribute fields. Comments should be separated with the pound sign (#) and comments which are repeated in multiple assets should be placed in a standard order.

The Comments field should use narratives with standard language for items which are expected to be repeated at multiple locations within a feature class. Comments or notations should be consistent such that the same comment should be used to reference similar notes or observations and allow for sorting or querying by comment. It may be necessary to note that a certain point represents the extent of field effort, particularly if further infrastructure may be present upstream. A Comment such as "Edge of boundary" can be noted in such cases.

3.6 Metadata

Metadata should be created for each feature class and provided as part of the database deliverable. The following graphic lists the minimum items that must be completed. Metadata should be created according to the ISO standard 19115 (2014). These standards describe the content, structure and eXtensible Markup Language (XML) file format of the metadata. Figure 3-2 shows an outline of the information which should be included in the created metadata. In addition to the created metadata, attribute fields are include in each feature class to record the source, date collected and accuracy of data. This allows delineation between field surveyed data, and data derived from as-builts, aerial imagery or other sources.

ISO STANDARD OUTLINE FOR METADATA

- **Resource Maintenance Scope** (include scope description of effort)
- **Credit** (include name of company or entity performing data collection or analysis, date awarded, start date and end date)
- **Quality Report** (should include updates to the Level Description tabs and Extent tabs)
- **Report Type under the Quality Report tab (Gridded Data Positional Accuracy) Dimension to include Horizontal and Vertical**

  Measure Date
  Measure Name (include company name and award date)
  Description (average accuracy of over lifetime of mapping effort)

- **Spatial Reference System** (if spatial reference system used for field collection differs from the source data then a new Reference System must be added with completed Authority Citation; also include vertical datum used)

Figure 3-2 Metadata Content and Structure

3.7 Management of GIS Data

Berkeley County may establish GIS data management procedures using online mapping services from ArcGISOnline and the Check-out/Check-in process by the mapping team. All project files should be stored in a working directory on a secure remote server hosted by the County (or contractor, if applicable). The GIS data will be stored in an enterprise multi-editing SQL/SDE ESRI geodatabase utilizing the County's GIS schema. Use of a secure remote server allows multiple team members to access and update the project files simultaneously. During the final Check-in, only the newly updated data from the mapping area will be uploaded to the County's database.

Figure 3-3 illustrates how GIS data collected in the field is managed when using ESRI mobile software on a tablet. The geodatabase is built to work in a connected environment (online access via mobile data or wifi) with live production enterprise database or in a disconnected mode where data is cached on the local device. The majority of field data collection will be completed in disconnected mode, and the data should be uploaded nightly to the server. The cumulative database, including any data processing which occurred after the daily download, should be downloaded each morning prior to starting field work. Post processing of data, including quality control checks, should be performed on a daily and weekly basis.

A new folder should be created for each day's work in the working directory. The folder for each day's work should be named according to the following simple file naming convention:

Z_YYMMDD

Where

Z = PHOTOS, VIDEOS or other file category
YYMMDD = date of data collection

Digital photographs and videos should be uploaded nightly to the working directory. Asset photos and videos will be stored in the stormwater feature dataset; outfall screening photos will be stored in the IDDE dataset. During field data collection, photos should also be stored in a separate folder on the field tablet or server, so that the field crew can access photos of previously mapped assets. This will allow the field crew to quickly access the photos for reference without having to maintain the full database and photo directory on the tablet.

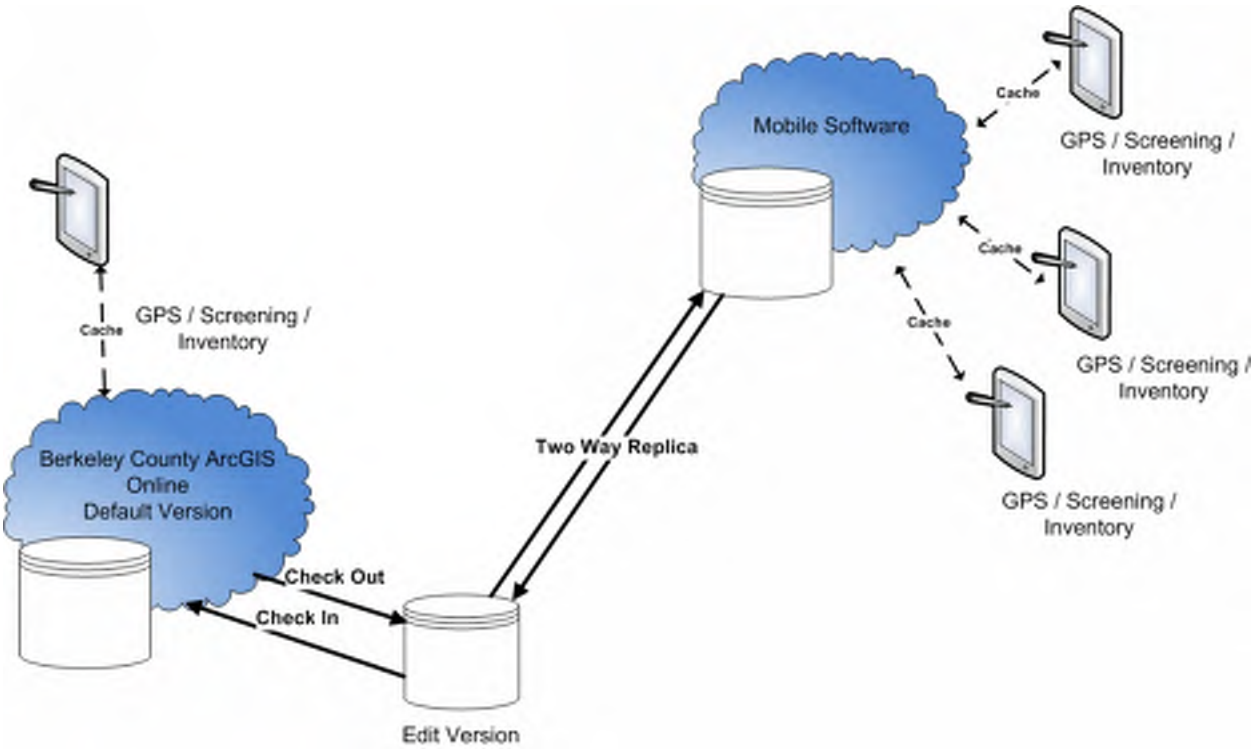


Figure 3-3 Data Management Graphic

3.8 Management of Non-GIS Data

The majority of data will be captured in the field and either directly stored in the GIS database or linked to it (such as photographs or videos). Any non-GIS data collected in the field should be uploaded nightly to the working directory. Non-GIS data should be managed outside of the database, as follows:

Maintenance Spreadsheet – For the final deliverable, a spreadsheet will be exported from the GIS database for all features that have maintenance issues. The spreadsheet will have the X,Y coordinate, AssetID, Issue Description ("Needs Maintenance" field), Comments, Location, Date, and associated "Issue" photo reference.

Accessibility Spreadsheet – For the final deliverable, a spreadsheet will be exported from the GIS database for all features that have access issues. The spreadsheet will have the X,Y coordinate, AssetID, Issue Description ("Accessible" field), Comments, Location, Date, and associated "Issue" photo reference.

Photos and Videos – The majority of photos and videos should be taken using the GIS tablet/handheld data collector, and these should be uploaded nightly to the proper directory. In the event that additional photos or videos are taken with other devices (such as a smartphone, hand-held or pole-mounted digital camera), these can be manually named with the appropriate AssetID, stored in the same directory with the other photos and videos, and manually linked to the geodatabase as needed. Photos/videos taken with other devices should include a GPS tag to aid in linking the photo to the proper AssetID.

Field Notes – Survey crews should maintain hard copy survey log books throughout the field work. Relevant records may be scanned and stored electronically in the same directory with the rest of the project files, for reference as needed.

3.9 Stormwater Topology Rules

Topology is the spatial relationship between feature classes in a feature dataset. Topology rules define the relationship between two features within the same feature class, or between two feature classes. Topology rules may also be used to define subtypes within and between feature classes. The following relationships may be used to establish the stormwater network, to ensure valid relationships are created in the GIS and to accurately represent co-located or linked features in the database and on maps.

Dead End Junctions – There should be no dead end junctions (inlets, manholes/junction boxes, outlet structures, MTDs). Each of these structures should have at least one pipe, culvert or open channel connected downstream.

Orphans – There should be no orphan stormwater features. (Exceptions: some infiltration BMPs; permeable pavement; points derived from as-builts which cannot be field verified and have been notated as ActiveFlag - No.)

Direction of Flow – Pipes must be digitized in the direction of flow to build the geometric network and support future modeling activities. Invert elevations should decrease while diameters should increase in the downstream direction.

Upstream vs. Downstream Invert Elevations – Invert elevations should decrease as flows move downstream. Therefore, the downstream invert elevation of upstream pipe, culvert or open channel must be greater than upstream invert elevation of the downstream pipe, culvert or open channel. (This rule may sometimes be violated, especially in flat areas.)

Snapping – All features must be snapped to the appropriate corresponding feature (for example, inlets must be snapped to their corresponding pipes). The most accurate feature should be used as the snapping target. For example, if feature locations are updated with GPS coordinates, the locations of any connected features must be adjusted to snap to the more accurate feature.

Connections to Appropriate Feature Type – Features must connect to appropriate features.

- The downstream end of a stormwater pipe may connect to an open channel, intersect a basin, or connect to an inlet, outlet or manhole/junction.
- An inlet must connect to a stormwater pipe. (Exception: curb cuts)
- Manholes and junction boxes must connect to a stormwater pipe.
- Outlets must connect to a stormwater pipe. (Exceptions: weir, gate, orifice or emergency spillway, in which case they may connect to an open channel.)
- MTDs must connect to a stormwater pipe.
- Culverts must connect to an open channel or intersect a structural BMP.
- Channels may intersect with other channels, pipes, culverts, or with a structural BMP.
- Cistern connects to a roof inlet at the top.
- Discharge Point Type must match the underlying asset's feature type.

Intersections - Stormwater pipes do not self-intersect. Culverts do not self-intersect. Channels do not self-intersect.

Overlaps – Stormwater pipes do not overlap each other or self-overlap. Culverts do not overlap each other or self-overlap. Channels do not overlap each other or self-overlap. BMPs do not overlap each other. BMPs do not overlap an open channel. Permeable Pavement does not overlap an open channel. Infiltration BMPs and Permeable Pavement may overlap an underdrain pipe.

Dangles – BMPs must not have dangles (i.e., dangling end of a line extending past the node). Intersecting channels must not have dangles. Pipes must not have dangles. Culverts must not have dangles. Permeable Pavement must not have dangles.

Polygon Contains Point – BMPs must contain at least one outlet structure. Cisterns must contain at least one orifice.

Buildings – Stormwater features may not intersect (be located underneath) a building.

3.10 GIS Quality Control Measures

Topology rules and other quality assurance/quality control (QA/QC) checks should be used to ensure the GIS database is complete and correct. A QA/QC Checklist is provided in Table 3-3. It includes overall checks for completeness, quality, accuracy and data structure, as well as specific queries and QC items for each part of the database. The QA/QC goals are:

- To verify the data collected is valid, accurate and consistent
- To verify the data has been properly processed and presented
- To verify the database and map deliverables meet the County's technical requirements for GIS deliverables
- To ensure proper review of all deliverables

Table 3-3 GIS QA/QC Checklist

√	ELEMENT TO CHECK	DESCRIPTION
STORMWATER DATABASE OVERALL		
	AssetIDs	All assets have a unique ID. There are no duplicate AssetIDs. All new assets with a temporary ID (9xxxxxxxxxxx) have been assigned a permanent unique ID.
	Required Fields	All required fields are populated.
	Completeness	All assets in the stormwater network are present in the GIS network database. All required attributes have been populated.
	Datum	All GPS points are properly referenced to the correct datum.
	Comments Field	Comments field is used to describe unique configurations or issues associated with data collection that cannot be stored in another attribute. Comments are standardized, # delimited, ordered, and necessary. All temporary comments from field data collection have been deleted.
	Units of Measure	Measured numeric values use correct units.
	Photos	All required photos are properly stored and linked to the database.
	Videos	All videos are properly stored and linked to the database.
	Photos and Videos	All assets have been verified to have the required photos/videos. Missing or unclear photos/videos have been identified and replaced.
	Photo and Video Naming	All photos and videos are named correctly according to the naming convention in the manual. All photo and video directory path hyperlinks are confirmed, if used. Flow direction of the asset matches flow direction given in file name for linear features. AssetID in photo/video file name has been updated for any feature, including new features (99xxxxxxxxxx), with an updated AssetID.
	File Naming	All files are named correctly according to the file naming convention.
	Metadata	Metadata have been created for each feature class, are complete, and follow the ISO standard and format.
	Aerial Imagery	Features have been checked against recent aerial photography, buildings feature classes, and other ancillary GIS data to ensure that features do not cross buildings or surface waters.

✓	ELEMENT TO CHECK	DESCRIPTION
	Grid	All features fall within Berkeley County's custom MS4 Grid index.
	HUC12	All features fall within one of Berkeley County's HUC12 watershed areas.
	Feature Classes	Database deliverable includes only the feature classes identified from Appendix A of the manual.
STORMWATER FEATURE DATASET		
	Spatial Accuracy	Coordinates meet horizontal and vertical accuracy standards established in this manual for mapping grade or survey grade data collection, as appropriate.
	Spatial Accuracy	If GPS coordinates were obtained for a feature, the GIS feature has been updated with these coordinates. The XY coordinate fields in the attribute table for these features have also been updated. Coordinates are in units of international feet.
	Control Point Checks	All survey grade GPS data has been validated for precision with multiple control point checks throughout the day.
	Elevations	All topographic survey data, including channel and BMP cross-sections, is stored in the Elevations feature class.
	Source	All points populated from as-built data have been: (1) updated with new XYZ coordinate, attributes, and Source identified by date of field mapping; (2) deleted and AssetID retired if structure confirmed no longer present; (3) kept, with Source identified as as-built data, ActiveFlag status as "No", LifeCycleStatus populated and Comment "not able to be located."
	Source Date	The date of the field inventory, as-built drawing or other source has been populated. This date may or may not match the date of the outfall screening record for the same asset.
	Flow and Connectivity of Network	Flow and connectivity issues within the dataset as well as any data gaps or missing/inconsistent data values have been identified and corrected in order to ensure a functioning geometric network.
	New Structures	Any new structures added to the network have been properly integrated into the geometric network following the topology rules described in this document. The new structures have been assigned proper AssetIDs.
	Duplicate Features	There are no duplicate features. Any duplicate features have been identified and deleted. This refers to features that have the same geometry (spatially coincident), as well as features that may not have exactly the same geometry but represent the same feature.
	Invalid Geometry	There are no features containing invalid geometry (null geometries, zero-length pipes, etc.). Any Pipe or Culvert Lengths less than 3.5 ft have been verified.
	Multipart Lines	There are no multipart features (cases in which multiple lines are represented as a single line).
	Mapping Area or Municipal Boundary	Features all or partly crossing the mapping area boundary or municipal boundary are noted in Comments field. Note if data is incomplete.
ATTRIBUTES		
	Pipe Type	*Gravity Main* is assigned to the primary drain line and *Secondary Line* is assigned to all tributaries.

✓	ELEMENT TO CHECK	DESCRIPTION
	Middle Pipe Attributes	Comparison of attributes of Pipes upstream and downstream of the pipe being checked (the "middle" pipe). If the material, diameter and pipe shape attributes of the upstream and downstream pipes are the same, then the attribute values of the "middle" pipe should also match.
	Pipe Shape and Materials	Some combinations of Pipe shape and pipe material are not valid. For each pipe, the combination of material and shape attribute values must be checked to ensure that it is a valid combination. Valid material and shape combinations are as follows: - Clay, PVC, HDPE and ductile iron pipes must be circular in shape - Concrete, brick and steel pipes may have different cross-sectional shapes.
	Culvert Shape and Materials	Some combinations of Culvert shape and material are not valid. For each culvert, the combination of material and shape attribute values must be checked to ensure that it is a valid combination. Valid combinations are: - Box culvert must be concrete, brick or stone - Arch culvert may be concrete, brick, stone or corrugated metal - Round and elliptical culverts may be concrete, corrugated metal or some type of plastic material
	Non-Circular Pipe or Culvert Dimensions	A non-circular Pipe or Culvert has unique values for its Width and Height. The Diameter field is not populated.
	Channel Shape	Shape attribute matches the number of points in the cross-section. For example, a rectangular XC should have 4 points; a v-ditch should have 3 points; a u-shaped channel should have 5 points.
	Channel Dimensions	Top Width and Bottom Width have been calculated using the correct corresponding elevations from a single cross-section.
	Invert Elevations – Linear Features	The upstream Invert Elevation of a single linear feature is greater than downstream Invert Elevation of that feature. The difference between the upstream and downstream invert elevations is greater than or equal to zero.
	Invert Elevations – Point Features	Top Elevation is greater than or equal to the Rim Elevation. Rim Elevation is greater than or equal to the Invert Elevation. Top Elevation is greater than (never equal to) the Invert Elevation.
	Top of Pipe and Headwall Elevations	Top of Pipe Elevation is greater than (never equal to) the Invert Elevation. Headwall Elevation is greater than (never equal to) the Invert Elevation.
	Channel and BMP Elevations	The Top of Bank Elevation is greater than the Bottom of Bank Elevation. The (Toe) Bottom of Bank Elevation is greater than or equal to the Invert Elevation.
	Normal WSE	The Normal Water Surface Elevation is between the Top of Bank Elevation and the Bottom of Bank Elevation.
	Calculating Elevations and Slopes	The correct elevation and slope calculations have been made according to Section 3.3 of the manual.
	Slope (Bottom Slope) Linear Features	Linear features (Pipes, Culverts, Channels) with negative slopes, zero slopes, and slopes greater than 3% have been identified, checked and noted in the Comment field for the feature.
	Side Slope	Side slope of embankments for Channels and BMP basins is the average value for the surveyed cross-sections. Negative side slopes have been checked and noted in the Comment field for the feature.

✓	ELEMENT TO CHECK	DESCRIPTION
	Structure Depth	Structure Depth is greater than or equal to the distance from structure Rim Elevation to Invert.
	Headwall	Pipe or Culvert Diameter is less than the invert depth if there is a headwall End Structure.
	Outlet Structures	Circular Outlet structures use Diameter fields. Square or rectangular Outlet structures use the dimension fields Length, Width and Height; Diameter is not populated.
	Inlet Dimensions	All Inlets have Length populated. *Curb inlets, box top inlets* and *curb cuts* have Height populated. *Grate top* and *drop inlets* have Width populated.
	Inlet Access Type and Dimensions	Inlet Access Types which are circular have Access Diameter field populated. Inlet Access Types which are square or rectangular have Access Length and Access Width dimension fields populated.
	Manhole/Junction Cover Type and Dimensions	Manhole/Junction Cover Types which are circular have CVDIAMETER populated. Manhole/Junction Cover Types which are rectangular or square should have Cover Width and Cover Length dimension fields populated.
	Markings	Inlets, Outlets, and Manholes/Junctions may have temporary or permanent markings. Temporary markings (paint, sticker, sign or plate) are identified in the Stencil attribute; permanent markings (engraved or stamped into metal cover, lid or grate) are identified with the Access Mark or Cover Mark attributes.
	Discharge Points	All Outfalls are Discharge Points, but not all Discharge Points are Outfalls.
	Outfalls	Outfalls are located immediately adjacent to waters of the US. There is only one outfall for each flow pathway in the geometric network.
	End Structures	For Pipes/Culverts intersecting a structure (Inlet, Outlet, Manhole, Junction, Headwall): identify *Flared End Section* or *Projected from Fill* as End Structure. For Pipes/Culverts intersecting a Channel: identify *headwalls/wingwalls, riprap, scour slab, tide valve*, etc. Also identify End Structures for Channels and BMP inflow/outflow protection. If there is more than one End Structure, note in Comments.
	Outlet End Structures	Identify outlet end structure: *headwall, scour slab, rip rap, bars/rack/screen, solid top, grate top.*
	Contributing Drainage Area	Contributing drainage area for structural BMPs is larger than the BMP polygon area. Contributing drainage area for permeable pavement is larger than the permeable pavement polygon area.
	Manufacturer Info, As-Built Drawings	Manufacturer information and/or as-built drawings have been used to populate attributes for MTDs, permeable pavement, cisterns, and some structural BMPs.
	NUM_ fields	Fields that require counting (inflows, outflows, filters, chambers, baffles, weirs, orifices) only count each feature once. A feature cannot also be counted in a different category. (Example: a baffle should not also be counted as a weir.)

✓	ELEMENT TO CHECK	DESCRIPTION
OUTFALL SCREENING		
	Outfall	Every Discharge Point identified as an Outfall has an associated record for: IDDETrack NPDESScreen IllicitDischargeSource
	Date	Outfall screening and source identification date (Inventory Date) has been populated. This date should match the NPDES screening date (Inspection Date); however, the date may be different than the field inventory date (Source Date) for the same asset.
	Investigation Status	If update to a previous status, the new date is noted in the Comments field.
	Case Status	CaseStatus fields for outfall (IDDETrack) and source (IllicitDischargeSource) should match.
	Inspector	Inspector name for outfall (IDDETrack), screening (NPDESScreen) and source (IllicitDischargeSource) should match.
	Source	If no source is found in the field, Source is indicated as "Unknown."
	Weather	Sampling was conducted in dry weather.
	Last Rain	Sampling was conducted 72 hours after last rain.
	Tide Level	Sampling was not conducted at high tide.
	Evidence of Illicit Discharge	If Yes, verify observation attributes and sampling fields are populated.
	HUC12	HUC12 field should match for both outfall (IDDETrack) and source (IllicitDischargeSource) unless drainage system is engineered to collect stormwater from adjacent HUC area. If not matching, verify source and outfall locations are in close proximity.
	Watershed Name	Watershed name field should match for both outfall (IDDETrack) and source (IllicitDischargeSource) unless drainage system is engineered to collect stormwater from adjacent watershed. If not matching, verify source and outfall locations are in close proximity.

Section 4 Presentation of Data

4.1 Deliverables and Format

Table 4-1 provides a checklist of deliverables, including the format and other details necessary in order to ensure consistent products are provided to the County.

Table 4-1 Checklist of GIS Deliverables, Format and Details

	DELIVERABLES	FORMAT AND DETAILS
	ESRI ArcGIS Geodatabase - BC_SW_Date .mxd - Stormwater feature dataset - IDDE outfall screening dataset - Symbology Layer files (.lyr file) - Created Metadata (.xml file) - Photos - Videos (if applicable) - Daily Control Point Checks (.csv file)	Database format provided/approved by the County Culmination of all updated feature classes, feature attachments, outfall screening dataset and attachments Photos linked to GIS database via attachment tables Videos linked to GIS database via attachment tables (if applicable), or stored separately
	NPDES Outfall Mapping, Screening and Source Tracking - Individual IDDE notification forms - Outfall mapping and screening spreadsheets for MS4 compliance	Hard copies Electronic (PDF/MS Word/MS Excel)
	Mapbook - Index Grid with Legend - Dynamic Map pages (if desired)	Hard copy(ies), bound PDF
	Maintenance/Access - Maintenance summary spreadsheet - Accessibility summary spreadsheet	Hard copies Electronic (PDF/MS Excel)

4.2 File Naming Convention

A standardized file naming convention has been established so as to ensure consistent nomenclature is used in every deliverable. The filename of the delivered geodatabase will use the following naming convention:

BC_SW_ABC_YYYYMMDD.GDB

Where

ABC = Watershed Area
YYYYMMDD = 8 digit date

4.3 Map Grid and Legend

A map grid, scale and symbology/legend for mapbook deliverables should be established prior to beginning field data collection activities. An index map of grids may be used to track progress of field work, maintenance or other activities. The map grid should be overlain on the most recent aerial imagery and should show the watershed boundary.

4.4 QA/QC Measures for Deliverables

All draft and final deliverables should undergo thorough review prior to submittal to Berkeley County. The map, report, spreadsheet, and any other deliverable format should be provided to one or more persons of appropriate technical expertise on the mapping team for review. The Project Manager should verify all reviews have been made and updates have been incorporated prior to submitting deliverables for inclusion in the County's GIS.

4.5 Long-term Maintenance and Management of Data

Primary ownership of data will reside with Berkeley County. The stormwater feature inventory and outfall screening data will be housed in GIS. This data may be updated by the County GIS department as as-builts are submitted for new construction projects, and/or as the County conducts maintenance or completes repair or capital improvement projects.

Successful upkeep of the GIS data requires routine sharing of data between the County and the GIS Consortium Members, including the Town of Goose Creek and City of Hanahan. The GIS Consortium Members have access to data and GIS products, maintain their own data and exchange updated information as changes occur.

4.6 Living Document

This manual is a living document. It was created to provide consistent data collection, storage and processing procedures, to ensure standardized use of stormwater terminology for the purpose of feature identification and outfall screening for MS4 permit compliance, and to produce accurate and consistent results regardless of the entity performing the work. As work proceeds throughout the County, it may be necessary to modify this manual.

Examples of possible modifications include changes to the following:

- GPS and survey equipment or accuracy
- ESRI GIS software
- Procedures to improve field efficiency
- Address issues within a specific watershed
- Adapt for cooperating municipal agencies

- Specific feature classes, attributes or domains used in GIS
- Presentation of deliverables

All modifications must be approved by the County. Changes to the manual should be logged in the Record of Revisions at the beginning of this document.

Appendix A - Stormwater GIS Data Dictionary

APPENDIX A
STORMWATER GIS DATA DICTIONARY

PART I. STORMWATER SYSTEM INVENTORY

System Inventory Summary

FEATURE CLASS	NOTES	TYPE
swInlet	Several types of Inlet structures (each with catch basin)	Point
swManhole (JUNCTIONS)	Junction Boxes and Manholes	Point
swOutletStructure	Subtype: Risers, Orifices, Weirs, Gates and Spillways	Point
swDischargePoint	Subset is Outfalls.	Point
swGravityMain (PIPES)	At least one end has vertical structure (inlet, manhole/junction, outlet structure)	Line
swCulvert	Pipe conveys water underneath road, etc. Open at both ends.	Line
swDrivewayCulvertPnt	Legacy data. New culverts data will be collected in swCulvert.	Point
swChannel	Open channel. May be natural or engineered.	Line
swStructuralBMP (SBMP)	Basins such as ponds and underground detention.	Polygon
swMTD	Future use by County.	Point
swPermPvmt	Future use by County.	Polygon
swCistern	Future use by County.	Point
swElevation	Store XYZ topo data for channels and BMP basins.	Point
MS4Grid	Custom grid for Berkeley County MS4 areas.	Polygon
swVirtualDrainline	Use in geometric network. No data collection.	Line
Stormwater_Net_Junctions	Use in geometric network. No data collection.	Network
TABLE	**NOTES**	
Orifices	Descriptors for Riser Orifices. Linked to OutletStructure feature class.	--
Weirs	Descriptors for Riser Weirs. Linked to OutletStructure feature class.	--

Quick Reference Stormwater Inventory Feature Classes and Domains

<table>
<tr><th>FEATURE CLASS</th><th colspan="3">CATEGORIES</th></tr>
<tr><td>INLETS
swInlet</td><td>Inlet Type
Combo Inlet
Curb Inlet
Grate Inlet
Box Top Inlet
Drop Inlet
Roof
Curb Cut
Beehive Inlet</td><td>Cover Mark
Stamped County Logo
Stamped City Logo
Stamped Agency Logo
Stamped Manuf Logo
Stamped Private
Stamped No Dumping
Stamped Storm Drain
Graphical Design only
Generic no mark on cover
Also applies to MH/JX</td><td>Inlet Cover Type
No Access
Door
Circular Grate
Rectangular Grate
Manhole Cover</td></tr>
<tr><td>JUNCTIONS
swManhole</td><td colspan="2">Manhole or Junction Type
Standard Manhole
Diversion Manhole
Sedimentation Manhole
Standard Junction Box
Junction Box w/ Diversion
Sedimentation Junction Box
Cleanout</td><td>Manhole or Junction Cover Type
No Access
Standard Manhole Cover
Standard w/ Lock
Standard w/ Ears
Rectangular Cover
Hinged Doors
Cleanout Cover w/ Lock
Cleanout Cover w/o Lock</td></tr>
<tr><td rowspan="2">OUTLETS
swOutletStructure</td><td>Outlet Subtype
Riser
Riser with Weir
Riser with Orifice
Riser with Weir and Orifice
Weir
Orifice
Gate
Spillway</td><td>Outlet End Structure
Headwall
Scour Slab
Rip Rap
Bars/Rack/Screen
Solid Top
Grate Top</td><td>Weir Shape, Spillway Type
Adjustable Weir
Circular
Irregular
Rectangular
Trapezoid
V-Notched
Combination
Labyrinth</td></tr>
<tr><td>Riser Type
Round
Square
Bell-mouth
Perforated
Combination</td><td>Gate Type
Sluice Gate
Radial Gate</td><td>Weir Type
Broad-crested
Sharp-crested</td></tr>
</table>

<table>
<tr><th>FEATURE CLASS</th><th colspan="3">CATEGORIES</th></tr>
<tr><td>DISCHARGE POINTS
swDischargePoint</td><td colspan="3">Discharge Point Type
Overflow Spillway
Channel
Pipe
Bridge
Culvert
NPDES Outfalls are identified with Yes/No attribute</td></tr>
<tr><td>PIPES
swGravityMain</td><td>Pipe Type
Gravity Main
Secondary Line
Underdrain</td><td>Pipe Shape
Circular
Rectangular
Trapezoidal
Triangular
Elliptical
Arched</td><td rowspan="4">End Structure Type
Projected from fill
Flared End Section
Mitered End Section
Mitered Headwall
Straight Headwall
Angled Wingwalls
Square Wingwalls
Scour Slab
Rip Rap
Gate Structure
Tide Valve
Bars/Rack
Energy Dissipator

End Structure Type may also be used for BMPs</td></tr>
<tr><td>CULVERTS
swCulvert

* Line Feature</td><td rowspan="2">Culvert Shape
Circular
Rectangular
Trapezoidal
Triangular
Elliptical
Arched</td><td rowspan="2">Land Use Crossing
Private Drive
Street
Parking Lot
Pedestrian
Railroad
Open Area</td></tr>
<tr><td>DRIVEWAY CULVERTS
swDrivewayCulvertPnt

* Point Feature</td></tr>
<tr><td>CHANNELS
swChannel</td><td>Channel Type
Channel
Ditch
Swale
Bioswale
Trench Drain</td><td>Channel Shape
Trapezoidal
Rectangular
Parabolic/U-shaped
Triangular/V-shaped
Valley Gutter Roadway</td></tr>
<tr><td>BMPS
swStructuralBMP</td><td colspan="2">BMP Type
Wet Pond
Dry Pond
Infiltration Basin
Wetlands
Bioretention
Underground Detention
Stilling Basin
Sand Filter</td><td rowspan="2">BMP Material
Aluminum
Asphalt
Blocks/pavers
Brick
Concrete
Earthen
Fiberglass
Geotextile
Grass
Plastic
Rip rap
Steel
Stone
Vegetation
Wood</td></tr>
<tr><td>MANUFACTURED TREATMENT DEVICES
swMTD</td><td colspan="2">MTD Type
Hydrocarbon
Sediment
Trash
Granular Activated Carbon
Oil Water Separator
Tree Box Filter
Multi</td></tr>
</table>

FEATURE CLASS	CATEGORIES	
CISTERN swCistern	**Cistern Type** Aboveground Tank Underground tank Rain Barrel	*BMP Material may also be used for Channels*
PERMEABLE PAVEMENT swPermPvmt	**Permeable Pavement Type** Permeable Pavers Permeable Pavement Grid System	**Pavement Material** Permeable Asphalt Permeable Concrete Plastic Grid Pavers Concrete Grid Pavers Interlocking Grid Pavers
ELEVATIONS swElevation	**Elevation Type** Bench Mark Cross-Section Location Top of Bank Bottom of Bank Top of Curb	Bottom of Curb Normal Water Surface Elevation Bottom / Low Point of Channel Other (see Comment)

This table serves as a quick reference for the stormwater feature classes, and the key domains used to describe the feature type, material, shape and configuration. Complete domain lists for all feature classes are shown in the domain tables following the feature class tables.

swInlet (INLETS)

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
ASSETID	ASSETID – unique identifier code	To be used within GIS as the primary linkage field.
GISOBJID	EAM ID - Enterprise Asset Management Servicer	Unique identifier for enterprise asset management system.
LegacyID	Legacy ID – former AssetIDs in County's database	Use in processing former data and tracking changes.
GlobalID	Global Identifier code	Primary identifier never changes.
INSTALLDATE	The date the asset was installed or constructed	Populate if known.
INLETTYPE	The type of stormwater inlet - tied to ***swInletTypes*** domain	Curb inlet, grate top, drop inlet, box top, curb cut, combo, are most common.
WALLMAT	WALLMAT - tied to ***swWallMat*** domain	Identify material of catch basin interior (walls and floor).
ACCESSTYPE	Method for accessing the opening - tied to ***swAccessType*** domain	Doors, grates, manhole covers
ACCESSMAT	Access material for cover - tied to ***swInletMaterial*** domain	Identify material of inlet cover, access manhole or door.
ACCESSMARK	Marking on inlet – tied to ***swCoverMark*** domain	Cover stamped with logo or name of agency or manufacturer.
ACCESSLENGTH	Length of inlet square or rectangular cover or access	For square or rectangular cover or access.
ACCESSWIDTH	Width of inlet square or rectangular cover or access	For square or rectangular cover or access.
ACCESSDIAM	Access diameter for the inlet - tied to **sw*PipeDiameter*** domain	Diameter of circular manhole cover on curb inlets or box top inlets.
HEIGHT	HEIGHT of opening	Height of curb inlet, box top inlet or curb cut entrance.
WIDTH	WIDTH of opening	Width of grate top or drop inlet entrance.
LENGTH	LENGTH of opening	Length of inlet entrance.
DEPTHTORIM	Vertical distance from top of slab to rim (entrance) of inlet	Measure down to rim for curb inlets and box top inlets.
INVERTDEPTH	INVERTDEPTH – distance from rim to lowest point at bottom of catch basin	Measure down from entrance/rim with Pipe-Mic.
TOPELEV	TOPELEV – top, central point of inlet	For grate top or drop inlets, collect at center of grate. If grate is curved, collect elevation at low point of grate top or drop inlet. For curb cuts, collect point at center of entrance or gutter. For curb inlets or box top inlets, collect at top-center of concrete or metal slab.
RIMELEV	RIMELEV - central low point of entrance to inlet	Calculate: TOPELEV – DEPTHTORIM RIMELEV = TOPELEV for grate top, drop inlets and curb cuts.
INVERTELEV	Invert Elevation - lowest point at bottom of catch basin	Calculate: RIMELEV – INVERTDEPTH For curb cuts, RIMELEV = INVERTELEV .
WaterQualityInsert	Catch Basin Insert Present - tied to ***YesNo*** domain	Water quality insert such as filter, cartridge or debris basket inside Inlet.

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
Steps	Inlet component - tied to ***YesNo*** domain	Yes if catch basin has steps or ladder inside.
BMP	BMP - tied to the ***YesNo*** domain	Yes if Inlet provides access to BMP.
STENCIL	Storm Drain Stencil – tied to ***YesNo*** domain	Identify inlets marked (with paint, sticker, sign or plate) "No Dumping - Drains to River" or similar.
COMMENTS	Narrative field – describe unique circumstances in feature or attributes only.	Separate comments with # sign.
ACTIVEFLAG	Indicates if the feature is in use/active - tied to ***BooleanDomain*** domain	If as-built feature cannot be located in field, keep in database but mark ActiveFlag as "No".
LIFECYCLESTATUS	Indicates status/use of feature – tied to ***LifeCycleStatus*** domain.	Identify active, abandoned, under construction, etc.
AncillaryRole	Ancillary Role – tied to ***AncillaryRoleDomain*** domain	Options are: source, sink, none.
NeedsMaintenance	For use in field data collection – tied to ***swMaint*** domain	Document maintenance issues observed in the field.
Accessible	For use in field data collection – tied to ***swAccessibility*** domain	Document access difficulties observed in the field.
OWNEDBY	Indicates which organization owns the asset - tied to ***swAgency*** domain	Identify Berkeley County, Goose Creek, Hanahan, etc.; update with annexation.
MAINTBY	Indicates which organization maintains the asset - tied to **sw*Agency*** domain	Identify Berkeley County, Goose Creek, Hanahan, private, etc.; may be determined by maintenance agreement.
LASTUPDATE	The date the feature was last updated in the database	Date of most recent edits
LASTEDITOR	The user who performed the last update	Name of analyst
SOURCE	SOURCE - tied to ***uSource*** domain	As-built, GPS, aerial image, etc.
SOURCEACC	SOURCEACC - tied to ***uSourceAccuracy*** domain	Accuracy of GPS equipment
SOURCEDATE	SOURCEDATE – date of source data used to create GIS	Date of as-built, GPS survey, aerial image, etc.
SOURCEDATUM	SOURCEDATUM – tied to ***uSourceDatum*** domain	Datum used in as-built, survey, etc.
HUC12	Hydrologic Unit Code - from USGS	Identify the 12-digit hydrologic unit code for the subwatershed in which the inlet is located.
RECSTREAM	Receiving Stream – receives discharge from feature	Identify the body of water directly downstream of the inlet.
WatshedName	Watershed Name – assigned by Berkeley County	Identify the watershed in which the inlet is located.
PHOTO_FILENAME	Photo filename and photo number	May use ***uattachment*** domain options (Area, Close-up, Internal, Issue, Video, etc.) in filename
PHOTO_PATH	Directory location where photo file is stored	Files are stored on a server separate from the GIS database.
PHOTO_RELPATH	Relative directory location where photo file is stored	// allows gdb to find the photo if server is mapped under a different letter.
DimUOMElev	Unit of Measure for Elevation – tied to ***uDimUOMElev*** domain	Elevations

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
DimUOMLength	Unit of Measure for Length Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMWidth	Unit of Measure for Width Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMDepth	Unit of Measure for Depth Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMHeight	Unit of Measure for Height Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMDiameter	Unit of Measure for Diameter Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
XCORD	X-Coordinate from GPS	Calculate using survey grade GPS point.
YCORD	Y-Coordinate from GPS	Calculate using survey grade GPS point.
ZCORD	Z-Coordinate from GPS	Calculate using survey grade GPS point.
ROTATION	ROTATION of symbol	Use for symbology as needed.
ENABLED	Geometric Network - tied to ***EnabledDomain*** domain	True indicates geometric network has been built and feature can be traced.
GRID	Map Grid number where the feature is located	Custom grid for Berkeley County

swManhole (JUNCTIONS)

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
ASSETID	ASSETID – unique identifier code	To be used within GIS as the primary linkage field.
GISOBJID	EAM ID - Enterprise Asset Management Servicer	Unique identifier for enterprise asset management system.
LegacyID	Legacy ID – former AssetIDs in County's database	Use in processing former data and tracking changes.
GlobalID	Global Identifier code	Primary identifier never changes.
INSTALLDATE	The date the asset was installed or constructed	Populate if known.
LOCDESC	Location Description	Street Address, HOA, Subdivision, or description of location of MH/JX on the parcel.
MHTYPE	Type of manhole - tied to ***swManholeType*** domain	Manhole (MH), Junction box (JX), or Cleanout.
CVTYPE	Type of stormwater manhole or junction box cover - *tied to* ***swManholeCoverType*** domain	Identifies cover type (manhole, rectangular cover, doors or cleanout cover).
CVMAT	Manhole or Junction box cover material – tied to ***swInletMaterial*** domain	Identify material of MH/JX box cover or doors.
CVDIAMETER	Size of Manhole Cover- tied to ***swPipeDiameter*** domain	Diameter of circular manhole cover.
CVLENGTH	Length of Junction Box Cover	Dimension of JX box cover or doors (if not circular)
CVWIDTH	Width of Junction Box Cover	Dimension of JX box cover or doors (if not circular)
CVMARK	Marking on MH/JX box cover – tied to ***swCoverMark*** domain	Identify MH/JX box cover stamped logo or name of agency or manufacturer.
WALLMAT	Wall material of the manhole – tied to ***swWallMat*** domain	Material of MH/JX box interior (walls and floor).
LININGMAT	Lining Material - tied to ***swLiningMat*** domain	Identify material lining of MH/JX box (walls and floor).
LINEDYEAR	Year the pipe was lined	Populate if known.
LINERTYPE	The type of liner - tied to ***swLiningMethod*** domain	Populate if known.
INVERTDEPTH	Depth of the manhole feature to the lowest point as measured from the rim of the manhole	Measure with Pipe-Mic from rim down to bottom of MH/JX box.
RIMELEV	The elevation of the manhole rim	Collect elevation at top-center of MH or JX cover.
INVERTELEV	Elevation of the manhole structure at lowest point of bottom	Calculate: RIMELEV - INVERTDEPTH
BMP	BMP - tied to the ***YesNo*** domain	Yes if MH/JX provides access to BMP.
Steps	MH/JX component - tied to ***YesNo*** domain	Yes if MH/JX has steps or ladder inside.
STENCIL	Storm Drain Stencil – tied to ***YesNo*** domain	Identify MH/JX marked (with paint, sticker, sign or plate) "No Dumping - Drains to River" or similar.
COMMENTS	Narrative field – describe unique circumstances in feature or attributes only.	Separate comments with # sign.

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
ACTIVEFLAG	Indicates if the feature is in use/active - tied to the ***BooleanDomain*** domain	If as-built feature cannot be located in field, keep in database but mark ActiveFlag as "No".
LIFECYCLESTATUS	Indicates status/use of feature – tied to ***LifeCycleStatus*** domain.	Identify active, abandoned, under construction, etc.
NeedsMaintenance	For use in field data collection – tied to ***swMaint*** domain	Document maintenance issues observed in the field.
Accessible	For use in field data collection – tied to ***swAccessibility*** domain	Document access difficulties observed in the field.
OWNEDBY	Indicates which organization owns the asset - tied to the ***swAgency*** domain	Identify Berkeley County, Goose Creek, Hanahan, etc.; update with annexation.
MAINTBY	Indicates which organization maintains the asset - tied to the ***swAgency*** domain	Identify Berkeley County, Goose Creek, Hanahan, private, etc.; may be determined by maintenance agreement.
LASTUPDATE	The date the feature was last updated in the database	Date of most recent edits
LASTEDITOR	The user who performed the last update	Name of analyst
SOURCE	SOURCE - tied to the ***uSource*** domain	As-built, GPS, aerial image, etc.
SOURCEACC	Source Accuracy - tied to the ***uSourceAccuracy*** domain	Accuracy of GPS equipment
SOURCEDATE	SOURCEDATE – date of source data used to create GIS	Date of as-built, GPS survey, aerial image, etc.
SOURCEDATUM	SOURCEDATUM – tied to ***uSourceDatum*** domain	Datum used in as-built, survey, etc.
HUC12	Hydrologic Unit Code - from USGS	Identify the 12-digit hydrologic unit code for the subwatershed in which the MH/JX is located.
RECSTREAM	Receiving Stream – receives discharge from feature	Identify the body of water directly downstream of the MH/JX.
WatshedName	Watershed Name – assigned by Berkeley County	Identify the watershed in which the MH/JX is located.
PHOTO_FILENAME	Photo filename and photo number	May use ***uattachment*** domain options (area, internal, issue, etc.) in filename
PHOTO_PATH	Directory location where photo file is stored	Files are stored on a server separate from the GIS database.
PHOTO_RELPATH	Relative directory location where photo file is stored	// allows gdb to find the photo if server is mapped under a different letter.
DimUOMElev	Unit of Measure for Elevation – tied to ***uDimUOMElev*** domain	Elevations
DimUOMLength	Unit of Measure for Length Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMWidth	Unit of Measure for Width Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMDepth	Unit of Measure for Depth Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMHeight	Unit of Measure for Height Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMDiameter	Unit of Measure for Diameter Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
XCORD	X-Coordinate from GPS	Calculate using survey grade GPS point.

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
YCORD	Y-Coordinate from GPS	Calculate using survey grade GPS point.
ZCORD	Z-Coordinate from GPS	Calculate using survey grade GPS point.
ENABLED	Geometric Network - tied to ***EnabledDomain*** domain	True indicates geometric network has been built and feature can be traced.
GRID	Map Grid number where the feature is located	Custom grid for Berkeley County

swOutletStructure (OUTLETS)

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
ASSETID	ASSETID – unique identifier code	To be used within GIS as the primary linkage field.
GISOBJID	EAM ID - Enterprise Asset Management Servicer	Unique identifier for enterprise asset management system.
LegacyID	Legacy ID – former AssetIDs in County's database	Use in processing former data and tracking changes.
GlobalID	Global Identifier code	Primary identifier never changes.
INSTALLDATE	The date the asset was installed or constructed	Populate if known.
LOCDESC	Location Description	Street Address, HOA, Subdivision, or description of location of Outlet Structure on the parcel.
OUTLET_SUBTYPE	The type of outlet structure for a BMP – tied to ***Outlet_Subtype*** table.	There may be multiple outlets and types in single BMP. Riser may have weirs and/or orifices included.
STRUCSHAPE	RISER_TYPE – tied to ***swRiserType*** domain	Round, perforated, square, bell-mouth or combination
MATERIAL	RISERMATERIAL – tied to ***swPipeMaterial*** domain	Note wooden flashboards in comments.
STRUCT_TYP	End Structure Type - tied to ***swStructType*** domain	Use if Outlet End Structure is already populated and additional end structure is present on outlet.
NUMWEIRS	Number of Weirs – either freestanding, or part of a riser.	Count total number of weirs on outlet structure. Record measurements of each weir notch in the Weirs table.
NUMORIFICE	Number of Orifices – either freestanding or part of a riser.	Count number of orifices on single outlet structure. Minimum of 1 if ORIFICESHAPE is populated.
LENGTH	LENGTH – of outlet structure	For rectangular or square riser, orifice, weir, spillway and gate dimensions.
WIDTH	WIDTH – of outlet structure	For rectangular or square riser, orifice, weir, spillway and gate dimensions.
DEPTH	DEPTH – of outlet structure	For rectangular or square riser, orifice, weir, spillway and gate dimensions.
HEIGHT	HEIGHT – of riser	Measured on exterior of riser.
DIAMETER	Diameter – tied to ***swPipeDiameter*** domain	Use for circular orifice, semi-circular weir, or radial gate.
AVG_ROCK_DIAMETER	Average Rock Diameter – refers to rip-rap	Use if primary material of outlet structure is rock.
FreeBrdHeight	Weir Freeboard Height - Maximum height of water flowing in controlled manner over outlet structure.	Measure or use design drawings to determine.
DEPTHTORIM	Vertical distance from top of slab to rim (entrance) of outlet structure	Measure down to rim (entrance) for box top outlets with slab on top
INVERTDEPTH	Interior depth at the low point of the outlet structure as measured from the rim to invert. Invert is at location of majority of flows.	Measure from RIMELEV down to INVERT. Use Pipe-Mic or survey rod for low point of interior of risers.

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
RIMELEV	Primary entrance of high flows (largest opening of outlet structure).	Calculate: TOPELEV – DEPTHTORIM for box top risers. TOPELEV = RIMELEV for circular riser, square grate-top riser, square combo riser and emergency overflow spillway. Perforated riser will not have a RIMELEV if capped.
TOPELEV	The elevation at the top of outlet structure.	Collect elevation at top of riser structure (not the trash rack), top of gate structure, top of weir or orifice plate (for orifice not located on riser) or central overflow point of spillway.
INVERTELEV	Invert elevation of the outlet structure at the low point of the outlet structure.	Calculate: RIMELEV – INVERTDEPTH for Risers. INVERTELEV = RIMELEV for weir plate, orifice plate, gate structure and emergency spillway.
OUTLETLOCATION	Describes where the outlet structure discharges – tied to ***swOutletLoc*** domain	Options are: Parking Area, Vegetation, Woods, Channel, Another Basin, Storm Sewer System, Flood Plain, USGS
CONVEYANCE_TYPE	Conveyance Type – tied to ***swOutletLocation*** domain	Legacy field/data.
Antivortex	Antivortex device present - tied to the ***YesNo*** domain	Device to promote settling of pollutants by preventing whirlpool from occurring at outlet structure (e.g., baffle or plate set on top of a riser). Yes if antivortex device is present.
BMP	BMP - tied to the ***YesNo*** domain	Yes if outlet structure is located in or for BMP.
PATTERN	Orifice pattern – tied to ***swPattern*** domain	Identify orifice pattern as Regular or Irregular.
STENCIL	Storm Drain Stencil – tied to ***YesNo*** domain	Identify outlets marked (with paint, sticker, sign or plate) "No Dumping - Drains to River" or similar.
COMMENTS	Narrative field – describe unique circumstances in feature or attributes only.	Identify configuration if multiple components of riser. If outlet structure is not accessible in wet pond, note in Comments. Separate comments with # sign.
ACTIVEFLAG	Indicates if the feature is in use/active - tied to ***BooleanDomain*** domain	If as-built feature cannot be located in field, keep in database but mark ActiveFlag as "No".
LIFECYCLESTATUS	Indicates status/use of feature – tied to ***LifeCycleStatus*** domain.	Identify active, abandoned, under construction, etc.
AncillaryRole	Ancillary Role – tied to ***AncillaryRoleDomain*** domain	Options are: source, sink, none.
NeedsMaintenance	For use in field data collection – tied to ***swMaint*** domain	Document maintenance issues observed in the field.
Accessible	For use in field data collection – tied to ***swAccessibility*** domain	Document access difficulties observed in the field.
OWNEDBY	Indicates which organization owns the asset - tied to ***swAgency*** domain	Identify Berkeley County, Goose Creek, Hanahan, etc.; update with annexation.
MAINTBY	Indicates which organization maintains the asset - tied to ***swAgency*** domain	Identify Berkeley County, Goose Creek, Hanahan, private, etc.; may be determined by maintenance agreement.
LASTUPDATE	The date the feature was last updated in the database	Date of most recent edits

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
LASTEDITOR	The user who performed the last update	Name of analyst
SOURCE	SOURCE - tied to ***uSource*** domain	As-built, GPS, aerial image, etc.
SOURCEACC	SOURCEACC - tied to ***uSourceAccuracy*** domain	Accuracy of GPS equipment
SOURCEDATE	SOURCEDATE – date of source data used to create GIS	Date of as-built, GPS survey, aerial image, etc.
SOURCEDATUM	SOURCEDATUM – tied to ***uSourceDatum*** domain	Datum used in as-built, survey, etc.
HUC12	Hydrologic Unit Code - from USGS	Identify the 12-digit hydrologic unit code for the subwatershed in which the outlet structure is located.
RECSTREAM	Receiving Stream – receives discharge from feature	Identify the body of water directly downstream of the outlet structure.
WatshedName	Watershed Name – assigned by Berkeley County	Identify the watershed in which the outlet structure is located.
PHOTO_FILENAME	Photo filename and photo number	May use ***uattachment*** domain options (area, internal, issue, etc.) in filename
PHOTO_PATH	Directory location where photo file is stored	Files are stored on a server separate from the GIS database.
PHOTO_RELPATH	Relative directory location where photo file is stored	// allows gdb to find the photo if server is mapped under a different letter.
DimUOMElev	Unit of Measure for Elevation – tied to ***uDimUOMElev*** domain	Elevations
DimUOMLength	Unit of Measure for Length Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMWidth	Unit of Measure for Width Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMDepth	Unit of Measure for Depth Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMHeight	Unit of Measure for Height Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMDiameter	Unit of Measure for Diameter Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
XCORD	X-Coordinate from GPS	Calculate using survey grade GPS point.
YCORD	Y-Coordinate from GPS	Calculate using survey grade GPS point.
ZCORD	Z-Coordinate from GPS	Calculate using survey grade GPS point.
ENABLED	Geometric Network - tied to ***EnabledDomain*** domain	True indicates geometric network has been built and feature can be traced.
GRID	Map Grid number where the feature is located	Custom grid for Berkeley County

Outlet Structure Notes

→ Outlet Structure feature class has an attribute Outlet_Subtype. The subtype selected then drives which attributes are available to populate for that subtype. Due to its size, the Subtype table can be more easily viewed in the html schema. Outlet structure subtypes are: Riser, Riser with Weir, Riser with Orifice, Riser with Weir and Orifice, Weir, Orifice, Gate, Spillway.

→ The Outlet Structure feature class is set up so that the attributes can be flexible enough to work for each subtype.

→ Risers with weir(s) and/or orifice(s) on the structure are attributed using the Weir and/or Orifice attachment tables. These weirs and orifices do not need separate GPS points.

→ Note that attributes NumWeirs and NumOrifice in the primary feature class table are different from the attributes WeirNum and OrifNum in the attachment tables.

Orifices - Table

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
ASSETID	ASSETID – unique identifier code	To be used within GIS as the primary linkage field.
GISOBJID	EAM ID - Enterprise Asset Management Servicer	Unique identifier for enterprise asset management system.
OrifNum	Orifice Number, counting up	Count number of orifices on single outlet structure. Minimum of 1 if OrifShp is populated.
OrifShp	Shape of orifice - tied to ***swPipeShape*** domain	Identify shape if outlet structure has orifice(s).
OrifDia	Orifice Diameter	Diameter of opening. Use for circular orifice.
OrifWdth	Orifice Width	Use for square or rectangular orifice.
OrifHgt	Orifice Height	Use for square or rectangular orifice.
OrifInvDepth	Depth to Orifice Invert	Measure from top of orifice plate.
INVERTELEV	Orifice Invert Elevation	Elevation at lowest point of orifice opening.
Comments	Narrative field – describe unique circumstances in feature or attributes only.	Separate comments with # sign.

Orifice Table Notes

→ Use this table to store additional data for orifices on a riser structure.

Weirs - Table

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
ASSETID	ASSETID – unique identifier code	To be used within GIS as the primary linkage field.
GISOBJID	EAM ID - Enterprise Asset Management Servicer	Unique identifier for enterprise asset management system.
WeirType	The type of weir - tied to ***swWeirType*** domain	Identify if outlet structure is fitted with weir plate or notches (broad-crested or sharp-crested).
WeirShape	The shape of the weir - tied to ***swWeirShape*** domain	If WEIRTYPE is populated, populate shape of weir notch.
WeirNum	Weir number, counting up	One table entry for each weir notch on the outlet structure.
WeirLen	Length of weir notch	Use tape measure at notch
WeirBotWidth	Overall length of weir	Use tape measure at bottom of weir
WeirHeight	Overall height of weir notch	Use tape measure at notch
WeirFreebrd	Weir freeboard distance – height of water over notch	Use float or measure during flow
WeirDepth	Depth of weir notch	Use tape measure at notch
INVERTELEV	Elevation of weir at invert (notch)	Low spot of notch
Comments	Narrative field – describe unique circumstances in feature or attributes only.	Separate comments with # sign.

Weir Table Notes

→ Use this table to store additional data for weir notches on a riser structure.

swDischargePoint (DISCHARGE POINTS)

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
ASSETID	ASSETID – unique identifier code	To be used within GIS as the primary linkage field.
GISOBJID	EAM ID - Enterprise Asset Management Servicer	Unique identifier for enterprise asset management system.
LegacyID	Legacy ID – former AssetIDs in County's database	Use in processing former data and tracking changes.
GlobalID	Global Identifier code	Primary identifier never changes.
DISCHID	Discharge Identifier	Assign as needed.
PERMITID	Unique permit identifier	County populate as needed.
INSTALLDATE	The date the asset was installed or constructed	Populate if known.
LOCDESC	Location Description	Street Address, HOA, Subdivision, or description of location of discharge point on the parcel.
DISCHRGTYP	The type of stormwater discharge - tied to ***swDischargePointType*** domain	Options are: Pipe, Culvert, Channel, Spillway, or Bridge. Bridge outfalls are identified using aerial image.
OUTFALL	OUTFALL - tied to ***BooleanDomain*** domain	Yes/No if discharge point is an MS4 outfall. May be determined in office using last feature at the downstream end of a drainage line. Upstream discharge points are not outfalls.
MAINSHAPE	Main Shape - tied to ***swPipeShape*** domain	Shape of asset where discharge point is located.
SHAPECONFIG	Channel cross-sectional shape – tied to ***swChannelShape*** domain	Identify as Trapezoidal, Rectangular, Parabolic/U-shaped, Triangular/V-shaped or Valley Gutter Roadway
MATERIAL	Material the asset is manufactured with - tied to ***swPipeMaterial*** domain	Identify the material at point of discharge.
LiningType	Material Bottom/Protection – tied to ***swBMPmat*** domain	Identify material lining of discharge point.
STRUCT_TYP	STRUCT_TYP – end structure of asset at discharge point – tied to ***swStructTYP*** domain	If more than one, note in Comments.
DIAMETER	The diameter of the asset - tied to ***swPipeDiameter*** domain	Diameter of asset, if circular, where discharge point is located.
WIDTH	WIDTH – of asset	Dimension of asset, if rectangular, where discharge point is located.
WIDTHBOT	Bottom Width – of asset	Dimension of asset, if rectangular, where discharge point is located.
HEIGHT	HEIGHT – of asset	Dimension of asset, if rectangular, where discharge point is located.
INVERTDEPTH	Invert Depth – of discharge point	Depth to invert at point of discharge.
INVERTELEV	Invert Elevation – of discharge point	Elevation at point of discharge.
BridgeWidth	Width of Bridge – if bridge is also an outfall	Populate if discharge sheet flows from bridge into receiving water. Inlets/scuppers are mapped in the Inlets feature class.

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
BridgeLength	Length of Bridge – if bridge is also an outfall	Populate if discharge sheet flows from bridge into receiving water. Inlets/scuppers are mapped in the Inlets feature class.
DischargeLoc	The location of the discharge point – tied to ***swOutletLocation*** domain	Legacy field/data.
BMP	BMP - tied to the ***YesNo*** domain	Yes if discharge point is from BMP directly to waters.
STENCIL	Storm Drain Stencil – tied to ***YesNo*** domain	Identify points marked (with paint, sticker, sign or plate) "No Dumping - Drains to River" or similar
COMMENTS	Narrative field – describe unique circumstances in feature or attributes only.	Separate comments with # sign.
ACTIVEFLAG	Indicates if the feature is in use/active - tied to ***BooleanDomain*** domain	If as-built feature cannot be located in field, keep in database but mark ActiveFlag as "No".
LIFECYCLESTATUS	Indicates status/use of feature – tied to ***LifeCycleStatus*** domain.	Identify active, abandoned, under construction, etc.
AncillaryRole	Ancillary Role – tied to ***AncillaryRoleDomain*** domain	Options are: source, sink, none.
NeedsMaintenance	For use in field data collection – tied to ***swMaint*** domain	Document maintenance issues observed in the field.
Accessible	For use in field data collection – tied to ***swAccessibility*** domain	Document access difficulties observed in the field.
OWNEDBY	Owned by - Indicates which organization owns the asset - tied to ***swAgency*** domain	Identify Berkeley County, Goose Creek, Hanahan, etc.; update with annexation.
MAINTBY	Indicates which organization maintains the asset - tied to ***swAgency*** domain	Identify Berkeley County, Goose Creek, Hanahan, private, etc.; may be determined by maintenance agreement.
LASTUPDATE	The date the feature was last updated in the database	Date of most recent edits
LASTEDITOR	The user who performed the last update	Name of analyst
SOURCE	SOURCE - tied to ***uSource*** domain	As-built, GPS, aerial image, etc.
SOURCEACC	SOURCEACC - tied to ***uSourceAccuracy*** domain	Accuracy of GPS equipment
SOURCEDATE	SOURCEDATE – date of source data used to create GIS	Date of as-built, GPS survey, aerial image, etc.
SOURCEDATUM	SOURCEDATUM – tied to ***uSourceDatum*** domain	Datum used in as-built, survey, etc.
HUC12	Hydrologic Unit Code - from USGS	Identify the 12-digit hydrologic unit code for the subwatershed in which the discharge point is located.
RECSTREAM	Receiving Stream – receives discharge from feature	Identify the body of water directly downstream of the discharge point.
WatshedName	Watershed Name – assigned by Berkeley County	Identify the watershed in which the discharge point is located.
PHOTO_FILENAME	Photo filename and photo number	May use ***uattachment*** domain options (area, internal, issue, etc.) in filename.
PHOTO_PATH	Directory location where photo file is stored	Files are stored on a server separate from the GIS database.

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
PHOTO_RELPATH	Relative directory location where photo file is stored	// allows gdb to find the photo if server is mapped under a different letter.
DimUOMElev	Unit of Measure for Elevation – tied to ***uDimUOMElev*** domain	Elevations
DimUOMLength	Unit of Measure for Length Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMWidth	Unit of Measure for Width Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMDepth	Unit of Measure for Depth Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMHeight	Unit of Measure for Height Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMDiameter	Unit of Measure for Diameter Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
XCORD	X-Coordinate from GPS	Calculate using survey grade GPS point
YCORD	Y-Coordinate from GPS	Calculate using survey grade GPS point
ZCORD	Z-Coordinate from GPS	Calculate using survey grade GPS point
ROTATION	ROTATION – of symbol	Use for symbology as needed.
ENABLED	Geometric Network - tied to ***EnabledDomain*** domain	True indicates geometric network has been built and feature can be traced.
GRID	Map Grid number where the feature is located	Custom grid for Berkeley County

Discharge Point Notes

→ This feature class is intended to only store information specific to the point of discharge, with minimal attributes. The underlying asset where the discharge point is located should be mapped in the appropriate feature class (pipe, culvert, channel, etc.)

→ This feature class has legacy data which cannot be migrated to the appropriate underlying feature class because the data was collected as points rather than lines. These attributes should be made un-editable for the future in order to ensure new data collection occurs in the correct feature class.

→ New outfalls will be extracted from the ends of the flow network and copied to this feature class.

→ Other NPDES-related data is stored in the NPDESSCREEN table and linked by AssetID.

swGravityMain_(PIPES)

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
ASSETID	ASSETID – unique identifier code	To be used within GIS as the primary linkage field.
GISOBJID	EAM ID - Enterprise Asset Management Servicer	Unique identifier for enterprise asset management system.
LegacyID	Legacy ID – former AssetIDs in County's database	Use in processing former data and tracking changes.
GlobalID	Global Identifier code	Primary identifier never changes .
INSTALLDATE	The date the asset was installed or constructed	Populate if known.
LOCDESC	Location Description	Street Address, HOA, Subdivision, or description of location of pipe on the parcel.
CONVEYANCE_TYPE	Conveyance Type – tied to ***swOutletLocation*** domain	Legacy field/data.
CROSSING_TYPE	Crossing Type – tied to ***swLanduseCross*** domain	Land use of area draining to pipe.
PIPETYPE	The type of stormwater pipe – tied to ***swPipeType*** domain	Gravity Main and Secondary Line determined in office using finished drainage network. Underdrains observed in field at BMP outlet structures, or may be shown on as-builts.
MAINSHAPE	The shape of the pipe - tied to ***swPipeShape*** domain	Circular and Elliptical most common. Others uncommon.
MATERIAL	Material the asset is manufactured with - tied to ***swPipeMaterial*** domain	Identify material.
LININGMAT	Lining Material - tied to ***swLiningMat*** domain	Identify material lining of pipe.
LINEDYEAR	Year the pipe was lined	Populate if known.
LINERTYPE	The type of liner - tied to *sw**LiningMethod*** domain	Populate if known.
DIAMETER	Diameter of pipe - tied to ***swiPipeDiameter*** domain	For circular pipes.
LENGTH	Length of pipe	Autogenerated for linear features.
WIDTH	WIDTH of pipe	For noncircular pipes or conduit.
HEIGHT	HEIGHT of pipe	For noncircular pipes or conduit.
AVGCOVERDEPTH	Average Cover Depth of pipe	Calculate: Average of upstream and downstream values: RimElev – Depth + Diameter *or* Ground Surface Elev – Top of Pipe Elev
DNDEPTH_TOP	Depth to Top of Pipe from top-center of headwall.	Measure down to top of pipe from top-center of headwall.
DNDEPTH_INV	Depth of pipe invert at downstream end	Measure from top of pipe.
DNELEV_HW	Headwall elevation at downstream end, where pipe intersects open channel or BMP.	Collect point at top-center of stable headwall structure.

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
DNELEV_TOP	Elevation, top of pipe at downstream end, where pipe intersects open channel or BMP. (If pipe intersects a structure, RIMELEV is stored in that feature class.)	Collect point at top of pipe if invert elevation is not accessible. If top of pipe is not accessible, calculate: DNELEV_HW – DNDEPTH_TOP
DNELEV_INV	The downstream invert elevation	Collect in GPS directly if possible. If not possible, calculate: DNELEV_TOP – DNDEPTH_INV *or* if intersects a structure DNRIMELEV – DNDEPTH_INV
UPDEPTH_TOP	Depth to Top of Pipe from top-center of headwall.	Measure down to top of pipe from top-center of headwall.
UPDEPTH_INV	Depth of pipe invert at upstream end	Measure from top of pipe.
UPELEV_HW	Headwall elevation at upstream end, where pipe intersects open channel or BMP.	Collect point at top-center of stable headwall structure.
UPELEV_TOP	Elevation, top of pipe at upstream end, where pipe intersects open channel or BMP. (If pipe intersects a structure, RIMELEV is stored in that feature class.)	Collect point at top of pipe if invert elevation is not accessible. If top of pipe is not accessible, calculate: UPELEV_HW – UPDEPTH_TOP
UPELEV_INV	The upstream invert elevation	Collect in GPS directly if possible. If not possible, calculate: UPELEV_TOP - UPDEPTH_INV *or* if intersects a structure UPRIMELEV – UPDEPTH_INV
STRUCT_TYP_UP	Upstream End Structure – tied to ***swStructTYP*** domain	Pipe intersecting structure (UP or DN): identify Flared End or Projected from Fill. If more than one, note in Comments.
STRUCT_PROTECT_UP	Structure protection upstream – tied to ***swBMPmat*** domain	Record rip-rap or other material protecting end of pipe from erosion.
STRUCT_TYP_DN	Downstream End Structure – tied to ***swStructTYP*** domain	Pipe intersecting channel (UP or DN): identify headwalls, riprap, tide valve, etc. If more than one, note in Comments.
STRUCT_PROTECT_DN	Structure protection downstream – tied to ***swBMPmat*** domain	Record rip-rap or other material protecting end of pipe from erosion.
SLOPE	The slope of the pipe	Calculate: (UPELEV_INV – DNELEV_INV) / LENGTH
STENCIL	Storm Drain Stencil – tied to ***YesNo*** domain	Identify pipes marked (with paint, sticker, sign or plate) "No Dumping - Drains to River" or similar.
COMMENTS	Narrative field – describe unique circumstances in feature or attributes only.	Separate comments with # sign.
ACTIVEFLAG	Indicates if the feature is in use/active - tied to ***BooleanDomain*** domain	If as-built feature cannot be located in field, keep in database but mark ActiveFlag as "No".
LIFECYCLESTATUS	Indicates status/use of feature – tied to ***LifeCycleStatus*** domain.	Identify active, abandoned, under construction, etc.
NeedsMaintenance	For use in field data collection – tied to ***swMaint*** domain	Document maintenance issues observed in the field.

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
Accessible	For use in field data collection – tied to ***swAccessibility*** domain	Document access difficulties observed in the field.
OWNEDBY	Indicates which organization owns the asset - tied to ***swAgency*** domain	Identify Berkeley County, Goose Creek, Hanahan, etc.; update with annexation.
MAINTBY	Indicates which organization maintains the asset - tied to ***swAgency*** domain	Identify Berkeley County, Goose Creek, Hanahan, private, etc.; may be determined by maintenance agreement.
LASTUPDATE	The date the feature was last updated in the database	Date of most recent edits
LASTEDITOR	The user who performed the last update	Name of analyst
SOURCE	SOURCE - tied to ***uSource*** domain	As-built, GPS, aerial image, etc.
SOURCEACC	SOURCEACC - tied to ***uSourceAccuracy*** domain	Accuracy of GPS equipment
SOURCEDATE	SOURCEDATE – date of source data used to create GIS	Date of as-built, GPS survey, aerial image, etc.
SOURCEDATUM	SOURCEDATUM – tied to ***uSourceDatum*** domain	Datum used in as-built, survey, etc.
HUC12	Hydrologic Unit Code - from USGS	Identify the 12-digit hydrologic unit code for the subwatershed in which the pipe is located. If the pipe crosses HUC-12 boundaries, note in Comments.
RECSTREAM	Receiving Stream – receives discharge from feature	Identify the body of water directly downstream of the pipe.
WatshedName	Watershed Name – assigned by Berkeley County	Identify the watershed in which the pipe is located.
PHOTO_FILENAME	Photo filename and photo number	May use ***uattachment*** domain options (area, internal, issue, etc.) in filename.
PHOTO_PATH	Directory location where photo file is stored	Files are stored on a server separate from the GIS database.
PHOTO_RELPATH	Relative directory location where photo file is stored	// allows gdb to find the photo if server is mapped under a different letter.
DimUOMElev	Unit of Measure for Elevation – tied to ***uDimUOMElev*** domain	Elevations
DimUOMLength	Unit of Measure for Length Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMWidth	Unit of Measure for Width Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMDepth	Unit of Measure for Depth Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMHeight	Unit of Measure for Height Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMSlope	Unit of Measure for Slope – tied to ***uDimUOMSlope*** domain	Ratio dimension (degrees or percent)

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
DimUOMDiameter	Unit of Measure for Diameter Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
TO ASSET	The downstream structure or asset determined in office	To AssetID – used to create linkage for geometric network.
FROM ASSET	The upstream structure or asset determined in office	From AssetID – used to create linkage for geometric network.
XCORD	X-Coordinate at midpoint	Calculate from midpoint of line feature
YCORD	Y-Coordinate at midpoint	Calculate from midpoint of line feature
ENABLED	Geometric Network - tied to ***EnabledDomain*** domain	True indicates geometric network has been built and feature can be traced.
GRID	Map Grid number where the feature is located	Custom grid for Berkeley County

Pipe Notes

→ For Pipes which intersect an open channel or BMP, collect GPS point at invert of pipe if possible. If invert is not accessible, collect point at top of pipe and measure depth to invert. If there is a headwall, collect GPS point at top-center of headwall and measure down to top of pipe. From top of pipe, measure depth to invert.

→ For pipes which intersect a closed structure (Manhole/Junction, Inlet, Outlet Structure, underground detention BMP, underground Cistern, MTD), TopElev, DepthToRim and RimElev are stored in the feature class for that structure. The measured DepthInv and calculated InvElev are reported in the Pipes feature class.

→ A ground surface elevation immediately above the end of the pipe is needed in order to calculate AvgCoverDepth for pipes which intersect a channel or BMP. For pipes which intersect a structure (Manhole/ Junction, Inlet, Outlet Structure), AvgCoverDepth is calculated from the RimElev of the structure.

swCulvert (CULVERTS)

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
ASSETID	ASSETID – unique identifier code	To be used within GIS as the primary linkage field.
GISOBJID	EAM ID - Enterprise Asset Management Servicer	Unique identifier for enterprise asset management system.
LegacyID	Legacy ID – former AssetIDs in City's database	Use in processing former data and tracking changes.
GlobalID	Global Identifier code	Primary identifier never changes.
INSTALLDATE	The date the asset was installed or constructed	Populate if known.
LOCDESC	Location Description	Street Address, HOA, Subdivision, or description of location of culvert on the parcel.
CONVEYANCE_TYPE	Conveyance Type – tied to ***swOutletLocation*** domain	Legacy field/data.
CROSSING_TYPE	Crossing Type – tied to ***swLanduseCross*** domain	Land use of area draining to culvert.
MAINSHAPE	The shape of the culvert - tied to ***swPipeShape*** domain	Circular, Rectangular (box), Elliptical, Arch most common.
MATERIAL	Material the asset is manufactured with - tied to ***swCulvertMat*** domain	Identify material.
LININGMAT	Lining Material - tied to ***swLiningMat*** domain	Identify material lining of culvert.
LINEDYEAR	Year the pipe was lined	Populate if known.
LINERTYPE	The type of liner - tied to ***swLiningMethod*** domain	Populate if known.
DIAMETER	Diameter of the asset - tied to ***swPipeDiameter*** domain	For circular culverts.
LENGTH	LENGTH of culvert	Autogenerated for linear features.
WIDTH	WIDTH of culvert	For noncircular culverts.
HEIGHT	HEIGHT of culvert	For noncircular culverts.
AVGCOVERDEPTH	AVERAGE COVER DEPTH – depth of soil/pavement cover from ground surface to top of pipe, on average along the length	Calculate: Average of upstream and downstream values: RimElev – Depth + Diameter *or* Ground Surface Elev – Top of Pipe Elev
DNDEPTH_TOP	Depth to Top of Pipe at downstream end of culvert.	Measure down to top of pipe from top-center of headwall.
DNDEPTH_INV	Downstream Depth to Invert	Measure from top of culvert down to culvert invert.
DNELEV_HW	Headwall elevation at downstream end of culvert.	Collect point at top-center of stable headwall structure.
DNELEV_TOP	Elevation, top of pipe at downstream end of culvert.	Collect point at top of culvert if invert elevation is not accessible. If top of pipe is not accessible, Calculate: DNELEV_HW – DNDEPTH_TOP
DNELEV_INV	Downstream Invert Elevation of culvert	Collect point directly if possible. If not possible, calculate: DNELEV_TOP – DNDEPTH_INV
UPDEPTH_TOP	Depth to Top of Pipe at upstream end of culvert.	Measure down to top of pipe from top-center of headwall.

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
UPDEPTH_INV	Upstream Depth to Invert	Measure from top of culvert down to culvert invert.
UPELEV_HW	Headwall elevation at upstream end of culvert.	Collect point at top-center of stable headwall structure.
UPELEV_TOP	Elevation, top of pipe at upstream end of culvert.	Collect point at top of culvert if invert elevation is not accessible. If top of pipe is not accessible, calculate: UPELEV_HW – UPDEPTH_TOP
UPELEV_INV	Upstream Invert Elevation of culvert	Collect point directly if possible. If not possible, calculate: UPELEV_TOP – UPDEPTH_INV
STRUCT_TYP_UP	Upstream End Structure Type – tied to ***swStructTyp*** domain	Identify headwalls, riprap, tide valve, etc. If more than one, choose most significant and note others in Comments.
STRUCT_TYP_DN	Downstream End Structure Type – tied to ***swStructTyp*** domain	Identify headwalls, riprap, tide valve, etc. If more than one, choose most significant and note others in Comments.
STRUCT_PROTECT_UP	Structure protection upstream – tied to ***swBMPmat*** domain	Record rip-rap or other material protecting end of culvert from erosion.
STRUCT_PROTECT_DN	Structure protection downstream – tied to ***swBMPmat*** domain	Record rip-rap or other material protecting end of culvert from erosion.
SLOPE	SLOPE of culvert	Calculate: (UPELEV_INV – DOWNELEV_INV) / LENGTH
BARRELS	Number of BARRELS	Legacy data. Not necessary to use this attribute in the future. Map each culvert as an individual line.
STENCIL	Storm Drain Stencil – tied to ***YesNo*** domain	Identify culverts marked (with paint, sticker, sign or plate) "No Dumping - Drains to River" or similar.
COMMENTS	Narrative field – describe unique circumstances in feature or attributes only.	Separate comments with # sign.
ACTIVEFLAG	Active Flag - Indicates if the feature is in use/active- tied to ***BooleanDomain*** domain	If as-built feature cannot be located in field, keep in database but mark ActiveFlag as "No".
LIFECYCLESTATUS	Indicates status/use of feature – tied to ***LifeCycleStatus*** domain.	Identify active, abandoned, under construction, etc.
NeedsMaintenance	For use in field data collection – tied to ***swMaint*** domain	Document maintenance issues observed in the field.
Accessible	For use in field data collection – tied to ***swAccessibility*** domain	Document access difficulties observed in the field.
OWNEDBY	Owned By - Indicates which organization owns the asset - tied to ***swAgency*** domain	Identify Berkeley County, Goose Creek, Hanahan, etc.; update with annexation.
MAINTBY	Maintained By - Indicates which organization maintains the asset- tied to ***swAgency*** domain	Identify Berkeley County, Goose Creek, Hanahan, private, etc.; may be determined by maintenance agreement.
LASTUPDATE	The date the feature was last updated in the database	Date of most recent edits
LASTEDITOR	Last Editor - The user who performed the last update	Name of analyst
SOURCE	Data Source - tied to ***uSource*** domain	As-built, GPS, aerial image, etc.

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
SOURCEACC	Source Accuracy - tied to ***uSourceAccuracy*** domain	Accuracy of GPS equipment
SOURCEDATE	SOURCEDATE – date of source data used to create GIS	Date of as-built, GPS survey, aerial image, etc.
SOURCEDATUM	SOURCEDATUM – tied to ***uSourceDatum*** domain	Datum used in as-built, survey, etc.
HUC12	Hydrologic Unit Code - from USGS	Identify the 12-digit hydrologic unit code for the subwatershed in which the culvert is located. If the culvert crosses HUC-12 boundaries, note in Comments.
RECSTREAM	Receiving Stream – receives discharge from feature	Identify the body of water directly downstream of the culvert.
WatshedName	Watershed Name – assigned by Berkeley County	Identify the watershed in which the culvert is located.
PHOTO_FILENAME	Photo filename and photo number	May use ***uattachment*** domain options (area, internal, issue, etc.) in filename
PHOTO_PATH	Directory location where photo file is stored	Files are stored on a server separate from the GIS database.
PHOTO_RELPATH	Relative directory location where photo file is stored	// allows gdb to find the photo if server is mapped under a different letter.
DimUOMElev	Unit of Measure for Elevation – tied to ***uDimUOMElev*** domain	Elevations
DimUOMLength	Unit of Measure for Length Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMWidth	Unit of Measure for Width Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMDepth	Unit of Measure for Depth Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMHeight	Unit of Measure for Height Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMSlope	Unit of Measure for Slope – tied to ***uDimUOMSlope*** domain	Ratio dimension (degrees or percent)
DimUOMDiameter	Unit of Measure for Diameter Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
ToAsset	The downstream structure or asset determined in office	To AssetID – used to create linkage for geometric network.
FromAsset	The upstream structure or asset determined in office	From AssetID – used to create linkage for geometric network.
XCORD	X-Coordinate at midpoint	Calculate from midpoint of line feature
YCORD	Y-Coordinate at midpoint	Calculate from midpoint of line feature
ENABLED	Geometric Network - tied to ***EnabledDomain*** domain	True indicates geometric network has been built and feature can be traced.
GRID	Map Grid number where the feature is located	Custom grid for Berkeley County

Culvert Notes

→ For Culverts, collect GPS point at invert of pipe if possible. If invert is not accessible, collect point at top of culvert and measure depth to invert. If there is a headwall, collect GPS point at top-center of headwall and measure down to top of culvert. From top of culvert, measure depth to invert.

→ A ground surface elevation immediately above the end of the culvert is needed in order to calculate AvgCoverDepth.

swDrivewayCulvertPnt (DRIVEWAY CULVERTS)

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
ASSETID	ASSETID – unique identifier code	To be used within GIS as the primary linkage field.
GISOBJID	EAM ID - Enterprise Asset Management Servicer	Unique identifier for enterprise asset management system.
LegacyID	Legacy ID – former AssetIDs in County's database	Use in processing former data and tracking changes.
GlobalID	Global Identifier code	Primary identifier never changes.
INSTALLDATE	The date the asset was installed or constructed	Populate if known.
LOCDESC	Location Description	Street Address, HOA, Subdivision, or description of location of driveway culvert on the parcel.
CROSSING_TYPE	Crossing Type – tied to ***swLanduseCross*** domain	Land use of area draining to driveway culvert.
MAINSHAPE	The shape of the culvert - tied to ***swPipeShape*** domain	Circular most common for driveway culverts.
MATERIAL	Material the asset is manufactured with - tied to ***swCulvertMat*** domain	Identify material.
LININGMAT	Lining Material - tied to ***swLiningMat*** domain	Identify material lining of culvert.
LINEDYEAR	Year the pipe was lined	Populate if known.
LINERTYPE	The type of liner - tied to ***swLiningMethod*** domain	Populate if known.
DIAMETER	Diameter of the asset - tied to ***swPipeDiameter*** domain	For circular culverts.
RECLENGTH	LENGTH of driveway culvert	Recorded length of culvert.
WIDTH	WIDTH of driveway culvert	For noncircular culverts.
HEIGHT	HEIGHT of driveway culvert	For noncircular culverts.
STRUCT_TYP_UP	Upstream End Structure Type – tied to ***swStructTyp*** domain	Identify headwalls, riprap, tide valve, etc. If more than one, choose primary and note secondary in STRUCT_PROTECT_UP.
STRUCT_PROTECT_UP	Structure protection upstream – tied to ***swBMPmat*** domain	Record rip-rap or other material protecting end of culvert from erosion.
STRUCT_TYP_DN	Downstream End Structure Type – tied to ***swStructTyp*** domain	Identify headwalls, riprap, tide valve, etc. If more than one, choose primary and note secondary in STRUCT_PROTECT_DN.
STRUCT_PROTECT_DN	Structure protection downstream – tied to ***swBMPmat*** domain	Record rip-rap or other material protecting end of culvert from erosion.
BARRELS	Number of Barrels (culverts) at same location	Count number of culverts in parallel alignment.
STENCIL	Storm Drain Stencil – tied to ***YesNo*** domain	Identify culverts marked (with paint, sticker, sign or plate) "No Dumping - Drains to River" or similar.
COMMENTS	Narrative field – describe unique circumstances in feature or attributes only.	Separate comments with # sign.

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
ACTIVEFLAG	Indicates if the feature is in use/active - tied to ***BooleanDomain*** domain	If as-built feature cannot be located in field, keep in database but mark ActiveFlag as "No".
LIFECYCLESTATUS	Indicates status/use of feature – tied to ***LifeCycleStatus*** domain.	Identify active, abandoned, under construction, etc.
NeedsMaintenance	For use in field data collection – tied to ***swMaint*** domain	Document maintenance issues observed in the field.
Accessible	For use in field data collection – tied to ***swAccessibility*** domain	Document access difficulties observed in the field.
OWNEDBY	Owned by - Indicates which organization owns the asset - tied to ***swAgency*** domain	Identify Berkeley County, Goose Creek, Hanahan, etc.; update with annexation.
MAINTBY	Indicates which organization maintains the asset - tied to ***swAgency*** domain	Identify Berkeley County, Goose Creek, Hanahan, private, etc.; may be determined by maintenance agreement.
LASTUPDATE	The date the feature was last updated in the database	Date of most recent edits
LASTEDITOR	The user who performed the last update	Name of analyst
SOURCE	SOURCE - tied to ***uSource*** domain	As-built, GPS, aerial image, etc.
SOURCEACC	SOURCEACC - tied to ***uSourceAccuracy*** domain	Accuracy of GPS equipment
SOURCEDATE	SOURCEDATE – date of source data used to create GIS	Date of as-built, GPS survey, aerial image, etc.
SOURCEDATUM	SOURCEDATUM – tied to ***uSourceDatum*** domain	Datum used in as-built, survey, etc.
HUC12	Hydrologic Unit Code - from USGS	Identify the 12-digit hydrologic unit code for the subwatershed in which the driveway culvert is located.
RECSTREAM	Receiving Stream – receives discharge from feature	Identify the body of water directly downstream of the driveway culvert.
WatshedName	Watershed Name – assigned by Berkeley County	Identify the watershed in which the driveway culvert is located.
PHOTO_FILENAME	Photo filename and photo number	May use ***uattachment*** domain options (area, internal, issue, etc.) in filename
PHOTO_PATH	Directory location where photo file is stored	Files are stored on a server separate from the GIS database.
PHOTO_RELPATH	Relative directory location where photo file is stored	// allows gdb to find the photo if server is mapped under a different letter.
DimUOMLength	Unit of Measure for Length Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMDepth	Unit of Measure for Depth Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMWidth	Unit of Measure for Width Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMHeight	Unit of Measure for Height Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMDiameter	Unit of Measure for Diameter Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
XCORD	X-Coordinate at midpoint	Calculate from midpoint of line feature

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
YCORD	Y-Coordinate at midpoint	Calculate from midpoint of line feature
ENABLED	Geometric Network - tied to ***EnabledDomain*** domain	True indicates geometric network has been built and feature can be traced.
GRID	Map Grid number where the feature is located	Custom grid for Berkeley County

Driveway Culvert Notes

→ Legacy data is stored in this feature class. All driveway culverts mapped in the future will be mapped as a line feature in the CULVERTS feature class.

swChannel (CHANNELS)

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
ASSETID	ASSETID – unique identifier code	To be used within GIS as the primary linkage field.
GISOBJID	EAM ID - Enterprise Asset Management Servicer	Unique identifier for enterprise asset management system.
LegacyID	Legacy ID – former AssetIDs in County's database	Use in processing former data and tracking changes.
GlobalID	Global Identifier code	Primary identifier never changes.
INSTALLDATE	The date the asset was installed or constructed	Populate if known.
LOCDESC	Location Description – tied to ***swOutletLocation*** domain	Select "other" from legacy domain and choose: Street Address, HOA, Subdivision, or description of location of channel on the parcel.
CHANNEL_TYP	Channel type – tied to ***swChannelType*** domain	Identify as Channel, Ditch, Swale, Bioswale, Trench Drain
CHANNELSHAPE	Channel cross-sectional shape – tied to ***swChannelShape*** domain	Identify as Trapezoidal, Rectangular, Parabolic/U-shaped or Triangular/V-shaped
BEDMATERIAL	The material on the bed of the open channel - tied to ***swBMPmat*** domain	If more than one material present, choose most prevalent.
SIDEMATERIAL	The material on the side of the open channel - tied to ***swBMPmat*** domain	If more than one material present, choose most prevalent.
LENGTH	Length at bottom of open channel	Autogenerated for linear features.
TOPWIDTH	Width at the top of the open channel	Use tape measure from top of bank to top of bank, or calculate using survey grade cross-sections.
BOTWIDTH	Width at the bottom of the open channel	Use tape measure from toe of bank to toe of bank, or calculate using survey grade cross-sections.
UPDEPTH	Upstream depth to invert	Measure down from Top of Bank to Invert, or calculate using survey grade cross-sections.
UPINVELEV	Upstream Invert Elevation - bottom of channel	Collect GPS point directly if possible. If not accessible, calculate: Upstream Top of Bank Elevation – UPDEPTH
DOWNDEPTH	Downstream depth to invert	Measure down from Top of Bank to Invert, or calculate using survey grade cross-sections.
DOWNINVELEV	Downstream Invert Elevation - bottom of channel	Collect GPS point directly if possible. If not accessible, calculate: Downstream Top of Bank Elevation – DOWNDEPTH
AVGDEPTH	The average depth of the open channel along its length. Minimum 1 ft deep in order to be mapped.	Calculate average from depths along the length. Depth is calculated from top elevation minus invert elevation.
LEFTSLOPE	The slope on the left side of channel, looking downstream	Calculate average using pairs of top of bank and bottom of channel elevations.
RIGHTSLOPE	The slope on the right side of channel, looking downstream	Calculate average using pairs of top of bank and bottom of channel elevations.
BOTSLOPE	The slope of the bottom of the channel	Calculate: (UPINVELEV – DOWNINVELEV) / LENGTH
STRUCT_TYP_UP	Upstream End Structure Type – tied to ***swStructTyp*** domain	Identify slab, riprap, gate structure, etc. If more than one, choose most significant and note others in Comments.

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
STRUCT_TYP_DN	Downstream End Structure Type – tied to ***swStructTyp*** domain	Identify slab, riprap, gate structure, etc. If more than one, choose most significant and note others in Comments.
RDROW	Road Right of Way – tied to ***YesNo*** domain	Asset receives drainage from public road
STENCIL	Storm Drain Stencil – tied to ***YesNo*** domain	Identify channels marked (with paint, sticker, sign or plate) "No Dumping - Drains to River" or similar.
BMP	BMP - tied to ***YesNo*** domain	Yes if channel also serves as BMP (types bioswale and infiltration trench).
COMMENTS	Narrative field – describe unique circumstances in feature or attributes only.	Separate comments with # sign.
ACTIVEFLAG	Active Flag - Indicates if the feature is in use/active - linked to ***BooleanDomain*** domain	If as-built feature cannot be located in field, keep in database but mark ActiveFlag as "No".
LIFECYCLESTATUS	Indicates status/use of feature – tied to ***LifeCycleStatus*** domain.	Identify active, abandoned, under construction, etc.
OWNEDBY	Indicates which organization owns the asset - tied to ***swAgency*** domain	Identify Berkeley County, Goose Creek, Hanahan, etc.; update with annexation.
MAINTBY	Indicates which organization maintains the asset - tied to ***swAgency*** domain	Identify Berkeley County, Goose Creek, Hanahan, private, etc.; may be determined by maintenance agreement.
LASTUPDATE	The date the feature was last updated in the database	Date of most recent edits
LASTEDITOR	The user who performed the last update	Name of analyst
SOURCE	SOURCE - tied to ***uSource*** domain	As-built, GPS, aerial image, etc.
SOURCEACC	SOURCEACC - tied to ***uSourceAccuracy*** domain	Accuracy of GPS equipment
SOURCEDATE	SOURCEDATE – date of source data used to create GIS	Date of as-built, GPS survey, aerial image, etc.
SOURCEDATUM	SOURCEDATUM – tied to ***uSourceDatum*** domain	Datum used in as-built, survey, etc.
HUC12	Hydrologic Unit Code - from USGS	Identify the 12-digit hydrologic unit code for the subwatershed in which the channel is located. If the channel crosses HUC-12 boundaries, note in Comments.
RECSTREAM	Receiving Stream – receives discharge from feature	Identify the body of water directly downstream of the channel.
WatshedName	Watershed Name – assigned by Berkeley County	Identify the watershed in which the channel is located.
PHOTO_FILENAME	Photo filename and photo number	May use ***uattachment*** domain options (area, internal, issue, etc.) in filename
PHOTO_PATH	Directory location where photo file is stored	Files are stored on a server separate from the GIS database.
PHOTO_RELPATH	Relative directory location where photo file is stored	// allows gdb to find the photo if server is mapped under a different letter.
DimUOMSlope	Unit of Measure for Slope – tied to ***uDimUOMSlope*** domain	Ratio dimension (degrees or percent)

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
DimUOMElev	Unit of Measure for Elevation – tied to ***uDimUOMElev*** domain	Elevations
DimUOMLength	Unit of Measure for Length Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMWidth	Unit of Measure for Width Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMDepth	Unit of Measure for Depth Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
ToAsset	The downstream structure or asset determined in office	To AssetID – used to create linkage for geometric network.
FromAsset	The upstream structure or asset determined in office	From AssetID – used to create linkage for geometric network.
XCORD	X-Coordinate at midpoint	Calculate from midpoint of line feature
YCORD	Y-Coordinate at midpoint	Calculate from midpoint of line feature
ENABLED	Geometric Network - tied to ***EnabledDomain*** domain	True indicates geometric network has been built and feature can be traced.
GRID	Map Grid number where the feature is located	Custom grid for Berkeley County

Channel Notes

→ New reach or segment of channel in GIS: bed material changes, change in slope, change in angle > 30°, significant change in dimensions, or intersection with another channel.

→ Collect elevations at top of bank and toe of bank (left and right) and invert of channel, roughly in cross-sections, in order to calculate side-slopes. Minimum of upstream and downstream pairs.

→ Additional GPS points for channels stored in ELEVATIONS feature class.

swStructuralBMP_(SBMP)

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
ASSETID	ASSETID – unique identifier code	To be used within GIS as the primary linkage field.
GISOBJID	EAM ID - Enterprise Asset Management Servicer	Unique identifier for enterprise asset management system.
LegacyID	Legacy ID – former AssetIDs in County's database	Use in processing former data and tracking changes.
GlobalID	Global Identifier code	Primary identifier never changes.
INSTALLDATE	The date the asset was installed or constructed	Populate if known.
LOCDESC	Location Description	Street Address, HOA, Subdivision, or description of location of BMP on the parcel.
OWNERNAME	Owner Name – of development	Name of residential HOA (Homeowners Association) or Subdivision. Different from OwnedBy field.
BMP_TYPE	BMP_TYPE - tied to ***swBMPtype*** domain	Options are: wet pond, dry pond, infiltration basin, wetlands, bioretention, underground detention, stilling basin, sand filter.
BEDMATERIAL	The material on the bed of the retention area - tied to ***swBMPmat*** domain	If more than one material present, choose most prevalent.
BNKMATERIAL	The material on the bank of the retention area - tied to ***swBMPmat*** domain	If more than one material present, choose most prevalent.
PROTECT_INM	Inflow Protection Material - tied to ***swBMPmat*** domain	End structure of inflow conveyance is noted in the feature class for that conveyance. Protection material may be adjacent to end structure.
PROTECT_OUTM	Outflow Protection Material - tied to ***swBMPmat*** domain	End structure of outflow conveyance or structure is noted in the feature class for that feature. Protection material may be adjacent to end structure.
EMB_PROTECTION	Embankment protection material - tied to ***swBMPmat*** domain	Note any rip-rap or other protective material used on the embankment or bottom of the BMP. In addition to BedMaterial and BnkMaterial.
EMB_TOP_WIDTH	Embankment Top Width	Width of flat area (walkable/drivable) at top of BMP embankment.
LENGTH	The length of the retention area at longest point	Measure with survey tape or calculate using survey grade data.
WIDTH	The width of the detention area at widest point	Measure with survey tape or calculate using survey grade data.
INVERTDEPTH	The depth of the retention area at lowest point	Calculate: Top of Bank Elev - InvertElev
INVERTELEV	Elevation at lowest point of BMP	If bottom is not accessible due to permanent pool, note in Comments field.
NORMWSELEV	Normal water surface elevation	Collect at least 3 days after rain event to ensure water level has stabilized at normal pool.
PERIMETER	Perimeter of BMP	Autogenerated for polygon features.
AREA	Area of BMP	Autogenerated for polygon features.
VOLUME	The volume of detention area	From as-built drawings or calcs.

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
IN_SIDESLO	Internal Side Slope	Slope of embankment inside BMP
EXT_SIDESLO	External Side Slope	Slope of embankment outside BMP
NUM_INFLOWS	Pipes, culverts, channels or inlets entering BMP	Count inflows.
NUM_OUTFLOWS	Pipes, culverts, channels or outlet structures exiting BMP	Count outflows.
LowFlowChannel	Low Flow Channel Material - tied to ***swBMPmat*** domain	Identify material if channel intentionally designed to convey runoff through the BMP.
BAFFLES	Baffle Material - tied to ***swBMPmat*** domain	Permanent baffles only. Do not record silt fence.
FENCE	Fence around BMP - tied to ***BooleanDomain*** domain	Yes/No
IS_FENCE_L	Is the fence locked - tied to ***BooleanDomain*** domain	Yes/No; If yes, include other information about gaining access in Comments field.
BENCH	Wetland Bench present - tied to ***YesNo*** domain	Specific to ponds only.
STENCIL	Storm Drain Stencil – tied to ***YesNo*** domain	Identify BMPs marked (with paint, sticker, sign or plate) "No Dumping - Drains to River" or similar.
COMMENTS	Narrative field – describe unique circumstances in feature or attributes only.	Separate comments with # sign.
ACTIVEFLAG	Indicates if the feature is in use/active - tied to ***BooleanDomain*** domain	If as-built feature cannot be located in field, keep in database but mark ActiveFlag as "No".
LIFECYCLESTATUS	Indicates status/use of feature – tied to ***LifeCycleStatus*** domain.	Identify active, abandoned, under construction, etc.
NeedsMaintenance	For use in field data collection – tied to ***swMaint*** domain	Document maintenance issues observed in the field.
Accessible	For use in field data collection – tied to ***swAccessibility*** domain	Document access difficulties observed in the field.
OWNEDBY	Indicates which organization owns the asset - tied to ***swAgency*** domain	Identify Berkeley County, Goose Creek, Hanahan, etc.; update with annexation.
MAINTBY	Indicates which organization maintains the asset - tied to ***swAgency*** domain	Identify Berkeley County, Goose Creek, Hanahan, private, etc.; may be determined by maintenance agreement.
LASTUPDATE	The date the feature was last updated in the database	Date of most recent edits
LASTEDITOR	The user who performed the last update	Name of analyst
SOURCE	Data Source - tied to ***uSource*** domain	As-built, GPS, aerial image, etc.
SOURCEACC	Source Accuracy - tied to ***uSourceAccuracy*** domain	Accuracy of GPS equipment
SOURCEDATE	SOURCEDATE – date of source data used to create GIS	Date of as-built, GPS survey, aerial image, etc.
SOURCEDATUM	SOURCEDATUM – tied to ***uSourceDatum*** domain	Datum used in as-built, survey, etc.
HUC12	Hydrologic Unit Code - from USGS	Identify the 12-digit hydrologic unit code for the subwatershed in which the structural BMP is located.

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
RECSTREAM	Receiving Stream – receives discharge from feature	Identify the body of water directly downstream of the structural BMP.
WatshedName	Watershed Name – assigned by Berkeley County	Identify the watershed in which the structural BMP is located.
PHOTO_FILENAME	Photo filename and photo number	May use ***uattachment*** domain options (area, internal, issue, etc.) in filename
PHOTO_PATH	Directory location where photo file is stored	Files are stored on a server separate from the GIS database.
PHOTO_RELPATH	Relative directory location where photo file is stored	// allows gdb to find the photo if server is mapped under a different letter.
DimUOMSlope	Unit of Measure for Slope – tied to ***uDimUOMSlope*** domain	Ratio dimension (degrees or percent)
DimUOMArea	Unit of Measure for Area (BMP area or drainage area) – tied to ***uDimUOMArea*** domain	Square units
DimUOMPerim	Unit of Measure for Perimeter – tied to ***uDimUOMPerim*** domain	Linear dimension
DimUOMVolume	Unit of Measure for Volume – tied to ***uDimUOMVol*** domain	Cubic units
DimUOMLength	Unit of Measure for Length Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMWidth	Unit of Measure for Width Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMDepth	Unit of Measure for Depth Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
XCORD	X-Coordinate at geographic center	Calculate geographic center of polygon feature
YCORD	Y-Coordinate at geographic center	Calculate geographic center of polygon feature
ENABLED	Geometric Network - tied to ***EnabledDomain*** domain	True indicates geometric network has been built and feature can be traced.
GRID	Map Grid number where the feature is located	Custom grid for Berkeley County

BMP Notes

→ Field crew will shoot elevations at top of bank perimeter of BMP and at normal pool elevation perimeter for wet ponds. For dry BMPs, shoot elevations at toe of bank. Pairs of elevations will be used to calculate side-slopes.

→ Additional GPS points for BMPs are stored in ELEVATIONS feature class.

swMTD (Manufactured Treatment Devices)

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
ASSETID	ASSETID – unique identifier code	To be used within GIS as the primary linkage field.
GISOBJID	EAM ID - Enterprise Asset Management Servicer	Unique identifier for enterprise asset management system.
GlobalID	Global Identifier code	Primary identifier never changes.
INSTALLDATE	The date the asset was installed or constructed	Populate if known.
LOCDESC	Location Description	Street Address, HOA, Subdivision, or description of location of MTD on the parcel.
MANUFACTURER	Manufacturer name	From as-built drawings or manufacturer info.
MODEL	Model number	From as-built drawings or manufacturer info.
MTD_TYPE	MTD_TYPE - tied to ***swMTDType*** domain	Type of treatment or pollutant of focus.
MTDMATERIAL	The material of the primary structure of the MTD - tied to ***swBMPmat*** domain	If more than one material present, choose most prevalent.
ACCESSTYPE	Method for accessing the opening - tied to ***swAccessType*** domain	Doors, grates, manhole covers.
ACCESSMAT	Access material for cover - tied to ***swInletMaterial*** domain	Identify material of access cover, manhole or door.
ACCESSDIAM	Access diameter for the access - tied to ***swPipeDiameter*** domain	For circular (manhole) access to MTD.
ACCESSLENGTH	Length of access doors	For square or rectangular access doors.
ACCESSWIDTH	Width of access doors	For square or rectangular access doors.
ACCESSMARK	Marking on MTD – tied to ***swCoverMark*** domain	Cover stamped with logo or words.
LENGTH	The length of the MTD	Measure with survey tape.
WIDTH	The width of the MTD	Measure with survey tape.
INVERTDEPTH	The depth of the MTD at lowest point	Calculate: Top Elev - InvertElev
INVERTELEV	Elevation at lowest point of MTD	If not accessible, note in Comments field.
TOPELEV	Elevation of top of MTD	Center-top of underground vault.
VOLUME	Treatment volume	From as-built drawings or manufacturer info.
FLOWRATE	Peak flowrate	From as-built drawings or manufacturer info.
DRAINAGE AREA	Contributing drainage area	From as-built drawings or manufacturer info.
NUM_INFLOWS	Number of inflows entering MTD	Count inflows
NUM_OUTFLOWS	Number of outflows exiting MTD	Count outflows
NUM_FILTERS	Number of filters	Count filters
NUM_CHAMBERS	Number of chambers	Count chambers
NUM_BAFFLES	Number of baffles	Count permanent baffles only.
PRETREATMENT	Pre-treatment or cleanout chamber prior to entrance of MTD – tied to ***YesNo*** domain	Yes/No
BMP	BMP - tied to ***YesNo*** domain	Should be YES for all AssetIDs in MTD feature class.

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
STENCIL	Storm Drain Stencil – tied to ***YesNo*** domain	Identify BMPs marked (with paint, sticker, sign or plate) "No Dumping - Drains to River" or similar.
COMMENTS	Narrative field – describe unique circumstances in feature or attributes only.	Separate comments with # sign.
ACTIVEFLAG	Indicates if the feature is in use/active - tied to ***BooleanDomain*** domain	If as-built feature cannot be located in field, keep in database but mark ActiveFlag as "No".
LIFECYCLESTATUS	Indicates status/use of feature – tied to ***LifeCycleStatus*** domain.	Identify active, abandoned, under construction, etc.
NeedsMaintenance	For use in field data collection – tied to ***swMaint*** domain	Document maintenance issues observed in the field.
Accessible	For use in field data collection – tied to ***swAccessibility*** domain	Document access difficulties observed in the field.
OWNEDBY	Indicates which organization owns the asset - tied to ***swAgency*** domain	Identify Berkeley County, Goose Creek, Hanahan, etc.; update with annexation.
MAINTBY	Indicates which organization maintains the asset - tied to ***swAgency*** domain	Identify Berkeley County, Goose Creek, Hanahan, private, etc.; may be determined by maintenance agreement.
LASTUPDATE	The date the feature was last updated in the database	Date of most recent edits
LASTEDITOR	The user who performed the last update	Name of analyst
SOURCE	Data Source - tied to ***uSource*** domain	As-built, GPS, aerial image, etc.
SOURCEACC	Source Accuracy - tied to ***uSourceAccuracy*** domain	Accuracy of GPS equipment
SOURCEDATE	SOURCEDATE – date of source data used to create GIS	Date of as-built, GPS survey, aerial image, etc.
SOURCEDATUM	SOURCEDATUM – tied to ***uSourceDatum*** domain	Datum used in as-built, survey, etc.
HUC12	Hydrologic Unit Code - from USGS	Identify the 12-digit hydrologic unit code for the subwatershed in which the MTD is located.
RECSTREAM	Receiving Stream – receives discharge from feature	Identify the body of water directly downstream of the MTD.
WatshedName	Watershed Name – assigned by Berkeley County	Identify the watershed in which the MTD is located.
PHOTO_FILENAME	Photo filename and photo number	May use ***uattachment*** domain options (area, internal, issue, etc.) in filename
PHOTO_PATH	Directory location where photo file is stored	Files are stored on a server separate from the GIS database.
PHOTO_RELPATH	Relative directory location where photo file is stored	// allows gdb to find the photo if server is mapped under a different letter.
DimUOMElev	Unit of Measure for Elevation – tied to ***uDimUOMElev*** domain	Elevations
DimUOMVolume	Unit of Measure for Volume – tied to ***uDimUOMVol*** domain	Volume (cubic units)
DimUOMFlowrate	Unit of Measure for Flowrate – tied to ***uDimUOMFlows*** domain	Flow rate (volume per area)
DimDrainageArea	Unit of Measure for Drainage Area – tied to ***uDimUOMArea*** domain	Drainage Area (square units)

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
DimUOMLength	Unit of Measure for Length Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMWidth	Unit of Measure for Width Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMDepth	Unit of Measure for Depth Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMHeight	Unit of Measure for Height Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMDiameter	Unit of Measure for Diameter Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
XCORD	X-Coordinate from GPS	Calculate using survey grade GPS point.
YCORD	Y-Coordinate from GPS	Calculate using survey grade GPS point.
ZCORD	Z-Coordinate from GPS	Calculate using survey grade GPS point.
GRID	Map Grid number where the feature is located	Custom grid for Berkeley County

swPermPvmt (Permeable Pavement)

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
ASSETID	ASSETID – unique identifier code	To be used within GIS as the primary linkage field.
GISOBJID	EAM ID - Enterprise Asset Management Servicer	Unique identifier for enterprise asset management system.
GlobalID	Global Identifier code	Primary identifier never changes.
INSTALLDATE	The date the asset was installed or constructed	Populate if known.
LOCDESC	Location Description	Street Address, HOA, Subdivision, or description of location of permeable pavement on the parcel.
PavementType	Pavement Type – tied to ***swPermPvmtType*** domain	Pavers, pavement or grid system.
PavementMaterial	Pavement Material – tied to ***swPermPvmtMaterial*** domain	Permeable asphalt, concrete or pavers.
PavmtLength	Length of area covered by permeable pavement	This is not the length of a single paver
PavmtWidth	Width of area covered by permeable pavement	This is not the width of a single paver
PavmtDepth	Depth to bottom of infiltration zone or depth to underdrain pipe	Depth of the BMP including pavers/pavement, gravel or other media.
PavmtArea	Area of permeable pavement	Autogenerated for polygon features.
PavmtPerimeter	Perimeter of permeable pavement	Autogenerated for polygon features.
DrainageArea	Contributing drainage area	Area draining into permeable pavement; may be larger than the area of the permeable pavement.
BMP	BMP - tied to ***YesNo*** domain	Should be YES for all AssetIDs in permeable pavement feature class.
STENCIL	Storm Drain Stencil – tied to ***YesNo*** domain	Identify BMPs marked (with paint, sticker, sign or plate) "No Dumping - Drains to River" or similar.
COMMENTS	Narrative field – describe unique circumstances in feature or attributes only.	Separate comments with # sign.
ACTIVEFLAG	Indicates if the feature is in use/active - tied to ***BooleanDomain*** domain	If as-built feature cannot be located in field, keep in database but mark ActiveFlag as "No".
LIFECYCLESTATUS	Indicates status/use of feature – tied to ***LifeCycleStatus*** domain.	Identify active, abandoned, under construction, etc.
NeedsMaintenance	For use in field data collection – tied to ***swMaint*** domain	Document maintenance issues observed in the field.
Accessible	For use in field data collection – tied to ***swAccessibility*** domain	Document access difficulties observed in the field.
OWNEDBY	Indicates which organization owns the asset - tied to ***swAgency*** domain	Identify Berkeley County, Goose Creek, Hanahan, etc.; update with annexation.
MAINTBY	Indicates which organization maintains the asset - tied to ***swAgency*** domain	Identify Berkeley County, Goose Creek, Hanahan, private, etc.; may be determined by maintenance agreement.
LASTUPDATE	The date the feature was last updated in the database	Date of most recent edits
LASTEDITOR	The user who performed the last update	Name of analyst

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
SOURCE	SOURCE - tied to ***uSource*** domain	As-built, GPS, aerial image, etc.
SOURCEACC	SOURCEACC - tied to ***uSourceAccuracy*** domain	Accuracy of GPS equipment
SOURCEDATE	SOURCEDATE – date of source data used to create GIS	Date of as-built, GPS survey, aerial image, etc.
SOURCEDATUM	SOURCEDATUM – tied to ***uSourceDatum*** domain	Datum used in as-built, survey, etc.
HUC12	Hydrologic Unit Code - from USGS	Identify the 12-digit hydrologic unit code for the subwatershed in which the permeable pavement is located.
RECSTREAM	Receiving Stream – receives discharge from feature	Identify the body of water directly downstream of the permeable pavement.
WatshedName	Watershed Name – assigned by Berkeley County	Identify the watershed in which the permeable pavement is located.
PHOTO_FILENAME	Photo filename and photo number	May use ***uattachment*** domain options (area, internal, issue, etc.) in filename
PHOTO_PATH	Directory location where photo file is stored	Files are stored on a server separate from the GIS database.
PHOTO_RELPATH	Relative directory location where photo file is stored	// allows gdb to find the photo if server is mapped under a different letter.
DimUOMLength	Unit of Measure for Length Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMWidth	Unit of Measure for Width Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMDepth	Unit of Measure for Depth Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMArea	Area UOM - tied to ***uDimUOMArea*** domain	Square units
DimUOMPerim	Perimeter UOM – tied to ***uDimUOMPerim*** domain	Linear dimension
XCORD	X-Coordinate at geographic center	Calculate geographic center of polygon feature
YCORD	Y-Coordinate at geographic center	Calculate geographic center of polygon feature
GRID	Map Grid number where the feature is located	Custom grid for Berkeley County

Permeable Pavement Notes

→ Note: Other roads/paving/sidewalks data are likely stored in a separate transportation dataset. Coordination with transportation data owner is recommended.

swCistern (CISTERNS)

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
ASSETID	ASSETID – unique identifier code	To be used within GIS as the primary linkage field.
GISOBJID	EAM ID - Enterprise Asset Management Servicer	Unique identifier for enterprise asset management system.
LegacyID	Legacy ID – former AssetIDs in County's database	Use in processing former data and tracking changes.
GlobalID	Global Identifier code	Primary identifier never changes.
LOCDESC	Location Description	Street Address, HOA, Subdivision, or description of location of cistern on the parcel.
INSTALLDATE	The date the asset was installed or constructed	Populate if known.
MANUFACTURER	Manufacturer name	From as-built drawings or manufacturer info.
CisternType	CisternType – tied to ***swCisternType*** domain	Aboveground, Underground, or Rain Barrel
CisternShape	Shape or configuration – tied to ***swPipeShape*** domain	Typically round aboveground; rectangular, arch or round belowground
Material	The material of the primary structure of the cistern - tied to ***swBMPmat*** domain	If more than one material present, choose most prevalent.
LiningMat	Lining Material - tied to ***swLiningMat*** domain	Identify material.
Diameter	The diameter of a round Cistern	Measure with survey tape.
Length	The length of a rectangular Cistern	Measure with survey tape.
Width	The width of a rectangular Cistern	Measure with survey tape.
Height	The height of a rectangular Cistern	Measure with survey rod.
Volume	Storage volume	From as-built drawings or manufacturer info.
DRAINAGE AREA	Contributing drainage area	Roof or pavement area
InvertDepth	Depth to Invert (bottom of cistern or discharge pipe)	Measure with survey rod.
InvertElevation	Elevation of bottom of cistern	If not accessible, note in Comments field.
TopElevation	Elevation of top of cistern	If not accessible, note in Comments field.
ACCESSTYPE	Method for accessing the opening - tied to ***swAccessType*** domain	Doors, grates, manhole covers
ACCESSMAT	Access material for cover - tied to ***swInletMaterial*** domain	Identify material of access cover, manhole or door.
ACCESSDIAM	Access diameter for the access - tied to ***swPipeDiameter*** domain	For circular (manhole) access to MTD.
ACCESSLENGTH	Length of access doors - tied to ***swPipeDiameter*** domain	For square or rectangular access doors.
ACCESSWIDTH	Width of access doors - tied to ***swPipeDiameter*** domain	For square or rectangular access doors.
ACCESSMARK	Marking on MTD – tied to ***swCoverMark*** domain	Cover stamped with logo or words.

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
ORIFICESIZE	Diameter of orifice - tied to ***swPipeDiameter*** domain	Orifice drains the cistern.
PRETREATMENT	Pre-treatment – tied to ***YesNo*** domain	Yes if cleanout chamber prior to entrance of MTD.
BMP	BMP - tied to Y***esNo*** domain	Should be YES for all AssetIDs in cisterns feature class.
STENCIL	Storm Drain Stencil – tied to ***YesNo*** domain	Identify BMPs marked (with paint, sticker, sign or plate) "No Dumping - Drains to River" or similar.
COMMENTS	Narrative field – describe unique circumstances in feature or attributes only.	Separate comments with # sign.
LIFECYCLESTATUS	Indicates status/use of feature – tied to ***LifeCycleStatus*** domain.	Identify active, abandoned, under construction, etc.
ACTIVEFLAG	Indicates if the feature is in use/active - tied to ***BooleanDomain*** domain	If as-built feature cannot be located in field, keep in database but mark ActiveFlag as "No".
NeedsMaintenance	For use in field data collection – tied to ***swMaint*** domain	Document maintenance issues observed in the field.
Accessible	For use in field data collection – tied to ***swAccessibility*** domain	Document access difficulties observed in the field.
OWNEDBY	Indicates which organization owns the asset - tied to ***swAgency*** domain	Identify Berkeley County, Goose Creek, Hanahan, etc.; update with annexation.
MAINTBY	Indicates which organization maintains the asset - tied to ***swAgency*** domain	Identify Berkeley County, Goose Creek, Hanahan, private, etc.; may be determined by maintenance agreement.
LASTUPDATE	The date the feature was last updated in the database	Date of most recent edits
LASTEDITOR	The user who performed the last update	Name of analyst
SOURCE	SOURCE - tied to ***uSource*** domain	As-built, GPS, aerial image, etc.
SOURCEACC	SOURCEACC - tied to ***uSourceAccuracy*** domain	Accuracy of GPS equipment
SOURCEDATE	SOURCEDATE – date of source data used to create GIS	Date of as-built, GPS survey, aerial image, etc.
SOURCEDATUM	SOURCEDATUM – tied to ***uSourceDatum*** domain	Datum used in as-built, survey, etc.
HUC12	Hydrologic Unit Code - from USGS	Identify the 12-digit hydrologic unit code for the subwatershed in which the cistern is located.
RECSTREAM	Receiving Stream – receives discharge from feature	Identify the body of water directly downstream of the cistern.
WatshedName	Watershed Name – assigned by Berkeley County	Identify the watershed in which the cistern is located.
PHOTO_FILENAME	Photo filename and photo number	May use ***uattachment*** domain options (area, internal, issue, etc.) in filename
PHOTO_PATH	Directory location where photo file is stored	Files are stored on a server separate from the GIS database.
PHOTO_RELPATH	Relative directory location where photo file is stored	// allows gdb to find the photo if server is mapped under a different letter.

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
DimUOMElev	Unit of Measure for Elevation – tied to ***uDimUOMElev*** domain	Elevations
DimUOMLength	Unit of Measure for Length Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMWidth	Unit of Measure for Width Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMDepth	Unit of Measure for Depth Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMHeight	Unit of Measure for Height Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMDiameter	Unit of Measure for Diameter Dimension – tied to ***uDimUOMLin*** domain	Linear dimension
DimUOMVolume	Unit of Measure for Volume – tied to ***uDimUOMVol*** domain	Volume (cubic units)
XCORD	X-Coordinate from GPS	Calculate using survey grade GPS point.
YCORD	Y-Coordinate from GPS	Calculate using survey grade GPS point.
ZCORD	Z-Coordinate from GPS	Calculate using survey grade GPS point.
ENABLED	Geometric Network - tied to ***EnabledDomain*** domain	True indicates geometric network has been built and feature can be traced.
GRID	Map Grid number where the feature is located	Custom grid for Berkeley County

swElevation (ELEVATIONS)

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
GlobalID	Global Identifier code	Primary identifier never changes
ElevationType	Identify type of additional topographic data points – tied to ***uElevationType*** domain.	Primarily used to locate channel cross-sections, and to determine elevations for natural surfaces of channels (cross-sections) and BMPs. Extra topo points may be used for ground surface measure-downs as needed.
LIFECYCLESTATUS	Indicates status/use of feature – tied to ***LifeCycleStatus*** domain.	Identify active, abandoned, under construction, etc.
Comments	Narrative field - unique circumstances requiring separate elevation point.	State purpose of additional elevation point.
PHOTO_FILENAME	Photo filename and photo number	May use ***uattachment*** domain options (area, internal, issue, etc.) in filename
PHOTO_PATH	Directory location where photo file is stored	Files are stored on a server separate from the GIS database.
PHOTO_RELPATH	Relative directory location where photo file is stored	// allows gdb to find the photo if server is mapped under a different letter.
DimUOMElev	Unit of Measure for Elevation – tied to ***uDimUOMElev*** domain	Elevations
XCORD	X-Coordinate from GPS	Calculate using survey grade GPS point.
YCORD	Y-Coordinate from GPS	Calculate using survey grade GPS point.
ZCORD	Z-Coordinate from GPS	Calculate using survey grade GPS point.
GRID	Map Grid number where the feature is located	Custom grid for Berkeley County

Elevations Notes

→ This feature class stores additional topo points needed to map the stormwater system, and particularly additional elevations used in calculating inverts. This feature class should only be used in absence of, or to supplement, existing fields in the primary feature class tables.

MS4Grid_(GRID)

FIELD NAME	FIELD DESCRIPTION	ADDITIONAL NOTES
GRID_NAME	Name of Grid Location	Custom grid developed in GIS for identification and counting of assets.

Inventory Domains

swPipeMaterial
(PIPES, OUTLETS (risers))

ABS	ABS Plastic
ASB	Asbestos Cement
ASP	Asphalt
BLK	Block
BR	Brick
BMP	Brick Masonry
CAS	Cast Iron
CT	Clay Tile
CP	Concrete (Non-Reinforced)
CSB	Concrete Segments (Bolted)
CSU	Concrete Segments (Unbolted)
CPP	Corrugated Plastic Pipe
CMP	Corrugated Metal
CIPP	Cured In Place
DIP	Ductile Iron
FRP	Fiberglass Reinforced Plastic
GP	Galvanized Pipe
HDPE	High Density Polyethylene
PPP	Perforated Plastic Pipe
PSC	Plastic/Steel Composite
PE	Polyethylene
PP	Polypropylene
PVC	Polyvinyl Chloride
PCCP	Pre-Stressed Concrete Cylinder
RCP	Reinforced Concrete
RPM	Reinforced Plastic (Truss)
SB	Segmented Block
SLCPP	Smooth Lined Corr Plastic Pipe
STL	Steel
STN	Stone
SPP	Structural Plate Pipe
VCP	Vitrified Clay
WD	Wood
UNK	Unknown
OTH	Other

swCulvertMat
(CULVERTS)

ASB	Asbestos Cement
BR	Brick
CAS	Cast Iron
CP	Concrete (Non-Reinforced)
CSB	Concrete Segments (Bolted)
CSU	Concrete Segments (Unbolted)
CMP	Corrugated Metal
DIP	Ductile Iron
FRP	Fiberglass Reinforced Plastic
GP	Galvanized Pipe
PSC	Plastic/Steel Composite
PVC	Polyvinyl Chloride
PCCP	Pre-Stressed Concrete Cylinder
RCP	Reinforced Concrete
RPM	Reinforced Plastic (Truss)
SB	Segmented Block
STL	Steel
VCP	Vitrified Clay
WD	Wood
OTH	Other
UNK	Unknown
HDPE	High Density Polyethylene
STN	Stone

swLiningMat
(PIPES, CULVERTS, MANHOLES AND JUNCTIONS)

ASB	Asbestos Cement
ASP	Asphalt
CMP	Corrugated Metal slipline
CIPP	Cured In Place
CON	Concrete
FRP	Fiberglass Reinforced Plastic
HDPE	High Density Polyethylene slipline
PVC	PVC Slipline
SLCPP	Smooth Lined Corr Plastic Pipe
SP	Steel pipe slipline
SPP	Structural Plate Pipe
OTH	Other
UNK	Unknown

swPipeDiameter

- 6"
- 8"
- 9″
- 10"
- 12"
- 14"
- 15"
- 16"
- 18"
- 20"
- 24"
- 30"
- 36"
- 40"
- 42"
- 48"
- 54"
- 56″
- 60"
- 66"
- 72"
- 75"
- Other
- Unknown

swLiningMethod
(JUNCTIONS, PIPES)

- Cured in Place
- Fold and Form or Deform/Reform
- Segmented Panel
- Segmented Pipe
- Spiral Wound
- Other
- None

swWallMat
(INLETS, MANHOLES AND JUNCTIONS)

- Brick
- Block
- Cast Iron
- Concrete
- Stone
- Combination
- Other
- Unknown

swPipeShape
(PIPES, CULVERTS, OUTLETS)

- Circular
- Rectangular
- Trapezoidal
- Triangular
- Elliptical
- Arched
- Other
- Unknown

swPipeType
(PIPES)

- Gravity Main
- Secondary Line
- Underdrain

swInletMaterial **(INLETS (Cover), OUTLETS (Weirs, Gates), MANHOLES AND JUNCTIONS (Cover))**	**swDischargePointType** **(DISCHARGE POINTS)**
• Aluminum • Asphalt • Blocks • Brass • Cast Iron • Concrete • Plastic • Rip-Rap • Steel • Wood • Combination (See Comments) • Other • Unknown	• Overflow Spillway • Channel • Pipe • Bridge • Culvert • Other • Unknown
swInletTypes **(INLETS)**	**swAccessType** **(INLETS (covers))**
• Roof • Combo Inlet • Curb Inlet • Grate Inlet • Box top Inlet • Beehive Inlet • Drop Inlet • Curb Cut • Other • Unknown	• No Access • Door • Circular Grate • Rectangular Grate • Manhole Cover • Unknown • Other
swManholeType **(MANHOLES AND JUNCTIONS)**	**swManholeCoverType** **(MANHOLES AND JUNCTIONS)**
• Standard Manhole • Diversion Manhole • Sedimentation Manhole • Standard Junction Box • Junction Box with Diversion • Sedimentation Junction Box • Cleanout • Other, Describe in Comments • Unknown	• No Access • Standard Manhole Cover • Standard w/ Lock • Standard w/ Ears • Rectangular Cover • Hinged Doors • Cleanout Cover w/ Lock • Cleanout Cover w/o Lock • Other • Unknown

swCoverMark
(INLETS, MANHOLES AND JUNCTIONS)

- Stamped County Logo
- Stamped City Logo
- Stamped Agency Logo
- Stamped Private
- Stamped Manufacturer Logo
- Stamped No Dumping or similar
- Stamped Storm Drain or similar
- Graphical Design only
- Generic no mark on cover
- Other
- N/A

swAgency
(ALL FEATURE CLASSES)

- Berkeley County
- Charleston County
- Dorchester County
- SCDOT
- City of Charleston
- City of North Charleston
- Town of Moncks Corner
- City of Hanahan
- Town of Goose Creek
- Town of Summerville
- Daniel Island
- Private
- Other

swOutlet_Subtype
(OUTLETS)

- Riser
- Riser with Weir
- Riser with Orifice
- Riser with Weir and Orifice
- Weir
- Gate
- Orifice
- Spillway
- Other

swGateType
(OUTLETS)

- Sluice
- Radial

swPattern
(OUTLETS (Orifices))

- Regular
- Irregular
- N/A

swRiserType
(OUTLETS)

- Round
- Perforated Pipe
- Square
- Bell-mouth
- Combination

swWeirShape
(OUTLETS (Spillway Type))

- Adjustable Weir
- Circular
- Irregular
- Rectangular
- Trapezoid
- V-Notched
- Combination
- Labyrinth
- Other

swWeirType
(OUTLETS)

- Broad-crested
- Sharp-crested
- Other

<table>
<tr>
<td><u>swChannelType
(CHANNELS)</u>

• Channel
• Ditch
• Swale
• Bioswale
• Trench Drain</td>
<td><u>swChannelShape
(CHANNELS)</u>

• Trapezoidal
• Rectangular
• Parabolic/U-shaped
• Triangular/V-shaped
• Valley Gutter Roadway</td>
</tr>
<tr>
<td><u>swBMPtype
(BMPS)</u>

• Wet Pond
• Dry Pond
• Infiltration Basin
• Wetlands
• Bioretention
• Underground Detention
• Stilling Basin
• Sand Filter</td>
<td rowspan="2"><u>swBMPmat
(CHANNELS, BMPS, OUTLETS (spillways), MANUFACTURED TREATMENT DEVICES, CISTERNS)</u>

• Aluminum
• Asphalt
• Blocks/pavers
• Brick
• Concrete
• Earthen
• Fiberglass
• Geotextile
• Grass
• Plastic
• Rip Rap
• Steel
• Stone
• Vegetation
• Wood
• Other
• N/A</td>
</tr>
<tr>
<td><u>swMTDType
(Manufactured Treatment Devices)</u>

• Hydrocarbon
• Sediment
• Trash
• Granular Activated Carbon
• Oil Water Separator
• Tree box filter
• Multi
• Other</td>
</tr>
<tr>
<td><u>swPermPvmtType
(PERMEABLE PAVEMENT)</u>

• Permeable Pavers
• Permeable Pavement
• Grid System
• Other</td>
<td><u>swPermPvmtMaterial
(PERMEABLE PAVEMENT)</u>

• Permeable Asphalt
• Permeable Concrete
• Plastic Grid Pavers
• Concrete Grid Pavers
• Interlocking Grid Pavers</td>
</tr>
</table>

swCisternType
(CISTERNS)

- Aboveground Tank
- Underground Tank
- Rain Barrel

swLandUseCross
(PIPES, CULVERTS, DRIVEWAY CULVERTS)

- Private Drive
- Street
- Parking Lot
- Pedestrian
- Railroad
- Open Area
- Other-Describe in Comments

swOutletLocation
(MULTIPLE FEATURE CLASSES)

- Upstream Left-Outfall
- Upstream Right-Outfall
- Headwaters-Outfall
- Upstream Terminus of System
- Downstream Terminus of System
- In-Stream Pond Outlet-Conveys Designated Waterway
- Conveys Designated Waterway
- Water Quality/Quantity Structure Outlet
- Part of Storm Sewer System
- Other-Describe in Comments

swOutletLoc
(MULTIPLE FEATURE CLASSES)

- Parking Area
- Vegetation
- Woods
- Channel
- Another Basin
- Storm Sewer System
- Flood Plain
- USGS
- Other - Describe in Comments

swStructType
(PIPES, CULVERTS, CHANNELS)
➔ End structures

- Projected from fill
- Flared End Section
- Mitered End section
- Mitered Headwall
- Straight Headwall
- Angled Wingwalls
- Square Wingwalls
- Scour Slab
- Rip Rap
- Gate Structure
- Tide Valve
- Bars/Rack
- Energy Dissipator
- Other
- Not Applicable

swOutletStructType
(OUTLETS)
➔ End structures

- Headwall
- Scour Slab
- Rip Rap
- Bars/Rack/Screen
- Solid Top
- Grate Top
- Other
- NA

uAttachment_Description
(ALL)

- Close-up Photo
- Area Photo
- Internal Photo
- Issue Photo
- Video

uSource	**uElevationType (ELEVATIONS)**
• GPS • Aerial • GeoCode • As-built • CAD • TABLET • DGPS • GPS – obscured • Other (see Comments	• Bench Mark • Cross-Section Location • Top of Bank • Bottom of Bank • Top of Curb • Bottom of Curb • Normal Water Surface Elevation • Bottom / Low Point of Channel • Other (see Comment)
uSourceDatum	**uSourceAccuracy**
• NAVD1929 • NAVD1988 • Site-Specific • Unknown • Other	• Sub-centimeter • Sub-meter • Recreational • Best Fit • N/A
swMaint (ALL FEATURE CLASSES)	**swAccessibility (ALL FEATURE CLASSES)**
• No Maintenance Issues • Standing Water / Sludge • Sediment / Debris Blocking Structure • Heavy Growth of Vegetation • Threat to Life or Property • Needs Service • Obstruction • Other (see Comment)	• Accessible • Fence or Locked Gate • Paved Over or Stuck • Requires Heavy Equipment • Property Owner Denied Access • Safety Issues • Other (see Comment)
LifeCycleStatus (ALL FEATURE CLASSES)	**uDimUOMLin (ALL FEATURE CLASSES)**
• Abandoned • Active • Inactive • Proposed • Removed • Under Construction	• Inch • Meter • Tenths of Foot • Centimeter

uDimUOMArea (BMPs)	**uDimUOMElev (POINT AND LINEAR FEATURES)**
• Square Foot • Square Miles • Hectare • Acre • Square Meter	• Feet • Centimeter • Meter
uDimUOMPerim (BMPs)	**uDimUOMSlope (PIPES, CULVERTS, CHANNELS, BMPs)**
• Kilometer • Meter • Feet • Miles	• Degrees • Percent
uDimUOMVol (BMPs)	**uDimUOMFlows (MTDS)**
• Cubic Foot • Cubic Meter • Other (see Comment)	• Cubic feet per second • Cubic meters per second • Other (Comment)

PART II. OUTFALL SCREENING

Outfall Screening Summary

FEATURE CLASS	NOTES	TYPE
IDDETrack	Downstream location of potential illicit discharge.	Point
Illicit DischargeSource	Location of upstream source of illicit discharge.	Point
TABLE	**NOTES**	
NPDESScreen	Outfall screening visual observations and sampling results. Linked to swDischargePoint feature class.	--

IDDETrack

Field Name	Field Description	Additional Notes
ASSETID	ASSETID – unique identifier code	To be used within GIS as the primary linkage field.
GISOBJID	EAM ID - Enterprise Asset Management Servicer	Unique identifier for enterprise asset management system.
INVENTORY_DATE	The date of outfall screening for illicit discharge	Field observations date. Should match NPDESScreen table Inspection Date.
REPORTED	Investigation trigger - tied to ***npdesReportHow*** domain.	Report may be verbal or written, from citizens or County personnel, or result from routine outfall screening.
REPORT_DESC	Description of the reported illicit discharge at downstream location	Complaint or observations of potential illicit discharge
REASON_TRACKED	Reason for inspection – tied to ***npdesReason*** domain.	Reasons could be Random Selection of Outfalls, Citizen Complaint, Re-Inspection of previous illicit discharge
INVEST_STATUS	Status of investigation for illicit discharge - tied to ***npdesIllInvest*** domain.	Enter status of investigation. Note details in Comments field.
CASESTATUS	Illicit Discharge tracking status – tied to ***npdesIDDE_Status*** domain.	Identify as Active or Closed
COMMENTS	Narrative field - unique circumstances in feature or attributes only.	Separate comments with # sign.
INSPECTOR	Name of person conducting outfall screening	First and last name.
HUC12	Hydrologic Unit Code - from USGS	Identify the 12-digit hydrologic unit code for the subwatershed in which the illicit discharge outfall is located.
WATERSHED_NAME	Watershed Name – assigned by Berkeley County	Identify the watershed in which the illicit discharge outfall is located.
PHOTO_FILENAME	Photo filename and photo number	May use ***uattachment*** domain options (area, internal, issue, etc.) in filename
PHOTO_PATH	Directory location where photo file is stored	Files are stored on a server separate from the GIS database.
PHOTO_RELPATH	Relative directory location where photo file is stored	// allows gdb to find the photo if server is mapped under a different letter.
XCORD	X-Coordinate from GPS	Calculate using survey grade GPS point
YCORD	Y-Coordinate from GPS	Calculate using survey grade GPS point
ZCORD	Z-Coordinate from GPS	Calculate using survey grade GPS point
GRID	Map Grid number where the feature is located	Custom grid for Berkeley County

IDDE Track Notes

→ This feature class stores the downstream location of potential illicit discharges.

→ One to Many relationship with this feature class allows each outfall screening event to create a new record, all tied back to the AssetID.

IllicitDischargeSource

Field Name	Field Description	Additional Notes
ASSETID	ASSETID – unique identifier code	To be used within GIS as the primary linkage field.
GISOBJID	EAM ID - Enterprise Asset Management Servicer	Unique identifier for enterprise asset management system.
INSPECTOR	Name of person conducting outfall screening	First and last name. Should match inspector name in IDDETrack of downstream location.
INVENTORY_DATE	The date of illicit discharge tracking to upstream source.	Field observations date. Should match NPDESScreen table Inspection Date and IDDETrack Inspection Date. If dates do not match, note reason in Comments field.
ILLICIT_DESC	Description of identified source of discharge – tied to ***npdesIllicitDesc*** domain.	Options are: Obvious Discharge, Suspect Discharge, Potential Discharge, Unlikely Discharge
SOURCE	Upstream source of the illicit discharge – tied to ***npdesIllicitSource*** domain.	Identify source of pollutants. Options are: industrial facility, construction site, auto body repair/gas station, car wash, outdoor materials/wastes storage, restaurant/grease trap, sanitary sewer overflow, illicit sanitary sewer connection, residential area, septic tank, illegal dumping or Unknown.
CASESTATUS	Illicit Discharge tracking status – tied to ***npdesIDDE_Status*** domain	Identify as Active or Closed
OWNER	Owner of parcel where upstream source is located.	Use County tax/property owner records.
TAXMAP	Parcel number where upstream source is located.	Use County tax/property owner records.
ADDRESS_NO	Street number where upstream source is located.	Use County tax/property owner records.
ADDRESS_ST_PREFIX	Street prefix where upstream source is located.	Use County tax/property owner records.
ADDRESS_NAME	Street name where upstream source is located.	Use County tax/property owner records.
ADDRESS_SUFFIX	Street suffix where upstream source is located.	Use County tax/property owner records.
CITY	City where upstream source is located.	Use County tax/property owner records.
STATE	State where upstream source is located.	Use County tax/property owner records.
ZIPCODE	Zip code where upstream source is located.	Use County tax/property owner records.
COMMENTS	Narrative field - unique circumstances in feature or attributes only.	Note relevant details of source, or if source is determined to be an authorized nonstormwater discharge (i.e., air conditioner condensate, landscape sprinklers, etc.)
HUC12	Hydrologic Unit Code - from USGS	Identify the 12-digit hydrologic unit code for the subwatershed in which the illicit source is located.

Field Name	Field Description	Additional Notes
WATERSHED_NAME	Watershed Name – assigned by Berkeley County	Identify the watershed in which the illicit discharge source is located.
PHOTO_FILENAME	Photo filename and photo number	May use ***uattachment*** domain options (area, internal, issue, etc.) in filename
PHOTO_PATH	Directory location where photo file is stored	Files are stored on a server separate from the GIS database.
PHOTO_RELPATH	Relative directory location where photo file is stored	// allows gdb to find the photo if server is mapped under a different letter.
XCORD	X-Coordinate from GPS	Calculate using survey grade GPS point
YCORD	Y-Coordinate from GPS	Calculate using survey grade GPS point
ZCORD	Z-Coordinate from GPS	Calculate using survey grade GPS point
GRID	Map Grid number where the feature is located	Custom grid for Berkeley County

Illicit Discharge Source Notes

→ This feature class stores the upstream location of illicit discharges which have been tracked to their source.

→ One to Many relationship with this feature class allows each outfall screening event to create a new record, all tied back to the AssetID.

NPDESScreen - Table

Field Name	Field Description	Additional Notes
ASSETID	ASSETID – unique identifier code	To be used within GIS as the primary linkage field.
GISOBJID	EAM ID - Enterprise Asset Management Servicer	Unique identifier for enterprise asset management system.
LEGACYID	Legacy ID – former AssetIDs in County's database	Use in processing former data and tracking changes.
GlobalID	Global Identifier code	Primary identifier never changes.
NPDESID	NPDES Permit Number	NPDES Permit number of MS4 (Berkeley County, Hanahan, Goose Creek) where outfall is located, or other NPDES permitted outfall.
Inspector	Name of person conducting outfall screening	First and last name.
INSPECDATE	Date of NPDES outfall screening	Inspection date should match with IDDETrack feature class Inventory Date.
WEATHER	Weather conditions at time of screening	Use local weather report.
LASTRAIN	Last rainfall event prior to screening - tied to ***npdesLastRain*** domain	Identify: less than 24 hrs, 24 to 48 hrs, 48 to 72 hrs, greater than 72 hrs. Use local weather report and rainfall data.
TIDELEVEL	Tide at time of screening - tied to ***npdesTideLevel*** domain	Check local tide table: low tide, mid tide or high tide.
IMPENDING_TIDE	Tide at time of screening – tied to ***npdesImpendingTide*** domain.	Check local tide table. Indicate Rising or Falling tide.
FLOW	Flow rate of discharge - tied to ***npdesFlow*** domain	Options are: dry, trickle, low steady flow, significant flow, or submerged. If dry, populate stains, scum, odor and/or vegetation.
DischargeR	Estimated flow rate at outfall at time of sample collection.	Visual estimate based on pipe diameter.
EvidIllicit	Evidence of illicit discharge - tied to ***YesNo*** domain	If yes, populate observation and sampling fields. If no, populate Date, Inspector, Weather, LastRain, TideLevel and Condition.
COLOR	Color of discharge - tied to ***npdesColor*** domain	Options are: clear, slightly tinted, rust, intense, black, white, oily. Note identifying details in Comments field.
ODOR	Odor of discharge - tied to ***npdesOdor*** domain	Options are: none, sewage, chlorine, petroleum, chemical, sulfide, rancid/sour.
TURBIDI	Discharge turbidity - tied to ***npdesTurb*** domain	Options are: clear, slight cloudiness, cloudy.
FLOATAB	Discharge floatables - tied to ***npdesFloatable*** domain	Identify: foam, sewage, petroleum, film, none.
STAINS	Stains or residue from the discharge left on the conveyance system - tied to ***npdesStains*** domain	Options are: powder, rust, petroleum, none.
Scum	Scum in discharge or on asset - tied to ***YesNo*** domain	Yes if scum line is visible on structure or vegetation.
VEGETATION	Vegetation growth in the immediate discharge area - tied to ***npdesVeg*** domain	Identify: normal, slight or excessive vegetation.

Field Name	Field Description	Additional Notes
CONDITION	Structural or overall condition of the asset - tied to ***Condition*** domain	Blockage/obstruction of asset stored in separate attribute.
BlckPrcntg	Percent blockage at outfall – tied to ***npdesBlockPercent*** domain	Estimate blockage of cross-sectional area of flow in increments of 25%.
BlckType	Type of blockage	State what object or material is blocking the discharge point.
BlckRsn	Reason for blockage – tied to ***npdesBlockReason*** domain	Reasons may be structural (collapse), temporary (parked vehicle) or other.
NumSmpl	Sample number – tied to ***npdesNumSmpl*** domain	Options are: First Sample, Second Sample, No Sample-Assessment Only, Illicit Tracking/Sampling.
pH	pH of sample at time of collection	Use probe.
Temp	Temperature of sample at time of collection (°C).	Use probe.
Chlorine	Total Chlorine concentration of sample at time of collection (mg/L).	Use mobile sampler.
Copper	Total Copper concentration of sample at time of collection (mg/L).	Use mobile sampler.
Phenol	Total Phenol concentration of sample at time of collection (mg/L).	Use mobile sampler.
Surfact	Surfactant concentration of sample at time of collection (mg/L).	Use mobile sampler.
Enterococcus	Concentration of Enterococcus indicator bacteria for saltwaters (MPN/100mL).	Collect grab sample and send to lab.
E. Coli	Concentration of E. Coli indicator bacteria for freshwaters (MPN/100mL).	Collect grab sample and send to lab.
Fecal Coliform	Concentration of Fecal Coliform indicator bacteria for shellfish harvesting (MPN/100mL).	Collect grab sample and send to lab.
COMMENT	Narrative field - unique circumstances in feature or attributes only.	Separate comments with # sign.
PIC_NUM	Photo filename and photo number	May use ***uattachment*** domain options (area, internal, issue, etc.) in filename.
PhotoHyperlink	Directory location where photo file is stored	Files are stored on a server separate from the GIS database.

NPDES Screen Notes

→ This table stores the outfall screening visual observations, measurements and sampling results performed at locations of potential illicit discharges.

→ Downstream location of illicit discharge is stored in IDDETRACK feature class.

→ Upstream location of pollutant source of illicit discharge is stored in ILLICITDISCHARGESOURCE feature class.

→ One to Many relationship with this feature class allows each outfall screening event to create a new record, all tied back to the AssetID.

Outfall Screening Domains

npdesColor (DISCHARGE POINTS) • Clear • Slightly Tinted • Rust • Intense • Black • White • Oily • Other (See Comment)	**npdesOdor (DISCHARGE POINTS)** • None • Sewage • Chlorine • Petroleum • Chemical • Other (See Comment) • Sulfide • Rancid/Sour
npdesTurb (DISCHARGE POINTS) • Clear • Cloudy • Slight Cloudiness • Other (See Comment)	**npdesFloatable (DISCHARGE POINTS)** • None • Foam • Petroleum • Sewage • Film • Other (See Comment)
npdesFlow (DISCHARGE POINTS) • Dry • Trickle • Low Steady Flow • Significant Flow • Submerged	**npdesLastRain (DISCHARGE POINTS)** • Greater than 72hrs • 48 to 72 hrs • 24 to 48 hrs • Less than 24 hrs
npdesTideLevel (DISCHARGE POINTS) • Low tide at time of inspection • Mid tide at time of inspection • High tide at time of inspection	**npdesImpendingTide (DISCHARGE POINTS)** • Rising • Falling
npdesStains (DISCHARGE POINTS) • None • Powder • Rust • Petroleum • Other (See Comment)	**npdesVeg (DISCHARGE POINTS)** • Normal • Slight • Excessive • Other

npdesBlockReason (DISCHARGE POINTS)	**npdesBlockPercent (DISCHARGE POINTS)**
• Permanent (structural) • Temporary • Other	• Less than 25 percent • 25 to 50 percent • 50 to 75 percent • More than 75 percent
npdesReportHow (DISCHARGE POINTS)	**npdesReason (DISCHARGE POINTS)**
• Complaint Call/Report • Outfall Screening • Other-Describe in Comments	• Random Selection of Outfalls • Citizen Complaint • Re-Inspection of previous illicit discharge
npdesIllInvest (DISCHARGE POINTS)	**npdesIllicitDesc (DISCHARGE POINTS)**
• No Illicit • Possible Illicit-Investigation Needed • Possible Illicit-On-Going investigation • Possible Illicit-Return for Additional Sampling • Illicit-Source Found • Illicit-Enforcement in Progress • Illicit-Investigation Closed	• Obvious Discharge • Suspect Discharge • Potential Discharge • Unlikely Discharge
npdesNumSmpl (DISCHARGE POINTS)	**npdesIDDE_Status (DISCHARGE POINTS)**
• First Sample • Second Sample • No Sample-Assessment Only • Illicit Tracking/Sampling	• Active • Closed
npdesIllicitSource (DISCHARGE POINTS)	**Condition (DISCHARGE POINTS)**
• Industrial facility • Construction site • Auto body repair/gas station • Car wash • Outdoor materials/wastes storage • Restaurant/grease trap • Residential area • Sanitary sewer overflow • Septic tank • Illicit San Sewer Connection • Illegal dumping • Unknown	• Excellent • Very Good • Good • Fair • Poor • Very Poor • Unknown • Needs Service

Appendix B - Stormwater Inventory Illustrated Guide

Appendix C - Public Notification Letter

BERKELEY COUNTY
STORMWATER MANAGEMENT PROGRAM
212 Oakley Plantation Drive
Moncks Corner, SC 29461
Main Line: 843.719.4195 – Charleston: 843.572.4400 (ext. 4195) –
St. Stephens 843.567.2061 (ext. 4195)
webswmp@berkeleycountysc.gov

PUBLIC NOTIFICATION LETTER

Month DD, YYYY

Dear Property Owner,

Berkeley County is conducting an outfall inventory of the County's stormwater management system to meet the requirements of our National Pollutant Discharge Elimination System (NPDES) stormwater permit, as required by EPA and SCDHEC. (Insert Company Name) has been contracted by the County to perform stormwater system data collection for this permit. The data collected will include features related to the storm drainage system, including manholes, inlets, pipes, culverts, ponds, channels, and outfalls to creeks and streams throughout the County. Please allow (Insert Company Name)'s field personnel access to stormwater system components on your property for the purpose of data collection.

(Insert Company Name) personnel are part of the stormwater data collection team. Field personnel will be identified by name badges, safety vests and/or other items of identification. Each will carry identification and can provide additional site specific information if necessary. Field personnel will take measurements and will use GPS or survey equipment and cameras in order to collect data.

Berkeley County and (Insert Company Name) appreciate your cooperation and understanding. If you have any questions or would like any further information please contact Berkeley County Stormwater at (Phone Number).

Sincerely,

County Engineer

Appendix D - Traffic Safety Plan

TRAFFIC SAFETY PLAN

1. Introduction

Each watershed area within Berkeley County has unique characteristics which present different safety challenges to field personnel. Municipal stormwater infrastructure is primarily located in road rights of way, which necessitates field personnel to work around live and moving traffic when collecting data. Field personnel will work in residential, commercial and industrial areas, in and near primary and secondary roads and parking lots. They may encounter vehicular traffic, property owners, pedestrians and other members of the public. This Traffic Safety Plan covers the general safety requirements for the County's GIS/GPS field data collection, including outfall screening. Traffic safety requirements will be implemented whenever workers are located within 20 ft. of moving traffic. Situations may be encountered in the field that require additional planning and protection procedures; these should be described in site-specific Safe Work Plan.

2. Fitness for Duty

Working around live and moving traffic poses a significant hazard that requires field personnel to be attentive and alert. Field personnel must arrive at the work site fit for duty and capable to perform their job responsibilities in a safe, secure, productive and effective manner during the entire time they are working.

3. Training

All field staff will receive on-site orientation regarding traffic safety hazards and controls. The flagman shall be trained in appropriate signaling and communication. Traffic safety and control will be overseen by a competent person.

4. Hazard Identification

Project site orientation and identification of hazards is a critical first step in developing a safety plan. Field personnel may encounter a variety of safety concerns in the project area, for example, narrow roadways with limited shoulder area for equipment setup, highways with multiple lanes of traffic, deep roadside ditches with flowing or standing stormwater, or stormwater infrastructure located in the middle of the road. As field personnel proceed from site to site, traffic conditions and site situations may change requiring a new hazard assessment and a corresponding change in safety and traffic control procedures.

5. Traffic Protection

The majority of the field work can be accomplished without the necessity for lane closures. When field work is conducted near moving traffic without encroaching in the travelled portion of the road, the following are minimum guidelines applicable to field personnel:

- PPE: Wear the appropriate personal protective equipment to ensure personnel are visible to vehicular traffic. A tear-away fluorescent reflective vest (and retro-reflective stripes on the arms and legs for night work or during periods of limited visibility) should be worn at all times.
- Flagman:
  - Include at least one crew member trained to serve as a flagman on each field team. The flagman is responsible for directing traffic using a STOP/SLOW or SLOW/SLOW sign as required to maintain the safety of the public and field personnel. The flagman should be utilized any time field personnel are working at the edge of a roadway. The flagman must follow the procedures set forth in the SCDOT Work Zone Safety handbook.
  - Stand in a safe position, be clearly visible, have an unobstructed view of approaching traffic, and be positioned a suitable distance away or from the work area (a distance permitting vehicles to slow down or stop before reaching the work area) unless circumstances or space requirements, such as working at or near an intersection, dictate otherwise.
- Signage:
  - Set out signage to signify workers are performing work on the side of the road.
  - Ensure signage meets local legislation requirements and is of acceptable standards, in good condition, clean, legible, suited to the purpose.
  - Secure or weight all signage.
  - Routinely inspect signage for placement, cleanliness, and physical damage.
  - Post "Survey Crew Ahead" or similar signage in advance of each flagman's station. Remove signs promptly when the flagging operation terminates.
- Parking:
  - Pull field vehicles off as far to the right of the travelled portion of the road as possible. Avoid parking at the top of earthen ditches. Confirm that the shoulder of the highway or street where parking the vehicle is wide enough to allow for safe ingress and egress from the vehicle.
  - Park the vehicle at least 100 feet in advance of the work area or the flagman's station. Position the vehicle between the flagman and the work crew. Position vehicles to protect workers from traffic.
  - Use spotters when backing up vehicles.

- Turn the vehicle's tires so that if the vehicle is struck, it will turn away from workers.

- Flashers: Activate the four-way flashers on the vehicle prior to exiting the vehicle.
- Weather Conditions: Ensure signage and flashing lights are visible under low light conditions and during rain or other weather events.
- Escape Route: Plan an escape route prior to exiting the vehicle.
- Loading/Unloading: Load and unload materials or equipment from the passenger side of the vehicle.
- Buddy System: Use the buddy system in heavy traffic areas. Avoid turning your back to oncoming traffic. Designate one person to watch traffic at all times.
- Situational Awareness: Be aware of mobile or heavy equipment that may be operating in the work area. Be aware of visibility limits and blind spots.
- Entry to Roadway: Do not enter onto the travelled portion of the road except to cross the road. Execute road crossings at a ninety degree angle to the direction of the road, at a crosswalk if possible. For roads with more than two lanes, use a vehicle to cross the roadway at the next intersection. Use extreme caution on narrow roadway shoulders, especially those without a curb or other barrier.

For guidance when conducting shoulder work with no encroachment, see typical application diagrams in *Exhibit A*, *Shoulder Work (Beyond 15' From the Edge of Pavement)*, and *Exhibit B*, *Shoulder Work (1' – 15' From the Edge of Pavement)*.

6. Traffic Control

Traffic Control is required for all field work conducted within the roadway. If traffic diversion or lane closures are required, coordination is carried out with the County and the South Carolina Department of Transportation (SCDOT). The Traffic Control plan will be reviewed by the site supervisor prior to beginning field work.

Follow the Work Zone Safety Guidelines for the South Carolina Department of Transportation, Municipalities, Counties, Utilities, and Contractors (SCDOT Work Zone Safety handbook, 2013 (or latest version)) for all traffic diversion, lane closures and traffic control. The handbook presents information and provides examples of typical traffic control applications for work zones on two-lane and multi-lane secondary and primary routes. The handbook is not intended for traffic control applications on interstate routes.

Work duration is a major factor in determining traffic control requirements. In general, longer duration work requires more traffic control devices. Based on the SCDOT Work Zone Safety Handbook definitions, stormwater mapping and inventory work may fall into two categories:

- Short Duration: Work that occupies a location up to 1 hour
- Short-Term Stationary: Daytime work that occupies a location from 1 to 12 hours

The SCDOT Work Zone Safety Handbook provides guidance for short duration and short-term stationary traffic control applicable to a variety of scenarios, including shoulder work and lane closures.

Examples of traffic control devices which may be used in work zones are signs, traffic cones, and warning lights. When planning for Traffic Control, consideration must be given to the posted speed limit, proximity to traffic, duration of the work, and traffic volume. Special attention should be given to schools and other facilities that generate additional traffic, and to peak-hour traffic increases. Part 6 of the Manual on Uniform Traffic Control Devices (MUTCD) contains the national standards for work zone traffic control. A Traffic Control Zone typically consists of five (5) parts:

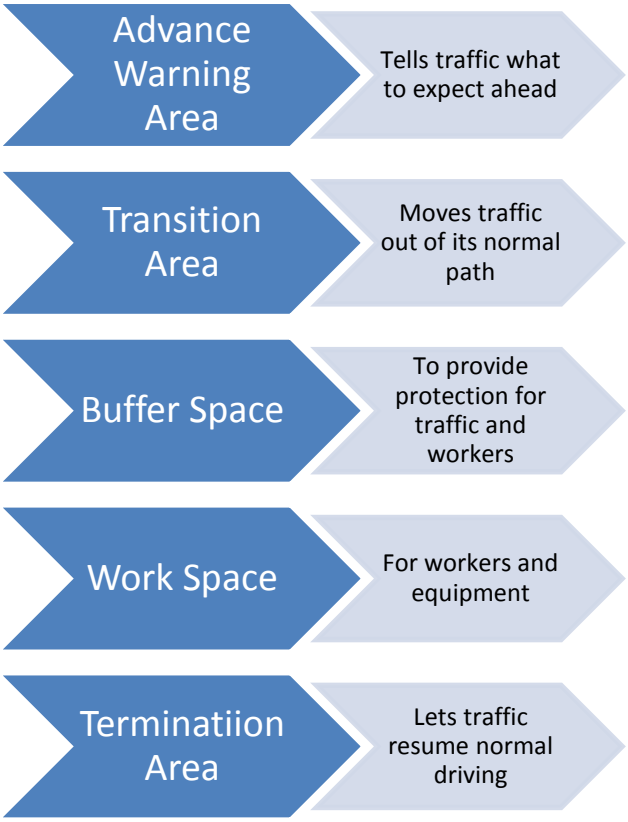


Figure D-1: Traffic Control Zone

Summary

Field personnel should follow the Traffic Protection guidelines at all times when conducting work near moving traffic. Traffic Control is required for all field work conducted within the roadway. Traffic Control, including traffic diversions or lane closures, should be coordinated and carried out with the County and SCDOT.

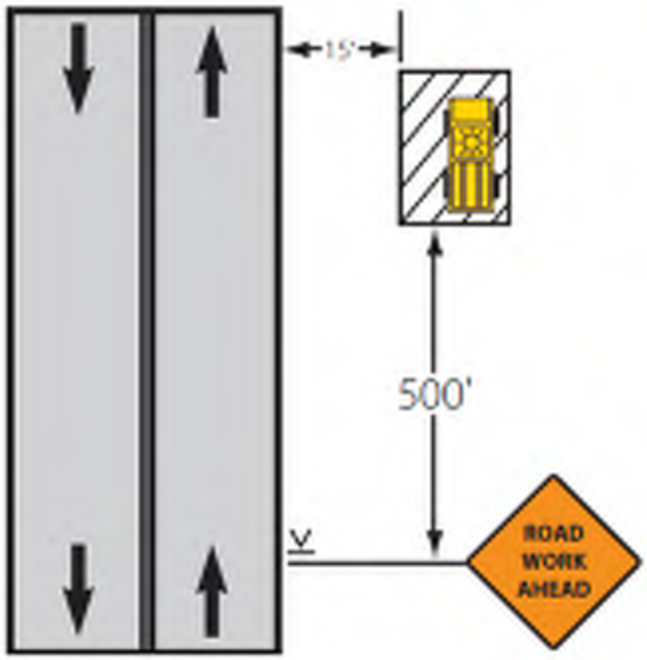
Safety planning and implementation requires constant vigilance, updates due to changing conditions, and regular safety meetings. This Traffic Safety Plan provides general guidance for working around live and moving traffic expected to be encountered under normal fieldwork conditions. Additional planning and protection measures should be addressed in a site-specific Safe Work Plan.

EXHIBIT A

Shoulder Work

(Beyond 15' From the Edge of Pavement)

Distances subject to adjustment depending on field conditions. Additional acceptable signage: "Survey Crew Ahead"



Notes:

1. For low speed conditions (35 MPH or less), a 200-foot sign spacing may be used. For speeds of 40 to 50 MPH a 350-foot sign spacing may be used.
2. For operations of 60 minutes or less, all signs and channelizing devices may be eliminated **if the work vehicles are equipped with an activated amber rotating, flashing, or strobe light mounted on top of each vehicle in accordance with the following conditions:**

   If the vehicle and work activity are both behind guardrail or beyond 15' but within 30' of the near edge of an adjacent travel lane.

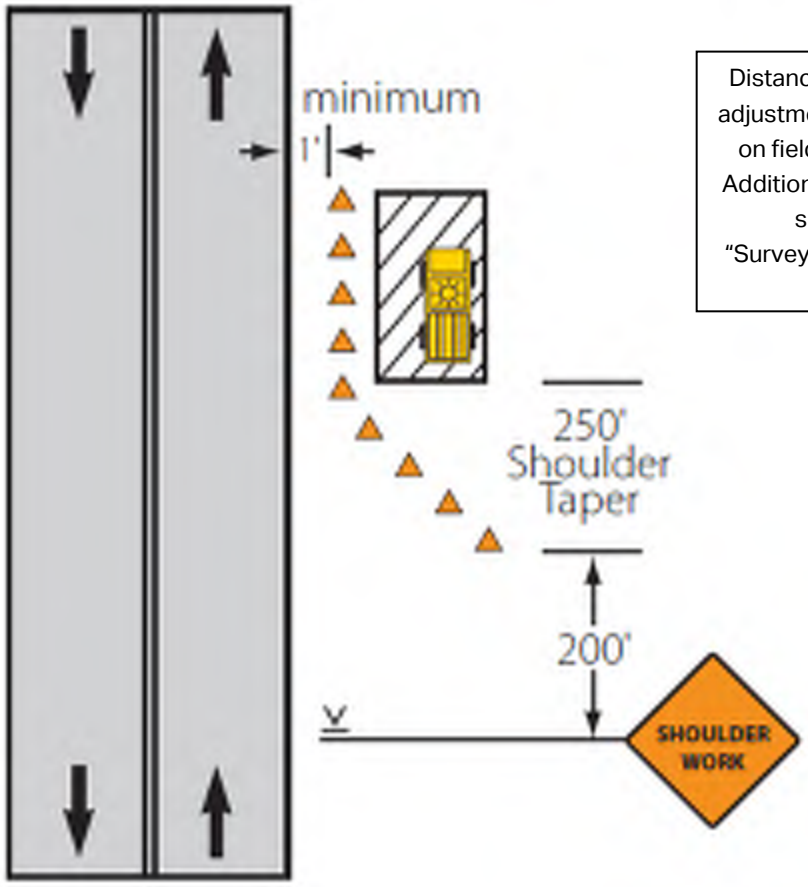
   Vehicle hazard warning signals are not an acceptable alternative.
3. An advance warning sign is required at all times during the performance of work within 30' of the near edge of an adjacent travel lane, if the vehicles or equipment will intermittently access the work space from the roadway during the performance of the work, if equipment will travel on or cross the highway, or if the activity may distract motorists.
4. Acceptable advance warning signs are those indicating "Shoulder Work", "Road Work Ahead", or "Utility Work Ahead"

Source: *2013 Work Zone Safety Guidelines for the South Carolina Department of Transportation, Municipalities, Counties Utilities, and Contractors.*

EXHIBIT B

Shoulder Work

(1' – 15' From the Edge of Pavement)
(Short-Term Stationary — 1 to 2 Hours)



Distances subject to adjustment depending on field conditions. Additional acceptable signage: "Survey Crew Ahead"

Notes:

1. For intermediate speed conditions (40 to 50 MPH), a 350-foot sign spacing may be used, and for high speed conditions (55 to 60 MPH), use a 500-foot sign spacing.
2. For short-term stationary work zones in a shoulder area, an array of advance warning signs is required. Install these advance warning sign arrays as follows:
   a. Low Speed Conditions (35 MPH or less) – this sign array will include "Shoulder Work".
   b. Intermediate Speed Conditions (40 to 50 MPH) – this sign array will include "Road Work Ahead", "Right (Left) Shoulder Closed Ahead", and "Shoulder Work".
   c. High Speed Conditions (55 to 60 MPH) – this sign array will include "Road Work 1500 FT", "Right (Left) Shoulder Closed 1000 FT", and "Right (Left) Shoulder Closed 500 FT".
3. "Utility Work Ahead" or "Workers" symbol signs may be used instead of the "Shoulder Work" sign.

Statement of Limitations

About AECOM

AECOM is built to deliver a better world. We design, build, finance and operate infrastructure assets for governments, businesses and organizations in more than 150 countries. As a fully integrated firm, we connect knowledge and experience across our global network of experts to help clients solve their most complex challenges. From high-performance buildings and infrastructure, to resilient communities and environments, to stable and secure nations, our work is transformative, differentiated and vital. A Fortune 500 firm, AECOM had revenue of approximately $17.4 billion during fiscal year 2016. See how we deliver what others can only imagine at aecom.com and @AECOM.

AECOM
4016 Salt Pointe Pkwy
North Charleston, SC 29405
T 843.767.4602

Appendix F: Enforcement Response Plan

ENFORCEMENT RESPONSE PLAN (ERP)

Berkeley County, Goose Creek, and Hanahan

South Carolina

December 2019

ENFORCEMENT RESPONSE PLAN
Berkeley County, Goose Creek, and Hanahan
South Carolina

Table of Contents

Contents

I. INTRODUCTION

This Enforcement Response Plan (ERP) document was developed as a guidance manual for identifying specific violation types, defining Berkeley County's response to violations, and noncompliance of the Stormwater Management Ordinance of Berkeley County, SC (Ordinance No. 14-11-36), the Berkeley County Stormwater Design Standards Manual, site specific stormwater management plans, and meet the requirements of the SCDHEC Small Municipal Separate Storm Sewer System (SMS4) Permit. The ERP also specifies criteria by which Berkeley County personnel can determine the enforcement response within the City of Goose Creek and the City of Hanahan per the amended Stormwater Management Ordinances of Goose Creek (Ordinance No. 18-024) and Hanahan (Ordinance No. 5-2018). The goals of the Enforcement Response Plan are to:

1) Prevent pollutants from entering the Municipal Separate Storm Sewer System (MS4) and causing environmental harm.

2) Define criteria for noncompliance.

3) Deter future noncompliance by the violator and other members of the regulated community.

4) Ensure that violators do not obtain economic benefit or advantage over competitors through noncompliance.

5) Apply fair and consistent enforcement actions to the regulated community throughout the County, the City of Goose Creek, and the City of Hanahan.

Upon determination that a violation of any provisions referenced above have occurred, the County will notify the responsible party(s) and may choose to assess and make a written demand for payment of a Civil Penalty. In addition to any applicable Civil Penalties (See Stormwater Management Ordinance Div. 6):

- Any person(s) or entity that negligently or intentionally violates any provision of the above with wanton disregard shall be guilty of a misdemeanor and punished within the jurisdictional limits of the magistrate's court.

- Berkeley County may withhold the release of permanent electric power to the site.

- Berkeley County may withhold, or revoke permits related to the site.

- If Berkeley County performs corrective action due to continued non-compliance, then the costs incurred as a result of such action shall be reimbursed to Berkeley County by the owner or operator.

- If Berkeley County, City of Goose Creek, or City of Hanahan is fined and/or placed under a compliance schedule by the state or federal government for a violation(s) of its NPDES permit and can identify the person(s) or entity who caused such violation(s) to occur, then Berkeley County, City of Goose Creek, or City of Hanahan may pass through the penalty and cost of compliance to that person(s) or entity.

Violations can be categorized as either minor, moderate, or major. The severity of the violation can be based on but not limited to the degree of harm or potential for harm to the public health, safety, private property, or the environment, the extent of deviation from the requirements of the regulation, standard, or permit, the frequency or duration of the violation, the economic benefit as a result of noncompliance, the cost of restoration of the environment or abatement of the environmental harm, the past performance record or past history of noncompliance, or the degree of willfulness or negligence.

Minor Violations - typically have not caused an immediate threat to the environment or SMS4 and most often only require a verbal or written warning.

Moderate Violations - dependent upon the extent of deviation from the requirements of the regulation, standard, or permit and the frequency or duration of the violation after issued notice to comply.

Major Violations - assessed when the operator has failed to comply with the above referenced stormwater management program ordinances or has not complied with violation notices, and such negligence has caused an immediate or significant impact on the environment or SMS4.

Berkeley County may determine the severity of a violation at its discretion. This Enforcement Response Plan (ERP) document is for the use of Berkeley County personnel. Berkeley County reserves the right to change this document at any time, without prior notice, or to act at variance to this document. This document does not create any rights, implied or otherwise, to any third parties.

II. ENFORCEMENT ACTION DEFINITIONS

Correction Order:

(Stormwater Design Standards Manual Sec. 4.3.1)

The Correction Order is a **written or verbal** notice for first offenses of non-compliance with the County Stormwater Management Ordinance or the approved stormwater management plan. The purpose of the Correction Order is to give notice of the deficiencies, identify expected corrective results and provide a reasonable timeframe to the contractor prior to the County taking further action to get a problem resolved. Correction Orders shall be submitted in writing, but a **verbal notice** may be given if the deficiency needs immediate correction to prevent offsite or downstream impacts.

Notice of Violation (NOV):

(Stormwater Management Ordinance Sec. 6.1.b and Stormwater Design Standards Manual Sec. 4.3.2)

The Notice of Violation is a written notice which serves as a legal requirement to remove the violation(s), of the County Stormwater Management Ordinance or the approved stormwater management plan. The NOV shall be provided to the owner or the person(s) deemed responsible for violations of the County Stormwater Management Ordinance or the approved stormwater management plan, stating the nature of the violation, the amount of time in which to correct deficiencies, the date on which an inspection will be made to make sure that corrective action has been performed, and the proposed penalty structure if corrective action is not taken by the inspection date. The NOV may address the entire site or a specific portion of the site.

Stop Work Order:

(Stormwater Management Ordinance Sec. 6.6 and Stormwater Design Standards Manual Sec. 4.3.3)

The Stop Work Order may allow or require correction of Notice of Violation (NOV) issues but shall otherwise stop all other construction related activities. A Stop Work Order may carry with it, Civil Penalties as well. Any person in violation of a Stop Work Order is subject to payment of all fees, bonds, and penalties prior to the lifting of the Stop Work Order.

Civil Penalty:

(Stormwater Management Ordinance Sec. 6.2 and Stormwater Design Standards Manual Sec. 4.3.3)

Any person violating any provision of the Stormwater Management Ordinance or approved stormwater management plan shall be subject to a Civil Penalty of not more than one thousand dollars ($1000) for each violation. Each separate day of a violation constitutes a new and separate violation. Notice of Civil Penalty shall be provided via the issuance of a uniform summons.

Criminal Penalty:

(Stormwater Management Ordinance Sec. 6.4)

In addition to any applicable Civil Penalties, any person who willfully, with wanton disregard, or intentionally violates any provision of the Stormwater Management Ordinance or approved stormwater management plan shall be guilty of a misdemeanor and upon conviction shall pay a fine of not more than $500.00 or imprisoned for not more than thirty (30) days. Each day of violation shall constitute a new and separate offense.

Denial of Certificate of Occupancy

(Stormwater Management Ordinance Sec. 6.1.c.3)

After the issuance of the NOV, the County Engineer or his designee is given the authority to proceed with enforcement actions that include withholding the release of permanent power to the site or certificate of occupancy.

Permit Block

(Stormwater Management Ordinance Sec. 6.1.c.4)

Permit Blocks shall be issued if non-compliance continues after issuance of the NOV or non-payment of issued penalties. Persons who have been found to be in violation of any provision of Stormwater Management Program Ordinance or approved stormwater management plan may have other permits related to their site withheld or revoked.

III. ENFORCEMENT RESPONSE LEVELS/PROCEDURE

Violations can vary from site to site and the corrective action taken will be on a case by case basis. Generally, the following levels can be used as guidance on determining the best course of action to take for the different types of violations.

Minor Violations — Administrative issues with relatively low environmental risk and an infrequent record of violation by the operator should cause the following enforcement sequence: Verbal Notice ➡ Written Correction Order ➡ Notice of Violation ➡ Stop Work Order ➡ Citation ➡ Civil Litigation**.**

Moderate Violations — Record keeping and site conditions that pose a relatively moderate/significant environmental risk to discharge pollutants into the SMS4 or adjacent receiving waterbody should cause the following enforcement sequence: Correction Order ➡ Notice of Violation ➡ Stop Work Order ➡ Citation ➡ Permit Block/Denial of C/O ➡ Civil Litigation**.**

Major Violations — Any immediate threat to human health and/or the environment or demonstrated willful noncompliance by an operator should cause the following enforcement sequence: Notice of Violation & Stop Work Order ➡ Citation ➡ Civil Litigation**.**

IV. VIOLATION CATEGORIES

A. Construction/Permitting Violations

Berkeley County has identified areas for focus as high priority elements of the construction site stormwater compliance program. Specifically, Berkeley County inspectors may refer the following situations to Berkeley County Codes Enforcement for Citation after the compliance deadline or for the third NOV that has been issued for any of the following violations:

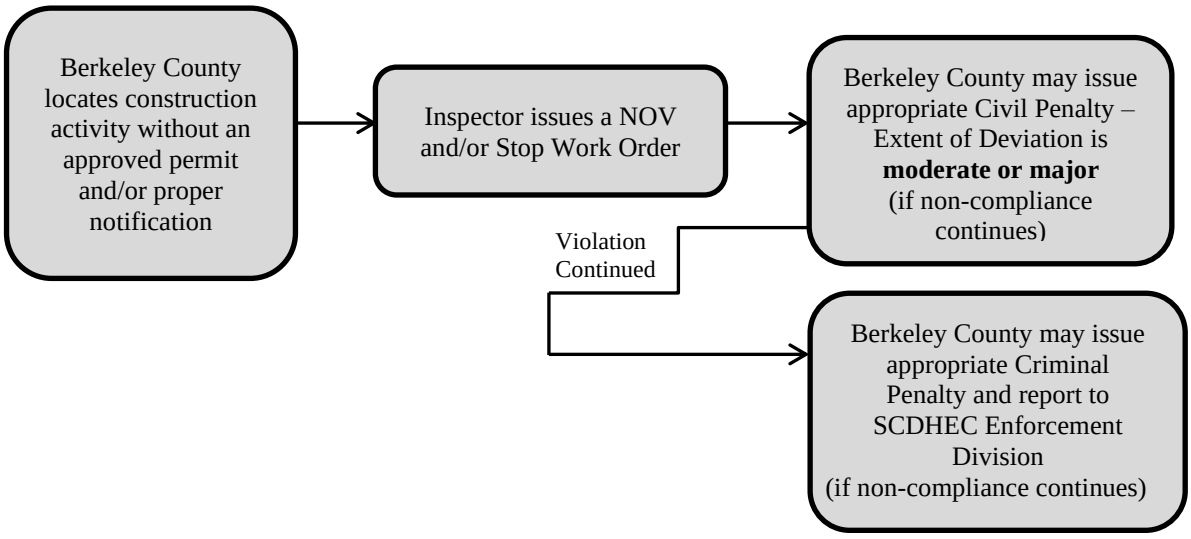
- Failure to obtain a Land Disturbance Permit before initiating land disturbance activities
- Failure to install BMPs before beginning land disturbance activities
- Failure to renew the Land Disturbance Permit upon expiration
- Failure to conduct inspections of BMPs and complete inspection reports

Special focus will be on chronic violators, i.e., individuals, businesses, organizations, or related entities who have received three or more NOVs for the below violations within the previous twelve (12) months, regardless of the site location. Additional guidance is provided to Berkeley County inspectors in the below flow chart scenarios, regarding which violations should result in Correction Orders (Written or Verbal), which should be subject to Notices of Violation, and when Civil Citations should be administered.

1. **Initiation of construction activity without an approved site development/land disturbing permit and/or proper notification.**

Berkeley County response:

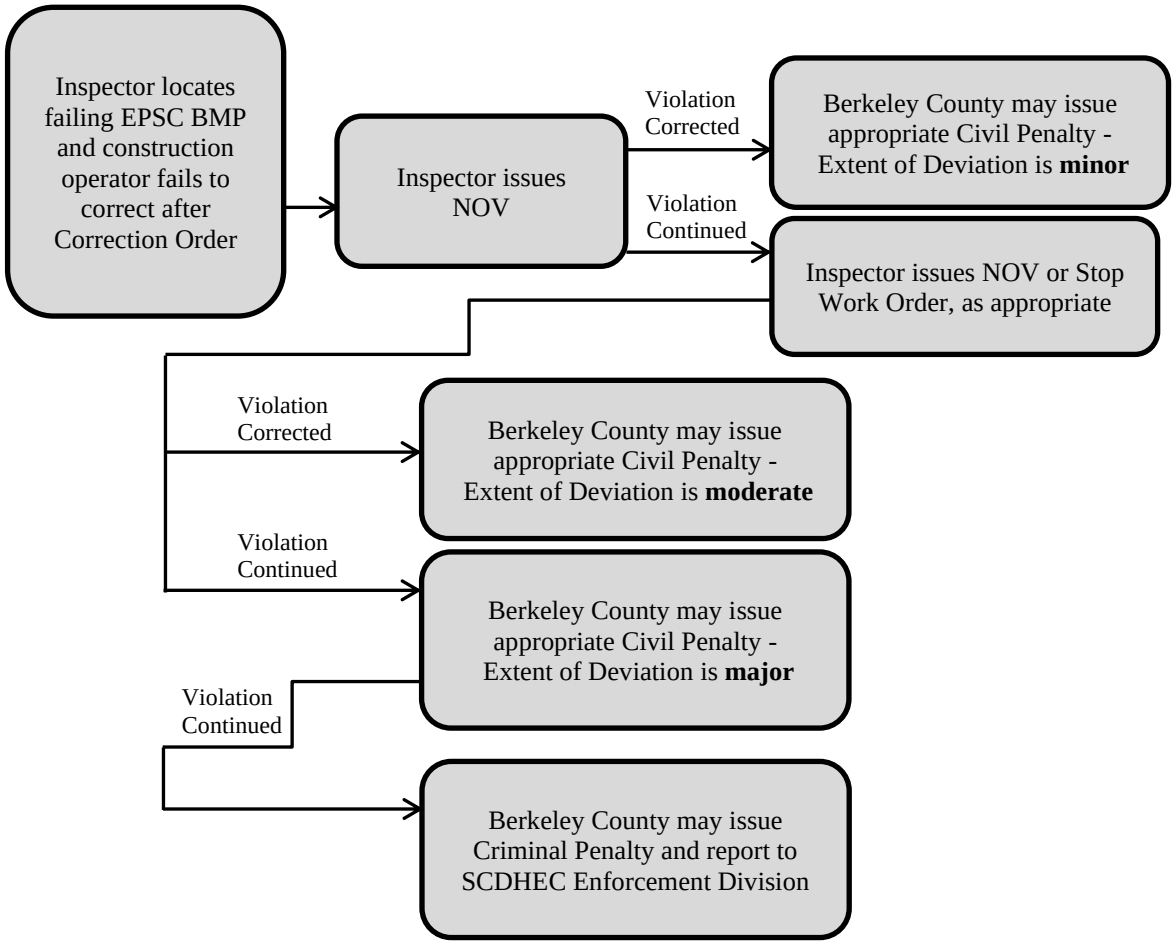
Berkeley County may issue a NOV and/or Stop Work Order, as appropriate, for all violations involving initiation of construction activity without an approved site development/land disturbing permit and proper notification. Appropriate Civil or Criminal Penalties may be issued. A repeat offense of failure to obtain the correct permit and notify the County prior to beginning construction will be considered a major offense. If non-compliance continues, the County may report the violation to SCDHEC Enforcement Division.



2. **Failure to properly operate and/or maintain all BMPs, components, facilities, and equipment associated with site Erosion Prevention and Sediment Control (EPSC).**

Berkeley County response:

In cases of minor violations for operation and maintenance of EPSC BMPs, the inspector may issue a verbal Correction Order prior to issuing written notifications. Berkeley County may issue a NOV if the construction operator fails to correct deficiency after a Correction Order. Berkeley County will conduct follow-up inspections to ensure corrective action is provided. A Stop Work Order or additional NOV may be issued if corrective action is not provided. Appropriate Civil or Criminal Penalties may be issued. If non-compliance continues, the County may report the violation to SCDHEC Enforcement Division.



B. Illicit Discharge/ Illicit Connection/ Improper Waste Disposal

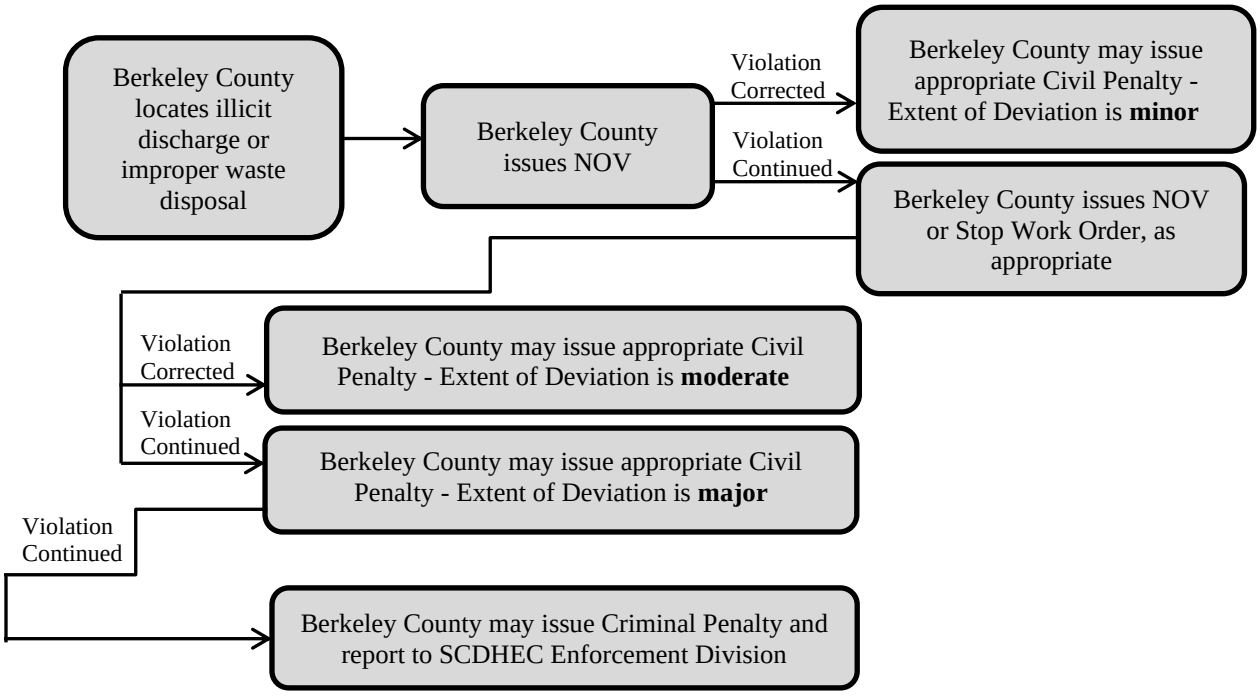
Berkeley County response:

Berkeley County must report immediately the occurrence of any dry weather flows believed to be an immediate threat to human health or the environment to SCDHEC Emergency Response, 1-**888-481-0125**.

If the source of the suspected illicit discharge is found to be a suspected non-compliance with an NPDES permit, the appropriate SCDHEC Regional Office must be notified.

Once the source of the illicit discharge has been determined, Berkeley County will notify the responsible party of the discharge, via NOV or stop work order, within twenty-four (24) hours to three (3) days after that determination, dependent upon the severity of the discharge. The County will require the responsible party(s) to conduct all necessary corrective actions to eliminate the non-stormwater discharge within five (5) business days to thirty (30) business days, dependent upon the severity of the discharge. If the elimination of the discharge will or does take longer than thirty (30) business days, Berkeley County will require responsible parties to submit an action plan with a schedule for elimination. Berkeley County will conduct a follow-up investigation to verify that the discharge has been eliminated upon being notified by responsible parties that the discharge has been eliminated.

Berkeley County may issue a Correction Order prior to the initial NOV. Berkeley County will issue an additional NOV or Stop Work Order, as appropriate, after thirty (30) business days if the illicit discharge has not been eliminated and no schedule for elimination has been submitted. Berkeley County will conduct follow-up inspections to ensure corrective action is provided. Appropriate Civil or Criminal Penalties may be issued. If non-compliance continues, the County may report the violation to SCDHEC Enforcement Division.

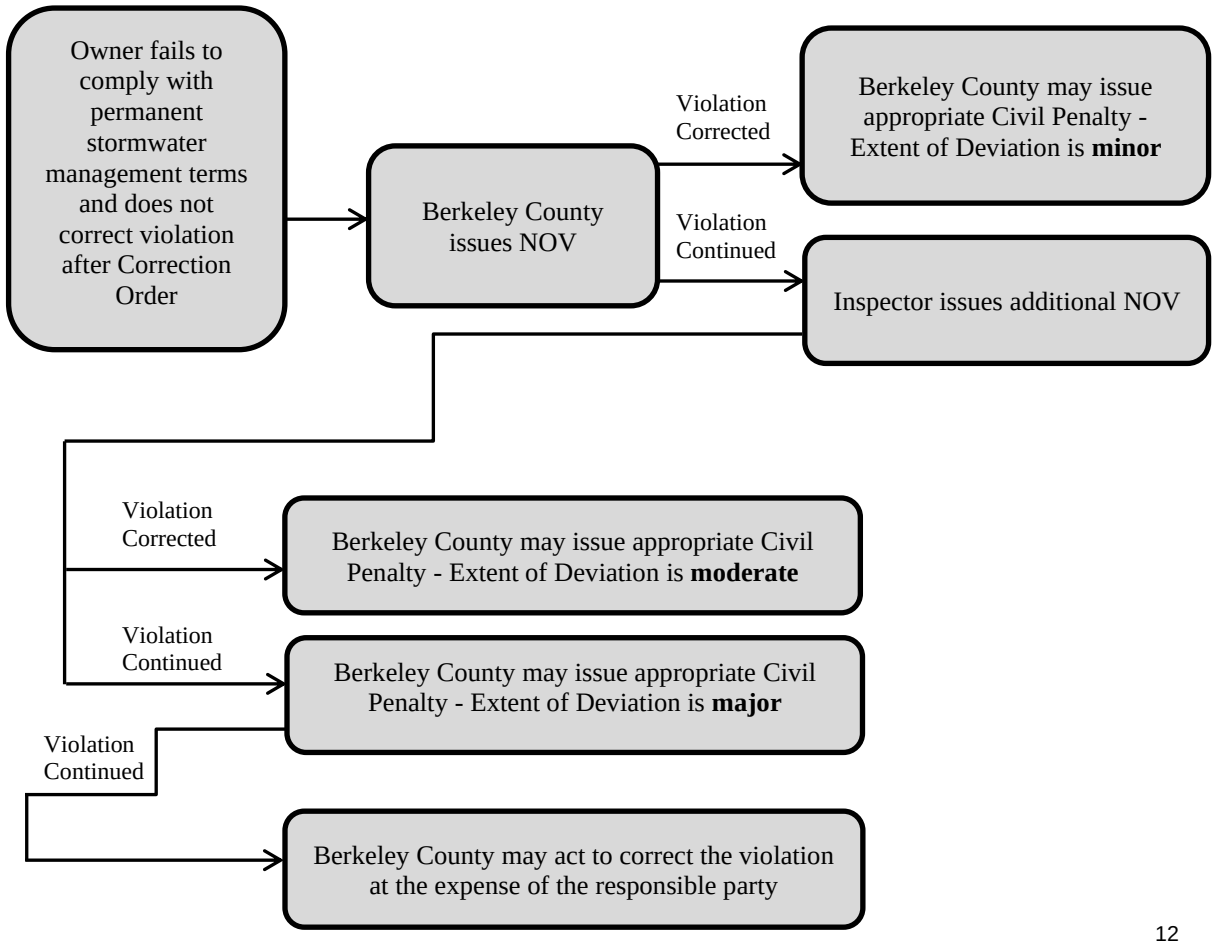


C. Failure to Comply with Permanent Stormwater Management Requirements & Stormwater Maintenance Covenant

Berkeley County response:

The County requires all developers of new and re-development projects to sign a Maintenance Covenant which designates the developer or designee/owner as the responsible party for maintaining and ensuring the proper function of all post construction BMPs. As per Berkeley County's, City of Goose Creek, and City of Hanahan SMS4 NPDES Permit, each respective entity is responsible for inspecting all post construction BMPs permitted, after the effective date of the Permit, at least once during the Permit cycle. Following the County's inspection, an inspection report will be generated and sent to the Permanent Stormwater Management Structure owner.

Berkeley County may issue a verbal Correction Order upon initial discovery of a permanent stormwater management violation. Berkeley County may issue a NOV if the operator fails to correct deficiency after a Correction Order. Berkeley County will conduct follow-up inspections to ensure corrective action is provided. An additional NOV may be issued if corrective action is not provided. Appropriate Civil or Criminal Penalties may be issued if necessary.

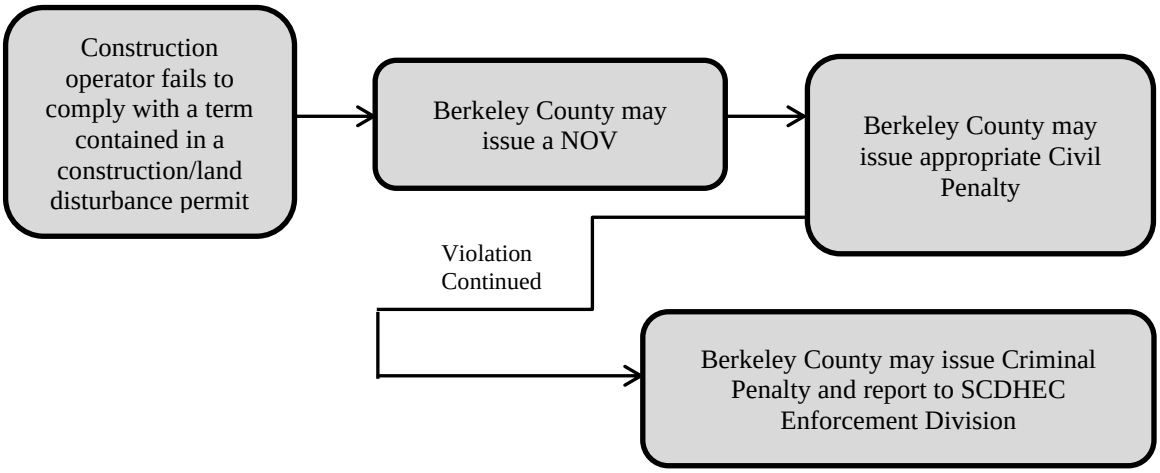


D. Failure to Comply with Permit

Failure to comply with a requirement, condition, or term contained in a construction permit, site development, land disturbance, or grading permit.

Berkeley County response:

Berkeley County may issue Notice of Violation (NOV) upon initial discovery of violation. Berkeley County will conduct follow-up inspections to ensure corrective action is provided. Appropriate Civil or Criminal Penalties may be issued. If non-compliance continues, the County may report the violation to SCDHEC Enforcement Division.

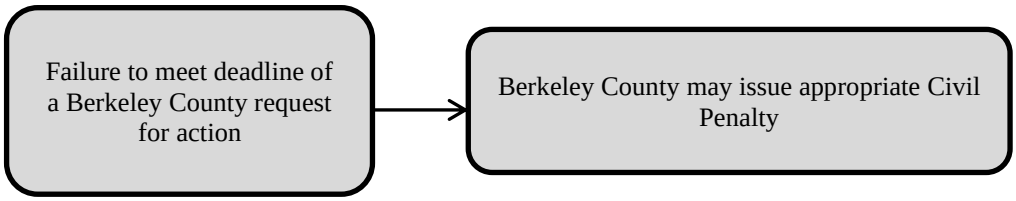


E. Failure to Comply with a County Request

Failure to comply with each requirement, term, or condition of a County request for action.

Berkeley County response:

For instances in which there is a failure to comply with a condition of a County request for action, Berkeley County may issue Civil Penalties when deadlines are not met.



V. PENALTY CALCULATION RATIONALE

The total penalty calculation will include consideration of the following factors at the discretion of Berkeley County:

1) Degree of harm or potential for harm to the public health, safety, private property, or the environment.

2) Extent of Deviation* from the requirements of the regulation, standard, or permit.

3) Frequency or duration of the violation.

4) Economic benefit as a result of noncompliance.

5) Cost of restoration of the environment or abatement of the environmental harm.

6) Past performance record or past history of noncompliance.

7) Degree of willfulness or negligence.

*Extent of Deviation for Civil Penalty comes from flow charts for each violation category. When not specified, the maximum Civil Penalty is to be determined by Berkeley County. Suggested Civil Penalties are as follow:

Extent of Deviation	Suggested Maximum Civil Penalty (per day)
Minor	$500
Moderate	$750
Major	$1000

When a violation is determined to involve criminal action, an additional Criminal Penalty of $500 per day may be assessed.

A total penalty assessment rationale will be developed and outlined in writing for each enforcement action for which a penalty is assessed. Penalties for long-lasting and/or continuing violations (such as, but not limited to, unauthorized discharges or poor operation and maintenance) and recovery of economic benefit may be assessed per occurrence, per month, or per week.

Appendix G: Clemson University/Carolina Clear Contract

Contractual Agreement
between
CLEMSON UNIVERSITY
and
BERKELEY COUNTY

PUBLIC awareness and education about natural resources is crucial to the process of protecting and restoring water quality. Clemson University (Clemson) and BERKELEY COUNTY will work together to deliver public education and outreach and public involvement/participation programming to general and targeted audiences towards achieving compliance with the public education and outreach and public involvement/participation requirements of the NPDES Phase II Stormwater Program. BERKELEY COUNTY will represent in this contract the CITY OF GOOSE CREEK, and the CITY OF HANAHAN, and will henceforth be referred to as BERKELEY COUNTY. Furthermore, BERKELEY COUNTY represents the aforementioned parties via Inter-Governmental Agreements (IGAs) entered into the 9th day of October, 2015 with the CITY OF HANAHAN and the 15th day of October, 2015 with the CITY OF GOOSE CREEK, respectively.

NOW, the parties agree as follows:

1. Clemson will deliver public education and outreach and public involvement/participation with a goal to increase public awareness and involvement in regards to local stormwater management. The educational programs will include components designed for various residential and commercial audiences and others targeted for their impact to stormwater and nonpoint source pollution. This effort will be delivered through various means, as detailed below in items 4 and 5. Events will be held at Clemson and/or other available facilities in such a way to reach diverse and regionally distributed audiences. Such instruction may include the furnishing of informational handouts, instructional manuals, promotional materials, webpages and similar such materials, as deemed appropriate by Clemson and the participating entity.

2. BERKELEY COUNTY will participate in a regional decision-making process to define regional priorities in regards to behaviors, pollutants, and audiences to be targeted for outreach. Additionally, BERKELEY COUNTY will represent henceforth in this contract, the communities of THE CITY OF GOOSE CREEK and THE CITY OF HANAHAN. BERKELEY COUNTY shall provide input as available on audience demographics, behaviors based on staff observations, residential and commercial impacts related to stormwater management that may lead to compliance and enforcement actions, and other input based on stormwater operations.

3. BERKELEY COUNTY shall provide information regarding readily available delivery modes for education and involvement programming (e.g., newsletters, community calendars, government access channels, community meetings, Council meetings, tax or water bills, etc.).

4. Clemson will raise public awareness using a mass media approach, which may include billboard and television public service announcements, radio broadcasts and interviews, newspaper articles, stories, publications, and advertisements.

5. Each of the public-related activities described below will be part of the core program on an annual basis and will target a specific audience, all subject to modification with the approval of BERKELEY COUNTY and Clemson, as well as acknowledging regulatory direction and interpretation by South Carolina DHEC.

6. In the event that an action is created to terminate, dissolve, and /or void the aforementioned IGA for any reason between BERKELEY COUNTY and its represented entity, BERKELEY COUNTY will notify Clemson of the action, with a 30-day advance written notice and within 30-days of receiving or administering a written notice of termination for the respective IGA. Furthermore, BERKELEY COUNTY reserves the right to cancel any coverages and/or cost associated with the defected entity covered under this contract at termination of the IGA. BERKELEY COUNTY's representation of an entity dissolves with the termination of its respective IGA and Clemson's obligations are subsequently dissolved concerning the respective entity. The termination of an IGA will only occur at the end of a 12-month period where either involved party has terminated the IGA through deliverance of a 12 months' advance written notice of termination to the other Party's address.

7. Clemson University will:

LEAD

7.1 Work with one regional association of **stormwater managers and local decision-makers** to update, plan and determine regional public education and outreach and public involvement/participation priorities from year-to-year (in this case, the ASHLEY COOPER STORMWATER EDUCATION CONSORTIUM).

7.2 Explore, pilot (as needed) and initiate strategic approaches to educating target audiences towards the goal of adopting improved behaviors and practices towards better stormwater management.

COMMUNICATE

7.3 Maintain webpage(s) with content specific to the regional outreach programs. Utilize tools to monitor website visits and other related statistics.

7.4 Maintain communication among regional partners through meetings, newsletters/e-news, one-on-one meetings or other means established as best practice for the partnership.

IMPLEMENT

7.5 Plan, develop, present and be a participant in at least three (3) **community** and **public** programs per year with emphasis on stormwater education. Provide resources to encourage continued learning and practice adoption.

7.6 Create at least three (3) news articles per year for the **general public**.

7.7 Plan and present homeowner and yard owner program(s) for **individuals** and **families**. Distribute or provide materials for distribution as part of workshops and/or provide resources to encourage continued learning and practice adoption.

7.8 Provide at least one (1) **youth** program per year within the region such as

i. Adopt-A-Watershed which uses a local watershed,
ii. Storm Drain Marking,
iii. 4-H Wetlands Project explores estuaries, marshes, and swamps,
iv. $4H_2O$ Exploring Watersheds,
v. Engaging teachers in new watershed and stormwater curriculum meeting SC Standards, and
vi. EnviroScape®.

7.9 Present at least one (1) program per year that addresses pollution prevention and alternatives for a **target audience, as per the region's priorities**.

7.10 Develop and provide for the **general public**, within means, items such as banners and promotional giveaways to serve as a way to attract audiences and increase regional consortium visibility.

7.11 Utilize mass media outlets to provide statewide education at an increased cost-effectiveness; as reasonably needed, locally utilize mass media such as newspapers, radio, interviews and advertisements to address specific needs.

INVOLVE

7.12 Provide at least one (1) opportunity to involve an audience (**general public** or **commercial**) in improved watershed management and stormwater awareness.

7.13 Promote and expand web-based tools to encourage learning about and adoption of low impact development techniques (SC LID Atlas) and furthering involvement from citizens in watershed-focused volunteer opportunities (Watershed Stewardship Map) and through the use of demonstration sites as warranted appropriate.

REPORT

7.14 Provide and manage a user-friendly database to track each year's activities.

7.15 Annually, produce a document summarizing the year's efforts, successes, decision-making processes, partnerships and regional priorities.

7.17 On request and based on current regulatory guidance, provide data for public education and outreach and public involvement/participation measures of the Annual Report Checklist required by DHEC of all Municipal Separate Storm Sewer Systems (MS4s).

8. Clemson will provide accountability statistics for each of the activities as best can be estimated. The statistics will include the following accomplishment indicators:

8.1 Number of educational programs and activities conducted.

8.2 Number of people reached through educational programs or involved by outreach programs according to method, audience or targeted behavior.

8.3 Number of people receiving information through "non-program" contacts such as telephone, office, visits, website contacts, visual and print media.

8.4 Evaluation of activities and the pollutant or behavior targeted.
8.5 As available, feedback on programs and anecdotal evidence of successful program implementation.

These accountability statistics shall be provided at a minimum of *once per permit cycle* (anticipated as no less than 3 years and no more than 5 years), and on the Carolina Clear statewide schedule so as to gain regional comparison information, implement statistically relevant survey instruments to gain insight on the awareness, knowledge and behaviors of the general public related to stormwater and watershed management, as well as regional effort awareness.

9. The County shall provide payment in the amount of $55,000 for the core program in year one; payment is expected within 60 days. Invoices for the core program for years two through five will be in the amount of $48,000 and invoiced after the 15th of July of each year beginning in 2017; payment is expected within 60 days.

   Fees for additional services will be negotiated based on cost. These costs are based on the urbanized area population of each MS4, county and/or defined area(s), and represent the summation of fees for BERKELEY COUNTY, CITY OF GOOSE CREEK, and CITY OF HANAHAN.

10. A mutually agreeable estimated delivery schedule shall provide activities distributed through each year in an Annual Activity Plan (as default) or on an otherwise agreed upon multi-year activity plan, which will be noted as a regional decision documented in writing for the regional entity.

11. Clemson is insured by the State Insurance Reserve Fund pursuant to the State Tort Claims Act. BERKELEY COUNTY is also insured by the State Insurance Reserve Fund. The parties agree that each shall be responsible for the negligent acts or omissions of its own officers, employees, and agents and that neither is responsible for the negligent acts or omissions of the other's officers, employees, and agents in the performance of the requirements of this agreement.

12. Either party may terminate this agreement by providing the other party with thirty (30) days written notice.

This contract is subject to the terms and conditions of the Memorandum of Understanding between Clemson and BERKELEY COUNTY, dated November 14, 2016 which are fully incorporated herein by reference.

Dr. George Askew, Vice President

Clemson University

11/20/16

Date

William W. Peagler, III, County Supervisor

Berkeley County

11-14-16

Date

Appendix H: Intergovernmental Agreements

BERKELEY COUNTY
SUPERVISOR'S OFFICE

William W. Peagler, III
SUPERVISOR

October 20, 2015

Dennis Harmon, City Administrator
City of Goose Creek
PO Drawer 1768
Goose Creek, South Carolina 29445-1768

Dear Dennis,

Enclosed please find the Intergovernmental Agreement regarding the NPDES stormwater discharge and other stormwater related services.

We look forward to partnering with the City of Goose Creek in this program.

Sincerely,

William W. Peagler, III
County Supervisor

WWP, III/bwm
Encl: as stated
cc: John O Williams
Tom Lewis
Chad Busby

STATE OF SOUTH CAROLINA	)	INTERGOVERNMENTAL
	)	AGREEMENT – NPDES STORMWATER
	)	DISCHARGE PERMIT COMPLIANCE
	)	AND OTHER STORMWATER RELATED
COUNTY OF BERKELEY	)	SERVICES

THIS AGREEMENT (Agreement) is made and entered into as of this 15th day of October, 2015, by and between the County of Berkeley, S.C. (the County) and the City of Goose Creek, S. C. (the City).

WHEREAS, the County and the City are required by law to establish a stormwater management program pursuant to a National Pollutant Discharge Elimination System (NPDES) Permit (SCR030000) (the Permit) issued by the South Carolina Department of Health and Environmental Control (DHEC), the purpose of which is to protect, maintain and enhance the environment of the County and City and the short-term and long-term public health, safety and general welfare of the citizens of the County and City by addressing discharges of pollutants to the stormwater drainage system; and

WHEREAS, the County has developed a Stormwater Management Program (the SWMP) for the unincorporated areas of the County; and

WHEREAS, the County has developed a Stormwater Management Utility for the purpose of implementing the Berkeley County SWMP and satisfying the regulatory requirements of the Permit; planning, designing, constructing, funding, and maintaining stormwater management, sediment control, and flood control programs, projects and facilities; and reviewing and approving stormwater management and sediment control plan for land disturbing activities; and providing for the administration and enforcement thereof; and

WHEREAS, the County and City believe it is in the best interest of their citizens to avoid duplication of services with respect to stormwater management by entering into an agreement for the County to administer and enforce a SWMP for the City in order to provide for the effective and efficient handling of stormwater in the City and within as much of the County as possible;

NOW THEREFORE, in consideration of the foregoing premises and other good and valuable consideration, the sufficiency and receipt of which are hereby acknowledged, the County and the City hereby agree as follows:

A. Mutual Protections for the City and County

The City and County hereby mutually covenant and agree to take, use, provide and make, all proper necessary and sufficient precautions, safeguards and protections against the occurrence of any accidents, injuries, or damages to any person or property in performing or failing to perform any actions under this Agreement, and to be responsible for and save harmless the other party from the payment of all sums of money by reason of all or any accidents, injuries, or damages that may occur in the progress of any work (or arising out of the alleged failure to perform work) performed under this Agreement and arising out of or in connection with intentional, willful, wanton, reckless, or negligent conduct of the responsible party. This payment obligation shall include, but not be limited to, losses

incurred under this Agreement for or by reason of the violation of any ordinance or regulation, or the laws of the State of South Carolina or of the United States. The City and County agree that the responsible party shall have the authority to control any litigation that arises from the responsible party's related activities under this section, provided that the parties are not adverse in such litigation.

B. Obligations of the City

1. The City authorizes the County to administer the SWMP within the municipal limits of the City. This agreement and the SWMP shall authorize enforcement by City and County representatives. The City agrees that Berkeley County shall utilize the Berkeley County Stormwater Design Standards Manual in the administration of the SWMP. All costs of defending the ordinances adopted by the City shall be borne by the City.

2. The City agrees to cooperate with the County to enable the County to implement the SWMP, the Manual, Permit, and stormwater utility fees within the City. The City agrees to educate its staff regarding the provisions of each, and will implement the operational measures necessary for compliance for City property and operations.

3. The City hereby delegates to the County the duties of development, implementation and enforcement of the SWMP, and the efforts of monitoring, recordkeeping and reporting which may be imposed by the Permit, subject to Section 4.4 thereof (as may be amended from time to time). The City shall make available to the County necessary documentation related to annual reporting associated with the Permit.

4. The City shall provide the County with documentation of easements and rights-of-way as needed to operate and maintain the drainage system. In those cases where easements or rights-of-way have not been obtained, but are needed, the City agrees to assist the County in obtaining an appropriate easement or right-of-way.

C. Obligations of the County

1. The County agrees to fulfill the responsibilities granted it by the City pursuant to this Agreement.

2. The County shall be responsible for the day to day operation and maintenance activities as well as the long-term management of the City's storm drainage system.

3. The methodology for determining fees or charges for this program shall be determined by the County. The County shall bill and collect stormwater management utility user fees from property owners, tenants, and other appropriate parties within the City using the same methods contained in the County's Stormwater Management Utility Ordinance.

4. The County shall implement and operate all six (6) of the minimum control measures as identified in the Permit, to include the Program Description of Elements, Measures and Services attached to this Agreement as Exhibit A and made part hereof by reference, within the City. While the County will be responsible for conducting and ensuring

compliance with the Permit, this does not exclude the City from assisting in these activities when deemed necessary or appropriate by the City and County.

5. The County hereby assumes the duties of development, implementation and enforcement of the SWMP, and the efforts of monitoring, recordkeeping and reporting which may be imposed by the Permit, subject to Section 4.4 thereof (as may be amended from time to time).

6. The City agrees to assist with information and non-legal advice regarding defense of any challenges to the County's Ordinances and program compliance.

D. Miscellaneous

1. This Agreement will become effective upon execution by authorized representatives of both parties.

2. This Agreement may not be revised or modified except by written mutual agreement of the City and the County.

3. The City and County reserve the right to challenge any of the terms, conditions, or provisions of the Permit, its enabling laws, rules and regulations and/or interpretations thereof by authorities asserting jurisdiction.

4. If any section, subsection, sentence, clause, phrase, or portion of this Agreement is for any reason held invalid or unconstitutional by any court or competent jurisdiction, such provision and such holding shall not affect the validity of the remaining portion of this Agreement.

5. Those rights and obligations under this Contract, which, by their nature should survive, shall remain in effect after termination, suspension or expiration hereof.

6. The failure of either Party to enforce at any time any of the provisions of this Contract shall in no way be construed as a waiver of such provision nor in any way affect the right of either Party thereafter to enforce each and every provision of this Contract. There can be no assignment by either party of any rights or responsibilities hereunder without the consent of the other party.

7. All parties acknowledge that nothing under this agreement creates a right of action for any person or entity, and that this contract does not create or otherwise permit third party beneficiary rights or related causes of action. It is further acknowledged that the parties hereto are governmental entities providing these services in a governmental capacity. Accordingly, it is agreed that the parties are sovereigns that are, to the extent permitted by the South Carolina Tort Claims Act, and other applicable law, protected by sovereign immunity with respect to all acts and omissions related hereto.

8. The City and County agree to enact, follow and enforce such ordinances, rules, policies, and regulations as may be necessary to carry out the terms of this Agreement.

9. Any notices which may be permitted or required hereunder shall be in writing and shall be deemed to have been duly given as of the date and time the same are personally delivered or are deposited with the United States Postal Service, postage prepaid, and addressed as follows:

   If to the County:
   Attn: Stormwater Management Program, Berkeley County Engineering, PO Box 6122 Moncks Corner, SC 29461

   If to the City:
   Attn: Director of Public Works, City of Goose Creek, P.O. Drawer 1768, Goose Creek, SC 29445

10. This agreement shall be effective as of the date listed above, and shall continue from year to year unless terminated. Either party may terminate this agreement by delivering 12 months' advance written notice of termination to the other Party's address listed above.

IN WITNESS WHEREOF, the parties have hereunto set their hands and seals, by and through the undersigned agents, this 15th day of October, 2015.

SIGNED, SEALED & DELIVERED
IN THE PRESENCE OF:

BERKELEY COUNTY

By: _____

Its: County Supervisor

THE CITY OF GOOSE CREEK

By: _____

Its: Mayor

Exhibit A

Program Description of Elements, Measures and Services Berkeley County will provide to the City in association with the Intergovernmental Agreement (IGA) for NPDES Strormwater Discharge Permit Compliance and Other Stormwater Related Services.

Notice of Intent (NOI):

- The County will review and update the City's NOI for consistency with the County's NOI and update the NOI as necessary for compliance with SCDHEC NPDES MS4 Permit NOI submittal requirements.

Stormwater Management Program (SWMP):

- The County will review, update and manage the City's SWMP and all associated documents for consistency with the County's SWMP and for compliance with the NPDES MS4 Permit requirements.
- The County will provide necessary updates to the SWMP and all associated documents as required by the NPDES MS4 Permit requirements.
- The County will implement the City's SWMP.
- The County will review and update the City's Stormwater Management Ordinance for consistency with the County Stormwater Management Ordinance.

Enforcement Response Plan (ERP):

- The County will review and update the City's ERP for consistency with the County's ERP.
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- The County will notify and coordinate any and all enforcement actions taken within the City with appropriate City personnel.
- The County will maintain records of all inspections and enforcement actions performed within the City.

Discharges to Sensitive Waters:

- The County will assess the City's receiving water conditions and impacts.

- The County will determine whether the City's MS4 discharges to receiving waters within a TMDL watershed, to impaired waters from the most current 303d list of impaired waters or to other Source Water Protection Areas (SWPA).
- The County will develop and implement TMDL assessment and monitoring plans as required by the NPDES MS4 Permit for all discharges where a Wasteload Allocation (WLA) is assigned.
- The County will assess all City MS4 discharges to 303d waters for cause/contribution of Pollutants of Concern (POCs).
- The County will program and implement Best Management Practices (BMPs) as necessary to address TMDLs and discharges to impaired waters as required by the NPDES MS4 Permit.

Public Education and Outreach on Stormwater Impacts:

- The County will implement, manage and maintain the partnership and contract with Clemson's Carolina Clear program for the City as necessary to satisfy the NPDES MS4 Permit Public Education and Outreach requirements.
- The County will maintain the partnership with the Ashley Cooper Stormwater Education Consortium.
- The County will maintain the partnership with the South Carolina Stormwater Managers Association.

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- The County will perform periodic dry weather screening/monitoring of all stormwater outfalls within the City for illicit discharges as required by the NPDES MS4 Permit.
- The County will initiate enforcement actions as necessary to eliminate illicit discharges in accordance with the ERP for all illicit discharges found during outfall dry weather screening.
- The County will inventory and update the City's stormwater system and establish a GIS map of the City's stormwater system.

- The County will perform periodic inspections of the City's stormwater system for illicit discharges and initiate enforcements actions for any illicit discharges found.
- The County will develop and perform illicit discharge training of all appropriate municipal staff as required by the NPDES MS4 Permit.
- The County will establish a hotline for citizens of the City to report illicit discharges.

Construction Site Stormwater Runoff Control:

- The County will review and update the City's Stormwater Construction Design Standards for consistency with the County Stormwater Design Standards.
- The County will review stormwater, erosion & sediment control, pollution prevention, site prep and grading plans for all residential, commercial, and industrial development and other construction projects within the City for compliance with County and state requirements as required by the NPDES MS4 Permit.
- The County will track all active construction projects within the City and maintain a database of all active construction projects.
- The County will perform stormwater and erosion and sediment control inspections of all residential, commercial and industrial construction projects within the City as required by the NPDES MS4 Permit.
- The County will track all active construction projects and maintain a database of all inspection reports from start of construction through construction completion and site stabilization.
- The County will initiate and manage enforcement actions for all non-compliant and deficient stormwater construction in accordance with the ERP.
- The County will provide staff training as required by the NPDES MS4 Permit.

Post-Construction Stormwater Management for New Development and Redevelopment:

- The County will review and update the City's Stormwater Post-Construction Design Standards for consistency with the County Stormwater Design Standards.
- The County will review stormwater plans for site performance post-construction stormwater control measures as required by the NPDES MS4 Permit.
- The County will review for and ensure long-term maintenance of post-construction stormwater control measures installed to meet site performance standards.
- The County will establish and maintain an inventory of all installed post-construction stormwater control measures.
- The County will inspect all post-construction stormwater control measures installed during construction, upon completion of construction and after construction as required by the NPDES MS4 Permit.
- The County will maintain a database of all post-construction inspection reports and enforcement actions in accordance with the NPDES Permit and ERP.

Pollution Prevention/Good Housekeeping for Municipal Operations:

- The County will establish and maintain an inventory of all municipally owned facilities within the City.
- The County will establish and maintain an inventory of all municipally owned stormwater controls within the City.
- The County will develop and perform Pollution Prevention/Good Housekeeping training of all appropriate municipal staff as required by the NPDES MS4 Permit.
- The County will perform a comprehensive assessment of all municipally owned facilities and maintain a database of assessment results.
- The County will identify all municipal High-Priority facilities within the City and perform facility specific inspections of all High Priority facilities as required by the NPDES MS4 Permit.
- The County will inventory and prioritize the municipally owned or operated stormwater system structures and catch basins within the City and implement a maintenance plan and schedule for the stormwater system structures and catch basins.
- The County will implement pollution prevention measures for all operation and maintenance activities performed within the City.
- The County will inspect and maintain all municipally owned or operated stormwater controls as required by the NPDES MS4 Permit.

Reviewing and Updating the SWMP:

- The County will perform an annual review of the City's SWMP.
- The County will update the City's SWMP as necessary to add or modify selected BMPs and comply with the NPDES MS4 Permit.

Monitoring, Record Keeping and Reporting:

- The County will maintain records of all outfall water quality screening, monitoring and testing data associated with TMDLs and discharges to impaired waters within the City.
- The County will maintain records of all illicit discharge inspection reports and enforcement actions within the City.
- The County will maintain records and track all active stormwater construction projects within the City.
- The County will maintain records of all stormwater construction inspections, post-construction inspections and enforcement actions associated with construction activity within the City.
- The County will maintain records of all post-construction BMPs and BMP inspections with the City.

- The County will maintain records of illicit discharge and good housekeeping training of municipal staff.
- The County will maintain records of all municipal facility assessments and high priority inspections within the City.
- The County will maintain records of all stormwater system maintenance, catch basin maintenance, stormwater control maintenance and street sweeping within the City.
- The County will prepare all annual reports to be submitted to SCDHEC in accordance with the NPDES MS4 Permit.

Stormwater Management Utility:

- The County will implement the Stormwater Management Utility Ordinance within the City.
- The County will manage the Stormwater Management Utility within the City.
- The County will bill and collect Stormwater Management Utility fees on parcels and users within the City.
- The County will perform, update and maintain impervious surface area calculation data within the City in association with the Stormwater Management Utility Rate Study.
- The County will incorporate parcels and users within the City in the Stormwater Management Utility Rate Study.
- The County will maintain records of all stormwater utility fees collected and stormwater utility revenues spent within the City.

Stormwater Capital Improvements:

- The County and the City will establish a Stormwater Advisory Board consisting of representatives of the both the County and City.
- The Stormwater Advisory Board will program, schedule and fund stormwater capital improvement projects and stormwater BMPs utilizing Stormwater Utility fees collected from parcels and users within the County and City.
- The County will implement, manage and construct stormwater capital improvement projects and stormwater BMPs under the oversight of the Stormwater Advisory Board and in accordance with the Stormwater Management Utility Ordinance.

BERKELEY COUNTY
SUPERVISOR'S OFFICE

William W. Peagler, III
SUPERVISOR

November 3, 2015

Tom
For your
F.Cos

Johnny Cribb, City Administrator
City of Hanahan
1255 Yeamans Hall Road
Hanahan, South Carolina 29410

Dear Johnny,

Enclosed please find the Intergovernmental Agreement regarding the NPDES stormwater discharge and other stormwater related services.

We look forward to partnering with the City of Hanahan in this program.

Sincerely,

William W. Peagler, III

William W. Peagler, III
County Supervisor

WWP, III/bwm
Encl: as stated
cc: John O Williams
Tom Lewis

STATE OF SOUTH CAROLINA	)	INTERGOVERNMENTAL
	)	AGREEMENT – NPDES STORMWATER
	)	DISCHARGE PERMIT COMPLIANCE
	)	AND OTHER STORMWATER RELATED
COUNTY OF BERKELEY	)	SERVICES

THIS AGREEMENT (Agreement) is made and entered into as of this 9th day of October, 2015, by and between the County of Berkeley, S.C. (the County) and the City of Hanahan (the City).

WHEREAS, the County and the City are required by law to establish a stormwater management program pursuant to a National Pollutant Discharge Elimination System (NPDES) Permit (SCR030000) (the Permit) issued by the South Carolina Department of Health and Environmental Control (DHEC), the purpose of which is to protect, maintain and enhance the environment of the County and City and the short-term and long-term public health, safety and general welfare of the citizens of the County and City by addressing discharges of pollutants to the stormwater drainage system; and

WHEREAS, the County has developed a Stormwater Management Program (the SWMP) for the unincorporated areas of the County; and

WHEREAS, the County has developed a Stormwater Management Utility for the purpose of implementing the Berkeley County SWMP and satisfying the regulatory requirements of the Permit; planning, designing, constructing, funding, and maintaining stormwater management, sediment control, and flood control programs, projects and facilities; and reviewing and approving stormwater management and sediment control plan for land disturbing activities; and providing for the administration and enforcement thereof; and

WHEREAS, the County and City believe it is in the best interest of their citizens to avoid duplication of services with respect to stormwater management by entering into an agreement for the County to administer and enforce a SWMP for the City in order to provide for the effective and efficient handling of stormwater in the City and within as much of the County as possible;

NOW THEREFORE, in consideration of the foregoing premises and other good and valuable consideration, the sufficiency and receipt of which are hereby acknowledged, the County and the City hereby agree as follows:

A. Mutual Protections for the City and County

The City and County hereby mutually covenant and agree to take, use, provide and make, all proper necessary and sufficient precautions, safeguards and protections against the occurrence of any accidents, injuries, or damages to any person or property in performing or failing to perform any actions under this Agreement, and to be responsible for and save harmless the other party from the payment of all sums of money by reason of all or any accidents, injuries, or damages that may occur in the progress of any work (or arising out of the alleged failure to perform work) performed under this Agreement and arising out of or in connection with intentional, willful, wanton, reckless, or negligent conduct of the responsible party. This payment obligation shall include, but not be limited to, losses

incurred under this Agreement for or by reason of the violation of any ordinance or regulation, or the laws of the State of South Carolina or of the United States. The City and County agree that the responsible party shall have the authority to control any litigation that arises from the responsible party's related activities under this section, provided that the parties are not adverse in such litigation.

B. Obligations of the City

1. The City authorizes the County to administer the SWMP within the municipal limits of the City. This agreement and the SWMP shall authorize enforcement by City and County representatives. The City agrees that Berkeley County shall utilize the Berkeley County Stormwater Design Standards Manual in the administration of the SWMP. All costs of defending the ordinances adopted by the City shall be borne by the City.

2. The City agrees to cooperate with the County to enable the County to implement the SWMP, the Manual, Permit, and stormwater utility fees within the City. The City agrees to educate its staff regarding the provisions of each, and will implement the operational measures necessary for compliance for City property and operations.

3. The City hereby delegates to the County the duties of development, implementation and enforcement of the SWMP, and the efforts of monitoring, recordkeeping and reporting which may be imposed by the Permit, subject to Section 4.4 thereof (as may be amended from time to time). The City shall make available to the County necessary documentation related to annual reporting associated with the Permit.

4. The City shall provide the County with documentation of easements and rights-of-way as needed to operate and maintain the drainage system. In those cases where easements or rights-of-way have not been obtained, but are needed, the City agrees to assist the County in obtaining an appropriate easement or right-of-way.

C. Obligations of the County

1. The County agrees to fulfill the responsibilities granted it by the City pursuant to this Agreement.

2. The County shall be responsible for the day to day operation and maintenance activities as well as the long-term management of the City's storm drainage system.

3. The methodology for determining fees or charges for this program shall be determined by the County. The County shall bill and collect stormwater management utility user fees from property owners, tenants, and other appropriate parties within the City using the same methods contained in the County's Stormwater Management Utility Ordinance.

4. The County shall implement and operate all six (6) of the minimum control measures as identified in the Permit, to include the Program Description of Elements, Measures and Services attached to this Agreement as Exhibit A and made part hereof by reference, within the City. While the County will be responsible for conducting

and ensuring compliance with the Permit, this does not exclude the City from assisting in these activities when deemed necessary or appropriate by the City and County.

5. The County hereby assumes the duties of development, implementation and enforcement of the SWMP, and the efforts of monitoring, recordkeeping and reporting which may be imposed by the Permit, subject to Section 4.4 thereof (as may be amended from time to time).

6. The City agrees to assist with information and non-legal advice regarding defense of any challenges to the County's Ordinances and program compliance.

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1. This Agreement will become effective upon execution by authorized representatives of both parties.

2. This Agreement may not be revised or modified except by written mutual agreement of the City and the County.

3. The City and County reserve the right to challenge any of the terms, conditions, or provisions of the Permit, its enabling laws, rules and regulations and/or interpretations thereof by authorities asserting jurisdiction.

4. If any section, subsection, sentence, clause, phrase, or portion of this Agreement is for any reason held invalid or unconstitutional by any court or competent jurisdiction, such provision and such holding shall not affect the validity of the remaining portion of this Agreement.

5. Those rights and obligations under this Contract, which, by their nature should survive, shall remain in effect after termination, suspension or expiration hereof.

6. The failure of either Party to enforce at any time any of the provisions of this Contract shall in no way be construed as a waiver of such provision nor in any way affect the right of either Party thereafter to enforce each and every provision of this Contract. There can be no assignment by either party of any rights or responsibilities hereunder without the consent of the other party.

7. All parties acknowledge that nothing under this agreement creates a right of action for any person or entity, and that this contract does not create or otherwise permit third party beneficiary rights or related causes of action. It is further acknowledged that the parties hereto are governmental entities providing these services in a governmental capacity. Accordingly, it is agreed that the parties are sovereigns that are, to the extent permitted by the South Carolina Tort Claims Act, and other applicable law, protected by sovereign immunity with respect to all acts and omissions related hereto.

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   If to the County:
   Attn: Stormwater Management Program, Berkeley County Engineering, PO Box 6122 Moncks Corner, SC 29461

   If to the City:
   Attn: City Administrator, City of Hanahan, 1255 Yeamans Hall Road, Hanahan, SC 29410

10. This agreement shall be effective as of the date listed above, and shall continue from year to year unless terminated. Either party may terminate this agreement by delivering 12 months' advance written notice of termination to the other Party's address listed above.

IN WITNESS WHEREOF, the parties have hereunto set their hands and seals, by and through the undersigned agents, this 9th day of October, 2015.

SIGNED, SEALED & DELIVERED
IN THE PRESENCE OF:

BERKELEY COUNTY

By: _____

Its: County Supervisor

THE CITY OF HANAHAN

By: _____

Its: City Administrator

Clerk of Council

Exhibit A

Program Description of Elements, Measures and Services Berkeley County will provide to the City in association with the Intergovernmental Agreement (IGA) for NPDES Strormwater Discharge Permit Compliance and Other Stormwater Related Services.

Notice of Intent (NOI):

- The County will review and update the City's NOI for consistency with the County's NOI and update the NOI as necessary for compliance with SCDHEC NPDES MS4 Permit NOI submittal requirements.

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- The County will review, update and manage the City's SWMP and all associated documents for consistency with the County's SWMP and for compliance with the NPDES MS4 Permit requirements.
- The County will provide necessary updates to the SWMP and all associated documents as required by the NPDES MS4 Permit requirements.
- The County will implement the City's SWMP.
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- The County will develop and implement TMDL assessment and monitoring plans as required by the NPDES MS4 Permit for all discharges where a Wasteload Allocation (WLA) is assigned.
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- The County will implement, manage and maintain the partnership and contract with Clemson's Carolina Clear program for the City as necessary to satisfy the NPDES MS4 Permit Public Education and Outreach requirements.
- The County will maintain the partnership with the Ashley Cooper Stormwater Education Consortium.
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Public Involvement/Participation:

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- The County will identify and map all City stormwater outfalls to receiving waters.
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- The County will review stormwater, erosion & sediment control, pollution prevention, site prep and grading plans for all residential, commercial, and industrial development and other construction projects within the City for compliance with County and state requirements as required by the NPDES MS4 Permit.
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Pollution Prevention/Good Housekeeping for Municipal Operations:

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- The County will maintain records and track all active stormwater construction projects within the City.
- The County will maintain records of all stormwater construction inspections, post-construction inspections and enforcement actions associated with construction activity within the City.
- The County will maintain records of all post-construction BMPs and BMP inspections with the City.

- The County will maintain records of illicit discharge and good housekeeping training of municipal staff.
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- The County will maintain records of all stormwater system maintenance, catch basin maintenance, stormwater control maintenance and street sweeping within the City.
- The County will prepare all annual reports to be submitted to SCDHEC in accordance with the NPDES MS4 Permit.

Stormwater Management Utility:

- The County will implement the Stormwater Management Utility Ordinance within the City.
- The County will manage the Stormwater Management Utility within the City.
- The County will bill and collect Stormwater Management Utility fees on parcels and users within the City.
- The County will perform, update and maintain impervious surface area calculation data within the City in association with the Stormwater Management Utility Rate Study.
- The County will incorporate parcels and users within the City in the Stormwater Management Utility Rate Study.
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- The County and the City will establish a Stormwater Advisory Board consisting of representatives of the both the County and City.
- The Stormwater Advisory Board will program, schedule and fund stormwater capital improvement projects and stormwater BMPs utilizing Stormwater Utility fees collected from parcels and users within the County and City.
- The County will implement, manage and construct stormwater capital improvement projects and stormwater BMPs under the oversight of the Stormwater Advisory Board and in accordance with the Stormwater Management Utility Ordinance.

Appendix I: Pollution Prevention and Good Housekeeping Manual

BERKELEY COUNTY
STORMWATER MANAGEMENT PROGRAM

POLLUTION PREVENTION/GOOD HOUSEKEEPING MANUAL

Adopted February 23, 2011
Revised December 2019

212 Oakley Plantation Drive
Moncks Corner, SC 29461
Telephone: 843.719.4195

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

Berkeley County has developed and is implementing a program for pollution prevention/good housekeeping to meet conditions of their National Pollutant Discharge Elimination System (NPDES) Phase II Small Municipal Separate Storm Sewer Systems (MS4) permit. Minimum Control Measure number six (6) of the County's MS4 permit states that Berkeley County must develop and implement an operation and maintenance program that includes a training component and has the ultimate goal of preventing or reducing pollutant runoff from County operations as an integral part of their Stormwater Management Program (SWMP). The Program includes employee training to prevent and reduce stormwater pollution from activities such as park and open space maintenance, fleet, and building maintenance, new construction and land disturbances, and stormwater system maintenance.

According to the NPDES Phase II regulations, the operator of a regulated MS4 community must develop a pollution prevention/good housekeeping program to:

- Prevent or reduce the amount of stormwater pollution generated by county/municipal operations and conveyed into receiving waters,
- Train employees on how to incorporate pollution prevention/good housekeeping techniques into county/municipal operations,
- Identify appropriate best management practices and measurable goals for preventing or reducing the amount of stormwater pollution generated by county/municipal operations.
- Prioritize County owned and/or operated storm water management systems/structures and implement a maintenance schedule.
- Develop a set of pollution prevention measures that, when applied during municipal O&M activities, will reduce the discharge of pollutants in stormwater Municipal operation and maintenance activities to be considered include but are not limited to pavement and rights-of-way maintenance, bridge maintenance, cold weather operations, and municipally sponsored events.
- Inspect and maintain, wherever and whenever necessary, all municipally-owned or maintained structural stromwater controls.
- Maintain all municipally owned green infrastructure practices through regularly scheduled maintenance activities.

This good housekeeping/pollution control manual is designed to assist Berkeley County staff in addressing potential stormwater runoff issues from County owned and/or operated facilities. A list of County and City owned, and/or operated facilities can be found in Appendix A. This manual includes information from the Berkeley County staff and the Urban Subwatershed Restoration Manual No. 9: Municipal Pollution Prevention/ Good Housekeeping Practices Version 1.0 produced by the Center for Watershed Protection.

Berkeley County entered into an Inter-Governmental Agreement (IGA) with the Cities of Hanahan and Goose Creek in October 2015. This IGA makes the County responsible for ensuring compliance with all six (6) minimum measures of the NPDES Phase II MS4 Permit, including development and implementation of the pollution prevention/good housekeeping program. Throughout this manual, wherever there is a reference to Berkeley County facilities, operations or projects, it also applies to the municipalities of Hanahan and Goose Creek.

2.0 BASICS OF COUNTY/MUNICIPAL POLLUTION PREVENTION/GOOD HOUSEKEEPING PROGRAMS

Every day, Berkeley County employees engage in a variety of activities that influence water quality. Some activities, such as County facility management, construction project management, and street repair and maintenance can negatively impact water quality, while others, such as storm drain maintenance and employee training, can help improve it. Whether a pollution prevention/good housekeeping program is designed to reduce the influence of activities that negatively impact water quality (Figure 2-1), or increase the influence of activities that help improve it (Figure 2-2), it should be carefully designed to address local water quality issues. A specific pollution prevention program activity that Berkeley County has recently undertaken to improve water quality is implementation of a catch basin maintenance program. Utilization of a vacuum truck and crew has allowed the County to remove debris, trash and sediment (with attached pollutants) from catch basins prior to potentially impacting downstream waterbodies.

Construction Site with No Erosion or Sediment Controls

Animal Shelter Pet Waste Washed into Ditch

Uncovered Storage Barrels at Public Works Yard

Figure 2-1: County/Municipal Activities Negatively Impacting Water Quality

Stormwater System Cleanout

Pet Waste Pick-Up Station

Covered/Contained Fuel Tanks

Figure 2-2: County/Municipal Activities Improving Water Quality

3.1 COUNTY/MUNICIPAL OPERATIONS AND ACTIVITIES AFFECTING WATER QUALITY

Pollution prevention/good housekeeping involves identifying county/municipal operations and/or activities that may affect stormwater runoff in a community and improving them to better support water quality goals. County/municipal operations and/or activities should be systematically evaluated to determine where improvements can be made in the following areas, at a minimum:

- Hotspot facility management
- Construction project management
- Post-construction stormwater management
- Street repair and maintenance
- Storm drain maintenance
- Park and landscape maintenance
- Employee training

These county/municipal operations/activities can generate or reduce a variety of stormwater pollutants, including sediment, nutrients, metals, hydrocarbons, pesticides, chlorides, bacteria and trash. Typical pollutants expected to be affected by these operations and/or activities are included in Table 3-1.

Table 3-1: Stormwater Pollutants Associated with County/Municipal Operations and Activities

County/Municipal Operations	Sediment	Nutrients	Metals	Hydro-carbons	Toxins	Others
Hotspot Facility Management	●	●	●	●	●	Trash, Organic Matter, Pesticides, Chlorine
Construction Project Management	●	◘	○	◘	◘	Trash
Street Repair and Maintenance	●	◘	◘	●	◘	Trash
Storm Drain Maintenance	◘	○	○	○	○	Trash, Organic Matter
Park and Landscape Maintenance	◘	●	○	○	◘	Pesticides
Post-construction Stormwater Management	◘	◘	◘	○	○	Bacteria
Animal Shelters	●	●	○	○	○	Bacteria
Employee Training	●	●	●	●	●	Chloride, Trash

Key
● = frequently associated with operation
◘ = infrequently associated with operation
○ = rarely associated with operation

Developing an effective pollution prevention/good housekeeping program involves determining which of these operations and/or activities are conducted in Berkeley County and designing a program that will increase or reduce their influence, depending on whether they have a positive or negative impact on water quality. One program that Berkeley County has initiated to address this issue is an aggressive stormwater system maintenance program. The County has identified and prioritized County owned/operated facilities and is systematically performing cleaning/vacuuming as necessary to meet schedules identified in a ranking matrix. A list of Berkeley County, City of Goose Creek and City of Hanahan owned/operated facilities can be found in Appendix A. The prioritization matrix used by the County to identify necessary maintenance frequencies is locate in Appendix B.

3.2 HOTSPOT FACILITY MANAGEMENT

County/municipal hotspot facilities are publicly owned and/or operated facilities that produce higher levels of stormwater pollutants and/or present a higher potential risk for spills, leaks or illicit discharges. Common county/municipal hotspot facilities include facilities that handle solid waste, wastewater, road and vehicle maintenance, and yard waste, such as:

- Equipment Storage and Maintenance Yards
- Hazardous Waste Disposal Facilities
- Hazardous Waste Handling and Transfer Facilities
- Landfills
- Materials Storage Yards
- Public Buildings (e.g. Libraries, Police and Fire Departments)
- Public Works Yards
- Solid Waste Handling and Transfer Facilities
- Vehicle Storage and Maintenance Yards
- Water and Wastewater Treatment Facilities
- Facilities such as morgue, mosquito abatement facility, fueling area, etc.
- Boat Landings
- Convenience Sites
- Animal Shelters

If not carefully managed, the activities conducted at county/municipal hotspot facilities can generate a wide variety of stormwater pollutants, including nutrients, hydrocarbons, metals, chlorides, pesticides, bacteria and trash. A summary of the pollution-generating activities typically conducted at county/municipal hotspot facilities and the pollutants associated with those activities are presented in Tables 3-2 and Table 3-3 below.

Table 3-2: Pollution Generating Activities Associated with County/Municipal Hotspot Facilities

County/Municipal Hotspot Facility	Pollution Generating Activities
Public Works Yards	Vehicle Maintenance and Repair, Vehicle Fueling, Vehicle Washing, Vehicle Storage, Outdoor Loading and Unloading, Outdoor Storage, Dumpster/Waste Management, Building Repair, Building Maintenance, Parking Lot Maintenance, Turf Management, Landscaping
Vehicle Storage and Maintenance Yards	Vehicle Maintenance and Repair, Vehicle Fueling, Vehicle Washing, Vehicle Storage, Outdoor Loading and Unloading, Outdoor Storage, Dumpster/Waste Management, Building Repair, Building Maintenance, Parking Lot Maintenance
Equipment Storage and Maintenance Yards	
Materials Storage Yards	Outdoor Loading and Unloading, Outdoor Storage, Dumpster/Waste Management, Parking Lot Maintenance
Water and Wastewater Treatment Facilities	Vehicle Storage, Outdoor Loading and Unloading, Outdoor Storage, Dumpster/Waste Management, Building Repair, Building Maintenance, Parking Lot Maintenance, Turf Management, Landscaping
Landfills	Vehicle Fueling, Vehicle Storage, Outdoor Loading and Unloading, Outdoor Storage, Dumpster/Waste Management
Solid Waste Handling and Transfer Facilities	
Hazardous Waste Disposal Facilities	
Hazardous Waste Handling and Transfer Facilities	
Composting Facilities	

County/Municipal Hotspot Facility	Pollution Generating Activities
Public Buildings	Outdoor Loading and Unloading, Outdoor Storage, Dumpster/Waste Management, Building Repair, Building Maintenance, Parking Lot Maintenance, Turf Management, Landscaping
Public Golf Course	Vehicle Maintenance and Repair, Vehicle Fueling, Vehicle Washing, Vehicle Storage, Outdoor Loading and Unloading, Outdoor Storage, Dumpster/Waste Management, Building Repair, Building Maintenance, Parking Lot Maintenance, Turf Management, Landscaping
Public Swimming Pool	Building Repair, Building Maintenance, Parking Lot Maintenance, Swimming Pool Discharges
Animal Shelters	Animal Washing/Handling, Lawn/Turf Maintenances, Waste Management

Table 3-3: Stormwater Pollutants Associated with Activities Conducted at Hotspot Facilities

Hotspot Operation or Activity	Sediment	Nutrients	Metals	Hydro-carbons	Toxins	Others
Vehicle Repair	○	○	●	●	●	
Vehicle Fueling	X	○	●	●	●	
Vehicle Washing	●	●	◘	◘	●	
Vehicle Storage	○	X	◘	●	○	Trash
Outdoor Loading	●	◘	◘	○	○	Organic Matter
Outdoor Storage	●	◘	◘	◘	◘	
Waste Management	○	◘	◘	◘	●	Trash
Building Repair	●	○	◘	◘	◘	
Building Maintenance	●	X	●	○	◘	
Parking Lot Maintenance	●	○	◘	●	◘	
Turf Management	◘	●	X	X	●	Pesticides
Landscaping	○	●	X	X	●	Pesticides
Swimming Pool Discharges	X	X	X	X	X	Chlorine
Animal Shelters	○	●	X	X	X	Bacteria

Key
X = not a pollutant source
○ = minor pollutant contribution
◘ = moderate pollutant contribution
● = major pollutant contribution

Of the hotspot facilities listed above, public works yards are often one of the most severe potential pollutant contributors (Figure 3-1). Several stormwater pollutants are often stored or handled at these facilities and they should be one of the first hotspot facilities to be investigated during the development of a pollution prevention/good housekeeping program. While animal shelters do not typically have the potential for a number of pollutants associated with other hotspot facilities, they can be a major contributor of bacteria and nutrients if proper best management practices are not used.

Figure 3-1: Public Works Yards - Typical Severe Hotspot Facilities in a Community

Inspecting Berkeley County owned, and/or operated facilities is necessary to identify potential causes of stormwater pollution. These investigations can be used to systematically evaluate the typical major categories of pollution-generating activities illustrated in Figure 3-2 that commonly contribute to stormwater quality problems at county/municipal facilities:

Figure 3-2: Typical Categories of Pollution-Generating Activities to Assess at Hotspot Facilities

Ideally, the individuals who manage or oversee each of the facilities will be present during a site inspection. They should be able to answer questions about the activities that are conducted at their facility and explain any pollution prevention/good housekeeping practices that may already be in place. Participation during site inspections is also an opportunity for facility managers/operators to learn more about the county/municipality's pollution prevention/good housekeeping efforts and how the activities conducted at their facility can influence stormwater quality.

During a county/municipal facility site inspection it is helpful to have an aerial photograph or site plan on which the locations of proposed pollution prevention/good housekeeping practices or stormwater retrofits can be marked. Digital photos should be taken during any facility inspection to document areas that need improvement and in the identification of stormwater management and pollution prevention/good housekeeping practices. The pictures can also be used to educate the facility manager and other county/municipal staff during employee training sessions.

Berkeley County's pollution prevention and good housekeeping inspection program was initiated in 2010 and has been executed in two main phases. The first phase of the program, conducted in 2010, included an initial audit of select municipal activities. These audit results were used to provide a baseline assessment of the pollutant potential at municipal sites and to guide the development of good housekeeping practices by County personnel.

The second phase of the County's program was initiated in 2015, when the County developed a comprehensive list of all County owned municipal facilities and any activities at each location which might harm the water quality of stormwater runoff. This list of identified municipal facilities with any pollution potential was selected for a thorough inspection to determine whether each constituted the designation of a "high priority" facility. A custom inspection form was developed and utilized to document all inspection findings at each listed facility and inspections were conducted in June of 2015.

A new “high priority” facility list was generated using the inspection results conducted in June 2015, as well as new facilities owned and operated by the co-permittees, City of Goose Creek and City of Hanahan. The facilities on this new comprehensive list were inspected in September 2016 and November 2017 utilizing the customized assessment forms to document all inspection findings.

A wide range of pollution prevention/good housekeeping practices can be used to address the pollution-generating activities conducted at county/municipal hotspot facilities. Some of the most commonly used practices are listed in Table 3-4.

Table 3-4: Pollution Prevention/Good Housekeeping Practices Commonly Used to Control Stormwater Pollution at County/Municipal Hotspot Facilities

Hotspot Operation or Activity	Pollution Prevention/Good Housekeeping Practices
Vehicle Maintenance and Repair	Drip pans, traps, covered outdoor storage areas, secondary containment, discharge of wash water to sanitary sewer system, proper disposal of used fluids, disconnected storm drains, automatic shutoff nozzles, signs, spill response plans, spill cleanup materials, dry cleanup methods, employee training, stormwater retrofits
Vehicle Fueling	
Vehicle Washing	
Vehicle Storage	
Outdoor Loading and Unloading	Covered loading and unloading areas, secondary containment, storm drain disconnection or treatment, inventory control, spill response plans, spill cleanup materials, dry cleanup methods, employee training, stormwater retrofits
Outdoor Storage	
Dumpster/Waste Management	Dumpster/Waste Management, secondary containment, storm drain disconnection or treatment, liquid separation/containment, employee training
Building Repair	Temporary covers/traps, employee training, contractor training, proper cleanup and disposal procedures, disconnected storm drains, dry cleaning methods, stormwater retrofits
Building Maintenance	
Parking Lot Maintenance	
Turf & Vegetation Management	Integrated pest management, reduced non-target irrigation, careful applications, proper disposal and landscaping water, avoid blowing and hosing to storm drain, employee training, stormwater retrofits
Landscaping	
Stormwater System Maintenance & Repair	Prioritization of stormwater systems with high potential for negative impacts if unmaintained, routine cleaning/vacuuming of catch basins, identification of damaged or deficient systems and repair/replacement
Spill Prevention and Response Plans	Identification of spills that require special cleanup, materials, inventory, maximum cleanup amount, facility map, spill kit inventory and associated labeling, employee training log.

In many cases, the pollution prevention/good housekeeping practices that can be used to address the pollution-generating activities associated with a county/municipal hotspot facility save time and money, reduce liability and do not greatly interfere with normal operations. For example, the pollution prevention/good housekeeping practices applied at a vehicle storage and maintenance yard might include the use of drip pans under vehicles, tarps for covering disabled vehicles, dry clean-up methods for spills, proper disposal of used fluids and covering and providing secondary containment for any outdoor storage area (Figure 3-3). In some cases, however, costlier on-site stormwater retrofit practices may be needed to control and treat stormwater runoff, especially when the facility is rated as a severe hotspot.


Figure 3-3: Pollution Prevention/Good Housekeeping Practices Commonly Used at County/Municipal Hotspot Facilities

Once the inspection is done a brief implementation plan should be developed. The plan should summarize the results of the assessment of the current County pollution prevention/good housekeeping practices and the practices that will be used to reduce the stormwater pollution generated by hotspot facilities. The plan should also include a schedule that describes when the prescribed pollution prevention/good housekeeping practices will be implemented. The contents of the implementation plan should be reviewed with the individual who manages the hotspot facility. A spill prevention and response plan should be incorporated for hotspot facilities (i.e. fleet maintenance). A sample Berkeley County plan is located in Appendix D.

3.3 CONSTRUCTION PROJECT MANAGEMENT

Berkeley County performs several capital improvement, development and redevelopment construction projects, which can generate a wide range of stormwater pollutants, including sediment, nutrients, hydrocarbons, pesticides, trash and construction debris.

Common county/municipal construction projects include:

- Public works facilities.
- Road construction and widening.
- Utility construction and repair.
- Water and wastewater treatment facilities.
- Public buildings (e.g. libraries, police and fire departments).

These County funded construction projects can have several negative impacts on water quality both during and after construction. From a water quality standpoint, the construction phase is often considered the most damaging phase of the land development cycle particularly regarding sediment impacts.

County construction project erosion/sediment control plans and procedures should include the following practices, at a minimum:

3.5.1. Minimize Clearing;
3.5.2. Protect Waterways;
3.5.3. Phase Construction;
3.5.4. Implement Rapid Soil Stabilization;
3.5.5. Protect Steep Slopes;
3.5.6. Install Perimeter Controls;
3.5.7. Adjust Erosion and Sediment Control Plan for Site Conditions; and
3.5.8. Assess Erosion and Sediment Control Plan After Storm Events.

All of these practices will be part of any County construction project and Berkeley County Ordinance 14-11-36 will ensure that necessary sediment/erosion control practices adequately apply to County projects. Some of the practices most commonly used to improve the way that county/municipal construction projects are managed are listed in Table 3-5.

Table 3-5: Pollution Prevention/Good Housekeeping Practices Commonly Used to Improve County/Municipal Construction Project Management

Existing Conditions	Recommended Improvements
• No local erosion and sediment control and/or stormwater ordinance in place	• Develop a local erosion and sediment control and/or stormwater management ordinance • Ensure that county/municipal construction sites are required to meet the provisions of each ordinance
• County/municipal construction projects are not subject to the requirements of the local erosion and sediment control and/or stormwater management ordinance	• Revise the local erosion and sediment control and/or stormwater management ordinance to ensure that county/municipal construction sites are required to meet the provisions of each ordinance
• County/municipal construction projects are not subject to local plan review and site inspection procedures	• Revise the local development review process to ensure that county/municipal construction sites are subject to local plan review and site inspection procedures
• Existing contractor selection and procurement procedures do not consider erosion and sediment control and/or stormwater management	• Revise the selection and procurement procedures to ensure that erosion and sediment control and stormwater management are considered during the selection process
• Innovative sediment/erosion control practices are not used on county/municipal construction projects	• Revise the local sediment/erosion control ordinance to ensure these practices are allowed • Promote the use of innovative sediment/erosion control practices on all county/municipal construction projects • Provide training to design engineers and contractors on the design and installation of innovative sediment/erosion control practices

3.4 POST-CONSTRUCTION STORMWATER MANAGEMENT

Stormwater Best Management Practices (BMPs) are engineered facilities designed to treat or otherwise manage post-construction stormwater runoff and mitigate the negative impacts of land development. These practices, which include dry detention ponds, wet detention ponds, stormwater wetlands, bioretention areas, swales, filtration practices and infiltration practices (Figure 3-4), provide many water quality and water quantity benefits and, if carefully designed, can provide several other benefits to the community (e.g. aesthetics, wildlife habitat, etc.).

Figure 3-4: Stormwater Best Management Practices (BMPs): (Clockwise from Top Left) Dry Detention Ponds, Wet Detention Ponds, Bioretention Area and Swales

Under the NPDES Phase II regulations, Berkeley County must ensure adequate long-term operation and maintenance of post-construction stormwater BMPs. Within many communities, the county/municipality as well as homeowners' associations and private landowners are responsible for the maintenance and upkeep of stormwater BMPs. Regulated communities can help to ensure that privately owned and -operated facilities are maintained by including enforceable provisions within the local stormwater management ordinance that require regular maintenance of these facilities.

Although not necessary, it is often helpful to create a map showing the location of each publicly owned and/or operated stormwater BMPs. A list of all Berkeley County, City of Goose Creek, and City of Hanahan owned/operated facilities, and their associated BMPs, has been created and can be found in Appendix A. It is important to conduct a site assessment of all county/municipal owned and/or operated stormwater BMPs to determine how well each practice is being maintained. An inspection checklist should be used to compile information during the assessment. Once inspected the County owned/operated facilities should be prioritized regarding the facilities which need most attention for routine maintenance activities. Berkeley County's stormwater system maintenance prioritization matrix for catch basins in public systems is contained in Appendix B.

After county/municipal owned/operated post-development stormwater BMPs are assessed, a comparison of the inspection results to determine which stormwater treatment practices are in the worst condition should be formulated. At the completion of each inspection, the local stormwater manager should make a note of any maintenance tasks that need to be performed and how urgent those tasks appear to be. If there are any urgent maintenance needs, the local stormwater manager should immediately notify the individual responsible for the upkeep and maintenance of the stormwater BMPs. These improvements, especially those that are needed to alleviate a safety hazard, should be made as soon as possible.

This process should also help to identify any common problems with maintenance, which can result in recommended changes to the county/municipality's inspection and maintenance procedures. Some of the most commonly used practices to improve post-construction stormwater BMPs are listed in Table 3-6.

Table 3-6: Pollution Prevention/Good Housekeeping Practices Commonly Used to Improve Post-Construction Stormwater BMPs

Post-Construction Stormwater BMPs	Recommended Practices
Dry Detention Ponds	• Mow side slopes monthly. • Repair undercut or eroded areas as necessary. • Pesticide/ nutrient management. • Remove litter/ debris as necessary. • Inspect for erosion of pond banks or bottom semi-annually. • Seed or sod to restore dead or damaged ground annually (as needed). • Inspect for damage to the embankment annually. • Monitor for sediment accumulation in the facility and forebay annually. • Inspect monthly to ensure that inlet and outlet devices are free of debris and operational. • Removal of sediment from the forebay every 5 to 7 years • Monitor sediment accumulations and remove sediment when the pond volume has been reduced by 25%.
Wet Detention Ponds	• Mow side slopes of the pond monthly. • Since decomposing vegetation captured in the wet pond can release pollutants, especially nutrients, it may be necessary to harvest dead vegetation annually. Otherwise the decaying vegetation can export pollutants out of the pond and also can cause nuisance conditions to occur. • Clear debris from all inlet and outlet structures monthly. • Repair all eroded or undercut areas as needed. • Place a sediment marker in the forebay to determine when sediment removal is required. • Monitor sediment accumulations in the main pond area and remove sediment when the permanent pool volume has been significantly filled and/or the pond becomes eutrophic.
Bioretention Area	• Pruning and weeding as needed • Remove trash and debris as needed • Inspect inflow points for clogging semi-annually (every 6-months). • Remove any sediment semi-annually (every 6-months). • Repair eroded areas. Re-seed or sod as necessary semi-annually (every 6-months). • Mulch void areas semi-annually (every 6-months). • Inspect trees and shrubs to evaluate their health semi-annually (every 6-months). • Remove and replace dead or severely diseased vegetation semi-annually (every 6-months). • Remove evasive vegetation semi-annually (every 6-months). • Nutrient and pesticide management. Annual, or as needed. • Water vegetation, shrubs and trees semi-annually (every 6-months). • Remove mulch, reapply new layer annually • Test planting mix for pH annually. • Apply lime if pH < 5.2. as needed. • Add iron sulfate + sulfur if pH > 8.0 as needed. • Place fresh mulch over entire area as needed. • Replace pea gravel diaphragm every 2 to 3 years if needed.

Swales	• Mow grass to maintain design height and remove clippings as needed (frequent/seasonally). • Nutrient and pesticide management annually, or as needed • Inspect side slopes for erosion and repair annually, or as needed • Inspect channel bottom for erosion and repair annually, or as needed • Remove trash and debris accumulated in forebay annually. • Annual (semi-annually first year) inspection of vegetation. Plant an alternative grass species if original cover is not established. • Annual inspection for clogging and correct the problem. • Roto-till or cultivate the surface of the bed if swale does not draw down in 48 hours as needed. • Remove sediment build-up within the bottom of the swale as needed, after 25% of the original design volume has filled.
Stormwater Wetlands	• Monitor wetlands after all storm events greater than 2-inches of rainfall during the first year to assess erosion, flow channelization and sediment accumulation. Inspection should be made at least once every six months during the first three years of establishment. • Place a sediment cleanout stake in the forebay area to determine when sediment removal is required. • Debris should be removed from the inlet and outlet structures monthly. • Monitor wetland vegetation and replaced as necessary once every 6-months during the first three years of establishment. • Annually inspect and maintain the depth of the zones within the wetland. • Annually remove invasive vegetation. • Repair all eroded or undercut areas as needed.
Vegetated Filter Strip	• Inspect vegetation for rills and gullies annually and correct. Seed or sod bare areas. • Inspect grass after installation to ensure it has established. If not replace with an alternative species. • Inspect to ensure that grass has established annually. If not, replace with an alternative species. • Mow grass to maintain a height of 3- to 4-inches. • Remove sediment build-up from the bottom when it has accumulated to 25% of the original capacity.

3.5 STREET REPAIR AND MAINTENANCE

Public streets and roadways in Berkeley County make up a significant percentage of the urban infrastructure and require regular maintenance to keep them in good condition. Regular County street repair and maintenance activities, such as pavement marking, repair, patching, resurfacing, sealing and right-of-way maintenance, can generate a range of stormwater pollutants, including metals, chlorides, hydrocarbons, nutrients, sediment and trash. If not properly managed, these activities can negatively impact water quality (Figure 3-5).

Figure 3-5: Roadway Repairs and Maintenance Generating Significant Amounts of Sediment

There are three primary county/municipal street repair and maintenance activities that can influence stormwater quality:

- Routine road and bridge maintenance: Re-chipping, grinding, pothole repair, pavement striping, asphalt re-paving, saw cutting.
  - Potential pollutants: Sediment, chloride, cyanide, and phosphorus.

- Winter operations: Sanding, application of deicing compounds.
  - Potential pollutants: Fine particles, creosote and PAH.

- Right-of-way maintenance: Herbicide and pesticide application, vegetation selection.
  - Potential pollutants: Nutrients, herbicides, pesticides.

All streets and roadways have routine maintenance needs such as mowing and sweeping, with other maintenance needs dictated by age, traffic volume or climatic conditions. Recommended pollution prevention/good housekeeping techniques for roadways are applied through county/municipal employee, utility employee and contractor training, as well as county contracting specifications.

Improving the way that county/municipal street repair and maintenance activities are conducted within the community can reduce the amount of stormwater pollution that is conveyed into receiving waters. Some of the practices most commonly used to improve the way that county/municipal street repair and maintenance activities are conducted are listed in Table 3-7.

Table 3-7: Pollution Prevention/Good Housekeeping Practices Commonly Used to Improve County/Municipal Street Repair and Maintenance Activities

Street Repair or Maintenance Activity	Recommended Improvements
Routine Roads and Bridges Maintenance	• Prevent paving materials and wastes from entering the storm drain system • Minimize the area of soils left exposed or graded • Collect any loose sand, gravel, asphalt, or other material as soon as possible after construction activities • When placing chip seals, limit spreading aggregate to the sealed surface and sweep up excess aggregate once cured and each day thereafter until aggregate loss is insignificant • Mix road stabilization materials during periods of calm, dry weather, and seal as soon as possible after dressing • Fill and compact soil, gravel, and asphalt in layers • Reuse road spoil in repairs if possible and sweep up and dispose of properly • Eliminate 'edge break' by fully sealing road shoulders • When striping, use water-based paints or thermoplastics rather than solvent based ones • Avoid striping operations while the pavement is wet, during humid conditions, or if rain is likely • Avoid applying thermoplastics at low temperatures, i.e. below 54°F • When possible, use portable drip trays under equipment to catch spills • Use a skirt around the blaster to minimize the spraying of material away from the work site • Coordinate street-sweeping with line removal, so that waste material is picked up before it can be transported by rain, wind, and traffic • Use dry cutting techniques when saw cutting and sweep or vacuum up residue • Construct runoff barriers to protect storm drains from wet saw-cut runoff • Place drip pans or absorbent materials under saw-cut equipment when not in use • Use as little cooling water as possible and switch the water off when the saw is not in use

Vegetative Maintenance	• Use mechanical methods of vegetation removal rather than herbicides • Dispose of lawn clippings at a landfill; clippings should not be disposed of in streams or storm drains • Avoid applying herbicides and pesticides if rain is expected • Calibrate equipment to avoid over application

A field investigation should regularly be done to assess current County pollution prevention/good housekeeping practices for street repair and maintenance activities. Once the investigations are done a brief implementation plan should be created if practices/activities are deemed to be causative of pollution. The plan will summarize the results of the assessment as it relates to the current County pollution prevention/good housekeeping practices and the practices that will be used to reduce the stormwater pollution generated by County street repair and maintenance activities. The plan will also include a schedule that describes when the prescribed pollution prevention/good housekeeping practices will be implemented. The contents of the implementation plan will be reviewed with the individual who manages the street repair and maintenance activities.

3.5.1. Street Sweeping

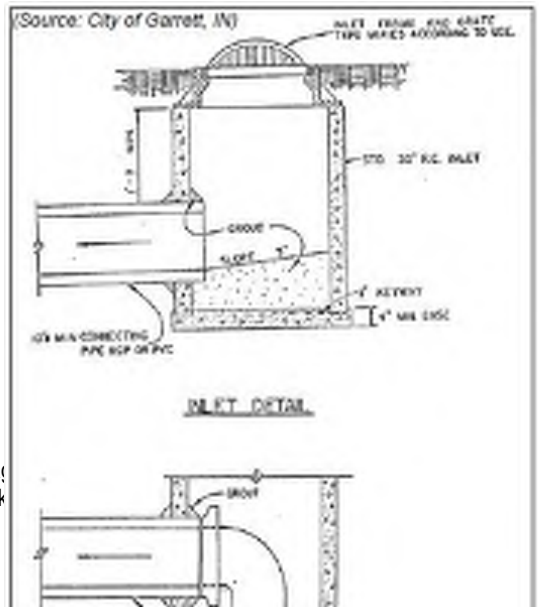
The public streets and roadways in Berkeley County under Berkeley County's maintenance responsibility require regular maintenance to keep them in good condition. Regular County street maintenance activity, via street sweeping maintenance, can generate a range of stormwater pollutant removals including Total Solids, Total Phosphorous, and Total Nitrogen, sediment and trash. However, if not properly managed, these activities can negatively impact water quality.

Using a conceptual model, it is expected that pollutant removal rates from street sweeping for TS, TP, and TN are: 9 %, 3% and 3%, respectively. The presented value is representative of mechanical, monthly street sweeping. All values presented are dependent upon the Street Particulate Matter (SPaM) that is available to be captured by pick-up of a street sweeper.

Berkeley County's and Municipality's solid waste programs includes a curb-side leaf litter pick-up that is able to maximize the reduction of leaf litter and prevent it from entering the storm drains. This is important for two reasons, 1) Berkeley County's street sweepers may also emulsify leafy debris and make it more easily entrained by runoff, and 2) the decomposition of leaves and other organic debris in storm drain inlets or catch basins can create an environment suitable for the release of inorganic nitrogen and transport to receiving waters.

3.6 STORM DRAIN MAINTENANCE

Storm drain maintenance is often the last opportunity to remove pollutants before they enter the storm drain system. The effectiveness of this pollution prevention/ good housekeeping practice depends on the basic design of the stormwater conveyance in a subwatershed. Most systems have a catch basin (Figure 3-6) or sump pit located in the storm drain inlet to trap sediment and organic matter and prevent clogging. In some areas, however, conveyance systems were designed to be self-cleansing and thus have no storage. Each catch basin or sump pit tends to be unique in how quickly it fills up, and whether the trapped material is liquid, solid or organic. To this extent, each reflects the conditions and behaviors that occur within the few hundred feet of street it serves.



The Berkeley County Stormwater Design Standards Manual (2009) contains additional information in regard to catch basins that may be encountered during the County's maintenance process. Materials and construction of storm drainage structures (catch basins, junction boxes, control structures, etc.) are as specified in Section 719 of the SCDOT specifications (2013). Roadway catch basins are typically SCDOT Type 9, Type 16, Type 17 or Type 18 Catch Basins based on the specific application.

Figure 3-6: Catch Basin Detail

Storm drain maintenance can be an effective strategy in urban subwatersheds that have few other feasible options to remove pollutants. For many communities, storm drain maintenance is reactive and conducted in response to complaints from residents. Water quality is not a commonly cited reason for a storm drain cleanout program. When performed properly, regular maintenance can improve water quality and prevent clogging and flooding.

Storm drain cleanout effectiveness is impacted by both the frequency and method of cleanout. Table 3-8 provides estimated pollutant removal rates for catch basin cleanouts.

Table 3-8: Expected Pollutant Removal Rates for Catch Basin Cleanouts (Law et al., 2008)

Frequency	Total Suspended Solids	Total Phosphorus	Total Nitrogen
Annual	18%	<1%	3%
Semi-Annual	35%	2%	6%

A storm drain maintenance program should address the following:

- *Tracking* – the location and maintenance of storm drains is tracked using a database and spatial referencing system (e.g., Global Positioning System, Geographic Information System) as well as with a project management/asset management software. Additionally, knowing the type and era of the storm drain system may be of use since some inlets/catch basins are designed to be self-cleaning while others have some trapping capacity.

- *Frequency* – Catch basins should be inspected and cleaned out according to their priority (see priority matrix in Appendix B):

    - Priority A – Catch basins to be cleaned annually.
    - Priority B – Catch basins to be cleaned at least once every two years.
    - Priority C – Catch basins to be cleaned less frequently than A & B.

- *Technology* – the four common methods of cleaning catch basins are described in Table 3-9.

- *Staff Training* - operators need to be properly trained in catch basin maintenance including waste collection and disposal methods. Staff should also be trained to report water quality problems and illicit discharges.

- *Material Disposal* - since catch basin waste may contain hazardous material, it should be tested and disposed of accordingly. Maintenance personnel should keep a log of the amount of sediment collected and the removal date at the catch basin.

Table 3-9: Equipment Used for Catch Basin and Inlet Cleaning

Equipment	Description
Manual cleaning	Bail out sediment-laden water and shovel into street then truck. Or crew enters catch basin and fill buckets with sediment that are then carried to a dump truck. Clean water is used to refill the catch basin.
Eductor cleaning	Eductor truck evacuates the catchment of the sediment-laden water into a settling tank.
Vacuum cleaning	Air blower of the vacuum truck is used to create a vacuum and the air-solid-liquid material is separated in the vacuum truck unit by gravity separation and baffles.
Vacuum combination jet cleaning (e.g. Vaccon)	A vacuum assisted truck that uses a combination of air, water and hydraulic suction. Suction is used to extract material from storm inlets. Water is used to clear material from storm drain pipes that is not removed by the vacuum. The material is stored in the truck holding tank and transported for disposal. This type of vacuum combination jet cleaning equipment is what is being utilized by Berkeley County for stormwater system maintenance (see following photograph).

The County initiated a comprehensive catch basin/stormwater system cleaning program in April 2017 utilizing a vacuum truck previously owned and operated by the Berkeley County Water and Sanitation Department. This catch basin/stormwater system maintenance program is based on the assessment and prioritization of County owned facilities (as required by the County's NPDES Phase II MS4 Permit) as well as in response to service requests. A summary of the catch basin prioritization matrix for public systems is contained in Appendix B. This summary includes the established rating system with descriptions, criteria for rating and recommendations on the number of suggested scheduled cleanings.

Figure 3-7: Catch Basin Maintenance Operation

3.7 PARK AND LANDSCAPE MAINTENANCE

A community may own or control as much as 10% of all the land within a subwatershed, when all the parks, schools, golf courses, rights-of-way, easements, open space and county/municipal buildings are combined. It is not uncommon for these areas to be managed as vast expanses of turf. The maintenance of these areas frequently includes mowing, fertilization, pesticide application, and supplemental irrigation. Poor turf management and landscaping practices have the potential to create stormwater pollution, particularly in urban areas where soils are compacted, and infiltration is minimized. Potential pollutants generated by landscape and park maintenance include nutrients, herbicides, organic debris, and sediment. Because of their large size and ownership, county/municipal lands are good candidates for pollution prevention/good housekeeping techniques such as riparian reforestation and integrated pest management.

A wide range of pollution prevention/good housekeeping practices can be used to improve the way that park and landscape maintenance activities are conducted within a community. Some of the most commonly used practices are listed in Table 3-10.

Table 3-10: Pollution Prevention/Good Housekeeping Practices Commonly Used to Improve County/Municipal Park and Landscape Maintenance Activities

Activity	Pollution Prevention/Good Housekeeping Practices
Turf Reduction	• Plant trees and/or other native vegetation in suitable areas • Consider turf alternatives, such as native or low-water, cool-season turf grass • Allow natural regeneration in suitable areas
Turf Management	• Sweep any grass clippings away from paved surfaces after mowing • Use mulching type mowers or dispose of at local composting facility • Use erosion control measures when soils are exposed • Place stockpiled materials away from storm drains
Native Plantings	• Provide native and naturalized landscaping guidance and plant lists • Require use of appropriate native and naturalized landscaping on municipally-owned properties
Landscape Management	• Collect landscape waste (including grass clippings) and dispose of at a local yard waste recycling/composting facility • Do not use leaf blowers to blow waste into streets, storm drains or ditches
Pesticide/Herbicide Application	• Develop an integrated pest management plan that uses pesticides only as a last resort • Apply only when rain is not expected • Do not prepare herbicides or pesticides for application near storm drains • Use manual and/or mechanical methods to remove weeds rather than herbicides • Consider a low or no pesticide approach to maintaining landscaped areas
Fertilizer Application	• Never apply fertilizers or pesticides within five feet of pavement, 25 feet of a storm drain inlet, or 50 feet of a stream or water body • Consider a low or no fertilizer approach to maintain turf • Apply only when rain is not expected • Perform a soil test to determine actual fertilization needs and application rate • Calibrate fertilizer spreaders to avoid excessive application Irrigation • Employ shutoff devices to prevent irrigation after precipitation
Irrigation	• Employ shutoff devices to prevent irrigation after precipitation or if a pressure drop occurs due to broken sprinkler heads or lines • Design irrigation systems specific to each landscaped area's water requirements • Select native plant species whenever possible and group together plants with similar water requirements in order to reduce excess irrigation • Use soaker hoses not sprinklers and irrigate in the morning or evening to conserve water
Employee Training	• Train employees on the use and appropriate application of pesticides, herbicides and fertilizers • Ensure that designated no mow areas are well advertised • Educate staff on the benefits of trees and native and naturalized species

A field investigation should regularly be done to assess current County pollution prevention/good housekeeping practices for park and landscape maintenance activities. Once the investigation is done a brief implementation plan should be created if it is found that the activities are thought to be causative of pollution.

The plan will summarize the results of the assessment as it relates to the current County pollution prevention/good housekeeping practices and the practices that will be used to reduce any stormwater pollution generated by the park and landscape maintenance activities. The plan will also include a schedule that describes when the prescribed pollution prevention/good housekeeping practices will be implemented. The contents of the implementation plan will be reviewed with the individual who manages the park and landscape maintenance activities.

3.8 ANIMAL SHELTERS

Animal Care and Handling Facilities
Since Berkeley County is currently responsible for an animal shelter on Cypress Gardens Road, included in this Manual is information on pollution prevention practices for these types of facilities. This animal shelter houses small animals (i.e. cats and dogs) as well as occasionally horses and other farm animals.

Pollutant sources at the animal shelter include, but are not limited to, the following:

- Animal washing
- Feeding / grazing
- Urine / feces and manure deposits
- Unpaved or non-vegetated areas

Pollutants can include:

- Coliform bacteria
- Nutrients
- Sediment

Approach
Minimize exposure of rain and runoff to animal care and handling areas by using cover and containment. In and around these areas, use good housekeeping to minimize the generation of pollutants. Make stormwater pollution prevention BMPs a part of standard operating procedures and the employee training program.

Source Control BMPs
Proposed best management practices are listed by activity.

Table 3-11: Pollution Prevention/Good Housekeeping Practices Commonly Used for Animal Handling Facilities

Activity	Pollution Prevention/Good Housekeeping Practices
Animal Handling/Washing	• Use dry cleaning methods (i.e. sweeping or vacuuming) to clean animal handling areas regularly. • Properly dispose of droppings, uneaten food, and other potential contaminants. • Do not discharge wash water to storm water drains or other conveyances. • Block the storm drain and contain the runoff for proper disposal. • Wash water should be collected and pumped to the sanitary sewer, do not allow wash water to enter storm drains. DO NOT discharge wash water to sanitary sewer until contacting the local sewer authority to find out if pretreatment is required. • Keep animals in paved and covered areas, if feasible. • If keeping animals in covered areas is not feasible, cover the ground with vegetation or some other type of ground cover such as mulch. • Prevent animals from moving away from controlled areas where BMPs are in use (e.g. fencing, leashing, etc.).

Horse Management	• Site Layout Considerations
	  ○ Site barns, manure storage, and other high-use areas on higher ground when possible or on the portion of property that drains away from storm drains, conveyances, or waterways.
	• Use grassed ditches, berms, or subsurface drains and properly sized roof gutters and downspouts to divert clean runoff around barnyard manure and sediment.
	• Divert contaminated runoff from manured areas away from storm drains or conveyances.
	• Focus on protecting the handling area's soil and vegetative cover. Prevent bare areas from forming.
	• Keep animals away from wet fields when possible.
	• During heavy rainfall, consider indoor feeding.
	• Clean up manure and soiled bedding regularly, especially during wet weather.
	• After cleanup, during the arid summer, water the areas where horses frequently deposit manure to promote decomposition.
	• Store horse waste in sturdy, insect-resistant, and seepage-free units that have an impervious surface bottom and a cover to prevent leaching and runoff, such as:
	  ○ Plastic garbage cans with lids
	  ○ Fly-tight wooden or concrete storage sheds
	  ○ Composters
	• Compost. Keep compost piles moist, and well aerated to promote decomposition.
	• Give away composted material to local greenhouses, nurseries and botanical gardens.
	• Transport manure to topsoil companies or composting centers.

Maintenance	• Clean storm drain inlets on a regular schedule and after large storms. • Maintain BMPs to reduce potential sediment runoff from outside exposed areas and any unpaved parking lot(s).
Training	• Install and alert employees to no dumping stencils on storms drains/inlets. • Train employees on BMPs, stormwater discharge prohibitions, and wastewater discharge requirements. • Train employees on proper spill containment and cleanup. • Establish a regular training schedule, train all new employees, and conduct annual refresher training. • Use a training log or similar method to document training.
Chemical Management	• Use Integrated Pest Management (IPM) or less-toxic methods for insect and weed control. • Use chemical insecticides and herbicides as a last resort. Always properly store and dispose of chemical pesticides.

3.9 EMPLOYEE TRAINING

County/municipal employees that are educated about the link between their work and stormwater quality can assist in reducing the amount of stormwater pollution that is conveyed into receiving waters. In order for county/municipal pollution prevention/good housekeeping programs to achieve success, employees must be trained on how to incorporate pollution prevention/good housekeeping practices into their everyday activities.

County/municipal employees must be provided with specific information about the actions they can take to prevent or reduce stormwater pollution. Table 3-11 presents the range of training topics that can be provided for each county/municipal operation. If they are not already familiar with the requirements of the NPDES Phase II permit, a general training session is a good opportunity to educate employees about them.

The most effective pollution prevention/good housekeeping training programs are the ones that provide the right information to the right employees. For example, employees engaged in landscape and park maintenance should be trained in landscaping techniques that use less fertilizer and pesticides, while employees responsible for maintaining fleet vehicles should be trained in the proper disposal of waste automotive fluids and how to correctly deal with leaky or disabled vehicles. Any County employees that are frequently in the field should be trained on how to identify and report any suspected illicit discharges.

There are a variety of methods that can be used to educate county/municipal employees on stormwater pollution prevention/good housekeeping practices, including:

- Annual Performance Reviews
- Brochures
- Conferences
- Meetings
- Training Sessions
- Videos
- Walkthroughs
- Workplace Posters
- Workshops

Employee turnover is an important consideration when developing an employee training and education program. The key to an effective program is to ensure that institutional knowledge about pollution prevention/good housekeeping practices is maintained over time. A tracking system, such as a sign in sheet that identifies the county/municipal staff members that have received training is critical to ensure the effectiveness of a pollution prevention/good housekeeping employee training program.

Table 3-12: Employee Training Programs – Presenting the Right Information to the Right Audience

County/Municipal Operation	Training Targets	Training Topics
Hotspot Facility Management	• Facility managers • Building maintenance staff • Fleet maintenance staff	• Vehicle maintenance and repair procedures • Vehicle washing procedures • Materials loading and unloading procedures • Materials storage procedures (outdoor storage) • Spill prevention and response • Dumpster management • Building repair and maintenance procedures
Construction Project Management	• Contract administration staff • Building services staff • Plan review staff • Site inspection staff	• Considering erosion and sediment control • and stormwater management during contractor selection • Plan review techniques • Erosion and sediment control practices • Ordinance enforcement procedures
Post-Construction Stormwater Management	• Storm drain staff • Site inspection staff • Maintenance staff	• Post-Construction stormwater BMP inspection procedures • Post-Construction stormwater BMP maintenance procedures

Street Repair and Maintenance	• Street maintenance staff • Vehicle operators	• Road maintenance procedures • Winter road maintenance procedures • Handling and application of pesticides and other chemicals
Storm Drain Maintenance	• Storm drain staff • Street maintenance staff • Vehicle operators	• Storm drain maintenance procedures • Materials disposal • Vacuum truck maintenance
Park and Landscape Maintenance	• Parks and recreation staff • Community forestry staff • Landscaping staff • Mowing staff	• Use an appropriate application of pesticides, herbicides and fertilizers • No mow areas • Benefits of trees, native and naturalized species
Animal Shelters	• Animal shelter staff • Landscaping staff	• Animal handling and washing • Waste management • Maintenance • Chemical management

Berkeley County has implemented a progressive pollution prevention/good housekeeping employee training program that now includes participants from the Cities of Goose Creek and Hanahan. The training program has historically consisted of workshops that includes Powerpoint presentations, videos, question and answer sessions and occasionally a short quiz on good housekeeping as well illicit discharge detection and elimination (IDDE).

The training workshops target key County and municipal personnel to include stormwater staff, roads and bridges, maintenance garage, fleet management, facilities and grounds, mosquito abatement, and building and codes. A template of an agenda and sample completion certification utilized by Berkeley County for the pollution prevention/good housekeeping training workshops can be found in Appendix E.

4.0 REFERENCES

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Appendix A
List of Berkeley County, Cities of Goose Creek and Hanahan Owned/Operated Facilities

LIST OF BERKELEY COUNTY GOVERNMENT FACILITIES

Facilities & Grounds Dept. Description of Services

Yellow = Building & Grounds Maintenance with custodial services
Light Green = Building & Grounds Maintenance only
Blue = Building Maintenance only when requested.
Green = Grounds Maintenance Only
Orange = Floor Plan Available
Limited to Structure Maintenance per Lease

Facility Occupied By---------- C=County S=State O=Other

Berkeley County Facilities	Year Built	Address	Approx. Sq. Ft.	Utilities Paid by:	Berkeley County is the:	Occupied By:	C	S	O	BMP Type
223 North Live Oak Bldg.	1952/2007	223 North Live Oak Dr., Moncks Corner, SC29461	48,000	F&G	Owner	**See (a) thru (e)**				
(a) Sheriff		***Complete Bldg Renovated in 2007-8***	15,300			Sheriff's staff	X			
(b) Central Summary Court			9,750			Magistrate's staff	X			
(c) Sheriff			1,570			EMS staff	X			
(d) EPD/EOC			3,400			EPD/EOC staff	X			
(e) I.T.			1,370			I.T. staff	X			
Training/Sheriff			1,290			Various departments for training/meetings	X			
Clerk of Court			260			Evidence Vault	X			
911 Dispatch Emer. Radio Rm			156			Back up Communications room	X			
911 Communications Building	1990	223 North Live Oak Dr., Moncks Corner, SC29461	2,091	F&G	Owner	911 Communications staff	X			
Guardian AD LITEM		111 Pine Street, Moncks Corner, SC 29461	900	Guardian AD LITEM	Owner	Guardian AD LITEM		X		
Facilities & Grounds	Mid-70's	223 North Live Oak Dr., Moncks Corner, SC29461	10,140	F&G	Owner	F&G Employees	X			
Portable Storage Unit		2 units 320sqft. Each	320			F&G Employees	X			
Portable Storage Unit			320			In use/Admin Services/Records Storage	X			
Public Works Building	Mid-70's	223 North Live Oak Dr., Moncks Corner, SC29461	16,470	F&G	Owner	**See (a) thru (d)**				
(a) Roads & Bridges			8,355			Roads and Bridges staff	X			
(b) Purchasing			3,290			Purchasing staff	X			
(c) Garage			10,080			Garage staff	X			
Garage Portable Storage Unit			320			Vehicle/Equipment Parts Storage	X			
(d) EMS Storage			576			Public Works staff	X			
Hoover Storage Building-PWD	2004	223 North Live Oak Dr., Moncks Corner, SC29461	900	F&G	Owner	Storage in use	X			
Mosquito Abatement Office Bldg	2013	223 North Live Oak Dr., Moncks Corner, SC29461	2655		Owner	Mosquito Abatement staff	X			2- Ponds
Mosquito Abatement Storage	2013	223 North Live Oak Dr., Moncks Corner, SC29461	2655		Owner	Chemicals Trucks	X			
Maude Callen Building	1983	Belt Drive, Moncks Corner, SC 29461	26,700		Owner	**See (a) thru (d)**				
(a) Head Start		4 Belt Drive, Moncks Corner, SC 29461	8,900	F&G	Owner	Unoccupied/ Records Storage				
(c) Voter Registration		6 Belt Drive, Moncks Corner, SC 29461	3,317	F&G		Election Commission staff	X			
(d) Administrative Services		Belt Drive, Moncks Corner, SC 29461	2,141	F&G		Admin. Services staff	X			
Guard House	1984	223 North Live Oak Dr., Moncks Corner, SC29461	80	F&G	Owner	Security Guards			X	
Training Center	1996	474 Reid Hill Road, Moncks Corner, SC 29461	12,088	Training Ctr. Budget	Bldg. Owner	Land leased from Santee Cooper	X			
Records Building	2000	223 North Live Oak Dr., Moncks Corner, SC29461	2,800	F&G	Owner	Records Storage	X			
EMS Admin Bldg	2000	223 North Live Oak Dr., Moncks Corner, SC29461	2,800	F&G	Owner	EMS Administrative staff	X			
Animal Shelter	1993	500 Cypress Gardens Rd.	6,000	F&G	Owner		X			
Home Telephone		**Complete Bldg renovation in 2004/2005**	312	Home Telephone		Leases 312 Sq. ft. for Sub Station				
Berkeley Admin. Bldg.	1981/2005	1003 Highway 52, Moncks Corner, SC 29461	71,604	F&G	Owner	Berkeley County offices	X			
Suite A			4000			County Supervisor Suite	X			
Suite B			2100			Finance Dept.	X			
Suite C			3325			Human Resources Dept.	X			
Suite D			1000			Legal Dept.	X			
Suite E			1891			Del. Tax Collector Dept.	X			
Suite F			5920			Planning, Permits, B&C, Animal Control	X			
Suite G			1980			GIS, 911 Addressing	X			
Suite H			4326			Real Property Services Dept.	X			
Suite J			2500			Auditor Dept.	X			
Suite K			6144			Clerk to Council, Assembly Room	X			
Suite L			1170			County Engineer Office, Conference Rm.	X			

Engneering			1574			Deputy County Eng. Engineer employees	X			
Suite M			5800			Information Technology Dept. Server Rm.	X			
Suite N			2430			Treasurer Dept.	X			
Suite P			7400			Register Of Deeds	X			
Food Lion	1981	Hwy 52 & 52 Bypass, Moncks Corner, SC 29461	31,569	F&G	Owner	*Unoccupied*				
Nesbitt Hse/Chamber of Commerce	1800's	1004 Old Hwy 52, Moncks Corner, SC 29461	2,470	Chamber of Comm.	Owner	Chamber of Commerce			X	
Moncks Corner Health Dept.	1932/1999	109 West Main St, Moncks Corner, SC 29461	28,832	Health Dept.	Owner	**See (a) thru (e)**				
(a) Health Dept. employees		***Complete Bldg renovated in 1999***	17,325			Dept.of Health & Human Services		X		
(b) Berkeley County D.J.J.			2320			Dept. of DJJ		X		
(d) Probation & Parole			1,710			Probation & Parole staff		X		
Court House Annex	1991	300-B California Ave, Moncks Corner, SC 29461	29,548	F&G	Owner	**See (a) thru (e)**				
(a) Clerk of Court			24,202			Clerk of Court/Family Court staff	X			
(b) Solicitor			2,946			Solicitor's staff	X			
(c) Master-in-Equity			526			Master-in-Equity staff	X			
(d) Probate Court			1,872			Probate Judge & staff	X			
Old Court House	1896/1966	300 California Ave, Moncks Corner, SC 29461	15,936	F&G	Owner	**See (a) thru (d)**				
(a) Sheriff		***Added on to in 1966 and renovated***	1,000			Sheriff's staff	X			
(b) Clerk of Court		***Windows, soffit & trim upgraded 2002/03***	11,000			Clerk of Court/Family Court staff	X			
(c) Probation & Parole		***Roof Replacement 2002/03***	1,120			Probation & Parole staff		X		
(d) I.T.			500			I.T. staff	X			
(e) Coroner Office			900			Coroner & staff	X			
(f) PTI Solicitor			1200			Pre-Trial Interv. Staff- Solicitor	X			
Hill Finklea Detention Center	1994/2008	300 California Ave, Moncks Corner, SC 29461	73,408	F&G	Owner	Detention staff **Addition in 2008/09**	X			1- pond
Jail Storage Buildings		300 California Ave, Moncks Corner, SC 29461	528	F&G	Owner	Storage in use				
Narcotic's Trailer Office		182 Dog Pound Road, Moncks Corner, SC 29461	2,220	F&G	Owner	Sheriff Staff	X			
Narcotic's Trailer Storage Bldg			1,116	F&G	Owner	Storage in use	X			
Forensics' Building	2000	300 California Ave, Moncks Corner, SC 29461	1,200	F&G	Owner	Sheriff Staff	X			
Morgue Building	1989/2007	223 North Live Oak Dr., Moncks Corner, SC29461	1,260	F&G	Owner	Coroner & staff	X			
Morgue itself			700							
Storage			560			Storage				
Airport/Terminal Building	2005	616 Whitesville Rd, Moncks Corner, SC 29461	2,625	F&G	Owner	Airport staff	X			4 -ponds & 1-Stormceptor
Shade Hangar Bldg #1			11,507	F&G	Owner					
Shade Hangar Bldg. #2			13,209	F&G	Owner					
Shade Hangar Bldg. #3			11,507	F&G	Owner					
T-Hangar Building			15,311	F&G	Owner					
Corporate Hangar			10,000	F&G	Owner					
Maintenance Hangar			4,600	F&G	Owner/Lessor	Private Aircraft Service Business			X	
Runway Light Vault			120	F&G	Owner					
Moncks Corner Senior Center	1999/2014	222 Heatley St, Moncks Corner, SC 29461	4,450	Berkeley Seniors	Owner	Senior Citizens			X	
Moncks Corner Library	1981/2005	1003 Highway 52, Moncks Corner, SC 29461	15,082	Library	Owner	Library staff, also see (a)	X			
Library Admin. Building	1970's	100 Library St, Moncks Corner, SC 29461	7,873	Library	Owner	Library staff	X			
Goose Creek Library	1992	325 Old Moncks Corner Rd, Goose Creek SC	16,462	Library	Owner	Library staff	X			1-pond
Sangaree Library	2006	595 Sangaree Parkway, Summerville, SC 29483	6,510	Library	Owner	Library staff	X			
Daniel's Island Library	2007	2301 Daniels Island Dr, Charleston, SC 29492	6,690	Library	Owner	Library staff	X			
Hanahan Library	2013	1216 Old Murray Ct. Hanahan SC	7,000	Library	Owner	Library staff	X			2-ponds
Cainhoy Community Center	early-80's	2442 Cainhoy Rd, Cainhoy SC	2,000	F&G	Owner	Community Use			X	
Building A			3,450							
Building B			2,988							
(a) Goose Creek Magistrate			8,148			Magistrate staff	X			
(b) Auditor			3,104			Auditor staff Not occupied	X			
(c) Treasurer			Inc. in Above			Treasurer staff Not Occupied	X			
(d) Veteran Affairs			Inc. in Above			Veteran Affairs staff	X			
Goose Creek Health Dept.	1985	106 West View Drive, Goose Creek, SC	6,000		Owner	Health Dept staff		X		

Cypress Gardens		3030 Cypress Gardens Road, Goose Creek SC	31,692	Cypress Gardens	Owner	Cypress Garden's staff/open to Public	X			1-backflow outfall structure
Gift shop/Interpretive Ctr/Offices			2,660							
Nature Center			1,442							
Environmental Classroom			800							
Butterfly House			3,285							
Aquarium			4,900							
History Center			2,993							
Dean Hall			7,000							
Conference Cottage			780							
Double Gazebos			1,152							
Restrooms (2)			578							
Maint. Office/Supply Storage Bldg.			276							
Maintenance Shop			589							
Maintenance Tool Shed			200							
Horticulture Supply Shed			544							
Green House			2,660							
Storage Containers (3)			320							
Horticulture Trailer			320							
Gift Shop Storage Trailer			552							
MT. Holly Commerce Park	1999	Jim Rozier Blvd, Hwy 52, Moncks Corner, SC		Economic Develop.		Industrial Park				5-ponds
Sangaree Sheriff's Sub Station	N/A	345 Sangaree Parkway	600	F&G	Agreement BCWS	Sheriff's Deputies	X			
Goose Creek Senior Center	1995/2005	103 Thurgood Rd. Goose Creek, S.C.	6,250	G.C. Rec. Comm	Owner	Berkeley Seniors Inc./G.C. Rec Comm.			X	
Medic 1 - Goose Creek	N/A	907 Redbank Rd, Goose Creek SC		Goose Creek Fire Dept.	Agreement	EMS/Goose Creek Fire Dept.	X		X	
Medic 2 - Summerville	2001	137 Farmington Rd, Summerville, SC	1,500	F&G	Owner	EMS	X			1-bioretention swale
Medic 3 - Moncks Corner	2002	223 North Live Oak Dr., Moncks Corner, SC29461	2,800	F&G	Owner	EMS	X			
Medic 4 - Cross	N/A	1659 Old Hwy 6 Cross SC 29436	2090	F&G	Owner	EMS/Sheriff Sub-station	X			
Medic 5 - St. Stephens	1999	336 Ravenell Dr, St. Stephens, SC	1,500	F&G	Owner	EMS	X			
Medic 6 - Jamestown	N/A	1052 Bee Drive, Jamestown, SC	1,200	F&G	Owner Oct. 2014	EMS	X			
Medic 7 - Cainhoy	1999	1501 Recreation Road, Cainhoy SC	3,600	F&G	Owner	EMS	X			
Medic 8 - Daniel's Island	N/A	235 Seven Farms Dr, Charleston, SC			Agreement	EMS/City of Chas. Fire Dept.	X		X	
Medic 9 - Goose Creek City	N/A				Agreement	Ambulance only - City of Goose Creek			X	
Medic 10 - Highway 176	2003	2355 State Rd, Summerville, SC	2,214	F&G	Owner	EMS	X			
Communications Towers:	N/A					911-Communication Radio Equipment				
Cainhoy Tower Building		2167 Cainhoy Rd. Cainhoy, SC BCWS	48			Communication Equipment				
Sandridge Tower Building		4594 State Rd. Ridgeville, SC	48			Communication Equipment				
Hwy 17A & 45 Tower Building		3659 N. Hwy 17A Jamestown, SC	48			Communication Equipment				
Hwy 27 Tower Building		1516 Old Gilliard Rd. Ridgeville/ Not in use	48			Communication Equipment				
Hwy 52 Tower Building		441 Drive In Lane Walmart Site	48			Communication Equipment				
Hwy 41 Tower Building		4796 HWY 41 BEC Huger Site	48			Communication Equipment				
Landfill Tower Building		555 Oakley Rd. Moncks Corner, SC	200	Communications	Owner	Communication Equipment				
Cross Tower Building		1338 Ranger Dr.- BCWS Water Tower	48			Communication Equipment				
Shulerville Tower Building		2115 Sulerville Rd. Jamestown, SC	48			Communication Equipment				
Russellville Site		138 Broadcast Lane- RCC Tower				Communication Equipment				
BC Central Communications		223 North Live Oak Dr.		F&G	Owner	Communication Equipment				
New Hope Site		1046 Jedburg Rd. Summerville, SC			Owner	Communication Equipment				
RCC Shop GC		102 Farm Rd. GC				Communication Equipment				
Goose Creek Site		Water Tower Rd. G.C.				Communication Equipment				
Live Oak Tower Site		223 North Live Oak Dr.	200	F&G		Communication Equipment				
Cordesville Tower Site		411 Zee Lane Cordesville, SC	48	Dispatch pays %		Communication Equipment				
M.C. Fairgrounds Property		327 Rembert C. Dennis Boulevard		16.07 Acres	Owner					
Berkeley Business Center Detention Pond		Bankton Circle, Hanahan, SC		4.39 Acres	Agreement	Berkeley Business Center			X	1-pond

List of City of Goose Creek Government Owned Property

Description of Services

Light Green = Building & Grounds Maintenance

Yellow = Building Maintenance only

Green = Grounds Maintenance Only

Blue = SW BMP On-site/BMP Type/BMP Maintenance when necessary

Orange = no maintenance performed

Facility Occupied By---------- C=City
S=State
O=Other

City of Goose Creek Facilities	Year Built	Address	Approx. Area	City of Goose Creek is the:	Occupied By:	C	S	O	BMP Type
Fire Station II	2002	950 Crowfield Boulevard	5,000 Sqft	owner	Fire & Safety Staff	X			1-pond
Berkeley Seniors Center	1996/2005	103 Thurgood Road	6,528 Sqft	Agreement W/ Berkeley County	Citizens			X	
Municipal Complex - Offices, Administration, Court, Police, IT	1999	519 N Goose Creek Boulevard	32,720 Sqft	owner	Municipal Staff	X			
Goose Creek Community Center- Gym	2005/2017	519 N Goose Creek Boulevard	37,000 Sqft	owner	Gym Staff	X			1-pond
Felkel Field - Baseball / Softball / Concession / Playground / Restrooms / **Equipment Maintenance** TMS# 2351308017	1989/1992 /1993	101 Lucy Drive	14,708 Sqft.	owner	Maintenance staff	X			1-pond
Crowfield Golf and Country Club- Golf Course / Clubhouse / Pool / Tennis Courts / Golf Cart Maintenance	1989	301 Hamlet Circle	180.44 Acres	owner	Golf Course Staff				11-ponds
Fire Station I	Unknown	101 Button Hall Avenue	6,000 Sqft.	owner	Fire & Safety Staff	X			
Department of Public Works- Water / Sanitation / Maintenance / Garage / Vehicle & Equipment Maintenance	1991	200 Button Hall Avenue	unknown	owner	Public Works Staff	X			1-pond
Casey Community Center- Meeting Facility / Basketball (Eubanks Park)	Unknown	147 Old Moncks Corner Road	14,750 Sqft bldg. 9.38 Acres	owner	unoccupied				
Dennis Park - Baseball / Softball / Picnic / Playground	1992	351 Anita Drive	4 Acres	owner	unoccupied				
Dogwood Park - Picnic / Football / Grill / Playground / Soccer	unknown	460 Liberty Hall Road	1,728 Sqft bldg 15.5 Acres	owner	unoccupied				
Etling Park - Basketball / Picnic / Playground	unknown	100 Ellen Street	unknown	owner	unoccupied				
Eubanks Park - Basketball / Picnic / Grill / Playground / Volleyball / Tennis	See Casey Community Center	Old Moncks Corner Road	See Casey Community Center	See Casey Community Center	See Casey Community Center				
Fairfax Park - Grill / Picnic / Playground	Unknown	13 Waterford Place	unknown	owner	unoccupied				
Forest Lawn Park - Grill / Picnic / Playground	Unknown	181 Giles Drive	unknown	owner	unoccupied				
Foster Creek Park - Concession / Picnic / Playground / Soccer	2008	224 Foster Creek Road	34.14 Acres	owner	unoccupied				
Lake Greenview Park - Picnic / Grill / Picnic / Playground / Trails	Unknown	1 East Pandora Drive	unknown	owner	unoccupied				

Oak Creek Park Picnic / Grill / Playground	Unknown	100 Persimmon Circle	unknown	owner	unoccupied				
Ryan Creek Park - Benches / Playground	Unknown	Janice Street	unknown	owner	unoccupied				
Shannon Park - Picnic / Playground	Unknown	101 Old Moncks Corner Road	unknown	owner	unoccupied				
Fire Station HQ & Meeting Facility	2016	201 Button Hall Avenue	34,525 Sqft bldg. 9.16 Acres	owner	Fire & Safety Staff	X			1-pond & 1-Bioswale
Fire Station III	2015	535 Old Mount Holly Road	10,000 Sqft bldg 3.9 Acres	owner	Fire & Safety Staff	X			2-ponds
St. James III Park - Picnic / Grill / Playground	Unknown	1084 Willowood Avenue	2.79 Acres	owner	unoccupied				
St. James Park - Picnic / Playground / Tennis	Unknown	188 Westminister Boulevard	unknown	owner	unoccupied				
Santee Cooper/Goose Creek Water Tower	Unknown	634 Saint James Avenue	unknown	owner	unoccupied				
TMS# 235-00-00-037 - Municipal Complex Park/Walking Trails	Unknown	No site address/ Adjoining 519 N Goose Creek Blvd	unknown	owner	unoccupied				2-ponds

List of City of Hanahan Government Owned Property

Description of Services

Light Green = Building & Grounds Maintenance

Yellow = Building Maintenance only

Green = Grounds Maintenance Only

Blue = SW BMP On-site/BMP Type/BMP Maintenance when necessary

Orange = no maintenance performed

Facility Occupied By---------- C=City S=State O=Other

City of Hanahan Facilities	Year Built	Address	Approx. Area	City of Hanahan is the:	Occupied By:	C	S	O	BMP Type
2511200098 - Vacant Parcel		NO SITE ADDRESS		Owner	unoccupied				
2521303035- Park Adjoining Goose Creek Reservoir		NO SITE ADDRESS - End of VENICE AVENUE	1 Acre	Owner	unoccupied				
2590000059- City of Hanahan Recs & Parks Grounds		3000 RAILROAD AVE.	24.14 Acres	Owner					
2590000065 - Tennis Court & Recycling		S. BASILICA AVE.	2.5 Acres	Owner	unoccupied				
2590000087- Fire Station 2	1994	1200 S. BASILICA AVE.	4,355 sqft	Owner	Fire & Safety	X			1-pond
2590000092- City of Hanahan Recs & Parks Grounds & Bettis Boat Landing		BETTIS BOAT LANDING RD.	11.26 Acres	Owner	unoccupied				
2590000093- City of Hanahan Recs & Parks Bldg. Senior Center, & Amphitheater	2005	3100 & 3102 MABELINE RD.	27,415 sqft	Owner	Recreation Dept. Staff & Public	X		X	1-pond
2590000105- Fire Station #3 & Public Works Department	Fire Dept-2008 & Public Works 2015	1101 WILLIAMS LN.	14,316 Sqft	Owner	Fire & Safety and Public Works Staff	X			1-pond
2590000149- Vacant Parcel		NO SITE ADDRESS/EAGLE LANDING	5.13 Acres	Owner	unoccupied				2-ponds
2650200026- Vacant Parcel		NO SITE ADDRESS		Owner	unoccupied				
2650702053- Vacant Parcel		NO SITE ADDRESS		Owner	unoccupied				
2650803058 - Old Public Works Facility		5920 STEWARD ST.		Owner	unoccupied				
2650804016 - Old Public Works Facility		5920 STEWARD ST.	5,400 sqft	Owner	Public Works Staff	X			
2651000062 - Vacant Parcel		NO SITE ADDRESS		Owner	unoccupied				
2651201020 - Vacant Parcel		NO SITE ADDRESS		Owner	unoccupied				
2651208001 - Vacant Parcel/ SW Drainage		NO SITE ADDRESS		Owner	unoccupied				
2651208021 - Vacant Parcel/ SW Drainage		NO SITE ADDRESS	3.88 Acres	Owner	unoccupied				
2651503060- City of Hanahan Gym Parking		5821 & 5823 ROBINSON ST.		Owner	unoccupied				
2651602055 - Rhodes Pond/Park		NO SITE ADDRESS	3.18 Acres	Owner	unoccupied				
2651503059 - Municipal Complex, Fire Station #1, and Gym		5826 CAMPBELL ST	10,444 sqft	Owner	Municpal Staff, Fire & Safety, Gym Staff	X			
		1265 YEAMANS HALL RD				X			
		1255 YEAMANS HALL RD	19,496			X			
2590000150- Vacant Parcel		NO SITE ADDRESS/EAGLE LANDING	1.54 Acres	Owner	unoccupied				1-pond
2590000104- Bowens Corner Elem. School		1173 WILLIAMS LN.	21.44 Acres	Agreement	Berkeley County School Dist.			X	
2660503071- Effluent Pump Station		Corner of EAST LAKESIDE DRIVE & WEST LAKE SIDE DRIVE		Agreement	unoccupied				
2590000117 - Vacant Parcel		WILLIAMS LN.	21.31 Acres	Owner	unoccupied				
2651205030- Park		Corner of YEAMANS HALL RD. & PARK RD.		Owner	unoccupied				

Appendix B
Prioritization Matrix for Catch Basins in Public Systems

Rating (A, B, or C)	Discription of Rating	Criteria for Rating	Number of Suggested Scheduled Cleanings
C	Moderate to Significant Need for Maintenance	Pipe size of less than fifteen (15) inches associated with Catch Basin, but basin made of solid material	Once every two years
B	High Need for Maintenance	Has a deficient material but pipe size is greater than fifteen (15) inches	Once every year
A	Very High Need for Maintenance	Basin is of deficient material and pipe size is less than fifteen (15)inches	Twice every year

Appendix C
Spill Prevention and Response Plan

BERKELEY COUNTY STORMWATER MANAGEMENT PROGRAM
212 Oakley Plantation Drive
Moncks Corner, SC 29461-5036
843.719.2697 843.723.3800 843.412.7313
843.719.4695 fax

SPILL PREVENTION & RESPONSE PLAN

Spill Prevention & Response Plan For

_____

(enter facility name and address)

Berkeley County Stormwater Management recommends our fleet maintenance, facilities fueling, vehicle washing, and vehicle storage areas and operations develop and implement a spill prevention and response plan that includes an employee training component and has the ultimate goal of preventing or reducing pollutant runoff from our municipally controlled and operated facilities, and to promote good housekeeping practices within each facility. Even with the best preventative efforts in place, spills may still occur. When spills do occur, it is up to facility personnel to respond quickly and effectively to clean-up any spilled material or notify someone who can. This Spill Prevention and Response Plan is designed as a template for Fleet Maintenance facilities and fueling operations to develop site-specific individual Spill Prevention and Response Plans. The plan should be kept in a central location that is easily accessible for employees and updated as site-specific operations change.

INSTRUCTIONS

Each facility can use this template by filling in the blanks and completing the attached:

_____Spills that require Special Cleanup
_____Materials Inventory
_____Maximum Cleanup Amounts
_____Facility Map
_____Spill Kit Inventory and associated labeling
_____Employee Training Log

Once completed, this Plan becomes the facility's individual Plan and must be properly implemented and maintained. The finished Plan should be reviewed and updated at least annually and or as site specific changes occur.

Plan Implementation Date:_____

Plan Revision Date(s):_____

Facility's Responsible Person(s) in charge of spill response planning, implementation and maintenance of the Plan:

Name Phone #

_____
_____

RESPONSIBILITIES

- Each "**Facility Responsible Person"** has the primary responsibility for coordinating the response to emergencies, this will include hazardous material spills.

- All **Supervisors** should ensure that their respective employees are familiar with these spill prevention and response procedures and receive the necessary training deemed appropriate for their role in spill prevention and spill response.

- **All employees** should follow these procedures in the event of a chemicalspill.

EMERGENCY CONTACT NUMBERS

The following telephone numbers should be posted near telephones and any other obvious locations near high potential spill locations:

- Outside emergency services (police, fire department, ambulance service): 911
- National Response Center: 800-424-8802
- South Carolina Department of Health and Environmental Control: 1-888-481-
- 0125
- South Carolina Emergency Management Division: 803-737-8500
  Berkeley County Emergency Preparedness: 843-719-4166
    - Safety Department: (if applicable): _____

CLEAN-UP PROCEDURES

Spilled hazardous materials should be quickly contained and effectively cleaned up. Employees should clean up spills themselves, ***only if properly trained and protected.*** Employees who are NOT trained in spill cleanup procedures should immediately report the spill to the Responsible Person(s) listed above, warn other employees in the area, and leave the area as soon as possible and if necessary.

The Maximum Cleanup Amounts that properly trained employees can cleanup **are listed on pages 8.** In the event of spills greater than the amounts listed on pages 8, contact the aforementioned appropriate responders listed in the Emergency Contact Numbers.

Berkeley County Stormwater recommends that the following generalized guidelines should be followed for evacuation of areas where hazardous material spills have occurred, spill control and containment, notification of proper authorities, and general emergency response procedures in the event of a spill incident in which there is potential for a significant release of hazardous materials:

1. **Evacuation**
   Personnel in the immediate vicinity of a spill should *immediately evacuate* the premises (except for employees with training in spill response for specific circumstances described below) if the material poses an immediate health hazard. If the spill is of "medium" or "large" size, or if the spill seems hazardous, immediately notify emergency response personnel.

2. **Spill Control Techniques**
   Once a spill has occurred, the properly trained personnel needs to decide whether the spill is small enough to handle without outside assistance. Only employees with training in spill response should attempt to contain or clean up a spill.

   NOTE: If you are properly trained for cleaning up a spill yourself, make sure you are aware of the hazards associated with the material spilled by referencing the on-site MSDS, make sure you have adequate ventilation, and make sure you have proper personal protective equipment on prior to initiating any cleaning activities. Treat all residual chemical and clean-up materials used throughout the course of the spill as a hazardous waste.

   Spill control equipment should be located wherever significant quantities of hazardous materials are received, stored, or used. MSDSs, absorbents, over-pack container, container patch kits, spill dams, shovels, floor dry, acid/base neutralizers, and "caution-keep out" signs are common items to be utilized during a spill response.

3. Spill Responses and Cleanup

Most hazardous material spills can be divided into three categories: Small, Medium and Large. Response and cleanup procedures can vary depending on the size of a spill. Using the information below, determine the extent and type of spill. If the spill is large, if there has been a release to the environment or if there is no one knowledgeable about spill clean-up available, contact the Facility Responsible Person or 911. Additionally, always refer to page 8 for the maximum clean-up amounts associated with each specific type of material.

Small Spills: Any spill where the major dimensions are less than 18 inches in diameter. Small spills are generally handled by properly trained internal personnel and usually do not require an emergency response by police or fire department HAZMAT teams.

- Quickly control the spill by stopping or securing the spill source. This could be as simple as up righting a container and using floor-dry or absorbent pads to soak up the spilled material. Be sure to wear gloves and protective clothing if necessary.
- Put spill material and absorbents in secure containers if any are available.
- Consult the Facility Responsible Person and the MSDS for the spill and waste disposal procedures.
- In most instances, the area of the spill should NOT be washed with water. Use Dry Cleanup Methods and **never** wash spills down the drain, onto a storm drain or onto the driveway or parking lot.
- Both the spilled material and the absorbent may be considered hazardous waste and must be disposed of in compliance with state and federal environmental regulations.

Medium Spills: Spills where the majority of the dimensions exceed 18 inches, but are less than 6 feet. Outside emergency response personnel

(police and fire department HAZMAT teams) may need to be called for medium sized spills. However, common sense and a certain degree of caution should dictate when it is necessary to call them.

- Immediately attempt to contain the spill at its original source by simple measures. Simple measures consist of quickly up-righting a container, or putting a lid on a container, if possible. Only use absorbents if they are immediately available. If you have made an attempt to contain the spill, and you have quickly determined you cannot take any short-term containment measures, leave the area and alert Emergency Responders. Closing doors behind you while leaving will help contain the fumes occurring from the spill(s). Give Emergency Responders accurate enough information that they are aware of the exact location, chemical, and estimated amount of the spill.

- Immediately assess the area surrounding the spill. Engines and electrical equipment near the spill area need to be turned off. This will minimize potential sources of ignition in the area. If engines and electrical sources can't be turned off prior to leaving, advise Emergency Responders of such. Furthermore, advise them on how to turn off engines or electrical sources. Do not attempt to go back into the area of the spill once you have left. Assist emergency responders by helping them determine where and how to shut off heating, air conditioning equipment, or air circulating equipment, if necessary.

- Be sure to follow all Emergency Responder instructions.

- Be prepared to assist Emergency Responders with any other information that may be necessary, such as MSDSs, questions about the facility, and appropriate Berkeley County personnel. Emergency Responders or trained personnel with proper personal protective equipment will then clean up the spill residue once it has been contained. Do not attempt to re-enter the area of the spill until the responder in charge says the area is acceptable for occupancy.

- All appropriate reports must be filed with proper authorities. It is the responsibility of the spiller to inform both his/her supervisor and the emergency responders as to what caused the spill. The response for large spills is similar to the procedures for medium spills, except that the exposure danger is greater.

Large Spills: Any spill involving flammable liquid where the major dimension exceeds 6 feet in diameter; and or any "running" spill, where the source of the spill has not been contained or flow has not been stopped.

- Immediately leave the area of the spill and notify Emergency Responders. Give the operator the spill location, chemical name, and approximate amount.

- Attempt to get MSDS information for the spilled chemical for the Emergency Responders to use, only if the MSDS information is located in a safe area away from the spill. Furthermore, be prepared to advise responders as to any ignition sources, engines, electrical power, or air conditioning/ventilation systems that are still running. Provide responders of any absorbents, containers, or spill control equipment that may be available. This should be done in a remote area, because the evacuation should place the spiller far away from the spill. Radios or phones can be used to assist from a distance, if necessary.

- Emergency Response personnel, in accordance with their own established procedures, should be the only personnel that handle any spills greater than 6 feet in any dimension or that are continuous or running. Once the Emergency Responders or HAZMAT team are on-site cleaning up spills and or putting out fires, the entire area will be under their control and no one may reenter the area until the responder in charge says the area is acceptable for occupancy.

- Provide information for reports to supervisors and responders, just as indicted in the medium spills.

REPORTING SPILLS

All hazardous material spills, regardless of their size, should be reported immediately to the **Facility Responsible Person**. It will be the responsibility of the Facility Responsible Person to determine if the spill has the potential for any environmental impacts outside of the facility and those that must be reported to 911, the National Response Center at 800-424-8802, the South Carolina Department of Health and Environmental Control at 1-888-481-0125, the South Carolina Emergency Management Division at 803-737-8500, and the Berkeley County Emergency Preparedness at 843-719-4166.

South Carolina Law requires reports of spills & releases that may impact the environment. Do not delay reporting! Calling a local DHEC office DOES NOT COUNT legally as reporting a spill. You must call the 24-hour SCDHEC Emergency Response number at 1-888-481-0125.

MAXIMUM CLEANUP AMOUNTS

Identify the maximum volume of spill that may be cleaned up by the facility employees or contractors based on material (use 1 qt or 1 lb unless other information is available). Also identify how wastes from a spill of material will be disposed (for example, absorbed and placed in dumpster) and the name and address of the offsite facility to which clean- up wastes will be sent for hazardous waste disposal, if applicable. A list of hazardous substances and reportable quantities (RQ), can be found at http://www.ecfr.gov/cgi-bin/text-idx?node=se40.28.302_14&rgn=div8.

MATERIAL	Max. Volume	Disposal Method/Location

SPILLED MATERIALS THAT REQUIRE SPECIAL CLEANUP

Describe any material used in your facility that requires special materials and procedures for cleanup beyond those listed above. Provide details regarding hazards associated with these.

Material	Hazards

MATERIAL INVENTORY

List all materials or waste that may require clean up. List the average and maximum amounts on site and their storage locations. *(Ignore any that do not apply and add other materials of concern that are onsite. Use additional sheets if necessary).*

Material	Amount (avg./max)	Location(s)
Antifreeze		
Used Oil		
Motor Oil		
Degreaser		
Hydraulic Oil		
Solvents		
Brake Cleaner		
Diesel Fuel		
Fuel Additive		
Unleaded Fuel		
Other		

Spill Kits

- Label each spill kit prominently with the words „SPILL KIT" or "Absorbent" etc.
- Label or stencil the necessary emergency telephone number(s) or pager of the persons to be contacted in case of a spill or leak that is beyond the training and equipment available on or near each spill kit location.

Facility Responsible Person/Phone Number:_____/ ( ) -_____

Spill Response Contractor (if any)/Phone Number:_____/ ( ) -_____

State Emergency Release and Incident Hotline: 1-(888)-481-0125

Spill Kit Inventory

List all response equipment that will be maintained in each spill kit location (refer to MSDSs to determine recommended clean-up methods PPE and supplies):

LOCATION	ABSORBENTS (bags or loose absorbent, pigs, neutralizing agent, etc.	TOOLS (shovels, brooms, waste containers, etc.	PERSONAL PROTECTIVE EQUIPMENT (impervious gloves, goggles, aprons, boots,	OTHER SUPPLIES (warning tape, labels, markers, MSDSs, etc.)

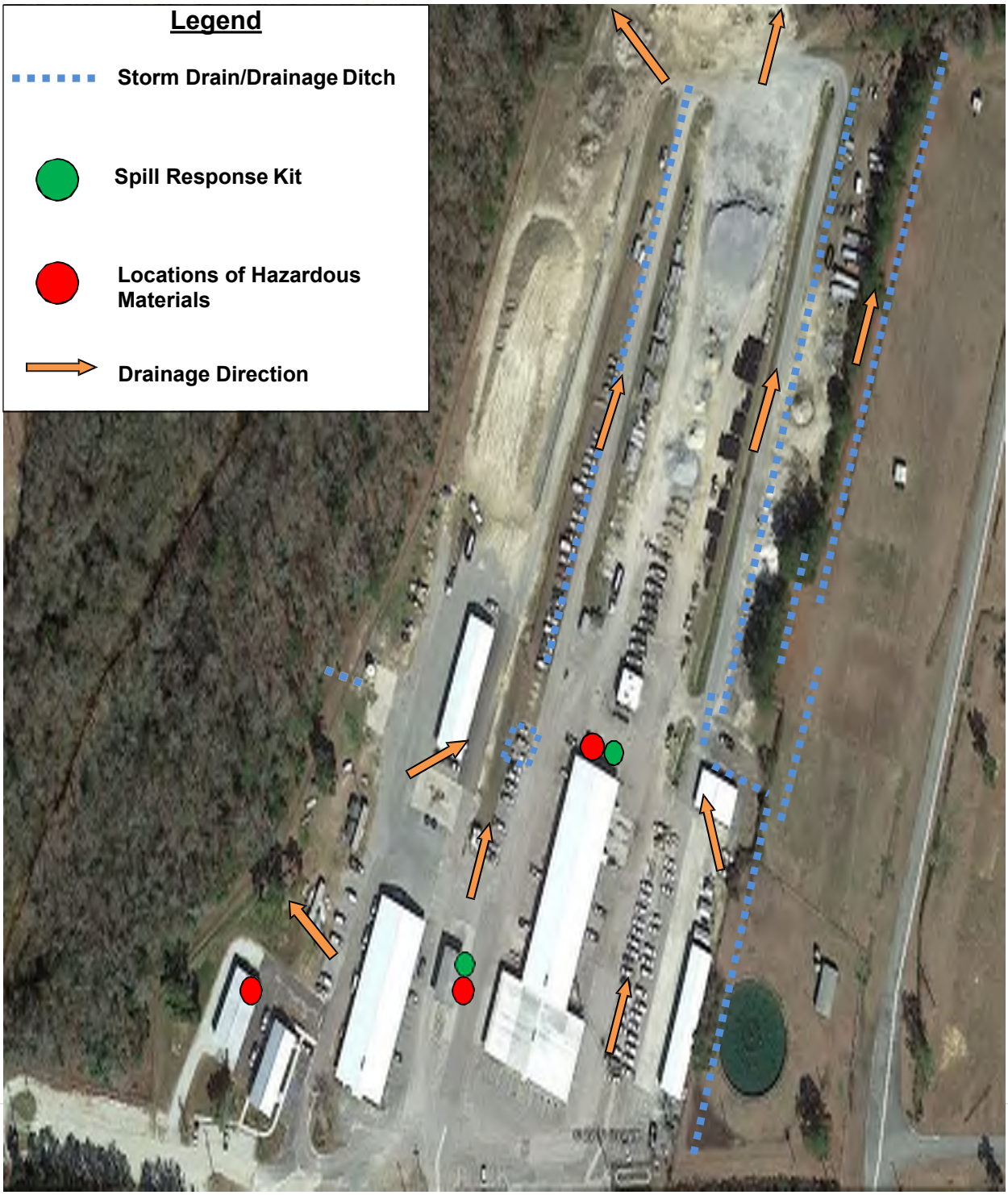
PERSON RESPONSIBLE FOR MAINTAINING THIS INVENTORY:

_____

FACILITY MAP

Attach a map or sketch of the facility showing:

(a) the locations of each spill response kit.
(b) the locations where the material identified on page 8 are normally stored or used.
(c) the location of each storm drain or drainage ditch.



Appendix D
Good Housekeeping/IDDE Training Template and Example Certificate

Stormwater Management Program
212 Oakley Plantation Drive
Moncks Corner, SC 29461
berkeleycountysc.gov
843.719.4195

AGENDA
Event: Illicit Discharge Detection and Elimination Training – Good Housekeeping Training
Date:
Time:
Location: Assembly Room, 1003 US-52, Moncks Corner, SC 29461
Attendees: **Stormwater Management Program:**

Roads & Bridges:

Maintenance Garage:

Fleet Management:

City Staff:

8:00am – 8:45am	**Introduction & Program Descriptions** I. Sign-in. II. SWMP introduction and program description. III. Introduction of attendees and a description of daily activities as it relates to stormwater.
8:45am – 10:15am	**Good Housekeeping** I. A presentation about good housekeeping practices. II. A few short videos about good housekeeping practices. III. Question and answer session. IV. A short quiz to be taken about the material just covered.
10:15am – 10:30am	**Break**
10:30am – 12:00pm	**Illicit Discharge Detection and Elimination** I. A presentation about how to detect illicit discharges and how to report. II. A few short videos about illicit discharges and how to detect them. III. Question and answer session. IV. A short quiz to be taken about materials just covered.
12:00pm	**Adjourn**

CERTIFICATE OF ATTENDANCE

BERKELEY COUNTY
in cooperation with
Berkeley County Stormwater Management Program

This certifies that

XXXXXX

BERKELEY COUNTY (DEPARTMENT)

Attended the *Stormwater Employee Training for*
Illicit Discharge Detection & Elimination – Good Housekeeping Workshop
MM/DD/YYYY

Instructor: XXXXXX
Berkeley County Stormwater Management Program

Appendix J: Stormwater Design Standards Manual

BERKELEY COUNTY
STORMWATER MANAGEMENT PROGRAM

STORMWATER DESIGN STANDARDS MANUAL

Adopted December 1, 2009

1003 Highway 52
Post Office Box 6122
Moncks Corner, SC 29461-6120
Telephone: 843.719.4127

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CHAPTER 2 – Stormwater Approval Procedures

CHAPTER 3 – Design Requirements

CHAPTER 4 – Inspections and Enforcement

CHAPTER 5 – References

APPENDICES

TABLES

CHAPTER 1 – GENERAL INFORMATION

1.1 PURPOSE

It is the purpose of this Manual and the Stormwater Management Ordinance to protect, maintain, and enhance water quality and the environment of Berkeley County and the short-term and long-term public health, safety, and general welfare of the citizens of Berkeley County. This Manual is also designed to minimize property damage by establishing requirements and procedures to control the potential adverse effects of increased stormwater runoff and related pollutant loads associated with both future development and existing developed land. Proper management of stormwater runoff will further the purpose of this Manual and the Stormwater Management Ordinance to ensure a functional drainage system, reduce the effects of development on land and stream channel erosion, attain and maintain water quality standards, enhance the local environment associated with the drainage system, reduce local flooding, maintain where necessary pre-developed runoff characteristics of the area in terms of flow rate, volume and pollutant concentration, and facilitate economic development while mitigating associated pollutant, flooding, erosion, and drainage impacts.

This Manual describes the policies and procedures used by the County Engineer to implement the Stormwater Management Ordinance and elements of the County's Stormwater Management Program (SWMP). These standards and procedures will:

1. Clearly describe the stormwater management plan and Construction Activity Application requirements and approval process as it relates to stormwater management;

2. Convey the technical design standards to the engineering community, to include standards which address flow rates, runoff volume, and pollutant load/concentration, as well as specific standards during construction and for long-term performance;

3. Provide general information on approaches to improve water quality, prevent illicit discharges, and minimize stormwater runoff impacts due to development and re- development;

4. Convey other protection provisions related to stormwater discharges such as wetlands and watercourse conservation;

Every effort has been made throughout this Manual to cover the common conditions and information needed by those involved in construction activities, however, these design standards and the County ordinances should be reviewed carefully to ensure that all requirements are being met. Developments may also be impacted by State and Federal requirements to include, but not be limited to, the NPDES Phase II Construction General Permit for Stormwater Discharges from Large and Small Construction Activities (CGP). Those projects not subject to NPDES requirements must still comply with applicable County ordinances and standards.

1.2 SCOPE

The scope of this Manual is limited to the requirements related to stormwater management as reviewed and approved by the Berkeley County Engineer. This Manual is not intended as a textbook or a comprehensive engineering design reference. It was instead developed under the assumption that the user possesses a basic understanding of stormwater control design, construction, or land development depending on the user's particular area of expertise. References to guidance documents from Federal,

State, and local agencies, as well as commercial products are given throughout this Manual to provide additional information to users. Two common examples are the Natural Resources Conservation Service's (NRCS) TR-55 and SCDHEC's Best Management Practices (BMP) Manual.

The design standards are not intended to restrain or inhibit engineering creativity, freedom of design, or the need for engineering judgment. When shown to be applicable, it is encouraged that new methods, techniques, and innovative stormwater BMPs be submitted with supporting documentation. However, the use of such approaches should be substantiated with submitted documentation by design professionals showing that the proposed design is equal to, or exceeds the traditional procedures in terms of performance and economic feasibility.

On projects that require site specific designs pertaining to stormwater management and water quality, site plans, details, calculations, construction specifications, and other technical documents must be signed and sealed by a professional engineer licensed in the state of South Carolina, with sufficient knowledge and experience to accomplish all design elements of the site plan. Users who are not justly qualified by education or experience in the fields of stormwater management design, construction, or land development should consult with a qualified professional in one or more of these areas prior to planning for construction activities.

1.3 MANUAL ORGANIZATION

The design standards are divided into five (5) chapters, organized to present recommended technical and engineering procedures along with criteria obtained from local, State, and Federal regulations. The remainder of this chapter provides information on the County's authority to develop and enforce design requirements along with several legal matters, some background information on stormwater management and its importance, and definitions for terms used throughout this Manual. Chapter 2 describes the process for obtaining stormwater approval. Chapter 3 contains specific design requirements and criteria. Chapter 4 describes the inspection and enforcement process. Chapter 5 contains references for designing components of the stormwater management system.

1.4 AUTHORIZATION

This Manual has been prepared under the direction of the County Engineer, who has been granted the authority to develop engineering design standards and enact programs and policies to ensure compliance with the NPDES Phase II General Permit for Stormwater Discharges from Regulated Small Municipal Separate Storm Sewer Systems (MS4s), SCR030000, and the County's pertinent ordinances.

1.4.1 NPDES MS4 GENERAL PERMIT SCR030000

Berkeley County, like many other counties and municipalities across the United States, is required to have an NPDES MS4 permit to discharge stormwater. Because construction activities contribute to the discharge of pollutants, the NPDES MS4 permit requires that Berkeley County encourage, promote, and implement certain practices, programs, and procedures for the purpose of reducing or limiting discharge of pollutants to waters of the State. The permit requires that Berkeley County develop and implement a Stormwater Management Program to control the discharge of pollutants from its MS4 to the maximum extent practicable (MEP). The SWMP has several components that must be met and this Manual provides partial compliance with several, including construction and post-construction management, illicit discharge detection, and public education. The MS4 permit can be found at:
http://www.scdhec.net/environment/water/docs/scs000000.pdf.

1.4.2 BERKELEY COUNTY ORDINANCES, REGULATIONS, AND STANDARDS

Berkeley County has developed and adopted ordinances and standards, largely based on State and Federal regulations, specifically to address concerns associated with uncontrolled stormwater runoff. The principal ordinances and standards for the County that affect the land development selection of stormwater control measures are:

1. Stormwater Management Ordinance: Established the engineering design standards and procedures for obtaining a stormwater approval within Berkeley County. The County Engineer was authorized by this Ordinance to develop all necessary regulations, as detailed in this Manual for properly controlling stormwater runoff and mitigating existing and future impacts;

2. Zoning and Land Development Regulations Ordinances: Issues that may be impacted by these Ordinances when designing stormwater management systems include but are not limited to: limits on building density, buffer and setback requirements, parking lot islands, required parking spaces, tree protection, planting species selection, and screening requirements for ponds and other BMPs. Applicants should specifically check to make sure a desired development type is allowed in the planned location;

3. Building & Codes and Floodplain Ordinances: These Ordinances implement and enforce all applicable provisions of the building codes and floodplain management regulations.

1.5 UPDATES TO THE DESIGN STANDARDS

This Manual is subject to updates. As design technology and criteria evolve or change or it becomes evident that additional measures are needed to ensure the public general welfare, the Manual will be updated as needed. Updates will be approved by the County Engineer. Users of this manual are encouraged to provide comments on the content of this manual at anytime in writing to the County Engineer. The comments shall include proposed changes, reasoning, and justification (including any supporting technical documents supporting the changes). All comments will be considered during manual updates. This Manual can also be found on the Berkeley County website at http://www.berkeleycountysc.gov/.

1.6 STORMWATER MANAGEMENT

Development has the potential to alter the natural drainage patterns, flow rates and volumes, and quality of the County's water resources. Traditional solutions have removed stormwater as efficiently as possible, while maintaining runoff quantity controls. The following sections discuss these impacts and the design considerations that are available and encouraged.

1.6.1 EFFECTS OF DEVELOPMENT ON WATERSHED HYDROLOGY

Development and urbanization have the following impacts on receiving waterbodies:

- Changes to Stream Flow;
  - Increased runoff volumes;
  - Increased peak runoff discharges;
  - Greater runoff velocities;

  - Increased flooding frequency;
  - Lower dry weather flows (base flow);
  - Increase in floodplain elevation;

- Changes to Stream Geometry;
  - Stream channel enlargement;
  - Stream down cutting;
  - Changes in channel bed due to sedimentation;

- Degradation of Aquatic Habitat;
  - Degradation of habitat structure;
  - Decline in stream biological functions;

- Water Quality Impacts;
  - Reduced oxygen in streams;
  - Microbial contamination;
  - Hydrocarbons and toxic materials;
  - Sedimentation;

- Property damage and safety concerns;
- Unsightly aesthetic stream channel conditions and restricted use of recreational waters.

1.6.2 STEPS TO SUCCESSFUL STORMWATER MANAGEMENT PLANS

Proper planning is necessary to ensure that stormwater management is considered and fully integrated at the various stages of the site-development process. This involves a comprehensive approach to site planning and a thorough understanding of the physical characteristics and resources associated with the project site. This planning includes addressing each of the following categories:

- Stormwater quantity controls;
- Erosion and sediment controls;
- Stormwater quality controls;
- Stormwater conveyance controls;
- Maintenance plans and schedules for construction and post construction activities.

The design of successful stormwater management plans involves adhering to the following principles, where applicable:

- Pre-submittal site meeting/site visit;
- Review of site development requirements;
- Detailed site analysis and supporting calculations;
- A thorough knowledge of the impacts the stormwater system may have on the watershed:
- Creation of a Stormwater Master Plan;
- Design aspects of the stormwater management plans;
- Approval and completion of the Construction Activity Application.

In Chapter 2, the procedure for including the necessary documentation for a complete stormwater management plan and Construction Activity Application is provided.

1.6.3 INNOVATIVE DESIGN APPROACH

Innovative approaches to site design focus on source control for stormwater runoff that limit the amount of runoff generated for a BMP to control. When designing for land disturbance activities, the design must address the following four categories of control: water quantity (flood control), design storm control (rate and volume), erosion prevention and sediment control, and pollution control (water quality standards). If an innovative stormwater design approach is to be used, the design professional should take the following considerations in mind, in addition to meeting these categories of control:

- Stormwater quantity and quality are best controlled at the source of the problem by reducing the potential maximum amount of runoff and pollutants. Source control will typically be more economical in order to treat the first flush of a storm event since a simple BMP for a large area will only treat the first flush from the closest portions of the site;
- Best management practices (BMPs) address stormwater management by using simple, structural and nonstructural methods along with or in place of traditional stormwater management structures when applicable;
- Equaling or exceeding traditional stormwater management designs in terms of performance (rate/volume attenuation, pollutant removal) and economic feasibility (long-term) are essential to a proposed concept's eventual approval.

1.6.4 BEST MANAGEMENT PRACTICES AND SITE PLANNING PROCESS

The first step in addressing stormwater management begins in the site planning and design stage of the development project. By implementing BMPs during the site planning process, the amount of runoff and pollutants generated from a site can be reduced by minimizing the amount of impervious area and utilizing natural on-site treatments. The minimizing of adverse stormwater runoff impacts by the use of BMPs and site planning should be a major consideration for a design professional.

The reduction of runoff volumes and stormwater pollutants decreases the total number and size of stormwater management controls that must be implemented under the guidelines set forth in this Manual.

BMPs reduce the amount of total post-development impervious areas and maintain natural characteristics of the pre-development site conditions. Therefore, the post-development curve numbers and time of concentrations are maintained more closely to the pre-development conditions. This reduces the overall hydrologic and hydraulic impact of the development.

1.6.4.1 MAINTAINING SITE RESOURCES AND NATURAL UNDISTURBED AREAS

Conservation of site resources and natural undisturbed areas helps to reduce the post development runoff volume and provides areas for natural stormwater management. Some natural site resources that should be maintained include, but are not limited to:

- Natural drainageways;
- Vegetated buffer areas along natural waterways;
- Floodplains;
- Areas of undisturbed vegetation;
- Low areas within the site terrain;
- Natural forested infiltration areas;
- Wetlands.

1.6.4.2 LOWER IMPACT SITE LAYOUT TECHNIQUES

Lower impact site layout techniques involve identifying and analyzing the location and configuration of structures on the site to be developed. Where applicable, the following options that create lower impact layouts should be used:

- Fit the design layout to follow the natural contours of the site to minimize clearing and grading and preserve natural drainage ways and patterns;
- Limit the amount of clearing and grading by identifying the smallest possible area on the site that would require land disturbance;
- Place development areas on the least sensitive areas of the site and avoid steeply sloped areas when possible;
- Utilize nontraditional designs to reduce the overall imperviousness of the site by providing more undisturbed open space and minimizing clear-cutting;
- Consider the utilization of cisterns and rain barrels to collect stormwater for reuse;
- Level spreaders or other energy dissipation devices should be used at all discharge points including discharge points into ponds and other basin-type BMPs. More information on these devices is provided in Chapter 3.

1.6.4.3 MINIMIZATION OF IMPERVIOUS COVER

The minimization of total impervious area directly relates to a reduction in stormwater runoff volume and the associated pollutants from a development site. The amount of impervious cover on a site can be reduced by the following techniques where applicable:

- Reduce building footprints by constructing some buildings as multi-story;
- Reduce parking lot areas and use porous/pervious pavement surfaces for desired overflow parking where feasible;
- Increase the amount of vegetated parking lot "islands" that can also be utilized for stormwater management practices such as bioretention areas;
- Disconnect impervious surfaces by directing runoff to adjacent pervious areas so that runoff can be filtered and infiltrated.

1.6.4.4 UTILIZATION OF NATURAL FEATURES FOR STORMWATER MANAGEMENT

Structural stormwater drainage controls are traditionally designed to quickly remove stormwater runoff from the site without utilizing any of the natural storage areas. These natural drainage areas should be considered as potential stormwater drainage systems. These natural areas can be utilized in the following ways where applicable:

- Vegetated buffers and undisturbed areas on the site are useful to control sheet flow (not concentrated flows) by providing infiltration, runoff velocity reduction, and pollutant removal;
- Various natural drainageways should be maintained and not disturbed to provide a natural stormwater drainage system to carry runoff to an existing outlet. The use of natural drainageways allows for more storage of stormwater runoff, lower peak flow rates, a reduction in erosive runoff velocities, and the capture and treatment of pollutants;
- Use vegetated swales where appropriate;
- Curb and gutter systems may be combined with vegetated swales at outfalls to provide added water quality benefits versus the traditional piped outfall designs;
- When applicable, direct rooftop runoff to pervious natural areas for water quality treatment and infiltration instead of connecting rooftop drains to roadways and other structural stormwater conveyance systems.

1.6.4.5 ENGINEERED/PROPRIETARY DEVICES

Berkeley County is aware of the potential benefit in using a number of stormwater engineered devices currently available on the market, such as baffle boxes, cartridge filters, bioretention, and sock and tube erosion control devices. The County Engineer will evaluate any and all such devices specified for a given product and require appropriate drawings, specifications, and discussions as to the applicability of the product, expected performance, and required maintenance. The County Engineer reserves the right to request that certain devices be installed and maintained.

1.7 ENGINEERING DESIGN ACCOUNTABILITY

This Manual will assist engineers, plan reviewers, inspectors, and contractors in the design and layout of most land disturbance projects. However, this Manual does not replace or otherwise excuse the need for professional engineering judgment and knowledge. The user of this Manual is hereby cautioned that many aspects of engineering design must be considered, including but not limited to:

- Public health and safety;
- Site-specific conditions or unusual features of a project site that warrant special designs;
- Current versions of design texts, manuals, technical documents, and research.

The design engineer (with assistance from other design professionals as needed) is expected to thoroughly investigate field conditions and coordinate all design efforts with Berkeley County.
For applicable projects, construction plans must be stamped and signed by a professional engineer licensed in the state of South Carolina, unless otherwise stated in this Manual. The design professional must have sufficient education and experience to perform a complete and thorough design of each element shown on the construction plans, and must also have complete control to change or alter plans during the design phase. The professional's stamp is a public guarantee that his design has the highest regard for health and safety, protects the environment (air, soil, water) to the maximum degree possible, and serves the interests of the general public within Berkeley County. A Certificate of Authorization (COA) is required on the construction plans in addition to the design professional's certification.

Berkeley County requires a certain level of design expertise for stormwater calculations and flooding analyses. Stormwater design criteria are based upon current scientific knowledge and engineering judgment. It should be realized by engineering designers that floods and flooding may occur at any time due to any number of factors beyond the reasonable control of Berkeley County, such as: greater amounts of precipitation or different rainfall patterns than used in design storms, wet soil conditions, debris or blockage of key stormwater channels, high groundwater tables, etc.

1.8 LEGAL ASPECTS

If any portion of this Manual is ruled to be invalid or unconstitutional by any court with adequate jurisdiction over Berkeley County, then such portion shall be considered to have been selectively removed from the design standards without affecting this Manual's overall applicability and legal standing to the land disturbance process. This Manual will be revised on a periodic basis to reflect known changes to laws and regulations. All local, State, and Federal laws and regulations shall be considered in regards to this Manual. In each instance, the more restrictive requirement shall govern unless sound engineering judgment can determine and prove that the more restrictive requirement would be otherwise unnecessary. In most instances, laws and regulations that are phrased more explicitly shall apply over those items that are described in general terms.

1.9 CONTACT INFORMATION

The following Berkeley County personnel should be contacted for any questions, clarifications, or other information related to stormwater management and this Manual.

Primary contact for stormwater issues:
Mr. Frank Carson
Berkeley County Engineer
PO Box 6122
Moncks Corner, S.C. 29461-6120
(843) 719-4179
fcarson@berkeleycountysc.gov

1.10 DEFINITIONS

Words used in this Manual shall have their customary meanings as determined by the standard dictionary definition except for the following specific words and terms which are herein defined or are otherwise defined in the Berkeley County Stormwater Management Ordinance. In any case, the County Engineer shall have the right to define or interpret any other word or term contained within this Manual. The rules of verbal construction found in the Stormwater Management Ordinance apply to this Manual.

1. Applicant: "Applicant" is a person, firm, governmental agency, partnership, or any other entity who seeks to obtain approval under the requirements of this Ordinance and who will be responsible for the land disturbing activity and related maintenance thereof.

2. Building: (1) a relatively permanent enclosed structure over a plot of land, having a roof and usually windows and often more than one level, used for any of a wide variety of activities, as living, entertaining, or manufacturing; (2) anything built or constructed; (3) the act, business, or practice of constructing houses, office buildings, etc.

3. Construction Activity: activity involving clearing, grading, transporting, filling, or any other activity which results in a change in the natural cover or topography that may cause erosion and contribute to sediment and alter the quality and quantity of stormwater runoff.

4. Construction Activity Application: means the set of drawings, specifications, design calculations, and other documents necessary to demonstrate compliance with the Stormwater Management Ordinance.

5. Contour: an imaginary line, or its representation on a contour (topographic) map, joining points of equal elevation.

6. Control/Outlet structure: stormwater management facility designed to regulate the elevation, rate, and volume of stormwater discharge from detention facilities.

7. Culvert: any structure not classified as a bridge which provides an opening under any roadway, including pipe culverts, and any structure so named in the plans.

8. Detention: the collection and storage of stormwater runoff in a surface or sub-surface facility for subsequent controlled discharge to a watercourse or water body.

9. Developer: any person, or others who act in his own behalf, that is required to submit an application for approval to disturb land or encroachment and is thereafter responsible for maintaining compliance with this Ordinance and conditions of the approved application.

10. Ditch: a drainage channel in earth created by natural or artificial means to convey surface and/or subsurface water, flowing continuously or intermittently.

11. Drainage: a general term applied to the removal of surface or subsurface water from a given area either by gravity via natural means or by systems constructed so to remove water, and is commonly applied herein to surface water.

12. Elevation: height in feet above a given known datum, such as mean sea level.

13. Embankment or Fill: a deposit of soil, rock or other material placed by man.

14. Grading: any displacement of soil by stripping, excavating, filling, stockpiling, or any combination thereof, including the land in its excavated or filled state.

15. Impervious surface: a surface which has been compacted or covered with a layer of material so that it is highly resistant to infiltration by water. The term includes most conventionally surfaced streets, roofs, sidewalks, parking lots, and other similar structures.

16. Mean sea level (MSL): the average (mean) height of the sea or ocean, in reference to NAVD88.

17. New-Development: any of the following actions undertaken by any person, including, without limitation, any public or private individual or entity:

    (a) division of a lot, tract, or parcels or other divisions by plat or deed;
    (b) the construction, installation, or alteration of land, a structure, impervious surface or drainage facility;
    (c) clearing, scraping, grubbing or otherwise significantly disturbing the soil, vegetation, mud, sand or rock of a site; or
    (d) adding, removing, exposing, excavating, leveling, grading, digging, burrowing, dumping, piling, dredging, or otherwise disturbing the soil, vegetation, mud, sand or rock of a site.

18. Operator: means the person who is operating the property, including an operator or person who is in charge of any activity related to land disturbance, construction or post construction stormwater quality or quantity.

19. Owner: means the property owner, or any person who acts in his own behalf, that submits an application for approval to disturb land or vegetation or for encroachment, and the person, if so designated by default or on legal documents, as the responsible party for maintenance of a stormwater management system(s) and/or facility(s).

20. Post-Development Conditions: those conditions which are expected to exist, or do exist, after alteration, of the natural topography, vegetation, and rate, volume or direction of stormwater runoff, (resulting from development activity).

21. Pre-Development Conditions: those conditions, in terms of the existing topography, vegetation and rate, volume or direction of stormwater runoff, which exist at the time the applicant submits an application form for a construction activity or variance.

22. Project: improvements and structures proposed by the applicant to be constructed on a defined site as part of a common plan of development.

23. Rate: volume of water passing a point per unit of times, generally expressed in cubic feet per second (cfs).

24. Re-Development: see New-Development.

25. Retention: the collection and storage of stormwater runoff without subsequent discharge to surface waters.

26. Retrofit: the process of altering an existing drainage system to function properly or more efficiently than currently exists. Retrofitting will be a common method used by the County to address Total Maximum Daily Loads (TMDLs) to include installation of water quality/runoff treatment devices.

27. Runoff: that part of rainfall that is not absorbed into the sites but flows over the site as surface waters.

28. Sediment: fine, particulate material, whether mineral or organic, that is in suspension and is being transported, or has been transported, from its site of origin by water or air.

29. Sedimentation: the process which operates at or near the surface of the ground, or deposits soils, debris and other materials either on other ground surfaces or in the waterbody.

30. Sedimentation Facility: any structure or area which is designed to retain suspended sediments from collected stormwater runoff, to include sediment basins.

31. Site: any tract, lot, or parcel of land or combination of tracts, lots, or parcels of land which are in common ownership, or are contiguous and in diverse ownership where development is to be performed as part of a unit, subdivision, or project.

32. Site Construction: the act or process of altering the natural cover or topography and alters the quality or quantity of stormwater runoff.

33. Special Protection Areas: designated areas within the County within which more stringent design standards have been established to address an existing problem, such as flooding or water quality. Construction activities occurring within these areas will be required to comply with the additional or more stringent design criteria.

34. Storm Frequency: rate of likely recurrence of a rainstorm over a period of specified time.

35. Stormwater Management Plan: the plan to manage stormwater in terms of collection, conveyance, storage, treatment and disposal of stormwater runoff in a manner to meet the objectives of the County Stormwater Management Ordinance, the Manual and their terms, including, but not limited to, measures that control the increased volume and rate of stormwater runoff and water quality impacts caused by man-made changes to the land. This plan is approved as detailed in this document and includes the engineering calculations and construction drawings.

36. Structures: anything constructed or erected, the use of which requires a location on the ground, or attached to something having a location on the ground, including, but not limited to, tennis courts, swimming pools, fences, and buildings.

37. Subdivision: all divisions of a tract or parcel of land into two or more lots, building sites, or other divisions for the purpose, whether immediate or future, of sale, lease, or building development, and includes all division of land involving a new street or change in existing streets, and includes re-subdivision which would involve the further division or relocation of lot lines of any lot or lots within a subdivision previously made and approved or recorded according to law; or, the alteration of any streets or the establishment of any new streets within any subdivision previously made and approved or recorded according to law, and includes combination of lots of record

38. Vegetation: all plant growth, especially trees, shrubs, mosses, and grasses.

39. Wetlands: those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions and delineated as freshwater wetlands by the U.S. Army Corps of Engineers.

CHAPTER 2 – STORMWATER APPROVAL PROCEDURES

This chapter provides developers, owners, engineers, contractors, and others with the information needed to obtain approval from the County Engineer as required for certain construction activities within the Berkeley County Regulated Area and encompassed municipalities as authorized under intergovernmental agreements. This section describes conditions when stormwater management plan approval is required, when Construction Activity Application (CAA) approval is required, and the procedures that apply to different situations, application package requirements, and when and if waivers of such requirements are applicable for certain activities.

2.1 DUTY TO COMPLY

Stormwater management plan approval is required for all construction activities within the Regulated Area, other than Single Family Residential (SFR) disturbing less than one-half (1/2) acre. In addition, CAA approval is required for all construction activities within the Regulated Area disturbing one-half (1/2) acre or more. Unless otherwise allowed by the Stormwater Management Ordinance or this Manual, the surface of land in Berkeley County shall not be disturbed or altered for any purpose whatsoever, nor any major drainage channel or component of the stormwater system impeded or encroached upon without approval from the County Engineer.

2.2 STORMWATER APPROVAL AND CONSTRUCTION ACTIVITY CLOSEOUT PROCEDURES

Stormwater management plans and Construction Activity Applications (CAAs) must be submitted to the Berkeley County Engineering Department (see the contact information in Chapter 1, Section 1.9) for approval. Stormwater management plans and applications that require other permit/certification coverage (such as but not limited to Coastal Zone Consistency Determination, 401 Water Quality certification and Navigable waters permit) from any State or Federal agency, can be processed simultaneously during County stormwater management plan review. The remainder of this Manual describes the procedures and application requirements of the County Engineer.

The County Engineer has established three (3) categories of Construction Activity:

1. Construction Activity for sites disturbing one-half (1/2) acre or more (Section 2.2.1).

2. Construction Activity for sites disturbing less than one-half (1/2) acre (Section 2.2.2).

3. Single Family Residential (SFR) disturbing less than one-half (1/2) acre (Section 2.2.3).

Stormwater management plans and applications required in this Manual shall be considered complete only if they are submitted in the required format, include all applicable information, and are accompanied by the established fee(s). Any stormwater management plan or application that is determined to be incomplete shall be returned to the applicant along with an explanation of the application's deficiencies. Fees shall not be refunded. No further processing of the stormwater management plan or application shall occur until the deficiencies are corrected. Once the deficiencies are corrected, the stormwater management plan or application may be resubmitted without the payment of additional fees, provided that it is resubmitted within six (6) months of the date that the stormwater management plan or application was returned to the applicant. A stormwater management plan and application resubmitted more than six (6) months after the date that the plan and application was returned as incomplete shall require repayment of applicable fees.

Whenever the procedures of the County expressly state that applications are to be submitted after a "pre-application conference," applicants shall be responsible for scheduling and attending such meetings. When pre-application conferences are required, an application shall not be accepted until the pre-application conference has been conducted, and any errors or omissions noted in review of the application for completeness have been addressed by the applicant.

2.2.1 CONSTRUCTION ACTIVITY FOR SITES DISTURBING ONE-HALF (1/2) ACRE OR MORE

All construction activity disturbing one-half (1/2) acre or more must submit a stormwater management plan and Construction Activity Application (CAA) to the Berkeley County Engineering Department. Construction shall not commence until the County approves the CAA. The approval process for CAA is shown in Appendix D. Submittal requirements are detailed below.

2.2.1.1 SUBMITTAL REQUIREMENTS

The following submittal requirements must be provided as part of a complete CAA to receive Berkeley County stormwater approval.

1. Application Form: The CAA is provided in Appendix A.

2. Technical Report: One (1) copy of the technical report should be prepared and submitted as part of the application package, prepared by a registered professional engineer. This report shall consist of maps, and supporting design calculations for the proposed stormwater system and erosion measures used during construction, to include, but not limited to, the following, when applicable:

    a. Map: A map of the project area containing the following:

        i. Site location drawing of the proposed project showing project location in relation to roadways, jurisdictional boundaries, streams, rivers, and lakes, and the boundary lines of the site to be developed,
        ii. Identification of all areas within the site that will be included in the construction activities,
        iii. Location of temporary and permanent stormwater management controls.

    b. Site Narrative: A narrative should be submitted with the application which includes, but is not limited to, the following:

        i. General description of the site,
        ii. Purpose of the construction activity,
        iii. Summary table(s) of existing and proposed runoff flows, volumes, and pollutant loads,
        iv. Topographic and soil information,
        v. Adjacent properties and owners,
        vi. Waterbodies receiving stormwater runoff (existing and proposed),
        vii. Water quality and flooding issues, and anticipated potential impacts (quality, downstream structures, etc.) and benefits (open space, treatment, maintenance, etc.),
        viii. Anticipated starting and completion dates of the various stages of the construction activities and the expected date of final stabilization,
        ix. If applicable, the narrative should also contain justification for variances, waivers, or other special conditions of the site,

x. Also, if applicable, wetland and water body disturbance issues should be discussed along with details on the status of necessary permit application to the USACOE,
xi. If a TMDL(S) is in place for the receiving waterbody, the narrative must describe how the project will comply with the TMDL(s).

c. Pre-development and post-development hydrologic analysis that determines the existing stormwater peak flow rates, flow velocities, and pollutant loads for all delineated sub basins/discharge points. The natural or historic condition will be the standard by which the stormwater plan for a construction project is evaluated. The stormwater plan must demonstrate control of runoff quantity and quality in accordance with design criteria provided in Chapter 3;

d. Hydraulic design calculations for all conveyances showing the ability to handle anticipated flows and volumes. Provide calculations showing that the project does not cause or increase any negative impact on downstream structures, and the upstream and downstream stormwater drainage system. The following computations should be included as necessary: hydrographs, routing of hydrographs through system components, pipe and open channel capacity, velocity calculations, and water surface elevations. Calculations and discussion shall be provided for energy dissipation and inlet/outlet protection devices. All system components should have standard details and specifications;

e. If the project is located in a Special Protection Area, a comprehensive evaluation of engineering calculations and analysis should be included that demonstrate that the project will not negatively impact current drainage conditions and/or comply with State and Federal regulations on stormwater discharges. More information is provided in Chapter 3;

f. Erosion and sediment control plan to include:
    i. A description of the erosion and sediment control facilities selected,

    ii. Plan showing the location of all erosion and sediment control facilities,

    iii. Design calculations of each measure, including trapping efficiencies. Each measure should also have a standard detail and specification,

    iv. Explanation/discussion of models used in the design.

g. Downstream analysis calculations showing the effect of post-development design flows on downstream storm water conveyance systems and channels. More details on this analysis and where it is applicable covered in Chapter 3;

h. Watershed delineation maps with consistent sequential notations;

i. Location map showing topography and waters of the state in relation to proposed project;

j. Discussion and calculation of any wetlands issues;

k. Map showing type and classification of all soils expected to be encountered or used at the development site;

l. Presentation of existing and proposed contours at the development site;

m. General description of the adjacent property and description of existing structures, buildings, and other fixed improvements located on surrounding properties;

n. Discussion of site access issues and easements to be obtained and provided to the County.

3. Construction Plans:

One complete set of certified and signed construction plans are to be included as part of the CAA. The information required on the construction plans shall include, but are not limited to the following list. Other items may be requested by the County Engineer on a case-by-case basis. Some items may be included in other components of the CAA application package, but should be adequately noted. Size D (24" X 36") Plan sheets/drawings are preferred.

a. North arrow and scale,

b. Property lines, bearings and distances, adjacent landowners' names, and land use conditions,

c. Legend,

d. Registered engineer's seal and signature,

e. Certificate of Authorization seal, as appropriate,

f. Existing and proposed contours (one foot contours) and land uses,

g. Limits of disturbed area,

h. Delineation of wetlands and/or waters of the state,

i. Location of any and all FEMA floodplains,

j. Easements,

k. Stormwater system profiles with existing and proposed ground elevations,

l. Construction sequence (include implementation of all stormwater and sediment controls in the first phase of construction),

m. Locations of all temporary and permanent control measures,

n. Details for all temporary and permanent control measures,

o. Grassing and stabilization specifications and schedule,

p. Maintenance requirements (for temporary and permanent controls, grassing, etc.),

q. Construction entrance/exit,

r. Tree protection, preservation, and overall landscaping plan with appropriate species selection and screening for ponds and other components required by the Zoning Ordinance,

s. Details and specifications of all necessary construction components,

t. Location map,

u. The cover sheet shall contain, at a minimum, the following items:

   i. Project name,

   ii. Engineers contact information (name, mailing address, telephone, fax),

   iii. Contact information (name, mailing, address, telephone, fax) of the owner, operator or designated party,

   iv. Vicinity map, and

   v. Table of contents.

v. All drawing elevations shall be based on the NAVD 88 and projected in the state plane coordinate system.

w. The following standard notes shall be shown on the plans. This list is not meant to be exhaustive and other notes should be included as necessary:

   i. If necessary, slopes which exceed eight (8) vertical feet should be stabilized with synthetic or vegetative mats, in addition to hydroseeding. It may be necessary to install temporary slope drains during construction. Temporary berms may be needed until the slope is brought to grade;

   ii. Stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than fourteen days (14) after work has ceased, unless activity in that portion of the site will resume within twenty-one (21) days;

   iii. All sediment and erosion control devices shall be routinely inspected every seven (7) days or every fourteen (14) days and after each rainfall occurrence that exceeds one-half inch. Damaged or ineffective devices shall be repaired or replaced, as necessary;

   iv. Provide silt fence and/or other control devices, as may be required, to control soil erosion during utility construction. All disturbed areas shall be cleaned, graded, and stabilized with grassing as soon as practicable after the utility installation;

   v. All erosion control devices shall be properly maintained during all phases of construction until the completion of all construction activities and all disturbed areas have been stabilized. Additional control devices may be required during construction in order to control erosion and/or offsite sedimentation. All temporary control devices shall be removed once construction is complete and the site is stabilized;

   vi. The contractor must take necessary action to minimize the tracking of mud onto the paved roadway construction areas. The contractor shall daily remove mud/soil from pavement, as may be required;

vii. Residential subdivisions require erosion control features for infrastructure as well as for individual lot construction. Individual property owners shall follow these plans during construction.

viii. Temporary diversion berms and/or ditches will be provided as needed during construction to protect work areas from upslope runoff and/or to divert sediment laden water to appropriate traps or stable outlets.

ix. Litter, construction debris, oils, fuels and building products with significant potential for impact (such as stockpiles of freshly treated lumber) and construction chemicals (concrete washdown areas, paint brush cleaners, etc.) that could be exposed to stormwater must be prevented from becoming a pollutant source in stormwater discharges.

x. Provide written proof that all off-site easements have been obtained.

4. Subdivision projects disturbing one-half (1/2) acre or more must have a complete set of plans and specifications to include, but not be limited to, the following items, as appropriate: lot layout/site plan and staking, acreage, limits of disturbance, road plan/profiles, storm drainage plan/profile, pre and post development drainage areas (both on and off-site), sediment and erosion control plans and details, construction waste management, utilities (water and sanitary sewer), post-construction stormwater management facilities, and traffic patterns with temporary (construction) and permanent traffic signage. Plans shall provide existing and proposed contours with intervals of not more than one (1) foot. Where possible and as needed, contour lines should be extended beyond the site boundary lines. While some of these items lend themselves to combining information on a single sheet/drawing, care should be taken to ensure that plans are not overcrowded/cluttered. The lot layout sheet should show a tie distance from the primary entrance of the proposed project to the nearest existing intersection.

5. All available or used bench marks shall be shown on this or other applicable sheet. At least one bench mark shall be available or established on/near (within survey instrument sight distance) the site. The bench mark shall be referenced to North American Datum (NAVD) 1988.

6. The applicant will provide a tentative construction time schedule for the development. Sediment and erosion control measures will be some of the first work at a site and such implementation will be demonstrated. The schedule will also provide for coordination with the responsibilities of all parties, including those installing utilities.

7. Specifications for all components of construction activities related to grading, utilities, sediment and erosion control, temporary and permanent vegetation, water quality BMPs, etc.

8. Fees: No plan review or inspection fees are required at this time but it is anticipated that review/inspection fees will be adopted by the County.

9. Covenants for Permanent Maintenance of Stormwater Systems and Maintenance Plans and Schedules: When stormwater management facilities and system components are to be maintained by an owner, operator, or other designated party, Berkeley County must be given assurance that such activities will be conducted. This is to be established using Berkeley County Covenants for Permanent Maintenance of Stormwater Systems (Covenants) to ensure that the stormwater management facilities are constructed, operated, and maintained by the owner, its successors and assigns, in accordance with the approved stormwater management plan and specifications identified

in the stormwater management plan. The Covenants must be recorded prior to the approval of the CAA in the Office of the Berkeley County Register of Deeds. If someone other than the owner is the responsible party for maintenance activities of stormwater management systems, a maintenance agreement between the operator and owner shall be included with the Covenants. The maintenance plan and schedules must be included in the stormwater management plan for all the activities to be conducted during and after construction for all stormwater system components.

2.2.1.2 PRE-SUBMITTAL MEETING

A pre-submittal meeting may be required for projects located in Special Protection Areas. Special Protection Areas are areas within the County that require some additional stormwater management controls due to existing problems. Such problems can include but are not limited to flooding and State recognized water quality impairments. The County Engineer may waive the pre-submittal meeting requirement on a case by case basis.

2.2.1.3 STORMWATER MASTER PLAN

For sites located in Special Protection Areas, a Stormwater Master Plan is required to be submitted prior to the submittal of the complete package as detailed below. This Master Plan is to be created to give the design professional the opportunity to propose a site layout and proposed stormwater controls to the County Engineer. The Master Plan should be submitted by hand or mail, and can be incorporated for discussion at the pre-submittal meeting. The County Engineer may waive the requirement for a master plan on a case by case basis.

The Master Plan can be a preliminary sketch of the site and shall contain the following items, when applicable:

1. Site layout showing buildings, roads, parking areas, utilities, and grassed or landscaped areas;

2. Vicinity map;

3. Pre- and post-development primary runoff patterns and discharge points;

4. Location/distances to Waters of the State and all other existing natural features such as wetlands, ponds, lakes, floodplains, and stream buffers;

In addition, the applicant should be prepared to discuss the following items, when applicable:

5. All modeling methodologies to be used;

6. Methods to show compliance with any adopted Total Maximum Daily Loads (TMDLs) or other waterbody impairments that may limit the allowable pollutant load that can be discharged;

7. Preliminary waiver or variance requests;

8. Others as requested by the County Engineer.

Upon submittal and discussion of the Master Plan and related concerns, the applicant can submit the complete CAA (items 1-11 in Section 2.2.2.1).

2.2.2 CONSTRUCTION ACTIVITY FOR SITES DISTURBING LESS THAN ONE-HALF (1/2) ACRE

All construction activities, other than SFR, disturbing less than one-half (1/2) acre must submit a stormwater management plan to the Berkeley County Engineering Department. A Construction Activity Application (CAA) is not required for this category of construction activity. Construction shall not commence until the County approves the stormwater management plan. Following is the submittal requirements for a stormwater management plan:

As a minimum the plan must include: location of property lines; existing and proposed structures; parking areas; buffer areas; wetlands; limits of disturbed areas; existing and proposed stormwater runoff patterns; location of 100-year flood plain; sediment and erosion control measures (silt fence, riprap, inlet protection, etc.); measures for construction waste management; location of existing and proposed stormwater management facilities. In addition, the construction activity shall implement and comply with the Minimum Stormwater Management BMPs (See Appendix E). Further guidance on selecting necessary erosion and sediment control measure controls is provided in http://www.scdhec.gov/environment/ocrm/pubs/tech_docs_water.htm#bmp. The County Engineer may require additional stormwater BMPs and/or a stormwater management plan prepared by a registered engineer.

When stormwater management facilities and system components are to be maintained by an owner, operator, or other designated party, Berkeley County must be given assurance that such activities will be conducted. This is to be established using Berkeley County Covenants for Permanent Maintenance of Stormwater Systems (Covenants) to ensure that the stormwater management facilities are constructed, operated, and maintained by the owner, its successors and assigns, in accordance with the approved stormwater management plan and specifications identified in the stormwater management plan. The Covenants must be recorded prior to the approval of the stormwater management plan in the Office of the Berkeley County Register of Deeds. If someone other than the owner is the responsible party for maintenance activities of stormwater management systems, a maintenance agreement between the operator and owner shall be included with the Covenants. The maintenance plan and schedules must be included in the stormwater management plan for all the activities to be conducted during and after construction for all stormwater system components.

No plan review or inspection fees are required at this time but it is anticipated that review/inspection fees will be adopted by the County.

2.2.3 SINGLE FAMILY RESIDENTIAL CONSTRUCTION ACTIVITY FOR SITES DISTURBING LESS THAN ONE-HALF (1/2) ACRE.

Submittal of a stormwater management plan or a CAA is not required for single family residential (SFR) construction activities that disturb less than one-half (1/2) acre. However, stormwater BMPs must be implemented on all SFR sites. SFR construction activity shall implement and comply with the Minimum Stormwater Management BMPs (See Appendix E). In addition, if the site is part of a larger common plan of development, stormwater management requirements and BMPs specified in the approved CAA for the larger common plan of development must be implemented. Any deviations and/or modifications to the BMPs must be approved by the County Engineer.

2.2.4 FINAL APPROVAL

Stormwater management plans and CAAs shall be submitted to the Berkeley County Engineering Department either via mail or hand delivery (see contact information in Section 1.9) along with required components and fees. Failure to provide all of the required information shall be considered an incomplete submittal. The applicant will be notified that further information is needed to complete the submittal. In some cases, a new stormwater management plan or CAA package will have to be resubmitted.

Once the stormwater management plan and CAA are deemed complete, the County's review shall be accomplished and an approval, denial, review comments, or request for further information shall be transmitted to the applicant. A stormwater plan review checklist for sites disturbing one-half (1/2) acre or more is provided in Appendix C.

SCDHEC may request additional information from the applicant for NPDES permit compliance, which may result in changes to the stormwater management plan or CAA. Any such changes shall be provided to the County Engineer as well. The County Engineer reserves the right to deny approval if a submittal fails to conform to the provisions of the Stormwater Management Ordinance and this Manual.

2.2.5 CONSTRUCTION ACTIVITY AND CLOSEOUT PROCEDURE

Site construction shall not commence until the stormwater management plan and CAA is approved by the County Engineer. Construction activities must adhere to the provisions and requirement of the stormwater management plan and CAA. Any substantial revisions to the approved stormwater management plan or CAA should be submitted in writing to the County Engineer along with any subsequent fees for review. Such changes shall not be implemented until approval is given. Substantial revisions for stormwater management issues may include, but are not limited to pipe size and grade alterations that affect hydraulic capacity, changes to easement boundary due to changes in the stormwater system components, or changes to the general grading plan of the site that affect the flow direction, rate, volume, or quality of stormwater runoff.

The owner is required to maintain at least one copy of the approved stormwater management plan on site. The County Engineer, or his designee, will conduct inspections during the construction phase. Frequency and specific times and dates of these inspections will be done at the discretion of the County Engineer or his designee. More information on inspections is given in Chapter 4. During construction, the owner or his designated representative must conduct inspections of all temporary erosion and sediment controls, construction waste control, and permanent stabilization on site in accordance with the submitted and approved plans and maintenance schedule.

2.2.5.1 TRANSFER OF OWNERSHIP

In certain cases and as requested by an applicant, the CAA may be transferred from one applicant to another. The most obvious example of this is when a developer prepares a piece of property for a new neighborhood by performing grading activities, utility installation, the building of roads, and then turns the property over to a homebuilder(s). In such cases, the applicant must make Berkeley County aware of plans to transfer ownership of the CAA and associated stormwater management issues through completion of the CAA transfer form in Appendix F. A transfer of ownership is also allowed for phases within a project. If a CAA transfer is not requested using the appropriate form, the current owner will continue to be held responsible for stormwater management issues at the site.

2.2.5.2 CONSTRUCTION ACTIVITY CLOSEOUT

At the conclusion of construction, the owner is responsible for making sure a site is permanently stabilized with vegetation established, paved areas and stormwater conveyances clean of debris and sediment/stormwater controls working properly. Proof of these will be determined by a County inspector and any problems found must be corrected by the owner prior to closing out a construction activity. As-built/record drawings must be submitted prior to the inspection. Upon confirming any such corrections are completed and the site is ready, the County Engineer will release any remaining bonds. The County Engineer may require additional items on a case by case basis in order to closeout a construction activity.

2.2.6 EXEMPTIONS

Per the Stormwater Management Ordinance, the provisions of this Manual shall not apply to:

- Land disturbing activities undertaken on forestland for the production and harvesting of timber and timber products and conducted in accordance with best management practices and minimum erosion protection measures established by the South Carolina Forestry Commission pursuant to Section 48-18-70 of the 1976 Code of Laws of South Carolina, as amended.

- Land disturbing activities on agricultural land for production of plants and animals, including but not limited to: forages and sod crops, grains and feed crops, tobacco, cotton, and peanuts; dairy animals and dairy products; poultry and poultry products; livestock, including beef cattle, sheep, swine, horses, ponies, mules, or goats, including the breeding and grazing of these animals; bees, fur animals, and aquaculture. The construction of an agricultural structure that requires the disturbance of one or more acres, such as, but not limited to, broiler houses, machine sheds, repair shops, coops, barns, and other major buildings shall require the submittal and approval.

- Linear utility installation activities that are covered under their own DHEC approved utility general permit requiring associated assurance of proper stormwater management.

2.2.7 EXPIRATION OF STORMWATER APPROVAL

Stormwater management plan approval and CAA approval will remain valid for up to five (5) years from the date of approval, provided that the project is in compliance with the Stormwater Management Ordinance and this Manual and is not inactive for a period of twelve (12) consecutive months. For sites disturbing less than one-half (1/2) acre, construction activity must be initiated within twelve (12) months of stormwater management plan approval and for sites disturbing one-half (1/2) acre or more, construction activity must be initiated within twelve (12) months of CAA approval. Failure to initiate construction will render all approvals invalid at the end of the twelfth month.

2.2.8 RESPONSIBILITY OF OWNER/OPERATOR

During any construction operation, the owner/operator shall be responsible for carrying out the proposed work in accordance with the approved plan, specifications, time schedule, and all requirements of the Stormwater Management Ordinance and this Manual.

2.2.9 VARIANCES

The County Engineer may grant variances from the requirements of this Manual for construction activities if there are exceptional circumstances applicable to the site such that strict adherence to these provisions will result in unnecessary hardship and not fulfill the purpose of this Manual and the Berkeley County Stormwater Management Ordinance.

A written request for variance must be provided to the County Engineer stating the specific variance(s) sought and the reason(s) with supporting data including descriptions, drawings, and any other information that is necessary to evaluate the proposed variance.

A separate written variance request shall be required if there are subsequent additions, extensions, or modifications which would alter a previously approved variance. A project may be eligible for a variance if the applicant can demonstrate the following:

1. The variance will not conflict with the purpose of this Manual, all pertinent Berkeley County ordinances or local, State or Federal requirements.

2. The proposed project will have no significant adverse impact on the receiving water or upstream, downstream or adjacent properties; or

3. The imposition of peak or volume control requirements of stormwater runoff would aggravate downstream flooding.

2.2.10 ENCROACHMENT PERMITS

All applicable encroachment permit(s) must be obtained from the SCDOT and/or the Berkeley County Roads & Bridges Department before construction begins. Applicants should be aware of Berkeley County requirements which may differ from SCDOT's.

It is the applicant's responsibility to comply with all SCDOT and Berkeley County Encroachment Permit application requirements. Approved encroachment permits are required prior to stormwater approval from the County Engineer.

2.2.11 EASEMENTS

The following section provides the required easement widths for various components of the stormwater management system(s). In all cases, there will be an allowance for offset easements, in which the pipe, channel, or other stormwater system component does not necessarily have to be in the middle of the easement width, but may be offset to allow for certain construction needs. Proposed offset easements will be identified and additional width may be required as prescribed by the County Engineer.

2.2.11.1 STORM DRAIN PIPE

Drainage easements shall provide adequate room for maintenance equipment to operate. Table 2.1 provides required minimum drainage easement widths for some of the more typical situations:

Table 2.1-Storm Drain Pipe Easements

Pipe size (in)	Maximum depth to invert (ft)	Minimum Width of drainage easement (ft)
18	3.5	20
24	5.0	20
42	7.0	25
54	7.0	30

Notes: (1) For depths greater than shown, pipe easement width shall be as determined by the County Engineer.
(2) For pipe sizes not specifically listed above, the easement width and depth to invert shall be that of the next size up, i.e. the easement width for a 36 inch pipe is the same as those for a 42 inch pipe.
(3) For larger pipe sizes and/or multiple lines of pipe easement width shall be as determined by the County Engineer.

2.2.11.2 DITCHES AND SWALES

The minimum drainage easement width for ditches shall be top of bank width of the ditch plus twenty (20) feet. The ditch shall be located in the easement maintaining five feet (5) shoulder area on one side of the ditch and fifteen feet (15) maintenance shelf on the other side of the ditch. The drainage easement for swales shall not be less than twenty feet (20).

2.2.11.3 DETENTION PONDS

A minimum access easement of twenty feet (20) shall be provided to all detention ponds. The drainage easement for the detention pond shall incorporate and include the pond area plus a minimum fifteen feet (15) around the perimeter of the pond for maintenance access beyond the top of the pond bank. While the County shall not accept responsibility for pond maintenance, unless agreed to in writing, the County may utilize the easement for necessary emergency repairs.

2.2.11.4 OTHER STORMWATER FACILITIES & BMPS

All other structures used for the control of stormwater runoff (quantity or quality) not otherwise covered above, shall have an easement for access and maintenance that is a minimum of twenty (20) feet beyond the boundary of any such structure. The County Engineer may request or allow other easement widths on a case-by-case basis given site constraints or special conditions. While the County shall not accept responsibility for stormwater facility maintenance, unless agreed to in writing, the County may utilize the easement for necessary emergency repairs.

2.2.11.5 OFFSITE EASEMENTS

Any required off-site easements should be obtained prior to stormwater approval which would impact upon that area. Any work done without a proper and adequate easement(s) shall be at the owner's own risk. Non-subdivision projects shall provide validation of necessary easements before a stormwater management plan and CAA is approved.

2.2.12 STORMWATER FACILITY OWNERSHIP AND MAINTENANCE

2.2.12.1 OWNERSHIP

The owner of a portion or the entire stormwater system, as the case may be, shall be clearly designated before a stormwater approval will be issued. Ownership shall also be recorded on the final plat. Ownership shall imply responsibility for maintaining the stormwater system, including all ponds and other BMPs used for controlling runoff quantity and quality. Ownership does not imply that the owner(s) may in any way alter the size, or function of any component of the stormwater system without consent from the County Engineer. Owners found altering such components will be required to remove any alterations.

2.2.12.2 MAINTENANCE

Each component of the stormwater management system (pipes, inlets, BMPs) shall have a maintenance plan (activities and associated schedule) as part of stormwater management plan and CAA package. The plan shall also cover temporary measures used during construction in addition to the long term maintenance of the system. Suggested maintenance activities and recurrence intervals for water quality BMPs are discussed and referenced in Chapter 3.

In addition, Covenants for Permanent Maintenance of Stormwater Systems must be recorded in the permanent land records with the Berkeley County Register of Deeds. The Covenants is provided in Appendix B. The Covenants must be signed and executed prior to the issuance of a stormwater approval.

CHAPTER 3 - DESIGN REQUIREMENTS

This chapter provides engineers, designers, developers, and others with the necessary information needed to design adequate systems that will control the rate, volume, and pollutant loads released from a new or re-development project where the County Engineer has been authorized by law or agreement to enforce engineering standards. These design requirements have been developed based on common engineering practice and reference State and Federal requirements, engineering publications, and other municipal and academic guidance.

It is the goal of this Chapter to provide a minimum set of design standards that will result in effective stormwater management to mitigate the impact of land development on existing/natural hydrologic and hydraulic processes, as well as attempt to prevent further degradation of the water resources in Berkeley County through proper planning, design, installation, and maintenance. The design professional shall use all means necessary to develop land in a manner consistent with all County ordinances and this Manual. Specific methods and applications not covered in this section can and should be discussed with the County Engineer for applicability prior to the submission of site plans and drainage calculations. The following section details the criteria that shall be followed in the absence of designated specific watershed master plan criteria.

3.1 GENERAL DESIGN STANDARDS

General requirements for all stormwater systems and facilities will include, but not be limited to, the following:

1. Site designers shall minimize the generation of stormwater and maximize pervious areas by:

    a. Selecting portions of the site where the drainage pattern, topography, and soils are favorable for the intended use.

    b. Exposing the smallest practical area of land for the least possible time during development. This includes maintaining or creating buffers and preserving natural areas.

    c. Limiting the drainage area to all BMPs. Specific maximum contributing areas to BMPs are provided in this chapter.

    d. When feasible, retaining and protecting natural vegetation and saving topsoil, for replacing on graded areas.

    e. Using plant cover, mulching, hydroseeding, or other stabilization methods to control runoff and protect areas subject to erosion during and after construction.

2. Annual groundwater recharge rates should be maintained to the maximum extent practical by promoting infiltration through the use of structural and non-structural methods.

3. Stormwater runoff generated from development shall be controlled to predevelopment and/or natural rates. The method for computing adequate control shall be based on several design storms. Greater detail is provided in this chapter.

4. Stormwater runoff generated from development shall be treated through the use of structural and/or non-structural practices. It is presumed that sufficient treatment is provided by the

proposed BMPs if they are:

a. Designed according to the specific performance criteria outlined in this Manual,

b. Constructed properly, and

c. Maintained regularly.

5. Stormwater discharges to special protection areas with sensitive resources or that have existing flooding or water quality problems [e.g., cold water fisheries, recharge areas, water supply reservoirs, Total Maximum Daily Loads (TMDLs), and 303(d) listings] are subject to additional performance criteria. Section 3.9 contains more specific information and design requirements on the areas that will receive this additional set of protection criteria.

6. All BMPs shall have an enforceable operation and maintenance plan and schedule to ensure the system functions as designed.

7. Sediment basins and other BMPs shall be used during construction to remove heavy sediment loads from runoff waters leaving the disturbed area. Design criteria are provided in this chapter.

8. Permanent vegetative cover and the long-term erosion protection structures shall be installed as soon as practical in the development process.

9. If wetlands are suspected to exist on the property, they should be investigated and delineated by a qualified professional. The US Army Corps of Engineers (USACOE) must make a determination as to whether or not the wetlands fall under their jurisdiction. All efforts should be made to reduce or eliminate impacts such as using a buffer and/or installing a silt fence around wetlands. If the wetlands fall under the jurisdiction of the USACOE, a Section 404 permit is needed before any disturbance of the wetlands is allowed. In addition, the DHEC-OCRM Coastal Zone Consistency Determination will address any proposed wetland impacts. Berkeley County will accept certified delineations from qualified consultants if the USACOE is unable to issue a verification on the jurisdictional determination.

10. Where existing wetlands are intended as a component of an overall stormwater management system, the approved plan for stormwater management shall not be implemented until all necessary State and Federal permits have been obtained.

11. All stormwater management and sediment control practices shall be designed, constructed, and maintained with consideration for the proper control of mosquitoes and other vectors. Specific design criteria are provided in this chapter.

12. For the purposes of hydraulic design, capacity of a system to transport stormwater runoff, shall be based on the size of the contributing drainage basin or subwatershed, as outlined below:

    a. Major Drainage Channels:

       All channels which drain an accumulation of primary and/or secondary drainage channels. These channels shall be the natural drainage channels of the watershed or man-made channels draining an area of one (1) square mile or more.

b. Primary Drainage Channels

All drainage channels which drain an area of two hundred (200) acres or more.

c. Secondary Drainage Channels

All drainage channels which drain an area of less than two hundred 200 acres and the primary benefit is to the development.

14. All development sites disturbing one-half (1/2) acre or more shall have an analysis performed of the drainage system to ascertain the function of the system during the 100-year storm event (precipitation only) or more specifically, determine that the project will not:

a. Increase the likelihood of dwelling flooding and property damage.

b. Increase water surface elevations or reduce system capacity in stormwater system and facilities upstream or downstream of the project.

c. Impose any new or additional increase in stormwater runoff velocity on adjacent properties, discharge points, or downstream areas.

d. Impose any new or additional increase in erosion and pollutant loads that would adversely impact waters of the state.

If a master plan exists for the area/watershed which encompasses the project, criteria set by that plan shall be used for determining the extent of this analysis. Without a master plan, analysis shall extend up to the top of the watershed and down to a Water of the State or to a point in which the project comprises 10% of the total contributing area, whichever occurs first. In these cases, the analysis criteria may include, but is not limited to:

a. Utilization of existing land use curve numbers for all areas,

b. Routing the flows using an accepted hydrologic and hydraulic method, and

c. Providing hydraulic step-backwater calculations using USACE's HEC-2 or HEC-RAS models or equivalent. Other calculations may be required by the County Engineer based on severity of potential impact and location of the project.

If the downstream analysis determines that the development of a particular site does contribute to flooding, pollution, or erosion problems, then the system design shall be changed or additional controls shall be included.

15. Watersheds that have documented water quantity problems may have more stringent or modified design criteria as determined from Berkeley County master plan studies or as dictated by State and Federal regulations. The County Engineer reserves the right to impose additional design requirements, such as the examples listed below:

a. Post-development discharge rates from the entire development area not exceeding pre-development discharge rates for storm frequencies greater than the 25-year frequency 24-hour duration storm event,

b. Post-development discharge volumes from the entire development area not exceeding pre-development discharge volumes for storm frequencies smaller than the 1-year frequency 24-hour duration storm event,

c. Reduction of peak flow rates below pre-development levels,

d. Downstream channel, culvert, or property improvements.

3.2 HYDROLOGIC COMPUTATION METHODS

All hydrologic computations shall be completed using volume-based hydrograph methods acceptable to the County Engineer. The design storm duration for these computations shall be the 24-hour storm event utilizing a SCS Type III distribution with a 0.1-hour duration time increment. Typical hydrologic inputs include, but are not limited to the following:

- Rainfall depth or intensity,
- NRCS soil classification and hydrologic soil group,
- Land use,
- Time of concentration, and
- Initial abstraction/surface storage.

The remainder of this section will provide basic information for the hydrologic calculations. As discussed, the intent of the Manual is not to provide detail on every aspect of hydrologic computations, their limitations, assumptions, appropriateness of use, but rather general guidance on generally accepted standards. This Manual does, however, reference suggested materials as necessary for detailed discussion of related topics.

3.2.1 INPUTS

The precipitation depths corresponding to various return periods to be used for projects in Berkeley County are shown in Table 3.1.

Table 3.1: Design Storm Precipitation Data (in Inches) for Berkeley County

Area	1-yr	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Berkeley (North)	3.5	3.8	5.0	5.9	7.2	8.2	9.4
Berkeley (South)	3.6	4.0	5.2	6.2	7.5	8.6	9.8

Source: SCDHEC 2003

Soil types in Berkeley County range from sands to sandy clays. Existing land use and corresponding runoff potential factors should be obtained from the site visit and other appropriate sources. Appropriate runoff potential factors can be found in several of the references listed in Chapter 5.

3.2.2 STORMWATER MANAGEMENT DESIGN METHODOLOGIES

Berkeley County recommended methods and corresponding design circumstances are listed in Table 3.2 and 3.3 below. If other methods are used, approval must first be given by the County Engineer. Complete source documentation must be submitted for approval.

Table 3.2: Recommended Methodologies Based on Land Disturbance Area

Method	Size Limitations*	Comments
(Modified) Rational Method	0 – < 1 Acres	Acceptable for sizing individual culverts or storm drains that are not part of a pipe network or system. Not to be used for storage design.
"SCS Method" (TR-55)	0 – 2000 Acres	Used for estimating peak flows from urban areas.

*****Size limitations refer to the subwatershed size to the point where a stormwater system component (i.e., culvert, inlet, BMP) is located.

Details of Rational Method and Modified Rational Method can be found in Chow (1988), ASCE (1996), USDA (1996), and Mays (2001). Documentation on the commonly used SCS (or NRCS) Method can be found on the US Department of Agriculture website (http://www.wcc.nrcs.usda.gov/hydro/hydro-tools-models-tr55.html). The USGS regression equations for South Carolina can be obtained from the US Geological Survey website (http://water.usgs.gov/osw/programs/nffpubs.html). Haan, C. T., Barfield, B. J., and Hayes, J. C. (1995) and USDT (1996, 2001) can also be referenced for greater detail on hydrology calculations and assumptions.

Table 3.3: Recommended Hydrologic Methods for Designing Various Stormwater Management Systems and Controls

Method	Rational Method	SCS Method
Extreme Flood Protection		+
Storage/Sedimentation Facilities		+
Outlet Structures		+
Gutter Flow and Inlets	+	
Storm Drain Pipes	+	+
Culverts	+	+
Small Ditches		+
Open Channels		+
Energy Dissipation		+

Methods for calculating the time of concentration and abstraction are numerous. However, a minimum time of concentration of six (6) minutes shall be used for all hydrologic calculations. See references given above for the suggested methodologies for information on these calculations.

3.2.3 HYDROGRAPHS

Hydrographs should be used to evaluate entire systems by routing storm events through pipe or storage systems. The use of a hydrograph will provide better insight into system performance than simply using the peak discharge. The County Engineer will accept computer models commonly used in the industry as well as newer models with appropriate documentation.

3.3 WATER QUANTITY CONTROL STANDARDS

Water quantity control is an integral component of overall stormwater management. Quantity control is effectively flood control, reducing potential damages and health risks, but because uncontrolled runoff can cause erosion, it can also be a form of water quality control. The following design criteria are established for water quantity control. All designs of storage facilities utilized for stormwater quantity control and required downstream analyses shall be submitted as part of the engineering calculations for obtaining a Berkeley County stormwater approval.

3.3.1 GENERAL WATER QUANTITY CRITERIA

1. Controls shall be designed by a traditional reservoir routing procedure.

2. All ponds shall have an emergency spillway designed to pass the 100-year storm event if the storage capacity is exceeded.

3. All quantity controls that are also used for quality control shall have a forebay or screening vault for removal of debris and coarse sediments.

    a. Forebays shall be placed upstream of the main pond storage area.

    b. Unless a separate vault is to be used for the forebay, the forebay shall be separated from the larger detention area by barriers or baffles that may be constructed of earth, stones, riprap, gabions, or geo-textiles. The barrier and/or baffles act as a trap for coarse sediments and minimize their movement into the main pond.

    c. Maintenance of forebays will be needed more frequently than the main storage area and all designs should consider this need.

3.3.2 DETENTION PONDS/RESERVOIRS

1. Ponds with vegetated embankments shall be less than 15-feet in height and shall have side slopes no steeper than 3H:1V. Embankments protected with Turf Reinforcement Matting or other methods (if approved by County Engineer) shall be no steeper than 2H:1V.

2. Access inside a pond shall be provided with at least one side slope at 3H:1V or flatter. Geotechnical slope stability analysis is required for embankments greater than 10-feet in height and have steeper slope than those indicated above.

2. A minimum freeboard of 1-foot above the design storm high water elevation shall be provided for all impoundments.

3.3.2.1 WET DETENTION PONDS

1. The maximum depth of permanent storage facilities with a permanent pool shall be determined by site conditions, design constraints, and environmental needs. The facility should provide a permanent pool of water with a depth sufficient to discourage weed and mosquito growth without creating undue potential for anaerobic bottom conditions. A minimum depth of four (4) feet is reasonable unless the Berkeley County Mosquito Abatement Department requirements dictate otherwise. In addition, the pond bottom shall be a minimum of two (2') below the invert to allow for sediment build-up.

2. Aeration or other means shall be used as necessary to prevent anaerobic conditions.

3.3.2.2 DRY DETENTION PONDS

1. The bottom of dry detention structures shall be graded towards the outlet structure(s) to prevent standing water conditions with a minimum 0.5% bottom slope. Provide a low flow channel to allow the pond to drain dry and prevent standing water.

2. Pond slopes and bottom to be grassed according to the seeding schedule in Section 3.5.1.5

3. Do not use dry detention ponds in areas with high water tables.

3.3.3 UNDERGROUND DETENTION DEVICES

1. Underground detention facilities shall be designed using the following criteria:

    a. Underground detention systems shall be located downstream of other stormwater controls providing treatment of the water quality volume.

    b. The maximum contributing drainage area to be served by a single underground detention vault or tank is five (5) acres.

    c. All systems shall be designed and located to facilitate maintenance. Systems should be cleaned out (sediment removal) as directed by the approved maintenance plan, but more frequently if necessary.

    d. The minimum pipe diameter for underground detention tanks is thirty-six (36) inches or equivalent.

    e. Underground detention systems must meet structural requirements for overburden support and traffic loading if appropriate.

    f. Access must be provided over the inlet pipe and outflow structure. Access openings can consist of a standard frame, grate and solid cover, or preferably a removable panel.

    g. All underground detention systems should accommodate at least six (6) inches of sediment storage in the volume calculations.

    h. The feasibility of these devices for a given situation shall be evaluated by a soil scientist, geotechnical engineer, or other individual certified by the State of South Carolina in water table estimation.

i. Water table estimation shall be based on first occurrence of two chroma features.

1. Any development that uses a parking area or other feature for detention storage capacity shall clearly identify the limits and depths of the proposed detention pool.

2. Basin configurations which create stagnant water conditions shall be avoided.

3. Post-development discharge rates shall not exceed pre-development discharge rates for the 2-year, 10-year, (and in some cases 25-year) frequency 24-hour duration storm events. The same hydrologic procedures shall be used in determining both the pre-development and post-development peak flow rates.

4. Post-development discharge velocities shall be reduced to provide non-erosive flow velocities from structures, channels or other control measures, or equal the pre-development 10-year 24-hour storm event flow velocities, whichever is less.

5. The volume within any structure used for water quantity control shall be drained from the structure within 72 hours.

3.3.4 INFILTRATION DEVICES

1. Infiltration devices shall be required on those sites which do not currently discharge stormwater runoff or have no existing outlet. In such cases, in the post-development condition, devices shall be designed to infiltrate the runoff volume equivalent to the 5-year storm event. For evaluating the 10-year and 25-year storm events, the discharge rate from the site shall be limited to (not exceed) that of a site of equivalent size and slope with a SCS Curve Number equal to 39. As with detention ponds, an emergency spillway shall be designed to pass the 100-year storm event if the storage capacity is exceeded. The system must be analyzed, but only to the extent that no structure flooding or damage results. The following other criteria, based primarily on SC Code of Regulation Section 72-307.C requirements, shall be followed in the design of infiltration systems:

    a. Infiltration device design shall be based on soils characteristics of the first twelve (12) inches below the proposed bottom of the device (not necessarily the first twelve (12) inches below ground surface).

    b. Areas draining to these practices must be stabilized and vegetative filters established prior to runoff entering the system. Infiltration practices shall not be used if a suspended solids filter system does not accompany the practice. If vegetation is the intended filter, there shall be, at least a twenty (20) foot length of vegetative filter prior to stormwater runoff entering the infiltration practice. Forebays or other engineered devices for sediment removal may be prudent.

    c. Each system shall be designed to prevent clogging by fine material and for ease of maintenance.

       The bottom of the infiltration practice shall be at least 0.25 feet above the "zone of seasonal saturation" and infiltration interface.

    d. The infiltration practice shall be designed to completely drain of water within 72 hours.

e. Soils must have adequate permeability to allow water to infiltrate. Infiltration practices are limited to soils having an infiltration rate of at least 0.30 inches per hour. If the infiltration rate is greater than 0.3 but less than 2.0 inches/hour, then an underdrain system must be installed. Initial consideration will be based on a review of the appropriate soil survey, and proposed depths of excavation. The survey may serve as a basis for rejection. On-site soil borings and textural classifications must be accomplished to verify the actual site and seasonal high water table conditions when infiltration is to be utilized.

f. Infiltration practices greater than three (3) feet deep shall be located at least twenty-five (25) feet from basement walls.

g. Infiltration practices designed to handle runoff from areas with a high runoff potential shall be a minimum of one hundred fifty (150) feet from any public or private water supply well.

h. The design of an infiltration practice shall have a properly sized overflow or bypass for larger storm events. Measures to provide a non-erosive velocity of flow along its length and at the outfall shall also be included as necessary. Additional control devices will typically be necessary prior to a release to a watercourse to meet water quality requirements.

i. The slope of the bottom of the infiltration practice shall not exceed five (5) percent. Also, the practice shall not be installed in fill material as piping along the fill/natural ground interface may cause slope failure.

j. An infiltration practice shall not be installed on or atop a slope whose natural or existing angle of incline exceeds twenty (20) percent.

k. If an underdrain system is required, clean outs will be provided at a minimum, every one hundred (100) feet along the infiltration practice to allow for access and maintenance.

2. In cases where such criteria or limitations make the use of infiltration devices inappropriate, but no discharge currently leaves a given site, runoff control must be provided by some other measure. The County Engineer shall be contacted for guidance on the appropriate controls to employ or other mutually accepted best management practices.

3.3.5 WATER QUANTITY VARIANCE AND DESIGN/CONSTRUCTION REFERENCES

The County Engineer may grant a variance from the requirements of the Stormwater Management Ordinance and this Manual for individual construction activities if there are exceptional circumstances applicable to the site such that strict adherence to these provisions will result in unnecessary hardship and not fulfill their intent. A written request from the applicant shall contain descriptions, drawings, and any other information that is necessary to evaluate the proposed variance. A separate written variance request shall be required if there are subsequent additions, extensions, or modifications which would alter a previously approved variance. A project may be eligible for a variance of stormwater management for water quantity if the applicant can demonstrate that:

1. The proposed project will have no significant adverse impact on the receiving natural waterway or upstream, downstream or adjacent properties; or

2. Attenuation of the runoff within the subject basin will alter the release rate such that downstream systems will be adversely impacted by storing the regulated storm event (i.e. it can be shown that the time of concentration of the basins will coincide, leading to an increase of the peak at an already vulnerable point downstream).

The imposition of peak or volume control requirements of stormwater runoff would aggravate downstream flooding. An example of this situation would be when an overall analysis has indicated that imposing restrictions in the upstream watershed of the proposed project would cause the timing of the peak of the routed hydrograph to coincide with the peak flow from another contributing watershed at a certain point downstream.

3.3.6 ACCEPTED WATER QUANTITY CONTROLS

Detention structural controls are used for providing water quantity control and are typically used downstream of other minor structural controls. These structures are designed to provide channel protection, overbank flood protection, and protection against adverse downstream impacts that are related to the increase in peak flow rates and flow volumes from a land disturbing activity development. Structural detention stormwater controls accepted by Berkeley County are shown in Table 3.4.

Table 3.4: Accepted Water Quantity Controls

General Structural Control	Description
Dry Detention/Dry Extended Basins	Dry detention basins and dry extended detention basins are surface storage facilities intended to provide temporary storage of stormwater runoff and releasing it at a designed flow rate to reduce downstream water quantity impacts. These structures are designed to completely drain to a dry condition within 72 hours.
Wet Storm Water Detention Basins • Wet Pond • Wet Extended Detention Pond • Micropool Extended Detention Pond • Multiple Pond System	Wet detention basins are constructed stormwater basins that have a permanent pool or micropool of water. Runoff from each rain event is detained above the permanent pool and released at a designed flow rate to reduce downstream water quantity impacts. Permanent pool depths must be ≥ 4 feet to prevent mosquito breeding.
Multi-purpose Detention Areas	Multi-purpose detention areas are used for one or more specific activities such as parking areas and rooftops. These areas are used to provide temporary storage of runoff. Some of the multi-purpose areas such as infiltration trenches or bio-retention cells may also be used for water quality purposes.
Underground Detention	Underground detention is used as an alternative to surface dry-detention basins. They are used in areas that are space-limited where there is not enough adequate land to provide the required detention volume. Underground storage utilizes tanks, vaults, and buried pipes to supply the required storage volume.
Infiltration Basins	Infiltration basins are used to remove runoff from the flow path into the ground. They are used in areas that currently do not discharge stormwater or create runoff only during large storm events.

3.3.7 STANDARD WATER QUANTITY DESIGN PROCEDURES

This section provides the general procedures for the design of stormwater quantity structures. The following items shall be required for the design of these structures and routing flows through them:

1. Compute the inflow hydrograph for the structure for the 2-year, 10-year, 25-year, 50-year, and 100-year 24-hour storm events for both the existing and proposed conditions. From this, determine peak flow rates for each storm.

2. Compute a stage-storage relationship for the proposed structure. A stage storage-curve defines the relationship between the depth of water and storage volume within the detention facility.

3. Compute stage-discharge relationship of the outlet control structure(s). A stage-discharge curve defines the flow capacity of a structure at a given stage or elevation.

4. Perform routing calculations for the 2-year, 10-year, and in some cases 25-year 24-hour storm events. Calculations may be done by hand, or may be done by using a storage routing computer model.

5. Determine the cumulative volume at the 24-hour point released from the facility.

6. Compare the two volumes and two peak discharges. The volume released from the pond after 24 hours should be at or below that for pre-development conditions. The peak discharge rate from the pond should be at or below the peak discharge rate for the pre-development condition for the 2-year, 10-year and in some cases 25-year storm events. Check to make sure the discharge hydrograph from the 100-year storm event does not overtop the banks of the facility.

7. Evaluate the control structure outlet flow velocity and provide velocity control and channel stabilization if needed. Drawings and details should be provided for outlet structures and basins.

8. Repeat Steps 1-7 for post-development condition until peak, volume, and velocity criteria are met.

9. Provide all calculations in submittal package in a cohesive, organized, and easy to follow format.

Stage-storage and stage-discharge calculations should be included in the engineering calculations. Common methodologies for stage-storage curves include the double end area method and the pyramid frustum method. Other methods will be accepted upon justification.

Hand calculations are available for routing hydrographs through detention structures, however they are time consuming and inefficient when multiple designs are required to be evaluated. For this Manual, it is assumed that the design professional will be using one of the many computer software packages available to perform storage routing calculations. All models/methodologies used must be approved by Berkeley County. A list of accepted models to date includes, but is not necessarily limited to:

- ICPR
- Drain:Edge
- PondPack/Civil Storm
- HEC-HMS
- HYDRAFLOW
- HydroCad
- SWMM

3.4 WATER QUALITY CONTROL STANDARDS

Water quality control is an integral and required component of overall stormwater management systems. New development and redevelopment projects must now include controls that treat or otherwise limit the discharge of pollutants. These requirements have been added due to new State and Federal requirements, but also due to the need to improve and preserve the water resources in Berkeley County. Because this is a requirement of stormwater design, some background information and references are provided in the sections below, followed by the design standards for addressing water quality.

3.4.1 CHARACTERIZATION OF URBAN STORM WATER RUNOFF QUALITY

This section provides some background information on the major sources of pollutants commonly found in stormwater flows and those that impact County waterbodies. In Table 3.5, these sources and the pollutants most commonly associated with them are presented. This is followed by a detailed discussion of the most common pollutants found in stormwater discharges.

Table 3.5: Typical Stormwater Pollutants and Sources

Pollutant Source	Pollutants of Concern
Erosion	Sediments and attached soil nutrients (numerous nitrogen and phosphorus forms), organic matter, and other adsorbed pollutants.
Atmospheric Deposition	Hydrocarbons emitted from automobiles, dust, metals, nutrients, and other chemicals released from industrial and commercial activities.
Roadways/Transportation related areas	Hydrocarbons emitted from automobiles, dust, metals,
Construction Sites	Sediment, metals, paint, and wood preservatives.
Manufactured Products (Industrial land uses)	Heavy metals, phenols, and oils from automobiles, Zinc and Cadmium from tire wear.
Lawn and Landscape Maintenance	Fertilizer and pesticides.
Plants and Animals	Plant debris, animal excrement.
Septic Tanks	Coliform bacteria, nitrogen, NO_3.
Non-Storm Water Connections	Sanitary sewage, industrial wastewater, commercial discharge, and construction activities.
Accidental Spills	Pollutants of concern depend on the nature of the spill.
Animal Waste Management	Coliform bacteria, nitrates, and phosphorus.

Pollutant Source	Pollutants of Concern
Pesticide Applications	Pollutants of concern depend on the pesticide being used and the type of crop or pest being treated.
Land Disturbance Agriculture	Sediment and attached soil nutrients, organic matter, and other adsorbed pollutants.
Fertilizer Applications	Nitrogen and phosphorus.

Source: U.S. Environmental Protection Agency, June 1992.

3.4.1.1 SUSPENDED SOLIDS

The most prevalent form of stormwater pollution is the presence of suspended matter that is either eroded by stormwater or washed off paved surfaces by stormwater. Suspended solids increase the turbidity of the receiving water, thereby reducing the penetration of light, resulting in decreased activity and growth of photosynthetic organisms. The increased turbidity also detracts from the aesthetics of natural waters. In addition, the clogging of fish gills has been attributed to the presence of suspended solids. Combined sewer overflows typically contain high suspended solids concentrations. The solids that settle in the receiving water pose long-term threats resulting from their oxygen demand and gradual accumulation of toxic substances (Moffa, 1990), as well as reducing primary production. Sedimentation and other forms of physical separation are often an effective means of removing suspended solids from stormwater.

Sediment is derived from a variety of sources, including erosion from disturbed areas, washoff of sediment deposited on impervious areas, and detachment of sediment due to the increased stream power that comes from increased flow rates and flow durations with urbanization. A significant number of models are available to predict total suspended solids (TSS) contributions from "clean" sediment, but few of the models have parameters specific to urbanized areas. Most of the models were developed to deal with agricultural soils, and their application to urban areas is limited.

Models that do have capabilities that have been used for predicting urban sediment include SWMM, SWAT, SEDPRO, and IDEAL models. For the models to be effectively utilized in sizing BMPs, predictions must be made of time varying quantities as well as the size distribution. Those distributions must be of the aggregated particles, not just the primary particles.

3.4.1.2 OXYGEN DEMANDING MATTER AND BACTERIA

Sufficient levels of dissolved oxygen (DO) in the water column are necessary to maintain aquatic life, growth, and reproductive activity, as well as to maintain aerobic conditions. The introduction of stormwater containing oxygen-demanding organic matter can impair the receiving water quality by reducing the DO levels such that it is unable to sustain certain forms of aquatic life and can further cause the water to become foul. Bacteria enter the stormwater drainage systems typically from the runoff of animal feces and organic matter from the catchment surface, possibly even disturbed soil. Bacteria also may enter the stormwater system and ultimately natural waters through leaking sewer systems (lateral connections, manholes, and industrial or commercial drains, etc.) and malfunctioning septic systems, all of which are termed illicit discharges and illegal by Berkeley County Stormwater Management Ordinance. Organic matter, usually in the form of vegetation and detritus, is carried through the conveyance system by the stormwater. Pathogenic bacteria and viruses in stormwater discharges pose

human health threats. The removal of pathogenic bacteria is achieved primarily through the process of biological decay and physical-chemical disinfection where practiced. Presence of such bacteria is assumed based on the detection of indicator bacteria such as fecal coliforms or E-coli. The reduction of bacteria in waters of the State has been the focus of TMDL efforts by SCHDEC to date.

3.4.1.3 NUTRIENTS

Nitrogen and phosphorus are plant nutrients that promote the growth of plants such as algae, and are the second leading stressor of impaired rivers and streams and the leading source of pollution in impaired lakes (US EPA, 1997). Such nutrients contribute to the eutrophication of water bodies which can result in decreased oxygen supply, alteration of aquatic life and decreased recreational value (Novotny, 1985).

Nutrients are typically derived from agricultural runoff as well as runoff from chemicals applied to lawns in urbanized areas, runoff from industrial sites, municipal wastewaters (of more concern for combined sewer overflows), or atmospheric deposition onto impervious surfaces that is later washed into stormwater. Model studies indicate that the increase in nutrient loading due to increased imperviousness will be dramatic. For example, the increase in the Maryland Chesapeake Bay watershed due to increased urbanization is expected to range from 2 to 20 times the current load, depending on whether residential development is highly restricted or unrestricted (Houlahan, 1992). Nutrients can be removed from stormwater prior to discharge through biological uptake such as by plantings in stormwater quality control ponds.

Most models of nutrient loadings that have an extensive data base included have been based on agricultural and forest operations. These have applicability to washoff from fertilized lawns and forested areas but not to the impervious areas. Models of nutrient loading in urban runoff are typically based on washoff type calculations or user-defined loadings and concentrations, all of which require user-defined constants and are relatively simplistic. A relatively new model called IDEAL, has additional treatment procedures for nutrient loads and removal using isothermic relationships that define adsorbed to dissolved nutrient ratios.

3.4.2 ACCEPTED WATER QUALITY BMPS

In selecting a BMP(s), it is most important to know what pollutants need to be removed, how to remove them, and what degree of removal is needed to meet water quality goals. There are many other project-specific considerations, however, with the proper planning, installation, and maintenance, BMPs are expected to reduce pollutant loads to receiving waters, reduce erosion, provide health and safety benefits, and be cost effective.

The varieties of water quality BMPs are numerous and are typically considered either structural or non-structural. Berkeley County's current approved list of stormwater quality BMPs, listed in Table 3.7, are based on literature reviews and experience. Some references to BMP selection, effectiveness, and design can be found in SCDHEC (2005), Agricultural Resource Council (2001), Schueler (1987), and Water Environment Foundation (WEF) & American Society of Civil Engineers (ASCE) (1998). Guidance on applying BMPs into Low Impact Development (LID) approaches can be found in Prince George County (1999 a and b).

Table 3.6. Average Pollutant Concentrations for Various Land Uses (mg/l)

	Pollutant Concentration (mg/l)											
Land Use	**BOD**	**COD**	**TSS**	**TDS**	**TP**	**DP**	**TKN**	**NO2/ NO3**	**Pb**	**Cu**	**Zn**	**Cd**
Forest/ Rural Open	3	27	51	415	0.11	0.03	0.94	0.80	0.000	0.000	0.000	0.000
Urban	3	27	51	415	0.11	0.03	0.94	0.80	0.014	0.000	0.040	0.001
Agricultural/ Pasture	3	53	145	415	0.37	0.09	1.92	4.06	0.000	0.000	0.000	0.000
Low Density Residential	38	124	70	144	0.52	0.27	3.32	1.83	0.057	0.026	0.161	0.004
Medium Density Residential	38	124	70	144	0.52	0.27	3.32	1.83	0.180	0.047	0.176	0.004
High Density Residential	14	79	97	189	0.24	0.08	1.17	2.12	0.041	0.033	0.218	0.003
Commercial	21	80	77	294	0.33	0.17	1.74	1.23	0.049	0.037	0.156	0.003
Industrial	24	85	149	202	0.32	0.11	2.08	1.89	0.072	0.058	0.671	0.005
Highways	24	103	141	294	0.43	0.22	1.82	0.83	0.049	0.037	0.156	0.003
Water/ Wetlands	4	6	6	12	0.08	0.04	0.79	0.59	0.011	0.007	0.003	0.001

Adapted from NURP (1983), Horner et. al (1994), and Cave et. Al. (1994)

BOD = Biochemical Oxygen Demand
COD = Chemical Oxygen Demand
TSS = Total Suspended Solids
TDS = Total Dissolved Solids
TP = Total Phosphorus
DP = Dissolved Phosphorus
TKN = Total Kjeldahl Nitrogen
NO_2/NO_3 = Nitrates / Nitrites
Pb = Lead
Cu = Copper
Zn = Zinc
Cd = Cadmium

Fecal coliform (FC) concentrations were not provided in the table above due to the large variability. Guidance from SCHDEC and NURP (1983) should be sought when estimating existing and post-development bacteria loads and the reduction requirements.

Table 3.7: Accepted Water Quality Controls

General Structural Control	Description
Wet Ponds	Wet stormwater ponds are constructed stormwater basins that have a permanent pool or micropool of water. Runoff from each rain event is detained and treated in the pool, and released at a designed rate.
Storm Water Wetlands	Stormwater wetlands are natural or constructed systems used for stormwater management. Stormwater wetlands consist of a combination of shallow marsh areas, open water and semi-wet areas above the permanent water surface.
Bioretention Areas	Bioretention areas are shallow stormwater basins or landscaped areas that utilize engineered soils and vegetation to capture and treat stormwater runoff. Runoff may be returned to the conveyance system or partially exfiltrate into the soil.
Sand Filters	Sand filters are multi-chamber structures designed to treat stormwater runoff through filtration, using a sand bed as its primary filter media. Filtered runoff may be returned to the conveyance system or partially exfiltrated into the soil.
Infiltration Trenches	An infiltration trench is an excavated trench filled with stone aggregate used to capture and allow infiltration of stormwater runoff into the surrounding soils from the bottom and sides of the trench.
Enhanced Grassed Swales	Enhanced swales are vegetated open channels that are explicitly designed and constructed to capture and treat stormwater runoff within dry or wet cells formed by check dams or other structures.
Engineered Devices • Vortex Separator • Baffles • Cartridges • Skimmers • Bioretention • Gravity Oil-Grit Separator • Filter Material • Inlet inserts	Pre-fabricated controls use the movement of stormwater runoff through a specially designed structure to remove target pollutants. They are typically used on smaller commercial sites and urban hotspots. There are numerous commercial vendors of these structures, but there is limited data on the performance of these structures. Until further research is done and substantial removal efficiencies are published, these structures may require monitoring. Some of the popular vendors/products include, but are not limited to, Crystal Stream, Vortechnics, Aquashield, Filterra, Stormceptor, Stormfilter, CDS, BaySaver, and Downstream Defender[1]. This is by no means a complete list and the County Engineer will evaluate any such device if included in designs, provided evidence is submitted as to their effectiveness. Such evidence must include applicability and proof of third-party testing on trapping efficiencies.

[1] This list is not intended as preference for these devices nor to exclude others.

Some structural BMPs have limited applications and are recommended to be used in conjunction with other BMPs. Limited application controls may be used within a system of water quality controls and are very effective pre-treatment structures for the controls listed in Table 3.7. Limited application structural controls should be designed and used only in development situations where regular maintenance is guaranteed. Some popular limited stormwater controls are shown in Table 3.8.

Table 3.8: Limited Structural Controls

Limited Structural Control	Description
Vegetated Filters • Filter Strip • Grassed Channels and Swales	Both filter strips and grassed channels provide filtering of stormwater runoff as it flows across the vegetation. However, by themselves these controls do not consistently obtain adequate sediment and pollutant removal. Both filter strips and vegetated channels shall be used as pretreatment measures or part of a treatment system approach.
Submerged Gravel Wetland Systems	Submerged gravel wetlands use wetland plants in a submerged gravel or crushed rock media to remove stormwater runoff pollutants. These systems should only be used in mid- to high- density environments where other structural controls will be utilized.
Small Sand Filters • Surface Sand Filter • Perimeter Sand Filter	Sand filters are multi-chamber structures designed to treat stormwater runoff through filtration, using a sand bed as its primary filter media. Filtered runoff may be returned to the conveyance system or partially exfiltrated into the soil.
Porous Paver Systems	Porous paver systems consist of open void paver units laid on gravel subgrade to promote stormwater infiltration. Porous pavers provide water quality and quantity benefits.

Regardless of the type of control, maintenance plan and schedules should be included for each BMP proposed.

Listed below are some non-structural BMPs that should be considered for use in larger construction activities and re-development projects.

1. Buffers: an area along a shoreline, wetland, or stream where development is restricted or prohibited. The primary function of the buffer is to physically protect and separate a stream, lake, or wetland from future disturbance or encroachment.

2. Disconnected roof drains/impervious areas: directing stormwater runoff from rooftops towards pervious areas where it is allowed to filter through vegetation and other landscaped material and infiltrate into the soil.

3. Grass/Porous pavements: allows for the reduction of paved areas by implementing areas that are infrequently used, providing water quality benefits through increased infiltration. Should be avoided in high traffic areas

4. Cluster development: concentrate development away from environmentally sensitive areas such as streams, wetlands, mature wooded areas, and steep slopes.

5. Literature for owners, and Homeowners Associations (HOAs) to educate and train themselves on the impact they can have on water quality and the activities necessary to maintain structural controls. These efforts are particularly critical in Low Impact Development (LID) designs.

3.4.3 WATER QUALITY DESIGN STANDARDS

3.4.3.1 GENERAL STANDARDS

The following design criteria are established for water quality control and must be incorporated in one or more BMPs for a given subbasin unless a specific quality variance is granted by the County Engineer. Incorporation of these requirements shall constitute adequate control of the discharge of pollutants.

1. All sites which disturb one-half (1/2) acre or greater shall have permanent BMP installed.

2. Permanent water quality addressed (all projects or LCP that disturb 5 or more acres)

2.1 All permanent water quality ponds having a permanent pool shall be designed to catch the water quality volume (WQV) defined as the first ½" of runoff from the entire area draining to the pond and release it over at least a 24-hour period.

2.2 Permanent water quality ponds, not having a permanent pool, shall be designed to catch the first 1" of runoff from the entire area draining to the pond and release it over at least a 24-hour period.

2.3 For areas not draining to a pond, show how permanent water quality requirements were addressed.

3. Projects disturbing less than five (5) acres but within one-half (1/2) mile of a receiving water body in the Coastal Zone must meet Section III.C.3.XIII.A of the Coastal Zone Management Program Refinements. Designs must show that the first ½ inch of runoff from the entire site or the first one (1) inch of runoff from the built upon area, whichever is greater, can be stored onsite.

4. Waters of the U.S./State are not used for permanent water quality control (alternative means of treatment must be used if an existing pond is to be used for water quantity control).

5. A variance of the WQV requirement may be approved if treatment is instead provided by engineered devices. Applicability of such waivers will be based on submitted information showing that the device(s) has a design pollutant removal efficiency equivalent to a "dry" pond with a WQV of 1-inch. If the project is located within one thousand feet (1000') of shellfish beds, the pollutant removal equivalency must match a WQV of the first one and one-half inches (1 ½") of runoff.

6. BMPs used strictly for water quality that will be capturing one (1) or more acres shall have a pretreatment device as part of the BMP or treatment system, such as a forebay or vault, to remove debris and coarser sediments.

7. All BMPs must have a maintenance plan and schedule for construction site and post construction. Suggested schedules and routine activities are provided in the SCDHEC BMP Manual (2005).

8. Projects that discharge either directly or indirectly into an impaired waterbody as determined by the existence of an adopted TMDL by SCDHEC or through SCDHEC's listing of the waterbody on the most current 303(d) list shall be required to reduce pollutant loads so as to meet applicable water quality standards. More background information is covered in Section 3.8 – Special Protection Areas. This will require the installation and implementation of measures (structural or non-structural BMPs) which are expected to adequately reduce pollutant loads to levels required by the TMDL (currently expressed as % reductions) or to prevent further impairment. A list of approved water quality devices was provided in the previous section.

9. The County Engineer reserves the right to require specific effluent limits for any pollutant from a site if necessary to ensure the water quality standards and other State and federal water quality regulations are met

3.4.3.2 TYPICAL WATER QUALITY DESIGN PROCEDURES

1. Determine an appropriate, accepted BMP(s) needed for the site, considering the land use, pollutants of concern (Table 3.5), soils, maintenance requirements, and location in relation to waters of the State and any impairments that may exist.

2. If the receiving water of the project is impaired or has an adopted TMDL, the applicant must show that water quality standards are being met and designated uses are not impacted. This proof must be quantitative and qualitative for sites which disturb greater than 25 acres (see Section 3.4.3.1.6). The appropriate steps include

    a. Calculate the estimated load for the pollutant(s) of concern. The IDEAL model may be used for all water quality calculations. Another, less preferred option is the Schuler Simple Method (Schueler 1987). This method is based on an extensive database obtained in Washington, D.C. for the National Urban Runoff Program (NURP). The Simple Method estimates pollutant loads from urban development by the following equation:

$$L = 0.227(Q\ P_j\ R_v\ C\ A) \qquad \text{Equation 1}$$

Where:

L = Pollutant load in pounds per desired time interval,
Q = Runoff depth,
½-inch for wet ponds, some wetlands,
1-inch for all other BMPs,
P_j = Fraction of rainfall events over the time intervals that produce runoff
P_j = 1 for a single event
P_j = 0.9 for larger time intervals (months, years),
R_v = Volumetric runoff coefficient expressing the fraction of rainfall converted to runoff (See Equation 2),
C = Event mean pollutant concentration in mg/l (See Table 3.6),
A = Total area of site in acres (areas < 640 acres are recommended for this method).

The most important factor affecting the volumetric runoff coefficient (**R_v**) is the imperviousness of the watershed, **I**, in percent. An empirical relationship was developed that relates **R_v** and I as:

$$R_v = 0.05 + 0.09(I)$$ Equation 2

The rainfall depth, P, was chosen such that a large percentage of storm events will be captured, with larger events only partially captured or bypassed. Greater than 85% of the average annual rainfall amount in Berkeley County occurs from storm events with a

total depth equal to or greater than 1-inch. The 1-inch of runoff from pervious areas is the result of approximately 4.5-inches of total rainfall, but it only takes a rainfall of 1.2 inches on impervious surfaces.

Other loading modules, such as in SEDPRO and SEDCAD for eroded particles or common buildup and washoff equations may be used.

b. Select appropriate BMPs from Tables 3.7 and the BMP Uses tables in Appendix G. The use of an engineered device would require documentation to demonstrate its equivalency in meeting water quality criteria.

c. Compute BMP effectiveness for removing pollutants of concern, showing at a minimum that the concentration of the pollutants of concern from the last BMP meets applicable water quality standards.

3. If the BMP is to capture runoff from 5 or more acres, design a forebay or vault. Guidance on this aspect can be found in SCDHEC (2005) and ARC (2001).

4. Calculate the water quality volume using the following equation.

$$WQV = \frac{Q * DA}{12} \qquad \text{Equation 3}$$

Where:

WQV = water quality volume (acre-feet)
Q = runoff depth inches (one-half inch for permanent pool ("wet") structures, one inch for dry structures, one and one-half inches if project is within 1,000 feet of a shellfish bed)
DA = drainage area to water quality BMP (acres). Runoff from the entire site must be captured in a water quality BMP, unless otherwise allowed by the County Engineer.

5. Compute the inflow hydrograph for the structure for one inch (1") or one-half inch (1/2"), 24-hour storm event, as necessary, for the proposed condition. Note – this is the one inch (1") **runoff** event.

6. Unless already known from the quantity calculations detailed in section 3.3.2, compute stage-storage and stage-discharge relationships of the outlet control structure(s).

7. Perform routing calculations for the one inch (1") or one-half inch (1/2"), 24-hour storm event through the BMP. These may be done by hand, or may be done by using a storage routing computer model.

8. Determine if the entire volume from the one inch (1") or one-half inch (1/2"), 24-hour storm event was released before the 24-hour point. If it does, the outlet is too large. Resize outlet structure.

9. Repeat steps 4-8 until entire volume is not released prior to 24-hours. This procedure is commonly accomplished using a low-flow orifice and the two-year discharge level is not reached.

10. For engineered devices, alternative calculations other than detailed here should be provided. SCDHEC has accepted some such devices as providing adequate treatment as compared to capturing and detaining the one inch (1") storm event.

11. Provide all calculations in the submittal package in a cohesive, organized, and easy to follow format.

3.5 EROSION PREVENTION AND SEDIMENT CONTROL STANDARDS

Berkeley County requires that an erosion prevention and sediment control (EPSC) plan be submitted and approved for construction activities that result in land disturbance of one-half (1/2) acre or more. This plan shall describe the practices and controls that will be used during and after construction to meet the following goals:

1. Minimization of the extent and duration of disturbed soil exposure,

2. Prompt stabilization of disturbed areas,

3. Protection of off-site and downstream locations, drainage systems and natural waterways from the impacts of erosion and sedimentation,

4. Limitation of the exit velocities of the flow leaving the site to non-erosive or pre-development conditions, and

5. Design and implementation of an ongoing inspection and maintenance plan.

3.5.1 ACCEPTED EPSC BMPS

The various types of EPSC BMPs that are acceptable for use in Berkeley County are presented below. These generally fall into three categories: erosion prevention measures, temporary sediment controls, and runoff control and conveyance measures. Runoff from sites should contain controls that fall into at least one of these categories.

3.5.1.1 EROSION PREVENTION MEASURES

Erosion prevention measures shall be used during and after construction site preparation to avert the discharge of runoff highly concentrated with sediment and other associated pollutants. One or more measures are typically needed on a given site. Measures that fall into this category along with their preferred application are provided in Table 3.9. Details on each of these measures are not discussed inthis Manual. Guidance documents that should be referenced as necessary include: SCDHEC (2003), Haan, C. T., Barfield, B. J., and Hayes, J. C. (1995) and Shwab, Glenn O. and Richard K. Frevert (1985). Other practices, such as engineered devices, will be allowed as long as sufficient evidence is presented as to their effectiveness. Standard details can be found at:
http://www.scdhec.gov/environment/ocrm/pubs/tech_docs_water.htm.

Table 3.9 Erosion Prevention BMP Suggested Uses

BMP	Slope Protection	Waterway Protection	Surface Protection	Enclosed Drainage	Large Flat Areas	Borrow Areas	Adjacent Properties
Erosion Prevention Measures	X	X	X	X	X	X	X
Surface Roughening	X		X				
Bench Terracing	X		X				
Temporary Seeding	X		X		X	X	X
Mulching	X				X	X	
Erosion Control Blankets (ECB) and Turf Reinforcement Mats (TRM)	X	X	X			X	
Final Stabilization	X		X		X		X
Topsoiling			X		X		
Permanent Seeding and Planting of Grasses	X		X		X		X
Permanent Ground Cover Plants	X		X				X
Sodding	X		X		X		X
Riprap or Aggregate	X	X	X				
Outlet Protection		X		X			X
Dust Control					X	X	X
Polyacrylamide (PAMs)	X		X	X	X	X	X

3.5.1.2 TEMPORARY SEDIMENT CONTROL MEASURES

Berkeley County emphasizes preventative measures as the main control to protect against erosion, both during and following construction. However, there are typically instances where erosion prevention measures alone do not provide sufficient control. For these situations, temporary sediment controls shall be implemented to control the migration of eroded sediment off site. The sediment control measures are typically only applicable as practices for use during construction. One or more of the measures should be utilized as appropriate during the project's construction phase. Table 3.10 contains a list of some of the suggested controls of this type along with their intended use. Details on these and others measures are again not discussed in detail in the Manual, however, an excellent reference is Haan, Barfield, and Hayes (1995) and SCDHEC's BMP Manual. Other practices, such as engineered devices, will be allowed as long as sufficient evidence is presented as to their effectiveness. Standard details can be found at http://www.scdhec.gov/environment/ocrm/pubs/tech_docs_water.htm

Table 3.10 Temporary Sediment Control BMP Suggested Uses

BMP	Slope Protection	Waterway Protection	Surface Protection	Enclosed Drainage	Large Flat Areas	Borrow Areas	Adjacent Properties
Temporary Sediment Control Structures	X	X	X	X	X	X	X
Storage Volumes and Maintenance Schedules		X		X			X
Temporary Sediment Basin		X	X	X			X
Multipurpose Basin		X	X	X			X
Temporary Sediment Trap		X	X				X
Silt Fence	X	X					X
Rock Ditch Check			X				X
Stabilized Construction Entrance					X		X
Storm Drain Inlet Protection		X		X			X
Vegetated Filter Strips		X					X
Rock Sediment Dike		X	X				X

3.5.1.3 RUNOFF CONTROL AND CONVEYANCE MEASURES

This category of EPSC BMPs should be used as necessary during and following construction. Suggested varieties and their corresponding uses are provided in Table 3.11.

Table 3.11 Runoff Control and Conveyance Measure BMP Suggested Uses

BMP	Slope Protection	Waterway Protection	Surface Protection	Enclosed Drainage	Large Flat Areas	Borrow Areas	Adjacent Properties
Pipe Slope Drains	X		X				
Temporary Stream Crossing		X	X				X
Runoff Conveyance Measures	X					X	X
Construction De-watering		X		X	X	X	
Level Spreader			X		X		X
Subsurface Drains			X		X		

3.5.1.4 TEMPORARY VEGETATION/SEEDING

Description
The purpose of temporary seeding is to reduce erosion and sedimentation by stabilizing disturbed areas that would otherwise lay bare for long periods of time before they are worked or stabilized. Temporary seeding is also used where permanent vegetation growth is not necessary or appropriate.

When and Where to Use
Temporary seeding is used on exposed soil surfaces such as denuded areas, soil stockpiles, dikes, dams, banks of sediment basins, banks of sediment traps and temporary road banks. Temporary seeding prevents and limits costly maintenance operations on sediment control devices. Cleanout requirements for sediment basins, sediment traps and silt fence is reduced if the drainage area is seeded when grading and construction operations are not taking place.

Temporary stabilization is required within fourteen (14) days after construction activity is complete. Cover seeded areas with an appropriate mulch to provide protection from the weather. When the temporary vegetation does not grow quickly or thick enough to prevent erosion, re-seed as soon as possible. Keep seeded areas adequately moist. Irrigate the seeded areas if normal rainfall is not adequate for germination and growth of seedlings. Water seeded areas at controlled rates that are less than the rate at which the soil can absorb water to prevent runoff. Runoff of irrigation water wastes water and can cause erosion.

Plant Selection
Plant seed selection should be based on the type of soil and the season of the year in which the planting is to be done. Tables 3.12 and 3.13 should be used if you plan to use conventional tillage methods (plowing, seedbed preparation, hydroseeding, etc). If you need a fast growing crop to nurse your permanent species, then use the mix rate. Failure to carefully follow agronomic recommendations often results in an inadequate stand of temporary vegetation that provides little or no erosion control.

Tillage
If the area has been recently plowed, no tillage is required other than raking or surface roughening to break any crust that has formed and to leave a textured surface. If the soil is compacted less than 6-inches, it should be disked for optimal germination.

Soil Testing
Information on soil testing is available from the Soil and Water Conservation District Office.

Lime
Lime is not required for temporary seeding unless a soil test shows that the soil pH is below 5.0. It may be desirable to apply lime during the temporary seeding operation to benefit the long-term permanent seeding. Apply a minimum of 1.5 tons of Lime/acre (70 pounds per 1000 square feet) if it is to be used.

Fertilizer
A minimum of 500 pounds per acre of 10-10-10 fertilizer (11.5 pounds per 1000 square feet) or equivalent should be applied during temporary seeding unless a soil test indicates a different requirement. Fertilizer and lime (if used) should be incorporated into the top 4-6 inches of the soil by disking or other means where conditions allow.

Seeding

The surface of the soil should be loosened just before broadcasting the seed. Seed should be applied evenly by the most convenient method available for the type of seed to be used and the location of the temporary seeding. Typical application methods include but are not limited to cyclone seeders, rotary spreaders, drop spreaders, broadcast spreaders, hand spreaders, cultipacker seeder, and hydro-seeders. Cover applied seed by raking or dragging a chain, and then lightly firming the area with a roller or cultipacker.

Mulching

Mulch should be used in seeded areas to retain soil moisture and reduce erosion during establishment of vegetation. The most commonly accepted mulch used in conjunction with temporary seeding is small grain straw. This straw should be dry and free from mold damage and noxious weeds. The straw may need to be anchored with netting or emulsions to prevent it from being blown or washed away. The straw mulch may be applied by hand or machine at the rate of 1.5 - 2 tons per acre (90 pounds per 1000 square feet). Frequent inspections are necessary to check that conditions for growth are good.

Irrigation

Seeded areas should be kept adequately moist. Irrigate the seeded area if normal rainfall is not adequate for the germination and growth of seedlings. Water seeded areas at controlled rates that are less than the rate at which the soil can absorb water to prevent runoff. Runoff of irrigation water wastes water and can cause erosion.

Re-seeding

Areas where the plants do not grow quickly, thick enough, or adequately to prevent erosion should be re-seeded with temporary grasses as soon as such areas are identified.

Table 3.12 Temporary Vegetation Schedule

Species	Rates (lbs/acre)	Optimum Dates to Plant	Remarks
Browntop Millet (Alone)	40	April 20 - August 15	Quick, Dense Cover
Browntop Millet (Mix)*	10	April 20 - August 15	Quick, Dense Cover
Rye Grain (Alone)	56	February - March, August 15 - November 20	Quick Cover
Rye Grain (Mix)*	10	February - March, August 15 - November 20	Quick Cover
Rye Grass (Alone)	50	August 10 - October 10	Competitive, Dense
Rye Grass (Mix)	8	August 10 - October 10	Competitive, Dense

* For details on mixes consult Clemson University Home and Garden Information Center at (888) 656-9988 or at http://hgic.clemson.edu.

Table 3.13 Temporary Vegetation for Steep Slopes/Cut Slopes

Species	Rates (lbs/acre)	Optimum Dates to Plant	Remarks
Weeping Lovegrass (Alone)	4	April - July 20	Quick cover, deep roots, likes dry sites, seldom used alone, clumps
Weeping Lovegrass (Mix)	2	April - July 20	Quick cover, deep roots, likes dry sites, seldom used alone, clumps

* For details on mixes consult Clemson University Home and Garden Information Center at (888) 656-9988

3.5.1.5 PERMANENT VEGETATION/SEEDING

Plant Selection

Plant seed selection should be based on the type of soil, the season of the year in which the planting is to be done, and the needs and desires of the permanent land user. Tables 3.14 and 3.15 should be used to select the desired species to be planted. Failure to carefully follow agronomic recommendations often results in an inadequate stand of permanent vegetation that provides little or no erosion control. The rates in Tables 3.14 and 3.15 are based on purity and germination standards required for certification.

The following notes apply to Tables 3.14 and 3.15.

1. In mixtures with temporary cover, the full seeding rate of permanent cover shall be used.

2. Mix means 2 or more long term species plus short term species. For dates other than optimum, call the Soil and Water Conservation District, (843) 719-4146.

3. A legume, such as a clover, crown vetch, and serecia should be used where it is possible.

4. The appropriate inoculants should be used.

Topsoil

If the surface soil of the seedbed is not adequate for plant growth, topsoil should be applied.

Tillage

If the area has been recently plowed, no tillage is required other than raking or surface roughening to break any crust that has formed and to leave a textured surface. If the soil is compacted less than 6-inches, it should be disked for optimal germination. If the soil is compacted more than 6-inches, it should be sub-soiled and disked.

Soil Testing

Information on soil testing is available from the Soil and Water Conservation District Office.

Lime

Unless a specific soil test indicates otherwise, apply 1½ tons of ground course textured agricultural limestone per acre (70 pounds per 1000 square feet).

Fertilizer

A minimum of 1000 pounds per acre of a complete 10-10-10 fertilizer (23 pounds per 1000 square feet) or equivalent should be applied during permanent seeding of grasses unless a soil test indicates a different requirement. Fertilizer and lime (if used) should be incorporated into the top 4-6 inches of the soil by disking or other means where conditions allow. Do not mix the lime and the fertilizer prior to the field application.

Seeding

The surface of the soil should be loosened just before broadcasting the seed. Seed should be evenly applied by the most convenient method available for the type of seed to be applied and the location of the temporary seeding. Typical application methods include but are not limited to cyclone seeders, rotary spreaders, drop spreaders, broadcast spreaders, hand spreaders, cultipacker seeder, and hydro-seeders. Cover applied seed by raking or dragging a chain or brush mat, and then lightly firming the area with a roller or cultipacker. Do not roll seed that is applied with a hydro-seeder and hydro-mulch.

Mulching

All permanent seeded areas should be covered with mulch immediately upon completion of the seeding application to retain soil moisture and reduce erosion during establishment of vegetation. The mulch should be applied evenly in such a manner that it provides a minimum of 75% coverage. Typical mulch applications include straw, wood chips, bark, wood fiber, and hydro-mulches. The most commonly accepted mulch used in conjunction with permanent seeding is small grain straw. This straw should be dry and free from mold damage and noxious weeds. The straw may need to be anchored with netting or asphalt emulsions to prevent it from being blown or washed away. The straw mulch may be applied by hand or machine at the rate of 2 tons per acre (90 pounds per 1000 square feet). Frequent inspections are necessary to check that conditions for growth are good.

Irrigation

Permanent seeded areas should be kept adequately moist, especially late in the specific growing season. Irrigate the seeded area if normal rainfall is not adequate for the germination and growth of seedlings. Water seeded areas at controlled rates that are less than the rate at which the soil can absorb water to prevent runoff. Runoff of irrigation water wastes water and can cause erosion.

Re-seeding

Inspect permanently seeded areas for failure, make necessary repairs and re-seed or overseed within the same growing season if possible. If the grass cover is sparse or patchy, re-evaluate the choice of grass and quantities of lime and fertilizer applied. If the permanent seeding has less than 40% cover, have the soil tested to determine any acidity or nutrient deficiency problems.

Final stabilization by permanent seeding of the site requires that it be covered by a 70% coverage rate.

Post-Stabilization

Once areas are stabilized they can be converted to native species or for establishing on non-critical, level sites. Table 3.16 lists some native species of Berkeley County that can be used.

Table 3.14 Permanent Vegetation Schedule

Species	Rates (lbs/acre)	Optimum Dates to Plant	Remarks
Bahia Grass (Alone)	40	March 20 - June 15	Slow to become established
Bahia Grass (Mix)*	30	March 20 - June 15	Slow to become established
Bermuda Grass (Hulled) (Alone)	8-12	April - July 15	Quick cover, Sod forming, partial winter kill
Bermuda Grass (Hulled) (Mix)*	4-6	April - July 15	Quick cover, Sod forming, partial winter kill
Fescue, Tall (KY31) Alone	40	August 15 - October	Seldom seeded alone, not for dry or wet sites
Fescue, Tall (KY31) Mix*	20	August 15 - October	Seldom seeded alone, not for dry or wet sites
Sericea Lespedeza (Scarified) Alone or Mix*, (Inoculate with EL Inoculant)	40	April - June	Good for slopes, cuts, and fills that require low maintenance
Ladino Clover (Mix* only), (Inoculate with AB Inoculant)	2	August 20 - October	Naturally adds nitrogen

* For details on mixes consult Clemson University Home and Garden Information Center at (888) 656-9988 or at http://hgic.clemson.edu.

Table 3.15 Permanent Vegetation Schedule for Steep Slopes/Cut Slopes

Species	Rates (lbs/acre)	Optimum Dates to Plant	Remarks
Weeping Lovegrass (Alone)	4	April – July 20	Quick cover, deep roots, likes dry sites, seldom used alone, clumps
Weeping Lovegrass (Mix)*	2	April – July 20	Quick cover, deep roots, likes dry sites, seldom used alone, clumps
Crownvetch (Mix*) (Inoculate with Type M Inoculant)	8-10	March - April	2 years to establish, no mowing, green all year, 20” maximum height

* For details on mixes consult Clemson University Home and Garden Information Center at (888) 656-9988 or at http://hgic.clemson.edu.

3.5.2 EPSC DESIGN STANDARDS

3.5.2.1 GENERAL STANDARDS

1. BMPs should be properly placed (silt fence, inlet protection, construction entrance, rip-rap at outfalls, check dams etc.).

2. EPSC plans shall be developed to achieve an eighty (80) percent design sediment removal efficiency goal, if more than 10 disturbed acres drain to a common point (stream, lake, etc.). Simply applied, when a site is completely denuded of vegetation, the structural and nonstructural EPSC measures shall be designed to trap 80 percent of the total suspended solids (TSS) that are generated by the site. The design storm event associated with this level of control is the 10-year, 24-hour SCS Type III storm event. Calculations using models, such as SEDPRO or SEDCAD, or SCDHEC design aids shall be provided to show adherence to this criteria.

3. SCS procedures should be used to determine runoff amounts. It is important to note that when a BMP is designed for the 10-year, 24-hour storm event, the BMP will have a greater trapping efficiency for more frequent events such as the 2-year 24-hour storm event.

4. Sediment basins must be provided for storage for the 10-year, 24-hour storm event for disturbed conditions or 3600 ft^3/ acre draining to the basin, if more than 10 disturbed acres drain to a common point (stream, lake, property line, etc.).

5. Activities that disturb between one (1) and ten (10) acres of land area that do not drain to a single outlet point may incorporate practices other than a sediment basin to achieve an equivalent removal efficiency.

6. Sediment traps only used for drainage areas of less than 5 acres.

7. Sediment trap storage calculations, showing that 1800 ft^3/ total acre draining to each trap is provided below the spillway.

8. If trapping efficiency calculations are required for sediment traps, then provide peak outflow, (q_{po}), calculations; the 10-year, 24-hour storm event for construction conditions cannot overtop the trap's spillway.

9. Sediment basins and traps designed for total area draining to them.

10. Drainage area map outlining the area draining to each sediment basin/ trap.

11. Copies of figures used to determine V_{15} (SV-1) and trapping efficiency (ST-1, SB-1, SB-2), if Design Aids from SCDHEC BMP Manual (2005) are used to determine trapping efficiencies.

12. Silt fencing shall be placed at the toe of all fill slopes and soil berms and below disturbed areas where the size of the area is no more than ¼-acre per one hundred (100) feet of silt fence length. The maximum slope length behind the fence is 100 feet and the maximum gradient behind the fence is 2H:1V.

13. The following nonstructural site management practices shall be utilized on the plans where applicable:

    a. Minimize site disturbance to preserve and maintain existing vegetative cover,

    b. Limit the number of temporary access points to the site for land disturbing activities,

    c. Protect off-site and downstream locations, drainage systems and natural waterways from the impacts of erosion and sedimentation,

    d. Phase and sequence construction activities to minimize the extent and duration of disturbed soil exposure, and

    e. Implement an ongoing inspection and maintenance plan. Suggested maintenance schedules are given in SCDHEC (2005).

14. Sediment storage volumes shall be calculated for all sediment controls to determine the required clean-out frequencies and maintenance schedules. The Universal Soil Loss Equation (USLE) and subsequent modifications or other acceptable methods that determine sediment yield may be used to predict the required sediment storage volumes for specific sediment control structures.

15. To encourage the development and testing of innovative alternative EPSC BMPs, alternative management practices that are not included in the Manual may be allowed upon review and approval by the County Engineer. To use an alternative BMP, the design professional shall submit substantial evidence that the proposed measure will perform at least equivalent to currently approved BMPs contained in the Manual. Evidence may include, but is not limited to:

    a. Supporting hydraulic and trapping efficiency calculations.

    b. Peer review by a panel of registered professional engineers.

    c. Research results as reported in professional journals.

    d. Manufacturer's literature.

16. Detailed EPSC plans shall comply to the maximum extent practicable with the following specific standards and review criteria:

    a. Sediment tracking control shall be implemented using stabilized construction entrances that are to be located and utilized at all points of ingress/egress on a construction site. The contractor must take necessary action to minimize the tracking of mud onto the paved roadway construction areas. The contractor shall daily remove mud/soil from pavement, as may be required.

    b. Crossings of waterways during construction should be minimized and must be approved by the County Engineer and possibly the U. S. Army Corps of Engineers (USACOE). Encroachment into stream buffers, riparian areas and wetlands should be avoided when possible.

    c. Topsoil shall be stockpiled and preserved from erosion or dispersal both during and after site grading operations when applicable.

d. Stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than fourteen days (14) after work has ceased, unless activity in that portion of the site will resume within twenty-one (21) days. Hydroseeding as often as possible is encouraged. Stabilization of disturbed areas is one of the best approaches for erosion prevention and sediment control.

e. All slopes must be stabilized though grassing, hydroseeding, synthetic or vegetative matting, diversion berms, temporary slope drains, etc. and must be performed within two (2) working days after the necessary grading (temporary or permanent) has been achieved.

f. A site is considered stabilized once the entire disturbed area has a vegetative cover with a density of 70%. Seeding should be accompanied or replaced with erosion control mats as necessary to achieve this density. Final or permanent stabilization is considered achieved once the entire disturbed area has a permanent vegetative cover with a density of 70%. Final stabilization shall be implemented within fourteen (14) days of completion of all construction activities. After final stabilization is achieved, all control measures shall be removed from the site

g. Temporary structural controls installed during construction shall be designed to accomplish maximum stabilization and control of erosion and sedimentation, and shall be installed, maintained, and removed according to the specifications set forth in the Manual and project specifics developed as part of the stormwater management plan. All temporary structural controls shall be designed to control the peak runoff resulting from the ten (10) year storm event.

h. All permanent structural controls, including drainage facilities such as channels, storm sewer inlets, and detention basins, shall be cleaned out as part of the project closeout process.

i. Linear projects (utility lines, road construction) over, under, or along a water body shall include measures and controls which adequately protect the water body from undue impact. Such work should be coordinated with the installation of erosion prevention and sediment control measures so that disruption is minimized. Every effort should be made to install utilities during the initial construction phases. Trench sharing is encouraged to the extent practicable.

17. The grading plan should include the following general measures at a minimum:

a. The finished cut and fill slopes to be vegetated should not be steeper than 3H:1V. The finished grades of cut and fill slopes to be vegetated with vines and/or groundcovers should not be steeper than 1H:1V.

b. Cuts or fills should not be so close to property lines as to endanger adjoining property without adequately protecting such properties against erosion, sedimentation, slippage, settlement, subsidence, or other damages.

c. Subsurface drainage should be provided in areas having a high water table to intercept seepage that would affect slope stability, bearing strength or create undesirable wetness.

d. No fill shall be placed where it can slide or wash onto another property.

e. Fill shall not be placed adjacent to channel banks where it can create bank failure, reduce the capacity of the stream, or result in downstream sediment deposition.

f. All borrow and disposal areas should be included as part of the grading plan.

g. Adequate channels and floodways should be provided to safely convey increased runoff from the developed area to an adequate outlet without causing significant channel degradation, or increased off-site flooding.

h. The site should be graded to direct flows to appropriate controls.

18. EPSC plan shall have the following information contained in a cohesive, organized, and easy to follow format:

a. Location of all erosion and sediment control structures on construction documents;

b. Delineation of all sensitive features (wetlands, streams, ponds, existing stormwater structures, etc.) and potential sediment sources;

c. Installation sequencing and maintenance plan and schedules for all EPSC BMPs during and after construction;

d. Provisions to preserve topsoil and limit the amount of total disturbed area;

e. Details of site grading;

f. Design details and calculations for all EPSC structures;

g. Protection of all storm drain inlets and outlets;

h. Explanation of any computer models or software used with highlights of and/or notes on the output data;

i. Locate temporary and permanent soil disposal areas, haul roads, and construction staging areas to minimize erosion, sediment transport, and disturbance to existing vegetation;

j. All necessary certifications by the person responsible for the activity. This includes the stormwater management plan, CAA and Covenants. Proper preparation of the EPSC Plan if necessary, by a registered engineer.

3.5.2.2 TYPICAL EPSC DESIGN PROCEDURES

The design procedures will vary depending on the EPSC BMP. Many of the BMPs listed in Tables 3.9 – 3.16 do not need to be "designed" using calculations, such as surface roughening or dust control. Others require the use of equations or design aids to properly design. SCDHEC has two handbooks, the BMP Handbook (SCDHEC 2005) and the Stormwater Management and Sediment Control Handbook (SCDHEC 2003) that provide the procedures and equations needed to design some of the EPSC BMPs listed in Tables 3.9 – 3.15. Example problems are given for most types. As with the design of any BMP, engineering judgment will be needed on most applications. Proper design must be complemented with proper installation and routine maintenance in order for BMPs to be effective and to adhere to the provisions of this section.

3.6 STORMWATER DRAINAGE SYSTEM DESIGN STANDARDS

This section provides the design requirements for various storm sewer drainage/collection system components including: design storms, velocities; and, pipe and inlet sizes. Storm drainage systems shall include all storm drainage structures and pipes that convey runoff. These systems are commonly referred to as lateral closed systems.

1. Storm drain pipes:

    a. Storm drainage lines shall be staked at each box or at intervals that would be sufficient to check alignment and grade of the construction with the approved plans. The use of lasers to augment control is encouraged.

        - The minimum size storm drainage pipe allowable shall be fifteen (15) inches in diameter. The minimum size pipe allowed under a public roadway, within the public right-of-way, and/or downstream of public right-of-ways shall be 18". Only concrete pipes are allowed in the County right-of-ways.

    b. The minimum allowable slope for storm drainage pipe shall be one-half of one (1) percent [0.005 ft/ft] or a minimum flow velocity of three (3) feet per second at all flow levels. Maximum allowable slope for storm drainage pipe is twenty (20) percent.

    c. Drainage system installation must be such that stormwater discharge is not concentrated on adjacent property owners and that the velocity is less than erosive limits for the site soils. At pipe outfalls, this normally requires the use of a rip-rap apron, placed on filter fabric and lightly grouted, for a minimum distance equal to or greater than six (6) pipe diameters.

    d. Type and class of storm drainage pipe, as well as the construction of pipe culverts, shall be in accordance with Sections 714 of the SCDOT specifications. The proposed use of any type of storm drainage pipes other than reinforced concrete pipe (RCP) shall be considered on a case by case basis.

    e. A minimum of one (1) foot of cover shall be provided for all RCP storm drainage pipes under unpaved roads or any other situation in which no roadway or other structure is to cover the pipe. For pipe under any paved surface, the minimum cover is twelve (12) inches. Contact the County Engineer for minimum depths in other situations (e.g. other pipe types).

f. Storm drainage pipe shall be placed to minimize length running under pavement. Where it is necessary for a pipe to cross the roadway, it preferably shall be placed at a ninety (90) degree angle, and in no case at less than forty-five (45) degrees. All cross lines in the roadway shall be compacted in twelve (12) inches lifts to ninety-five (95) percent Standard Proctor maximum density and to one hundred (100) percent Standard on the last twelve (12) inches.

g. Any "open" storm drainage cross line pipe shall extend out to the toe of the roadway embankment; in no case will the end of the pipe be within the five foot roadway shoulder.

h. Storm drainage pipe discharging into a drainage channel shall intersect the channel in a manner such that the interior angles measured from their centerlines of flow, is greater than, or at most equal to ninety (90) degrees. Rip-rap, or other suitable protection, is required from the outlet point to the bottom of the channel and on the opposite channel bank to prevent scour and erosion.

i. Storm drainage pipe discharging into a wet pond or lake shall have the discharge invert above the permanent pool elevation and rip-rap or other energy dissipation structures shall be placed from the outlet point to pool level. Submerged systems should be avoided.

j. If submerged systems cannot be avoided, o-ring jointed pipe is required.

k. A maintenance access point shall be available within every 200 feet for 15-18" diameter pipe, every 400 feet for 24" pipe and every 500 feet for larger storm drainage lines.

l. The 100-year, 24-hour storm event shall be used to check all drainage designs in Special Protection Areas for flood hazards at adjacent structures and/or property.

m. Hydraulic grade line and head loss calculations for determining water surface elevations shall be performed for all systems connections.

n. Calculations should be performed for the appropriate design storm event (see General requirements section above).

o. For storm drainage systems with less than five (5) connections, Manning's Equation shall be acceptable for sizing the capacity of drain pipes for non-submerged conditions where the free water surface elevation is below the crown of the pipes. The Saint-Venant equations (full dynamic wave), which are used in many common engineering programs, shall be employed in larger design situations.

p. Storm drain profile plots should be included in the set of construction plans.

q. Storm drainage systems shall be designed to convey stormwater runoff by gravity flow unless otherwise approved.

r. For very flat flow lines, flow velocities shall increase progressively throughout the system. Upper reaches of the pipe system may have flatter slopes than the lower end of the system.

2. Ditches and Swales:

   Open ditch drainage may be used, provided that such ditches are "V" or trapezoidal ditches with side slopes not exceeding the following requirements based upon maximum depth:

   a. Depths up to and including five (5) feet – Side slope ratio of 1.5:1 (1.5 horizontal to 1 vertical).

   b. Depths greater than five (5) feet but no more than seven (7) feet – Side slope ratio of 3:1 (3 horizontal to 1 vertical).

   c. At the option of the developer any open ditch may be piped in lieu of these requirements. As a minimum the drainage system must be piped from the right of way to the rear property line on residential lots.

   d. No drainage ditch shall exceed a maximum depth of seven (7) feet.

   e. Swales shall have side slopes of 4:1 (4 horizontal to 1 vertical) or flatter.

3. Culverts:

   a. Proper consideration of inlet and outlet control shall be given in the design of culverts and outlets.

   b. The pipe, appurtenant entrance and outlet structure should properly account for water, bed-load, and floating debris at all stages of flow.

   c. There should be no unnecessary or excessive cause of property damage.

   d. The outlet should be designed to resist undermining and washout.

   e. Culvert design shall include all cross drainage facilities that transport stormwater runoff under roadways. Culvert selection techniques can range from solving empirical formulas, to using nomographs and charts, to comprehensive mathematical analysis for specific hydraulic conditions. The models used for these calculations are listed below. Other widely accepted models may be used, but must be approved by the County Engineer. Designs shall be based upon SCDOT requirements where applicable.

   f. Culverts under roadways shall be designed using the twenty five (25) year storm event as a minimum, but critical roadways shall be designed using a higher storm event. Ponding on the upstream end of the culvert is acceptable as long as the roadway is not overtopped during the precipitation event. Ponding or backwater effects shall not impact any new or existing structures and recede after the storm event in a time period acceptable to the County Engineer.

   g. Additional hydraulic capacity shall be required as necessary to prevent backwater effects that may adversely impact upstream property or structures.

   h. Acceptable models for designing culverts include, but are not limited to:

   - ICPR
   - HY8
   - Pond Pack

- HEC-RAS
- Flow Master
- HydroCad

All natural primary and/or major drainage channels which are located within, or along the property line of an improvement, development or subdivision shall be protected by the developer as follows:

a. The existing channel lying within or along the property line of a subdivision or parcel of land proposed for development or redevelopment shall be straightened, widened, and improved to the extent required to prevent overflow, resulting from a fifty (50) year frequency rainfall.

b. Site improvement shall provide for the grading of all building pads to an elevation where all building pads will not be subject to overflow from the one hundred (100) year frequency flood and in a manner that will provide for a rapid runoff of stormwater.

c. Whenever channel improvements are carried out, sodding, backsloping, cribbing, and other bank protection practices shall be designed and constructed to control erosion from the anticipated conditions and flow resulting from a fifty (50) year frequency rainfall.

d. An existing natural drainage channel shall not be located in a street easement unless it is placed in an enclosed storm sewer except under the following conditions:

    1. Where a paved street surface at least two (2) lanes wide is provided on both sides of a paved or stabilized bank channel so as to provide access to abutting properties.
    2. When a condition exists as outlined above, adequate space shall be dedicated as right-of-way to provide for maintenance of the paved drainage channel.

e. Culverts, bridges, and other drainage structures shall be constructed in accordance with the specifications and design criteria of Berkeley County when the County shall have present or future maintenance responsibility.

f. No open natural storm drainage course shall be permitted within seventy-five (75) feet of the rear or side of a building to the top of the edge of the drainage facility or vice versa, or 35' from impervious parking areas unless exceptional site planning opportunity is afforded and the improvement will not be jeopardized by flooding or erosion.

All secondary drainage channels which are within, or immediately adjacent to an improvement or subdivision shall be protected and improved by the developer as follows:

a. Secondary drainage channels which have a primary function of collecting surface water from adjacent properties or intercepting and diverting side hill drainage shall be sodded, bank stablized or piped.

b. Developments-

    1. In single-family residential, duplex or apartment-townhouse-condominium development, site grading shall be carried out in such a manner that surface water from each dwelling lot will flow directly to a storm sewer, sodded swale, or paved street with storm drainage without crossing more than (4) adjacent lots in overland flow and with no adverse effects to adjacent property.

2. In commercial, industrial and institutional development, roofs, paved area, yards, courts and courtyards shall be drained into a storm drainage facility.

c. Surface water collected on roadways shall be diverted to a drainage facility at satisfactory intervals to prevent overtopping the centerline of the road during a ten-year frequency rain for minor residential roadways and during the twenty-five year frequency for collector roadways. Design frequency may vary with the classification of street, highway, or land use in the area. Drainage areas allowed for surface flow on streets at the point of diversion shall not exceed twenty (20) acres, regardless of flow.

4. Headwalls and Outlets:

All exposed ends of pipes shall be protected by a flared end section (limited to pipes 36" or less in diameter) or one of the following type headwalls:

a. A concrete or brick plastered with grout, headwall is preferred; it is required on culverts located in major defined drainage channels. An acceptable design detail is provided at http://www.scdhec.gov/environment/ocrm/pubs/tech_docs_water.htm

b. A rip-rap headwall is acceptable for pipes 24" or less in a number of situations; if used, it should conform to the standard details provided at: http://www.scdhec.gov/environment/ocrm/pubs/tech_docs_water.htm. Note that this technique requires the use of both filter fabric and grout.

c. Storm drainage or pond outfalls must be carried to an existing drainage outfall such as a pipe, ditch, etc.

d. No new point discharge onto adjacent property, where there was not an existing point discharge, is allowed without the property owner's written permission. Discharge points created with new development shall connect to an existing drainage system, whether natural or man-made. The new outlet may not cause flooding or in any way degrade the existing drainage system and proof of such shall be provided. In some cases, conveyance must be constructed from the new development to a point of discharge into the existing system and shall be done at the owner's expense. In these cases, the owner is responsible for obtaining all necessary easements and agreements to construct such drainage improvements.

e. Outlets will not be allowed to discharge on fill slopes.

5. Energy Dissipation:

a. All outlets should be sufficiently stabilized. Calculations shall be provided justifying the design and material used (e.g. riprap aprons geometry and diameter).

b. If riprap aprons are used, filter fabric is to be installed beneath all riprap.

c. Level spreaders, plunge pools, etc. shall be properly designed and installed at the proposed outlet(s).

6. Storm drainage structures
(Catch basins, yard inlets, manholes, and junction boxes, control structures, etc.):

a. Materials and construction shall be as specified in Section 719 of the SCDOT (2007) specifications.

b. When the depth of a storm drainage structure exceeds four and one-half (4-1/2) feet, rungs/steps shall be provided for ascent and descent. (Steps are to be ASTM-C-478, or equivalent.)

c. The inside dimension of all the storm drainage structures shall be a minimum of three (3) feet by three (3) feet. Sides shall be plastered with grout.

d. All pipes entering or leaving shall not protrude more than four (4) inches into the box.

e. All roadway catch basins shall be SCDOT Type 9, Type 16, Type 17 or Type 18 Catch Basins based on the application.

f. Maximum roadway catch basin inlet capacity for an inlet shall be determined based on the following:

For inlets at sag, capacity shall be based on weir flow (unsubmerged). The depth flow shall be limited to the curb depth, but may be further limited by the allowed spread, detailed below. In sag conditions, a 15% factor of safety shall be used to account for debris/clogging. Ponding at the sag location shall be limited to 24 hours after the storm event.

For inlet on grade, theoretical capacity shall be considered in the design the longitudinal and cross slopes, and gutter depression. The length of the gutter opening must be such that the gutter efficiency is 80% of the theoretical capacity. Several equations and nomographs are available in the literature for determining the theoretical capacity. Maximum flow depth shall be limited to the depth of curb.

g. Catch basins and yard inlets shall be designed to accommodate a given flow such that ponded water is removed within 24 hours and does not cause flooding to adjacent buildings or other structures.

h. Storm drainage structures will be located outside curve radii.

i. Storm drainage structures shall contain a minimum drop of 0.2 feet from invert in to invert out.

j. Floors of Storm drainage structures shall be of concrete and contain "formed troughs" to help channel flow.

k. Storm drainage structures, the elevation at the crown of any inlet pipe shall be equal to or greater than the crown of the outlet pipe.

l. Area around all catch basins shall be backfilled in six (6) inch to eight (8) inch lifts, compacted to ninety-five (95) percent Standard Proctor maximum density.

m. Inlet protection shall be provided at all inlets into the stormwater system during construction and until project closure procedures have been completed or notification from the County Engineer has been given stating that an acceptable level of stabilization has been achieved. Guidance on design, installation and maintenance of inlet protection can be found in SCDOT (2007).

n. Roadway inlet spacing shall be based partly on the maximum spread of water into the roadway. For the appropriate design storm, at least one full travel lane width must be available during the rain event for all roads. Inlets up-gradient of a road intersection, sag inlets, or the last inlet for a given system must be designed with sufficient capacity to handle the entire flow, such that there is no flow through/bypass.

o. Maximum depth in which the water may pond above or around an inlet must not threaten surrounding permanent structures or facilities including vehicular or pedestrian traffic.

p. Inlets placed in collector roadway gutter lines must be spaced to prevent flow from entering road intersections and to not exceed a maximum spread of 6-feet, or one-half of a travel lane, whichever is greater, and based on maximum inlet capacity.

q. In depth design procedures for inlet and storm sewer design may be referenced in AASHTO (1999), USDT (2001b), Mays, L., (2001), and Yen (2001). Culvert design guidance is found in USDT (2001a).

r. All manhole lids and catch basins shall contain the Berkeley County water quality logo or an alternate design approved by the County Engineer. Contact the County Engineer for information on how to obtain logos.

3.7 OPEN CHANNEL HYDRAULICS

Open channels shall include all permanent storm drainage channels including swales, culverts, and diversions. These storm drainage systems shall be designed based upon the following criteria:

1. All open channels shall be uniform and shall be stabilized to prevent erosion in a manner approved by the County Engineer. A number of acceptable techniques are shown in the current version of the SCDHEC (2005).

2. The design of open channels shall be based on Manning's Formula where backwater effects from obstructions and/or tailwater is not present. Flow velocities for the 10-year storm event must be less than five (5) ft/sec (two and one-half (2.5) ft/sec in bare sandy soils) or the channel surfaces must be adequately lined, e.g., rip-rap, concrete.

3. The minimum channel grade shall be 0.005 ft/ft, unless supporting calculations show that there will be no pools or standing water areas formed in the channels at smaller slopes.

4. Design conditions can be assumed to be steady, uniform flow.

5. Except for roadside ditches, the side slopes of grassed lined channels without Erosion Control Blankets or Turf Reinforcement Matting shall be no steeper than 3H to 1V.

6. Channels may be designed with multiple stage levels with a low flow section to carry the 2-year storm event and a high flow section to carry storms of larger frequencies.

7. Berkeley County allows vegetated channels. Guidance on the design of these type channels can be found in Haan et. al. (1995) or by using computer software that is capable of calculating channel stability and capacity.

8. Additional hydraulic capacity shall be required as necessary to prevent backwater effects that may adversely impact upstream property or structures.

9. Acceptable models for designing open channels include, but are not limited to:

    - ICPR
    - HY8
    - Pond Pack
    - HEC-RAS
    - Flow Master
    - HydroCAD

Table 3.16 Maximum Permissible Velocities for Vegetated Channels

Cover	Permissible Velocity (ft./sec.)*					
	Erosion Resistant Soils % Slope			Easily Eroded Soils % Slope		
	0-5	5-10	> 10	0-5	5-10	> 10
Bermuda Grass	8	7	6	6	5	4
Bahia Buffalo Grass Blue Gamma Centipede Grass Tall Fescue Kentucky Bluegrass Red Canary Grass	7	6	5	5	4	3
Grass-legume Mixture	5	4	NR	4	3	NR
Lespedeza Sericea Weeping Lovegrass Kudzu Alfalfa Small Grains Temporary Vegetation	3.5	NR	NR	2.5	NR	NR

*Allow velocities over 5 ft/sec only where good cover and maintenance will be provided. If poor vegetation exists due to shade, climate, soils or other factors, the permissible velocity shall be reduced by 50 percent.
NR = Not Recommended
Sources: Elementary Soil and Water Engineering, Shwab et. al. and Hann et. al. (1995)

General guidance on open channel design can be found in USDT (1996, 2001).

3.8 SPECIAL PROTECTION AREAS

In an effort to address some of the most critical water resource problems that exist in the County, Special Protection Areas have been established. Those wishing to develop or redevelop lands within these protected areas will be required to comply with the minimum standards listed in the preceding sections as well as a more stringent set of design criteria detailed below. These generally focus on either a water quantity (reduce or prevent frequent and/or extreme flooding) or a water quality problem (prevent or reduce degradation of riverine, estuarine, coastal ecosystems or maintain a designated use(s). At such times that maps are made available to the public, the County Engineer will inform applicants on whether or not a proposed project is required to comply with additional design criteria listed in the following sections. The maps are not included in the manual due to expected changes in the designated areas, particularly those associated with TMDLs.

3.8.1 WATER QUANTITY ISSUES

Flooding problem areas exist in many locations around the County to the point that stormwater controls have become overwhelmed, or where controls were never adequately designed or installed to control runoff. The ability to maintain a system is also suspected to be contributing to some of the frequent flooding. In an effort to relieve existing flooding problems, the following list of design criteria will be required in designated areas. The requirement in conjunction with the enforcement of other design criteria listed in the sections above, are required to provide the necessary controls.

1. The post-development, peak discharge rates are restricted to half (½) the pre-development rates for the 2 and 10-year storm event or to the downstream system capacity, whichever is less.

2. The post-development runoff volumes for the 2-year frequency 24-hour duration storm events above the pre-development level shall be stored for a period of 24-hours on average before release.

Additional criteria may be established on a case by case basis.

3.8.2 WATER QUALITY ISSUES

In conjunction with the NPDES permitting program, SCDHEC, through delegated responsibility from EPA, must identify and mitigate impaired waterbodies. Impaired waterbodies are identified through a monitoring program, the results of which are compared against water quality standards developed to protect designated uses of individual waterbodies. Impaired waterbodies are those that do not meet these standards and cannot be used for their designated purposes, such as fishing, swimming, recreation, and/or support of aquatic life. In accordance with Section 303 of the Clean Water Act, states must release a bi-annual report of the impaired waterbodies. Waters listed on the 303(d) list will eventually have a TMDL developed, which represents the daily amount of a particular pollutant that a waterbody can receive and still meet the water quality standard for its designated use(s). A list of the 303(d) waterbodies can be found at http://www.scdhec.gov/environment/water/tmdl/index.htm.

1. List the nearest SCDHEC Water Quality Monitoring Station (WQMS) that the site's stormwater discharges drain to and the waterbody on which it is located.

2. If nearest WQMS is listed on the most current 303(d) List of Impaired Waters and if site's stormwater construction discharges contain the pollutant of impairment and if the site disturbance 25 or more acres, qualitative and quantitative assessment (described in Section 3.4C of SCR100000) shall be provided and include at a minimum, calculations that show:

- a sites pollutant load for all pollutants of concern (see Table 3.5),
- the trapping effectiveness of the chosen BMPs, and
- that the runoff discharged through the last water quality BMP has a water quality level equal to or better than the in-stream standard or as required by an applicable TMDL.

3. Evaluation of selected BMPs if nearest WQMS listed on the most current 303(d) List of Impaired Waters and if site's stormwater construction discharges contain the pollutant of impairment and if site disturbance less than 25 acres. Such evaluations may reference published values on BMP effectiveness.

4. If a TMDL has been developed for the nearest WQMS and if the site's stormwater construction discharges contain the pollutant of impairment, show that measures and controls meet assumptions and requirements of TMDL (may need to contact SCDHEC Watershed Manager for assistance).

CHAPTER 4 - INSPECTIONS & ENFORCEMENT

This chapter establishes inspection and enforcement guidelines to be followed by the County.

4.1 BERKELEY COUNTY STORMWATER MANAGEMENT INSPECTIONS

The County will inspect applicable construction sites from initial land clearing to final stabilization. The purpose of these inspections will be to check for compliance with the stormwater management plan approved by the County Engineer and County Stormwater Management Ordinance. Maintenance inspections will also be performed on stormwater management systems and facilities throughout their useful life. For each system or facility installed or retrofitted during an approved construction project, the applicant must have submitted a maintenance schedule and plan. County Inspector will be checking for adherence to this plan and any necessary changes that may arise after installation. County inspections are not to be construed as a relaxation of the requirements on owners/operators to conduct self-inspection in accordance with any applicable local, State or Federal stormwater requirements.

4.1.1 STORMWATER MANAGEMENT INSPECTOR DUTIES/RESPONSIBILITIES

Berkeley County Inspector shall inspect and enforce the requirements of the County Stormwater Management Ordinance. The job duties/responsibilities of a County Inspector shall include, but not be limited to, the following:

1. Conduct and document site inspections during construction to ensure compliance with the approved stormwater management plan. Frequency of inspections will be determined by County staff on an as needed basis.

2. Ensure that the approved stormwater management plan, and the construction plans are on the project site and are properly being followed and implemented.

3. Conduct post-construction inspections to ensure that permanent maintenance is being performed in accordance with the maintenance schedules and Covenants of Permanent Maintenance of Stormwater Systems (Covenants) for the various stormwater management facilities in the approved stormwater management plan.

4. Issue enforcement orders, as necessary, to the owner/operator when any portion of the work does not comply with the approved stormwater management plan or work is occurring without appropriate approval or permitting. The enforcement process and types of orders is detailed in Section 4.3.

5. Perform a final inspection upon the completion of the stormwater system to determine if the system is constructed in accordance with the approved stormwater management plan.

6. Take immediate action if the owner/operator fails to comply with the approved stormwater management plan and an imminent hazard exists as a result. The County Inspector should address the situation and notify any applicable local, State and Federal agencies.

7. Maintain accurate and comprehensive project inspection files ensuring all relevant information is entered in the files to be maintained in the County Engineering Department.

4.1.2 INSPECTION PROCESS AND PROCEDURES

As per Berkeley County's Stormwater Management Ordinance, the County Engineer or an authorized representative/designee (County Inspector) may enter upon all properties for regular inspections, periodic investigations, enforcement and to effectuate the provisions of the Ordinance. Upon refusal by any owner/operator to permit a County Inspector to enter upon the property or continue an inspection, the County Inspector shall terminate the inspection or confine the inspection to portions of the property to which no objection is raised. The County Engineer or his designee shall document the refusal and the grounds for such and promptly seek appropriate compulsory process.

Upon completion of a during construction site inspection, the County Inspector should, at a minimum, include the following in his inspection report:

1. Date and location of the site inspection.

2. Whether the approved stormwater management plan, and construction plans have been properly implemented and maintained.

3. Identification of any approved plan or BMP deficiencies.

4. Any corrective actions needed.

Upon completion of a post-construction maintenance inspection, the County Inspector should, at a minimum, include the following in this inspection report:

1. Date and location of the site inspection.

2. Whether the activities identified in the approved maintenance plan and schedule and Covenants have been properly implemented, completed, and maintained.

3. Identification of any maintenance deficiencies.

4. Any corrective actions needed.

4.2 PERMITTEE INSPECTION RESPONSIBILITIES

In accordance with any applicable local, State and Federal stormwater requirements including, but not limited to, the NPDES Construction General Permit (CGP), owner/operators are responsible for conducting during construction and post-construction site inspections. Records of such inspections should be kept for a minimum of five (5) years and must be made available to Berkeley County upon request.

4.3 ENFORCEMENT

If the County determines that a project is in non-compliance with the County's Stormwater Management Ordinance, then the County Inspector may direct conformity by proceeding with the appropriate enforcement action. The types of enforcement tools available to the County include a Correction Order, Notice of Violation (NOV), Stop Work Order and Civil/Criminal Penalties. The enforcement mechanism to be utilized will depend on the circumstances as described in the following sections.

4.3.1 CORRECTION ORDERS

The County Engineer typically issues a Correction Order for first offenses of non-compliance with the County Stormwater Management Ordinance and the approved stormwater management plan. The purpose of the Correction Order is to give notice of the deficiencies, identify expected corrective results and provide a reasonable timeframe to the contractor prior to the County taking further action to get a problem resolved. Correction Orders shall be submitted in writing, but a verbal notice may be given if the deficiency needs immediate correction to prevent offsite or downstream impacts. The County Engineer shall issue Correction Orders within five (5) working days of an inspection. All Correction Orders, verbal or written, shall be noted in the project file.

Correction Orders may be issued in such cases, but not be limited to, when there is:

1. Failure to comply with the approved stormwater management plans to include failure to have properly installed and/or maintained BMP measures.

2. Failure to properly maintain permanent stormwater management structures.

3. Failure to notify the County Engineer before beginning work on a phase of an approved project.

4. Failure to call for a final site inspection.

A Correction Order should at a minimum include, but not be limited to, the following:

1. Nature of the violation(s).

2. Proposed penalty.

3. Required corrective actions.

4. The time period for correcting the violation(s).

4.3.2 NOTICES OF VIOLATION (NOV)

If a Correction Order has been previously issued and there are either subsequent non-compliance issues or failure to complete the items on the Correction Order within a specified time period, then a Notice of Violation may be issued. In addition, for violations that do not involve a safety issue or an imminent threat of serious damage to the environment and/or public or private property, a Notice of Violation may be issued for, but are not limited to, the following:

1. If construction activities have been initiated and no BMP measures are in place, or are not working to prevent sediment from leaving the site.

2. Failure to have work inspected and approved before restarting construction activities after a stoppage of work.

A Notice of Violation (NOV) should at a minimum include, but not be limited to, the following:

1. Nature of the violation(s).

2. Proposed penalty.

3. Notification that a Stop Work Order may be issued or that permits for the site may be suspended or revoked if there is continued non-compliance.

4. Required corrective actions.

5. The time period for correcting the violation(s).

4.3.3 STOP WORK ORDER

A Stop Work Order may be issued for, but are not limited to, the following:

1. Construction activities are occurring without an approved stormwater management plan.

2. Past enforcement actions taken by the County (Correction Orders, Notice of Violations) to remedy a situation(s) have not been properly addressed with appropriate and prompt action to the satisfaction of the County Engineer.

3. Non-compliance with the plans has resulted in a health or safety issue.

4. Offsite sedimentation resulting from non-compliance with the approved stormwater plan has eliminated or severely degraded a use in a downstream waterbody or that such degradation is imminent.

5. Offsite sedimentation resulting from non-compliance with the approved stormwater management plan has caused severe damage to adjacent, downstream or upstream property.

A Stop Work Order may allow or require correction of violations, but no other construction activities may occur. The Stop Work Order shall state that failure to comply may result in the suspension or revocation of any remaining permits issued for the site and/or civil penalties being issued.

4.3.4 CIVIL PENALTIES

The County may issue a Civil Penalty if a Notice of Violation and/or Stop Work Order has not been complied with or there has not been substantial progress in complying with the Notice of Violation and/or Stop Work Order. In addition, a Civil Penalty may be issued when there are repeated, recurring violations at the same site or when there are repeated, recurring violations by the same responsible party. Violations may subject the owner/operator to Civil Penalties of not more than $1,000 for each violation. Each separate day of a violation constitutes a new and separate violation.

4.3.5 CRIMINAL PENALTIES

In addition to any applicable civil penalties, any person who negligently, willfully, or intentionally violates any provision of the Stormwater Management Ordinance shall be guilty of a misdemeanor and shall be punished within the jurisdictional limits of the magistrate's court. The County may issue a uniform summons citation for a violation of this Ordinance. Fines imposed under the NOV may not exceed $500.00 per violation and/or thirty (30) days in jail. Each day of a violation shall constitute a new and separate violation.

CHAPTER 5 - REFERENCES

This chapter lists the various references used in the manual and if available, websites where they can be retrieved.

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Appendix A
Construction Activity Application (CAA)

BERKELEY COUNTY STORMWATER MANAGEMENT PROGRAM

CONSTRUCTION ACTIVITY APPLICATION

Sites within Regulated Area and disturbing one-half (1/2) acre or more

For Official Use Only	
Date Received: _____ Application No: _____	

I. Owner Information

Owner (Company or person):_____

Contact Person:_____ Company EIN: __ __ - __ __ __ __ __ __ __

Address: _____

City:_____ State: _____ Zip:_____

Phone: (Day) __ __ __-__ __ __-__ __ __ __ (Mobile) __ __ __-__ __ __-__ __ __ __ (Fax) __ __ __-__ __ __-__ __ __ __

Email address:_____

II. Operator Information

Company or person:_____

Contact Person:_____ Company EIN: __ __ - __ __ __ __ __ __ __

Address: _____

City:_____ State: _____ Zip:_____

Phone: (Day) __ __ __-__ __ __-__ __ __ __ (Mobile) __ __ __-__ __ __-__ __ __ __ (Fax) __ __ __-__ __ __-__ __ __ __

Email address: _____

III. Contractor Information

Company or person:_____

License #:_____

City:_____ State: _____ Zip:_____

Phone: (Day) __ __ __-__ __ __-__ __ __ __ (Mobile) __ __ __-__ __ __-__ __ __ __ (Fax) __ __ __-__ __ __-__ __ __ __

Email address: _____

IV. Plan Preparer Information

Plan Preparer: _____ S.C. Registration #: __ __ __ __ __

Company/ Firm: _____ S.C. COA #: __ __ __ __

Mailing Address: _____

City:_____ State: _____ Zip:_____

Phone: (Day) __ __ __-__ __ __-__ __ __ __ (Mobile) __ __ __-__ __ __-__ __ __ __ (Fax) __ __ __-__ __ __-__ __ __ __

Email address: _____

V. Project Information

A. Project Name: _____

Location (street address, nearest intersection, etc.): _____

_____

Tax map # (list all):_____

_____

Disturbed area (to the nearest tenth of an acre): __ __ __ __ __. __

Total area: __ __ __ __ __. __ Impervious area: __ __ __ __ __. __

B. Is this project part of a Larger Common Plan for Development or Sale (LCP)? ☐ Yes ☐ No

LCP/Overall Development Name: _____

Check here if this is the first phase. ☐

Previous state permit/file no.? __ __-__ __-__ __-__ __ __ Previous NPDES coverage number: SCR10 __ __ __ __

C. Type of Construction Activity (check all that apply):

☐Commercial ☐Residential: Single-family ☐Linear (Roads, utility lines, etc.)

☐Institutional ☐Residential: Multi-family ☐Site Preparation (No new impervious)

☐Industrial ☐Re-development ☐Other:_____

VI. Waterbody Information

A. Nearest receiving waterbody(s): _____ Distance to this waterbody (feet):_____

Next/Nearest named receiving waterbody(s):_____

B. Wetlands/ Waters of the State

Waters of the U.S./ State	On the site?	If yes, delineated/ identified?	Impacts?	Amount of impacts
a. Jurisdictional wetlands	☐Yes ☐No	☐Yes ☐No	☐Yes ☐No	_____ Ac _____ Feet
b. Non-jurisdictional wetlands	☐Yes ☐No	☐Yes ☐No	☐Yes ☐No	_____ Ac _____ Feet
c. Other (List):_____	☐Yes ☐No	☐Yes ☐No	☐Yes ☐No	_____ Ac _____ Feet

If yes for delineation, has documentation of the delineation from the USACOE been provided? ☐ Yes ☐ No ☐ N/A

If yes for impacts, has a USACOE permit been applied for or obtained for those impacts? ☐ Yes ☐ No ☐ N/A
If yes, provide copy of the approved USACOE permit.

C. Special Protection Areas*

1. Are there any flooding problems downstream of or adjacent to this site? ☐Yes ☐No
   If yes, see attached instruction.

2. Are any portions of the site located in a designated floodplain? ☐Yes ☐No
   If yes, what are the FIRM Numbers?_____

3. List the nearest DHEC water quality monitoring station(s) [WQMS(s)] to which stormwater (SW) discharges will drain and the corresponding waterbody(s). _____

   3.1. Is this WQMS listed on the most current 303(d) List for Impaired Waters? ☐ Yes ☐ No
   a. If yes for (3.1), list the impairment(s). _____
   b. If yes for (3.1) will SW discharges from your site contain the pollutant(s) of impairment? ☐ Yes ☐ No
   c. If yes for (b) will use of the proposed BMPs ensure that the site's discharges will not contribute to or cause further water quality standard violations? ☐ Yes ☐ No

   3.2. Has a TMDL(s) been developed? ☐Yes ☐ No
   a. If yes for (3.2), list the waterbody _____
   list the impairment(s).____
   b. Has the standard been attained for the impairment(s)? ☐Yes ☐ No

c. If no for (b), will SW discharges from your site contain the pollutant of impairment? ☐Yes ☐No
d. If yes for (c), are your discharges consistent with the assumptions and requirements of the TMDL(s)? ☐ Yes ☐ No
e. If no for (d), will use of the selected BMPs ensure that the site's discharges will not contribute to or cause further water quality standard violations? ☐Yes ☐ No

*Projects located in the Special Protection Areas may require a pre-submittal meeting.

VII. Signatures and Certifications

A. One copy of the stormwater plan, all specifications and supporting calculations, forms, and reports are herewith submitted and made a part of this application. I have placed my signature and seal on the design documents submitted signifying that I accept responsibility for the design of the system. Further, I certify to the best of my knowledge and belief that the design is consistent with the requirements of the Berkeley County Stormwater Management Ordinance and the Berkeley County Stormwater Design Standards. (This should be the person identified in Section IV)

_____	_____	_____
Printed name of Plan Preparer	**Signature of Plan Preparer**	**S.C. Registration #**

B. I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

I hereby certify that all construction and associated activity pertaining to this site shall be accomplished pursuant to and in keeping with the terms and conditions of the approved plans. I also certify that a responsible person will be assigned to the project for day-to-day control. I hereby grant authorization to Berkeley County the right of access to the site at all times for the purpose of on site inspections during the course of construction and to perform maintenance inspections following the completion of the land-disturbing activity.

_____	_____	_____
Printed name of Owner/Operator**	**Signature of Owner/Operator**	**Title/ Position**

**In such cases where an operator signs the certification, a copy of the maintenance agreement between the owner and operator as required by the Stormwater Management Ordinance must be submitted with this application.

Instructions

Completing the Application:

You must type or print legibly. You must include the original, signed application form, one copy of the stormwater plan, and one copy of all other supporting documentation with the initial submittal. A checklist of all the documents necessary to obtain Construction Activity Application approval is available online.

Who Must Submit an Application:

Any construction project located within "Regulated Area" as defined in the Stormwater Management Ordinance and disturbing one (1) acre or more unless exempted in the Ordinance and/or Manual.
"**Regulated Area**" is defined in the Stormwater Management Ordinance as "the boundaries of Berkeley County's urbanized areas as determined by Decennial Census Data from the United States Bureau of the Census. Regulated Area also includes any portion of the County that is so designated by Berkeley County Council. The Regulated Area designated by Berkeley County Council coincides with the area defined as "Service Zone 1" by the "Transportation Impact Fee Ordinance for Unincorporated Berkeley County" (Ordinance No. 06-11-75)". The Regulated Area can be viewed from Berkley County Website: http://gis.co.berkeley.sc.us/map.htm GIS Mapping → GIS Internet Mapping (MS4 Regulated Area)

Projects located in the Berkeley County Regulated Area submit to:

Berkeley County Engineering
1003 Highway 52
Post Office Box 6122
Moncks Corner, S. C. 29461-6120
843.719.4127

I. Owner Information

- The official or legal name of the owner shall be listed. If the owner is a company, then a Permit Contact person shall be listed. This can be someone other than the person that has signatory authority for the company. All correspondence regarding this permit application will be sent to Permit Contact at the address listed.
- Owner is defined in the Stormwater Management Ordinance as the "property owner, or any person who acts in his own behalf, that submits an application for approval to disturb land or vegetation or encroachment and the person, if so designated by default or on legal documents, as the responsible party for maintenance of a stormwater system(s) and facility(s)".
- The Company EIN is the Employer Identification Number as established by the U.S. Internal Revenue Service.

II. Operator Information

- The official or legal name of the operator should be listed. If the operator is a company, then a Permit Contact person shall be listed. This can be someone other than the person that has signatory authority for the company. All correspondence regarding this permit application will be sent to Permit Contact at the address listed.
- Operator is defined in the Stormwater Management Ordinance as the "the person who is operating the property, including an operator or person who is in charge of any activity related to land disturbance, construction or post construction stormwater quality or quantity".
- The Company EIN is the Employer Identification Number as established by the U.S. Internal Revenue Service.

III. Contractor Information

- The name of the Company shall be listed.
- The Company License # is the License number as established by the State.

IV. Plan Preparer Information

- Enter the name and registration number of the stormwater plan preparer. S.C. COA is the company's S.C. Certificate of Authorization. Enter N/A for S.C. COA if the firm does not have a COA or the preparer is an individual. If an email address is entered, the County Engineer may contact the plan preparer via email.

Note: Typically, the plan preparer must be an engineer licensed in the State of South Carolina. For certain construction activity, the plan preparer may be someone other than a licensed engineer. However, this must be approved in advance by the County Engineer.

V. Project Information

A. The Project/ Site Name should be a unique or distinguishing name (e.g., not Proposed Subdivision). The Department should be notified in writing if the Project/ Site Name changes.
County: If the project is in multiple counties, list all counties and indicate in which county the majority of the project will be.

The total and disturbed areas should be rounded to the nearest tenth of an acre. For subdivisions, if the exact build-out is not known, the disturbed area can be estimated using the following equation: Disturbed area = 2(Maximum Footprint of House)(# of lots) + Road/ Right-of-Way areas + Other easements/ disturbance. Please note that the County must be notified if the actual disturbed area is greater than the disturbed area listed on the application.

B. Institutional includes schools and other publicly owned projects, except linear projects. Site Preparation includes clearing, grubbing, and grading only; no new impervious areas shall be proposed if this activity type is checked.

VI. Waterbody Information

A. The nearest receiving waterbody is the nearest waters of the State to which the site's stormwater will discharge. If this waterbody is unnamed, then provide a description that references the nearest, named waterbody (e.g., tributary to Grove Creek). If the site's stormwater discharges to multiple waterbodies, then list all such waterbodies and attach additional sheets, if necessary.

C. Special Protection Areas: If yes for (2), then the extent of the flooding problems and the effect of this project on those problems must be explained in the checklist under Project Narrative. For design criteria, see checklist under Special Protection Areas.

VII. Certifications

A. The same licensed professional must sign and seal the application, drawings, calculations, and supporting documentation.
B. A person with signatory authority for the project owner/ operator must sign the application. The plan preparer cannot sign the application for the project owner/ operator. The plans, all reports, including monthly reports, and any information requested by the Engineering Department must be signed by a person with signatory authority for the project owner/ operator or a duly authorized representative.
   - Corporation: A responsible corporate officer (e.g., president, vice-president, certain managers)
   - Partnership or Sole Proprietorship: A general partner or the proprietor, respectively
   - Municipality, State, Federal or Other Public Agency: Principal executive officer or ranking elected official

Office Mechanics and Filing

This form and supporting documentation will be kept in the Engineering Department files.

Appendix B
Covenants for Permanent Maintenance of Stormwater Systems

BERKELEY COUNTY STORMWATER MANAGEMENT PROGRAM

COVENANTS FOR PERMANENT MAINTENANCE OF STORMWATER SYSTEMS

THE TERM STORMWATER SYSTEMS MAY REFER TO WATER QUANTITY AND/OR WATER QUALITY FACILITIES, AND BEST MANAGEMENT PRACTICES, BMPS (i.e., detention basins, retention basins, stormwater ponds, stormwater wetlands, water quality buffers, swales, ditches, pipes, inlets, separators, filtering devices, water quality structures, etc.)

THIS Covenant made and entered into this _____ day of _____, 20_____, by

and between (Insert Full Name of property owner) _____ hereinafter called the "Owner", and Berkeley County, South Carolina hereinafter called the "County".

WHEREAS, the Property Owner is the owner of certain real property described as Berkeley County Tax Map Number, (TMS#) _____ as recorded by deed in the Berkeley County Register of Deeds (ROD), Deed Book _____Page_____, hereinafter called the "Property;" and

WHEREAS, the Owner is proceeding to, or has, made improvements on the Property; and

WHEREAS, the Site Plan/Subdivision Plan known as (Name of Plan/Development) _____

_____

hereinafter called the "Plan," which is expressly incorporated herein by reference, as approved, or to be approved, by the County, provides for the construction and maintenance of stormwater facilities, BMPs, and improvements within the confines of the Property; and

WHEREAS, the County requires that on-site stormwater facilities, BMPs, and improvements as shown on the Plan be constructed and adequately maintained by the Owner, its successors and assigns, including any homeowners association;

WHEREAS, the Owner, its successors and assigns, understands that the execution and adherence to the provisions of this Covenant is a condition precedent to the County's permitting, and/or approving the Site Plan, Storm Water Management Plan, and/or Subdivision Plan for the Property and the development located thereon;

NOW, THEREFORE, in consideration of the foregoing premises and mutual covenants the parties hereby agree as follows:

1. The on-site stormwater facilities, BMPs, and, improvements shall be constructed, operated, and maintained by the Owner, its successors and assigns, in accordance with the approved Plan and specifications identified in the Plan, as well as in accordance with State and federal requirements, the Berkeley County Stormwater Management Ordinance and Stormwater Design Standards Manual, and any and all other applicable County ordinances.

2. The Owner, its successors and assigns, including any homeowners association, shall adequately maintain the stormwater facilities, BMPs, and improvements on the Property. Adequate maintenance required by this Covenant shall include, but is not limited to, scheduled and corrective maintenance as described on/in the approved Plan and/or as described in the Berkeley County Stormwater Design Standards Manual for all stormwater facilities, BMPs, and improvements intended to manage and/or control stormwater on the Property, with such facilities, BMPs, and improvements to expressly include, but not be limited to pipes, drainage structures, ditches, swales, vegetation, berms, pond areas, outlet structures, maintenance shelf(s) and access roads, or any other improvement associated with stormwater on the Property but excluding any such improvements located on, under, or within any publicly owned or dedicated rights-of-way in which State or County has accepted maintenance of the roadways and/or drainage facilities. Adequate maintenance is herein defined as keeping such stormwater facilities, BMPs, and improvements in good working condition such that they satisfactorily perform their intended design functions.

3. The Owner, its successors and assigns, shall inspect the stormwater facilities, BMPs, and improvements as described on/in the approved Plan and/or as described in the Berkeley County Stormwater Design Standards Manual to assure safe and proper functioning of the stormwater facilities, BMPs, and improvements located on the Property. Any and all deficiencies identified during such inspections shall be repaired as necessary at the Owner's expense. A detailed repair plan may be required to be prepared by a professional engineer, licensed in the State of South Carolina.

4. The Owner, its successors and assigns, hereby grants permission to the County, its authorized agents and employees, to enter upon the Property and to inspect the stormwater facilities, BMPs, and improvements as deemed necessary by the County for purposes of protecting the public health, safety or welfare, for purposes of investigating or inspecting any reported or suspected deficiencies in the stormwater facilities, BMPs, and improvements on the Property, for purposes of responding to or investigating citizens' complaints relating to the management or control of stormwater on the Property, or for any other purpose deemed necessary by the County. The County shall provide the Owner, its successors and assigns, with a copy of any inspection findings, as well as a directive to commence with any required repairs. To the extent that the County does not agree with or to the contemplated repairs proposed by the Owner, the County may submit an alternate repair plan to the Owner or require the Owner to submit a detailed repair plan prepared by a professional engineer, licensed in the State of South Carolina.

5. In the event the Owner, its successors and assigns, fails to maintain the stormwater facilities, BMPs, and improvements on the Property in good working condition acceptable to the County, or fails to make repairs as specified in the inspection report within a reasonable time frame as established by the County, with such time frame not to be shorter than thirty (30) days, the County may enter upon the Property and take any and all action necessary to correct deficiencies identified in the inspection report. The Owner, its successors and assigns, shall be responsible for any and all expenses incurred by the County in taking such corrective action. This provision shall not be construed to allow the County to erect any structure of a permanent nature on the land of the Owner outside the easement for the stormwater management/BMP facilities. It is expressly understood and agreed that this Covenant imposes no obligation or responsibility on the County to routinely maintain or repair any stormwater facilities, BMPs, and improvements located on the property.

6. In the event that the County performs or undertakes work of any kind pursuant to this Covenant or expends any funds or resources in performance of said work for labor, use of equipment, supplies, material, and the like, the Owner, its successors and assigns, shall reimburse the County upon demand, within thirty (30) days of receipt of same.

7. This Covenant shall impose no liability on the County with respect to the maintenance or repair of any stormwater facilities, BMPs, and improvements on the Property, nor does the County assume any obligation

or duty to undertake or perform any action allowed for, or permitted by, this Covenant. The Owner, its successors and assigns, further agrees to indemnify and hold the County harmless from any liability arising out of the management, operation, maintenance, or failure of any stormwater facilities, BMPs, and improvement subject to this Covenant.

8. Notwithstanding any right extended to the County pursuant to this Covenant, it is expressly recognized and acknowledged that the County retains all prosecutorial rights and remedies available to it, including the enforcement of any and all applicable County ordinances, against the Owner, its successors and assigns, relating to the operation, maintenance, and/or repair of stormwater facilities, BMPs, and improvements located on the Property.

9. This Covenant shall be recorded among the land records of Berkeley County, South Carolina, and shall constitute running with the land, and shall be binding on the Owner, its administrators, executors, assigns, heirs and any other successors in interests, including homeowners association.

IN WITNESS WHEROF the undersigned have caused this Covenant to be executed on the date first written above.

WITNESSES: OWNER:

_____ _____
Witness: Individual/Company/Corporation/Partnership Name

_____ By: _____
Witness: Title:

STATE OF SOUTH CAROLINA)
) ACKNOWLEDGEMENT
COUNTY OF BERKELEY)

I, the undersigned Notary Public, do hereby certify that _____

_____, personally appeared before me this day and acknowledged the due execution of the foregoing instrument

WITNESS my hand and seal this _____ day of _____, 20_____.

_____(SEAL)
Notary Public for South Carolina
My Commission Expires:_____

Appendix C
Checklist for CAA

BERKELEY COUNTY STORMWATER MANAGEMENT PROGRAM

CHECKLIST
FOR
CONSTRUCTION ACTIVITY APPLICATION

The following checklist shows the components that must be provided by the applicant with the completed Construction Activity Application.

The submitted information typically includes three parts: the application, the technical engineering calculations and discussions, and the construction documents (plans, details, specifications).

I. APPLICATION FORM

- All application items must be completed and answered sufficiently.
- Signatory authority (original signatures) must be provided where requested.

II. TECHNICAL REPORT/ENGINEERING CALCULATIONS

1 REPORT COMPOSITION:

1.1 Table of Contents
1.2 Report should be put together in a manner that facilitates review
1.3 Report prepared by licensed professional
1.4 One copy to be submitted.

2 MAP(S):

2.1 Include north arrow and scale on all maps.
2.2 Outlined project location.
2.3 Labeled road names.
2.4 Nearest waterbodies, discharge points, and waters of the State.
2.5 Location of any nearby protected areas (waters, wetlands, etc.)
2.6 Topographic information showing runoff patterns/overland flow paths.
2.7 Soil types.
2.8 100-year floodplain contours, location of floodway.
2.9 Wetlands.

3 PROJECT NARRATIVE:

3.1 A description of the site in general, purposes of the construction activity, issues with upstream, downstream, and adjacent properties, waterbodies receiving stormwater runoff, issues with site soils, existing water quality and flooding issues, anticipated impacts (quality, upstream/downstream structures, etc.) and benefits (open space, treatment, maintenance, etc.), and reasons for waiver request.
3.2 A summary table to include at least the following:
- Total and disturbed area
- Soil Type(s)
- Nearest receiving water body(s)

- List of BMPs for water quality and quantity
- 10-year & 100-year flood elevation if located in flood plain.

3.3 A summary table of existing and proposed runoff flows, volumes, and pollutant loads.
3.4 A discussion of issues relating to other State and federal permits needed or regulations to be followed.
3.5 A summary of the maintenance plan and schedule of the stormwater facilities, BMPs, and any improvements on the property for construction site and post-construction, and arrangements for construction site and post-construction maintenance responsibility.

4 WATERS OF THE STATE, INCLUDING WETLANDS:

4.1 Delineation of all waters of the State (WoS) located on the site, including wetlands, shown and labeled on plans.
4.2 If impacts to WoS, outlined areas of impacts and labeled that no work can begin in this area until all necessary USACOE permits and SCDHEC 401 certifications have been obtained.
4.3 Double row of silt fence provided in all areas where a 50' undisturbed buffer cannot be maintained between the disturbed area and the WoS.
4.4 Minimum 10' maintenance buffer provided between last row of silt fence and WoS; or, if buffer not provided, then statement from P.E. on plans indicating how silt fence will be installed and maintained without impacts to WoS.

Note: If there are proposed impacts to WoS, then applicant must contact the USACOE and/or S.C. DHEC Water Quality Certification, Standards & Wetlands Programs Section to determine additional requirements before submitting this NOI.
Note: If WoS are to be impacted, work cannot be performed in these designated areas until all necessary permits have been acquired.
Note: If USACOE permit is required for construction of a permanent stormwater management structure, County final approval cannot be granted until all applicable State and federal permits have been obtained. A preliminary approval is issued instead.
Note: A 50-foot buffer between a sediment trap/basin and WoS and wetland areas is recommended.

5 HYDROLOGIC ANALYSIS:

5.1 Drainage area maps clearly delineating the sub basins/watersheds for pre and post developed conditions. The sub basins/watersheds must correspond to the pre and post developed calculations.
5.2 Pre and post developed hydrologic analysis calculations for the 2-year, 10-year, 25-year, 50-year, and 100- year storm events, at each outfall point. Analysis should be performed at the same points and with the same drainage area for both pre and post developed conditions. The analysis must correspond to the delineated drainage area maps for pre and post developed conditions.
5.3 Analysis performed using SCS 24-hour storm (Rational Method not acceptable) or other if acceptable to the County Engineer.
5.4 Use rainfall data from South Carolina DHEC Storm Water Management BMP Handbook.

6 DETENTION ANALYSIS/DESIGN:

6.1 Analysis

6.1.1 Pond routing using a volume based hydrograph for the 2-year, 10-year, 25-year, 50-year and 100-year SCS 24-hour rainfall event (Drain:Edge, ICPR, HEC-1, SedCAD, HYDRAFLOW, etc. perform full pond routings: TR55 does not perform a full pond routing; rational method cannot be used).
6.1.2 Hydrologic and hydraulic calculations necessary to determine the impact of hydrograph timing modifications of the proposed land disturbing activity, with and without the pond (results of analysis will determine the need to modify the pond design or eliminate the pond requirement, see note below).
6.1.3 Inputs and outputs from analysis program.

6.1.4 Summary table of the peak inflows, peak outflows, and maximum water surface elevations (WSE) for the 2-year, 10-year, 25-year, 50-year and 100-year storm events for each pond.
6.1.5 Stage-storage-discharge relationship for the outlet structure of each detention structure.
6.1.6 If a rating curve for the outlet structure must be generated externally from the analysis program (Drain:Edge, HEC-1, HydroCAD), data and equations used to rate the outlet structure.

Note: The 10% rule in performing analysis is recommended. The hydrologic analysis should be conducted for the larger drainage area, where the site in question encompasses 10% of the total drainage area. For example, if your site is 10 acres, then the hydrologic analysis should be performed at the point downstream where the contributing drainage area, including your 10-acre site, is approximately 100 acres.

6.2 Design

6.2.1 The post-development discharges rates should be less than pre-development discharge rates for each outfall point for the 2-year and 10-year (and in some cases 25-year) storm events. If not, then a detention waiver must be requested.
6.2.2 Detail of outlet structure and cross-section of the dam/berm or pond bank, including elevations and dimensions that correspond to the calculations.
6.2.3 Orifice constructability considered (do not specify orifice diameters with increments of less than ¼").
6.2.4 Maximum WSE for the 10-year storm event below the emergency spillway with 0.5-ft of freeboard between maximum WSE for the 10-year storm and the emergency spillway.
6.2.5 Maximum WSE for the 100-year storm event below the embankment with 0.5-ft of freeboard between maximum WSE for the 100-year storm and the embankment.
6.2.6 The volume within any structure (i.e., dry ponds etc.) used for water quantity control shall be drained from the structure within 72 hours.
6.2.7 Bottom of all detention and retention ponds graded to have a slope of not less than 0.5% and side slopes no steeper than 3:1.
6.2.8 If the pond is to be used for sediment control during construction, outlet structure should be sufficiently protected.
6.2.9 Permanent maintenance access to all permanent detention structures (easements may be needed for structures surrounded by lots).
6.2.10 As a minimum, infiltration systems must be designed in accordance with S.C. Reg. 72-307.C(11) [specify how items a-j have been addressed]

Note: Emergency spillways should not be built on fill slopes.
Note: Installation of a trash rack or other debris-screening device is recommended on all pond risers.
Note: Installation of sediment forebays is recommended at each outfall into the detention/ sediment basin.

7 HYDRAULIC DESIGN:

7.1 Design calculations for all conveyances, inlets, and outlets based on the contributing area, allowable velocities, and upstream and downstream conditions.
7.2 Upstream and downstream analysis showing the project will not impact new and existing structures or reduce downstream system capacity.
7.3 Check to make sure the proper design storms were used at the appropriate design points.

8 WATER QUALITY REQUIREMENTS:

8.1 All sites which disturb one-half (1/2) acre or greater shall have permanent BMP installed.
8.2 Permanent water quality addressed (all projects or LCP that disturb 5 or more acres)
8.2.1 Wet ponds designed to catch the first ½" of runoff from the entire area draining to the pond and release it over at least a 24-hour period.

8.2.2 Dry ponds designed to catch the first 1" of runoff from the entire area draining to the pond and release it over at least a 24-hour period.

8.2.3 For areas not draining to a pond, show how permanent water quality requirements were addressed

8.3 Projects disturbing less than five (5) acres but within one-half (1/2) mile of a receiving water body in the Coastal Zone must meet Section III.C.3.XIII.A of the Coastal Zone Management Program Refinements. Designs must show that the first ½ inch of runoff from the entire site or the first one (1) inch of runoff from the built upon area, whichever is greater, can be stored onsite.

8.4 Waters of the U.S./State are not used for permanent water quality control (alternative means of treatment must be used if an existing pond is to be used for water quantity control).

8.5 The WQV requirement may be waived if treatment is instead provided by engineered devices. Applicability of such waivers will be based on submitted information showing that the device(s) has a design pollutant removal efficiency equivalent to a "dry" pond with a WQV of 1-inch. If the project is located within one thousand feet (1000') of shellfish beds, the pollutant removal equivalency must match a WQV of the first one and one-half inches (1 ½") of runoff.

8.6 BMPs used strictly for water quality that will be capturing one (1) or more acres shall have a pretreatment device as part of the BMP or treatment system, such as a forebay or vault, to remove debris and coarser sediments.

8.7 All BMPs must have a maintenance plan and schedule for construction site and post construction. Suggested schedules and routine activities are provided in the SCDHEC BMP Manual (2005).

8.8 For projects that discharge either directly or indirectly into an impaired waterbody as determined through SCDHEC's listing of the waterbody on the most current 303(d) list or by the existence of an adopted TMDL by SCDHEC is discussed in section below (Section II.9) under Special Protection Areas.

The County Engineer reserves the right to require specific effluent limits for any pollutant from a site if necessary to ensure the water quality standards and other State and federal water quality regulations are met

9 SPECIAL PROTECTION AREAS:

9.1 List the nearest S.C.DHEC Water Quality Monitoring Station (WQMS) that the site's stormwater discharges drain to and the waterbody on which it is located.

9.2 Qualitative and quantitative assessment (described in Section 3.4C of SCR100000), if nearest WQMS is listed on the most current 303(d) List of Impaired Waters and if site's stormwater construction discharges contain the pollutant of impairment and if the site disturbance 25 or more acres.

9.3 Evaluation of selected BMPs if nearest WQMS listed on the most current 303(d) List of Impaired Waters and if site's stormwater construction discharges contain the pollutant of impairment and if site disturbance less than 25 acres.

9.4 If a TMDL has been developed for the nearest WQMS and if the site's stormwater construction discharges contain the pollutant of impairment, show that measures and controls meet assumptions and requirements of TMDL (may need to contact DHEC Watershed Manager for assistance).

9.5 Where flooding problems exist, explain any anticipated impacts of this project on the adjacent properties and downstream structures. In an effort to relieve existing flooding problems downstream of or adjacent to this site, the following list of design criteria will be required:

- The post-development, peak discharge rates are restricted to half (½) the pre-development rates for the 2-year and 10-year storm event or to the downstream system capacity, whichever is less.
- The post-development runoff volumes for the 2-year frequency 24-hour duration storm events above the predevelopment level shall be stored for a period of 24-hours on average before release.

10 SEDIMENTOLOGY:

10.1 BMPs should be properly placed (silt fence, inlet protection, construction entrance, rip-rap at outfalls, check dams etc.).

10.2 Trapping efficiency calculations showing that all sediment basins/ traps are capable of achieving a sediment

trapping efficiency of at least 80% for the 10-year, 24-hour storm event, if more than 10 disturbed acres drain to a common point (stream, lake, etc.)

10.3 Sediment basins must be provided for storage for the 10-year, 24-hour storm event for disturbed conditions or 3600 ft^3/ acre draining to the basin, if more than 10 disturbed acres drain to a common point (stream, lake, property line, etc.).

10.4 Sediment traps only used for drainage areas of less than 5 acres.

10.5 Sediment trap storage calculations, showing that 1800 ft^3/ total acre draining to each trap is provided below the spillway.

10.6 If trapping efficiency calculations are required for sediment traps, then provide peak outflow, (q_{po}), calculations; the 10-year, 24-hour storm event for construction conditions cannot overtop the trap's spillway.

10.7 Sediment basins and traps designed for total area draining to them.

10.8 Drainage area map outlining the area draining to each sediment basin/ trap.

10.9 Copies of figures used to determine V_{15} (SV-1) and trapping efficiency (ST-1, SB-1, SB-2), if Design Aids from SCDHEC BMP Manual (2005) are used to determine trapping efficiencies.

10.10 Silt fence only used in areas with drainage areas of less than ¼ acre per 100 linear foot of fence and not used in areas with concentrated flows.

10.11 Clean-out stake, marked at ½ the designed sediment storage depth, provided in all sediment basins/ sediment traps.

Note: Consult the SCDHEC OCRM STORMWATER BMP Handbook for information on the design of these and other devices.

Note: The Design Aids in the SCDHEC OCRM STORMWATER BMP Handbook cannot be used to determine trapping efficiencies for structures in series. If the flow for the10-year, 24-hour storm for construction conditions overtops the structure or the structure's spillway, then the Design Aids cannot be used. If multiple soil types are in the area draining to the structure, then the soil type with the smallest D_{15} for the appropriate depth should be used to determine the settling velocity, V_{15}; an average D_{15} should not be used.

11 INLET PROTECTION:

11.1 Provided at all inlets (no hay bales).

11.2 Steel posts and buried fabric shown for filter fabric inlet protection.

11.3 Inlet protection details provided for pre-paving and after roadways have been paved.

12 SLOPE AND/OR CHANNEL STABILIZATION:

12.1 All slopes designed and stabilized properly.

12.2 All channels and diversion ditches must be able to handle the 10-year storm event with non-erosive velocities during construction and design storm event for post-construction.

12.3 Rock check dams provided in temporary diversion.

12.4 Installation detail for erosion control blanket (ECB) or turf reinforcement matting (TRM) if ECBs or TRMs to be used.

12.5 Slope drains provided where concentrated flows discharge onto a fill slope.

13 DISCHARGE POINTS:

13.1 Storm drainage or pond outfalls are carried to an existing drainage outfall such as a pipe, ditch, easement, etc.

13.2 No new point discharges onto adjacent property where there was not a point discharge previously without providing the adjacent property owner's written permission.

13.3 Level spreaders, plunge pools, etc. provided when the proposed outlet is near the property line.

13.4 Provided a 20-foot minimum buffer between the property line and the end of all pipes or energy dissipation measures are installed.

13.5 Outfalls shall not discharge on fill slopes.
13.6 All outfalls must be stabilized.
13.7 Riprap aprons sized appropriately.
13.8 Riprap detail shows apron dimensions and stone sizes.
13.9 Filter fabric installed beneath all riprap.

14 UTILITY/LINEAR PROJECTS:

14.1 Limits of disturbance include areas disturbed for utility line(s) installation.
14.2 Inlet protection provided at all existing inlets that receive flows from the disturbed areas; also add this as a note on the plans.
14.3 For all utility lines crossing WoS, narrative and detail showing sediment and erosion control measures provided on plans.
14.4 Note for construction entrances to be provided at all locations where construction traffic accesses a paved roadway.

15 POST-CONSTRUCTION MAINTENANCE PLAN AND SCHEDULE:

15.1 Description of maintenance plan to be used
15.2 Schedule of maintenance procedures (e.g., every 6 months)
15.3 Detailed or manufacturer-specific maintenance items for proprietary control devices (oil-water separators, etc.), underground detention structures, exfiltration systems and non-traditional stormwater controls (constructed wetlands, bioretention, etc.)
15.4 Typical maintenance items to be addressed
- Ditches and swales to be cleaned (for sediments, debris, vegetative growth, etc), inspected and repaired.
- Stormwater drainage pipes, catch basins to be cleaned, inspected and repaired. Clean-out must include the removal and legal disposal of any accumulated sediment and debris.
- Grass to be mowed.
- Trees to be removed from within the pond and on the embankment.
- Trash and sediment to be removed from inside of and around the pond outlet structure.
- Orifices to be cleaned and unclogged.
- Outfall pipe to be cleaned, inspected, and repaired.
- Sediment accumulation to be removed from pond.
- Pond bottom to be regraded to provide proper drainage towards the outlet discharge point.
- Energy dissipator to be cleaned and repaired.
- Emergency spillway, if applicable, to be inspected and repaired.
- Erosion on side slopes, if present, to be addressed.

15.5 Specific maintenance items particular to more complex structures.

16 ACCESS:

Project layout has considered access for maintenance and inspection of stormwater facilities during and after construction.

17 DETENTION WAIVER:

17.1 If the 2-year and 10-year post development flow rates exceed the pre-development rates, waivers from detention may be granted on a case-by-case basis.
17.2 Justification shall be provided in a separate written request and demonstrate that:
- The proposed project will have no adverse impact on the receiving natural waterway or upstream, downstream or adjacent properties; or

- The imposition of peak control requirement for rates of stormwater runoff would aggravate downstream flooding.

17.3 Waiver request signed by the project's Professional Engineer.

17.4 Waiver from water quality criteria is not allowed. However, another equivalent method or criteria will be reviewed (applicant should provide all the necessary information to make a decision).

III. CONSTRUCTION PLANS

- One complete set of plans and one complete set of technical report/engineering calculations for review.
- Once review is complete and comments are satisfied the following plans must be submitted to Engineering Department for stamping:
    - Four sets of full size plans
    - One set of half size plans
    - One set of technical report/engineering calculations
    - An electronic copy of the plans in pdf format on a CD-ROM
    - Additional sets if needed by the owner/project engineer

Note: One set of the approved and stamped plans must be on-site at all times during construction.

1. GENERAL ITEMS:

1.1 All sheets 24" x 36".
1.2 Engineer stamp and signature on every sheet.
1.3 Correct Scale and North Arrow.
1.4 Location map.
1.5 Property lines, adjacent landowners' names, and existing site conditions (locate buildings, structures, driveways, etc. onsite/offsite), critical or protected area.
1.6 Legend.
1.7 Existing elevations and contours for the entire site. Contours are to be tied to a known datum (for example, NGVD 29, NAVD 88 datum), no **assumed** elevations, (1' interval is the minimum).
1.8 Limits of the disturbed area.
1.9 Lot Layout.
1.10 Delineation of WoS, including wetlands with letter from US Army Corps of Engineers, if applicable.
1.11 All existing and proposed easements.
1.12 Construction sequence & details (include implementation of all stormwater, erosion and sediment controls).
1.13 Locations and details of all temporary and permanent erosion and sediment control measures.
1.14 Construction entrance/exit.
1.15 Grassing and stabilization details and specifications.
1.16 Individual lot erosion control plan (applicable to all subdivisions).
1.17 Roadway plan and profiles with existing and proposed ground elevations.
1.18 Revision block utilized.

2. STORMWATER DRAINAGE SHEETS

2.1 Drainage area maps for existing and proposed conditions, outlining delineated sub basins, sub basin characteristics (watershed identifier, Curve Number, Tc, Area length, Slope), and the areas draining to all BMPs on site. Off-site drainage areas must be included on the map.
2.2 Labeling must be consistent with Technical Report/Engineering Calculations.
2.3 Proposed grading plan for the entire disturbed area.
2.4 Catch basin locations must be outside intersection curve radii.
2.5 Adequate drainage easements for any and all drainage structures located outside the road rights-of-way.
2.6 Adequate maintenance shelf around the entire pond(s) and along ditch(s) must be provided.

2.7 Label all storm drainage structures.
2.8 Water surface elevation in ponds and basins for all design storm events.
2.9 Storm drainage at roadway crossings to have one foot of cover minimum.
2.10 Minimum 18-inch RCP pipe under roadway (no decreases in pipe size in the downstream direction).
2.11 Crown elevation of inlet pipes equal or greater than crown elevation of outlet pipe.
2.12 Steps must be provided for all stormwater drainage boxes greater than 4.5 feet deep.
2.13 A minimum of 3'X3' size box is required for all storm drain boxes/inlets.
2.14 A table with calculated design flows for each pipe.
2.15 Hydraulic grade lines on profiles of storm pipe.
2.16 Existing and proposed grade on profiles of storm pipe.
2.17 Details of all stormwater drainage facilities and BMPs (catch basins, manholes, junctions boxes, detention basins, retention basins, ponds, pond outfall structures, emergency spillways, ditches, swales, stormwater wetlands, headwalls, rip-rap aprons, water quality buffers, oil/water separators, sand filtering devices, water quality structures, curb and gutter, etc.).
2.18 Typical roadway cross section(s), roadway cross sections(s) at wetland crossing

3. UTILITY SHEETS

3.1 Water and sewer plans including horizontal alignment of all lines and structures within rights-of-way and easements.
3.2 Pipe sizes and materials.
3.3 Invert elevations of all sanitary sewer pipes entering and exiting the manholes.
3.4 Bottom elevation, top elevation and/or rim elevation of all sanitary sewer manholes.
3.5 Water and sewer details.
3.6 Utility main(s) and service(s) at roadway crossings to have minimum three feet of cover.
3.7 Utility service(s) at ditch crossing to have minimum 18" of separation from the ditch design flow line elevation.
3.8 All fire hydrants must be located at/near the right-of-way line.
3.9 Manholes, valves or utility boxes must not be located within the curb and gutter section and/or within the roadway pavement section.
3.10 No conflict box.

4. STANDARD NOTES:

Notes as required by State and federal agencies and any additional notes for compliance with Berkeley County requirements.

IV. DOCUMENTS:

Following additional documents are needed prior approval of Construction Activity Application:

- A Berkeley County Encroachment Permit Application if applicable.
- A copy of the approved SCDOT Encroachment Permit Application if applicable.
- A copy of a geotechnical report when needed.
- A copy of the recorded Covenants for Permanent Maintenance of Stormwater Systems by the property owner.
- A copy of the maintenance agreement between the operator and property owner where an operator other than the property owner is the responsible party for maintenance activities of stormwater systems.
- A copy of the approved Notice of Intent (NOI) for Stormwater Discharges from Large and Small Construction Activity.
- A copy of SCDHEC's Certificate of Coverage under the Construction General Permit (CGP).

Appendix D
Approval Process for CAA

BERKELEY COUNTY STORMWATER MANAGEMENT PROGRAM

APPROVAL PROCESS FOR CONSTRUCTION ACTIVITY APPLICATION

For projects (including subdivision plan, site/stormwater management plan, and encroachment permit application plan) located within **regulated area** (can be viewed from Berkeley County GIS Mapping Service: http://gis.co.berkeley.sc.us/disclaimer.htm - MS4 Regulated Area) **and** disturbing **1/2 acre** or more:

1. Documents necessary to submit to Berkeley County Engineering (BCE) for stormwater management plan approval:
   i. Completed "Construction Activity Application" (CAA)
   ii. One complete set of plans
   iii. One set of technical report/engineering calculations
   iv. **Copy** of the SCDHEC-OCRM Notice of Intent (NOI)
   v. Encroachment permit application if applicable
   vi. Covenants for Permanent Maintenance of Stormwater Systems (Covenants) signed and notarized. If someone other than the owner is the responsible party for maintenance activities of stormwater systems, a maintenance agreement between the operator and owner must be submitted along with the Covenants.

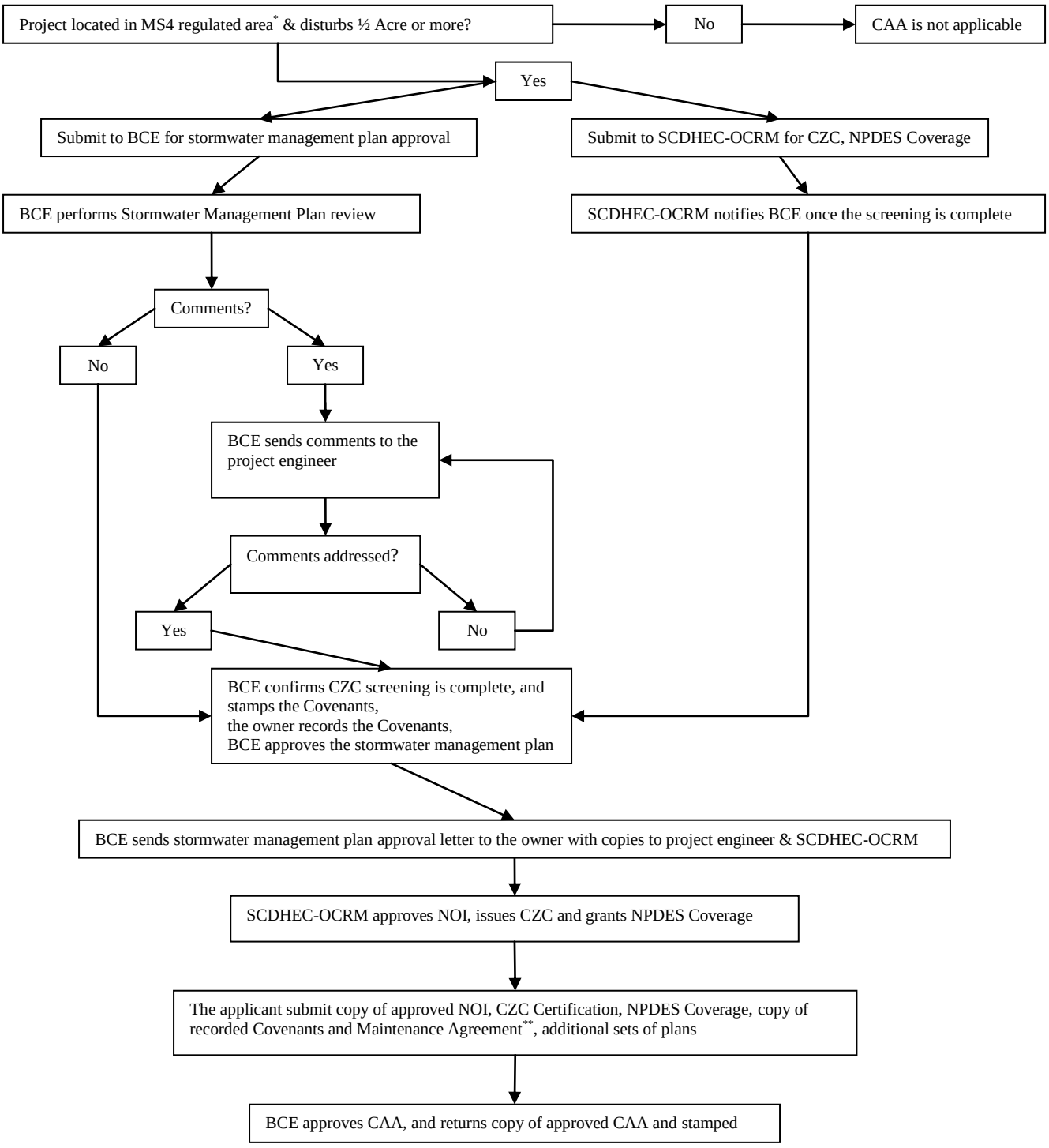
2. Once all BCE comments are addressed and review is complete, and BCE receives notification from SCDHEC-OCRM that Coastal Zone Consistency (CZC) screening is complete:
   i. BCE stamps the Covenants and returns the Covenants to the owner.
   ii. The owner records the Covenants in the Office of the Berkeley County Register of Deeds.
   iii. BCE approves the stormwater management plan.
   iv. BCE sends the approval letter to the applicant with copies to the project engineer and SCDHEC-OCRM. This **approval of the stormwater management plan does not constitute, in any way, the right to start construction**.

3. SCDHEC-OCRM approves NOI, issues CZC Certification and, authorizes coverage under the NPDES Phase II Construction General Permit (NPDES CGP).

4. Once the above steps are completed, the applicant submits:
   i. A copy of SCDHEC-OCRM's approved NOI
   ii. A copy of CZC Certification
   iii. A copy of SCDHEC's letter authorizing coverage under NPDES CGP
   iv. A copy of the recorded Covenants and maintenance agreement where applicable
   v. Additional sets of the approved stormwater management plans based on the type of construction activity:
      a. Subdivision (residential/commercial/industrial) with roads and drainage system to be accepted by the County: three sets of full size plans, one set of half size plan
      b. Site/stormwater management plan associated with building permits – three sets of full size plans.
      c. Linear (roads, utility lines, etc.)/encroachment permits/site preparation – two sets of full size plans.

      Note: Additional sets if needed by the owner/project engineer.
   vi. BCE approves CAA and returns a copy of the approved CAA and the stamped plans. **One set of the approved and stamped plans must be on-site at all times during construction**.

Construction Activity Application Review and Approval Flow Chart



BCE: Berkeley County Engineering
CAA: Construction Activity Application
CZC: Coastal Zone Consistency
NPDES Coverage: NPDES Phase II Construction General Permit Coverage
*Regulated area can be viewed from Berkeley County GIS Mapping Service: http://gis.co.berkeley.sc.us/disclaimer.htm - MS4 Regulated Area
**If someone other than the owner is the responsible party for maintenance activities of stormwater systems, maintenance agreement between the operator and owner must be submitted along with the Covenants

Appendix E
Minimum Stormwater Management BMPs

BERKELEY COUNTY STORMWATER MANAGEMENT PROGRAM

MINIMUM STORMWATER MANAGEMENT BEST MANAGEMENT PRACTICES (BMPS)

All construction activity disturbing less than one-half (½) acre, including single family residential, shall implement and comply with the following requirements. In addition, if the site is part of a larger common plan of development, stormwater management requirements and BMPs specified in the approved CAA for the larger common plan of development must be implemented.

1. The site shall have adequate erosion and sediment control measures as necessary to prevent the movement of sediment off the property, into wetlands, and receiving waters. These measures shall be installed within 24-hours of land disturbance and maintained until the project is stabilized. Proper construction of these measures can be found in SCDHEC's BMP Manual. Manufacturers recommended installation and maintenance procedures shall be followed as applicable.

    - The maximum distance from the crest of a hill to a section of silt fence is 100 feet. When the distance from a crest to the property boundary is greater than 100 feet, an intermediate row of silt fence shall be used or another control measure shall be employed.

    - The maximum slope steepness (perpendicular to silt fence line) is 2H:1V. When exceeded, slope drains shall be employed.

    - A maximum of ¼ acre drainage per 100 linear feet of silt fence should be used. When this is exceeded, an intermediate row of silt fence shall be used or another control measure shall be employed.

    - Sediment accumulated along silt fence shall be removed when it reaches 1/3 the height of the fence.

2. Nearby stormwater inlets, manholes, etc. in the street or on this or adjacent property shall be protected through the use of sediment tubes, check dams, or inlet protection devices. These measures will be maintained throughout the construction process until the site is stabilized as detailed below.

3. Construction entrances shall be provided at entrances/exits (maximum of 2) as necessary. The stone in the entrance/exit shall be maintained throughout the construction process until the site is stabilized as detailed below. Sediment tracked onto streets shall be removed immediately for proper disposal.

4. Stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than fourteen days (14) after work has ceased, unless activity in that portion of the site will resume within twenty-one days. Existing/natural vegetation should be preserved as much as possible.

5. A site is considered stabilized once the entire disturbed area has a vegetative cover with a density of 70%. Seeding should be accompanied or replaced with erosion control mats as necessary to achieve this density. Final or permanent stabilization is considered achieved once the entire disturbed area has a permanent vegetative cover with a density of 70%. Final stabilization shall be implemented within fourteen (14) days of completion of all construction activities. After final stabilization is achieved, all control measures shall be removed from the site.

6. Site must be graded to achieve positive drainage away from the building(s). Positive yard drainage must be achieved as well.

7. Site must be graded to accommodate any existing offsite stormwater runoff and shall not block any existing runoff onto and throughout the site.

8. The construction activity will not cause or contribute in altering the natural drainage flow pattern of the site or adjacent properties. If the site is part of a larger common plan of development, the drainage must be constructed in accordance with the approved stormwater management plan.

9. The existing ground elevations at the property lines of a site must remain undisturbed and not altered unless a written agreement with the adjacent property owners has been obtained. If the site is part of a larger common plan of development, the site must be graded in accordance with the approved stormwater management plan.

10. Ensure good house keeping for proper use, storage, clean up and disposal of the various materials used during construction activities. Construction materials include concrete, cement, paint products, solvents, gas, oils, fertilizers, etc.

    - Construction debris and other waste shall be contained in a dumpster or covered with plastic. Covers that prevent exposure to precipitation shall also be used for stockpiles of soil.

    - Chemicals, paints, solvents, gas, oils and other materials shall be stored properly to prevent leaks and low exposure risk to precipitation and stormwater runoff. They must be disposed properly. Never clean brushes or rinse paint containers into a street, gutter or storm drainage structures. Clean up leaks/spills immediately. Never hose down pavement of surfaces where materials or chemicals have spilled. Use dry up method whenever possible.

    - Never dispose or dump concrete or washout from the mixing of concrete onto driveways, streets, gutters, or storm drainage structures. Concrete wash water shall be disposed in an area of soil away from surface waters where soil can act as a filter or evaporate the water. Remaining concrete shall be disposed of in a dumpster or otherwise removed from the site. Be aware that this water can kill vegetation. Store bags of cement and plaster in a dry place to protect from rainfall/sprinklers/wind and away from gutters/storm drainage structures.

    - De-watering water shall be disposed of in a pervious area. Discharge of sediment from dewatering operations shall be prevented from entering into storm sewers and surface waters.

11. Any and all on-site stormwater facilities, BMPs, and improvements must be adequately maintained by the owner, its successors and assigns in good working condition such that they satisfactorily perform their intended design functions.

Appendix F
Transfer of Ownership Application

BERKELEY COUNTY STORMWATER MANAGEMENT PROGRAM
1003 Highway 52 Post Office Box 6122
Moncks Corner, SC 29461-6120
843.719.4127 843.723.3800 843.567.3136
843.719.4695 fax

TRANSFER OF OWNERSHIP APPLICATION

A. Project Name: _____

B. CAA Number: _____

C. NPDES Permit Coverage Number (if applicable): SCR10 _____

D. New Applicant Name: _____
Address: _____
City: _____, State: _____
Zip: _____
Phone: _ _ _ - _ _ _ - _ _ _ _ Mobile: _ _ _ - _ _ _ - _ _ _ _ Fax: _ _ _ - _ _ _ - _ _ _ _
Email Address (optional): _____

E. Property Info: ☐ Check Box if same as above
Address: _____
City: _____, South Carolina
Zip: _____
Tax Map Number(s): _____

F. Original Applicant Name: _____
Address: _____
City: _____, State: _____
Zip: _____
Phone: _ _ _ - _ _ _ - _ _ _ _ Mobile: _ _ _ - _ _ _ - _ _ _ _ Fax: _ _ _ - _ _ _ - _ _ _ _
Email Address (optional): _____

G. Transfer Information: Transfer Date (MM/DD/YYYY): __ __/__ __/__ __ __ __
a. Is the entire CAA being transferred to a new owner? ☐Yes ☐No
b. Is this a subdivision where only a lot or a group of lots are being transferred? ☐Yes ☐No
c. If Yes to Item G.b., list the lot, or group of lots being transferred.
_____

H. Other Information:
a. If there are no modifications being made to the plans, include five (5) sets of plans with signed Designer and Applicant's certification statements.
b. If this is a subdivision where a lot or group of lots are being transferred, include a plat sheet with the lot or group of lots that are being transferred clearly outlined.

Original Applicant's Certification
I hereby relinquish the responsibility and ownership of the CAA listed in Item B above. I realize that the construction responsibility for the identified project/lots/group of lots now belongs to the new applicant.

_____ _____ _____
Original Applicant's Printed Name Original Applicant's Signature Date

New Applicant's Certification
I hereby certify that all construction and/or development will be done pursuant to this plan and I am responsible for the construction activities and related maintenance thereof. Berkeley County authorities will be allowed to enter the project site for the purpose of on-site inspections.

_____ _____ _____
New Applicant's Printed Name New Applicant's Signature Date

Appendix G
Table of BMP Suggested Uses

EROSION PREVENTION BMP SUGGESTED USES

BMP	Slope Protection	Waterway Protection	Surface Protection	Enclosed Drainage	Large Flat Areas	Borrow Areas	Adjacent Properties
Erosion Prevention Measures	X	X	X	X	X	X	X
Surface Roughening	X		X				
Bench Terracing	X		X				
Temporary Seeding	X		X		X	X	X
Mulching	X				X	X	
Erosion Control Blankets and Turf Reinforcement Mats	X	X	X			X	
Final Stabilization	X		X		X		X
Topsoiling			X		X		
Permanent Seeding and Planting of Grasses	X		X		X		X
Permanent Ground Cover Plants	X		X				X
Sodding	X		X		X		X
Riprap or Aggregate	X	X	X				
Outlet Protection		X		X			X
Dust Control					X	X	X
Polyacrylamide (PAMs)	X		X	X	X	X	X

TEMPORARY SEDIMENT CONTROL BMP SUGGESTED USES

BMP	Slope Protection	Waterway Protection	Surface Protection	Enclosed Drainage	Large Flat Areas	Borrow Areas	Adjacent Properties
Temporary Sediment Control Structures	X	X	X	X	X	X	X
Storage Volumes and Maintenance Schedules		X		X			X
Temporary Sediment Basin		X	X	X			X
Multipurpose Basin		X	X	.X			X
Temporary Sediment Trap		X	X				X
Silt Fence	X	X					X
Rock Ditch Check			X				X
Stabilized Construction Entrance					X		X
Storm Drain Inlet Protection		X		X			X
Vegetated Filter Strips		X					X
Rock Sediment Dike		X	X				X

RUNOFF CONTROL AND CONVEYANCE BMP SUGGESTED USES

BMP	Slope Protection	Waterway Protection	Surface Protection	Enclosed Drainage	Large Flat Areas	Borrow Areas	Adjacent Properties
Pipe Slope Drains	X		X				
Temporary Stream Crossing		X	X				X
Runoff Conveyance Measures	X					X	X
Construction De-watering		X		X	X	X	
Level Spreader			X		X		X
Subsurface Drains			X		X		

STRUCTURAL STORMWATER QUALITY BMP SUGGESTED USES

BMP	Land Requirement	Single Family	Multi Family	Low Density Commercial	High Density Commercial	Low Density Industrial	High Density Industrial
Wet Storm Water Ponds	MODERATE - HIGH	X	X	X	X	X	X
Wet Extended Pond	MODERATE - HIGH	X	X	X	X	X	X
Micropool Extended Pond	MODERATE - HIGH	X	X	X		X	
Shallow Wetland	MODERATE - HIGH	X	X	X		X	
Extended Detention Shallow Wetland	MODERATE - HIGH	X	X	X		X	
Pond/Wetland System	MODERATE - HIGH	X	X	X		X	
Pocket Wetland	MODERATE	X	X		X		X
Bioretention Areas	MODERATE	X	X	X	X	X	X
Sand Filtration Facilities	LOW			X	X	X	X
Infiltration Trenches	MODERATE	X	X	X	X	X	X
Enhanced Dry Swales	HIGH	X	X	X		X	
Pre-Fabricated Control Devices	LOW		X	X	X	X	X

STRUCTURAL STORMWATER QUALITY BMP CHARACTERISTICS

BMP	Maintenance Burden	Costs	Aesthetically Pleasing	Provide Habitat	Drainage Area (Acres)	Soils
Wet Storm Water Pond	LOW	LOW	X	X	10 MIN 25 PREFERRED	HSG A SOILS MAY REQUIRE POND LINER HSG B SOILS MAY REQUIRE INFILTRATION TESTING
Wet Extended Pond with Aquatic Bench	LOW	LOW	X	X	10 MIN 25 PREFERRED	
Micropool Extended Pond	MODERATE	LOW	X	X	10 MIN	
Shallow Wetland	MODERATE	MODERATE	X	X	20 MIN	HSG A AND B SOILS MAY REQUIRE LINER
Extended Detention Shallow Wetland	MODERATE	MODERATE	X	X	20 MIN	
Pond/Wetland System	MODERATE	MODERATE	X	X	20 MIN	
Pocket Wetland	HIGH	MODERATE	X	X	5 MIN	
Bioretention Areas	LOW	MODERATE	X	X	5 MAX	CLAY OR SILTY SOILS MAY
Sand Filtration Facilities	HIGH	HIGH			5 MAX 2 PREFFERED	REQUIRE PRETREATMENT
Infiltration Trenches	HIGH	HIGH			5 MAX	INFILTRATION RATE > 0.5 IN/HR
Enhanced Dry Swales	LOW	MODERATE			5 MAX	PERMEABLE SOIL
Pre-Fabricated Control Devices	HIGH	HIGH	X (HIDDEN)		VARIES	NO REQUIREMENT

STRUCTURAL STORMWATER QUALITY BMP SUGGESTED USES

BMP	Water Quality	Channel Protection	Flood Protection	TSS Removal	Nutrient Removal	Metal Removal	Bacterial Removal
Wet Stormwater Pond	X	X	X	HIGH	MODERATE	MODERATE	MODERATE
Wet Extended Pond with Aquatic Bench	X	X	X	HIGH	HIGH	MODERATE	MODERATE
Micropool Extended Pond	X	X	X	HIGH	MODERATE	MODERATE	NO DATA
Shallow Wetland	X	X	X	HIGH	HIGH	MODERATE	HIGH
Extended Detention Shallow Wetland	X	X	X	HIGH	HIGH	MODERATE	HIGH
Pond/Wetland System	X	X	X	HIGH	HIGH	MODERATE	HIGH
Pocket Wetland	X	X		HIGH	HIGH	MODERATE	HIGH
Bioretention Areas	X			HIGH	MODERATE	MODERATE	NO DATA
Sand Filtration Facilities	X			HIGH	MODERATE	MODERATE	MODERATE
Infiltration Trenches	X			HIGH	MODERATE	HIGH	HIGH
Enhanced Dry Swales	X			HIGH	MODERATE	MODERATE	LOW
Pre-Fabricated Control Devices	X			HIGH	LOW-HIGH	LOW-HIGH	LOW-HIGH

STRUCTURAL STORMWATER QUALITY BMP TRAPPING EFFICIENCY

BMP	Pollutant Removal Efficiency %					
	Monitoring	TSS	TP	TN	Nitrate Nitrogen	Other
Surface Sand Filters	Yes	85	55	35	Neg	Bacteria 40-80 Metals 35-90
Perimeter Sand Filters	Yes	80	65	45	Neg	Hydrocarbons 80
Organic Sand Filter	Yes	95	40	35	Neg	Hydrocarbons 80 Soluble P Neg Metals 85
Gravel Filter	Yes	80	80	65	75	Hydrocarbons 85 Metals 50-75
Dry Enhanced Swales	Yes	90	65	50	80	Metals 80-90
Wet Enhanced Swales	Yes	80	20	40	50	Metals 40-70
Plain Drainage Channel	Yes	30	10	0	0	Bacteria Neg
Vegetated Drainage Channel	Yes	65	25	15	Neg	Hydrocarbons 65 Metals 20-50 Bacteria Neg
Vegetated Filter Strip	Yes	70	10	30	0	Metals 40-50

Should be used as a general guide to expected effectiveness and not for design purposes.

Appendix H
Inspection Checklist

BERKELEY COUNTY STORMWATER MANAGEMENT PROGRAM
1003 Highway 52 Post Office Box 6122
Moncks Corner, SC 29461-6120
843.719.4127 843.723.3800 843.567.3136
843.719.4695 fax

INSPECTION CHECKLIST

Below are the items that County Inspectors will address during each site inspection.

1. Are contractor's maintenance logs available?
2. Are contractor's set of plans available on-site?
3. What is the current status of construction: beginning, middle, nearing completion, complete?
4. Have areas been clear cutting? If so, does the total area exceed the 10-acre limit?
5. Are there any waterbody impacts (sediment, oil, grease, etc)?
6. Are there any roadway impacts (sediments, damaged asphalt, etc.)?
7. Have any adjacent properties been negatively impacted? If so, what is the extent of the impacts?
8. Are there any air/dust impacts?
9. Are all tree protections in place and maintained? Enter any additional comments on tree protection.
10. Are all channels stabilized? Enter any additional comments on stabilized channels.
11. Is there any evidence of channel erosion? Enter any additional comments on channel erosion.
12. Are all inactive areas stabilized?
13. Are all inactive slopes stabilized?
14. Are all inactive stock piles stabilized?
15. Enter any additional comments on stabilization needs.
16. Are all erosion prevention and sediment control (EPSC) devices properly installed and maintained?
17. Do the EPSC devices provide adequate protection?
18. Are there any unneeded controls or are there any that need to be removed (closeout)?
19. Enter any additional comments on EPSC devices.
20. Are there any instances of erosion across the site? If so, what is the percentage?
21. Enter the re-inspection date based on condition of the site and offsite impact.
22. Enter any additional comments as necessary.
23. Is any enforcement action necessary?

Appendix I
Enforcement Forms

BERKELEY COUNTY STORMWATER MANAGEMENT PROGRAM
1003 Highway 52 Post Office Box 6122
Moncks Corner, SC 29461-6120
843.719.4127 843.723.3800 843.567.3136
843.719.4695 fax

CORRECTION ORDER

Date:

Name:_____

Address:_____

City: _____ State: _____ZIP Code:_____

Project:_____

CAA No./Stormwater Management Plan No.:_____

This correction order serves as a warning concerning activities on your above mentioned site.

This warning is based on the results of a Berkeley County inspection on _____.
A verbal warning was also given to _____ at the time of the inspection.
A copy of our inspection report detailing the deficiencies in enclosed with this warning.

You have until _____ to correct the deficiencies noted on the inspection report. At that time a County Inspector will re-visit your site. Failure to comply with this warning is considered a violation of the Berkeley County Stormwater Management Ordinance and will result in the issuance of a **Notice of Violation and/or Stop Work Order**.

If you have any questions concerning this warning you may contact our office at 843-719-4174.

Signed by: _____

Printed Name: _____

BERKELEY COUNTY STORMWATER MANAGEMENT PROGRAM
1003 Highway 52 Post Office Box 6122
Moncks Corner, SC 29461-6120
843.719.4127 843.723.3800 843.567.3136
843.719.4695 fax

NOTICE OF VIOLATION

Date:

Name:_____
Address:_____
City: _____ State: _____ZIP Code:_____
Project:_____
CAA No./Stormwater Management Plan No.:_____

You are hereby served notice that you are in violation of Berkeley County's Stormwater Management Ordinance at the above mentioned site. This violation is the results of a Berkeley County inspection completed on _____. A copy of our inspection report is enclosed with this violation.

Violation:

Corrective Action(s):

The corrective actions must be completed within **five (5) working days** of the date of this letter. Failure to comply with this Notice of Violation will result in an immediate **Stop Work Order** issued for your site and/or a **civil penalty in the amount of $1,000/day for each deficiency.**

If you have questions concerning this violation you can contact our office at 843-719-4174.

Signed by: _____Printed Name: _____

BERKELEY COUNTY STORMWATER MANAGEMENT PROGRAM
1003 Highway 52 Post Office Box 6122
Moncks Corner, SC 29461-6120
843.719.4127 843.723.3800 843.567.3136
843.719.4695 fax

NOTICE OF VIOLATION – STOP WORK ORDER

Date:

Name:_____

Address:_____

City: _____ State: _____ZIP Code:_____

Project:_____

CAA No./Stormwater Management Plan No.:_____

You are hereby served notice that you are in violation of Berkeley County's Stormwater Management Ordinance at the above referenced site. A "**STOP WORK**" order is being posted on this property effective **IMMEDIATELY.**

This violation is due to failure to comply with a Notice of Violation issued on _____ and the results of a Berkeley County follow up inspection completed on _____.
A copy of our inspection report is enclosed with this violation.

Your site must be inspected by a County Inspector prior to resuming any construction activity. Any activity other than work leading to compliance with this Stop Work Order can result in the issuance of a civil penalty in the amount of **$1,000/day for each deficiency and/or 30 days in jail**.

If you have any questions concerning this warning you may contact our office at 843-719-4174.

Signed by: _____

Printed Name: _____

Appendix J
Berkeley County Stormwater Management Ordinance

BERKELEY COUNTY COUNCIL

Daniel W. Davis - Supervisor & Chairman
Dennis L. Fish - Vice Chairman (District No. 5)

COMMITTEE CHAIRMEN

District 1
Phillip Farley
Committee on
Land Use &
Development

District 2
Timothy J. Callanan
Committee on
Finance

District 3
Kenneth E. Gunn, Jr.
Committee on
Justice &
Public Safety

District 4
Cathy S. Davis
Committee on
Water & Sanitation

District 5
Dennis L. Fish
Committee on
Human Resources &
Purchasing

District 6
Jack H. Schurlknight
Committee on
Human Services

District 7
Caldwell Pinckney, Jr.
Committee on
Community Services

District 8
Steve C. Davis
Committee on
Facilities & Code
Enforcement

December 2, 2014

Ms. Kace Smith
Berkeley County Deputy Supervisor/Finance
P.O. Box 6122
Moncks Corner, SC 29461

Re: Ordinance No. 14-11-36, to amend Ordinance No. 07-07-44, an ordinance establishing regulations to develop and enforce a Stormwater Management Program to reduce the discharge of pollutants associated with stormwater runoff and Berkeley County's Storm Sewer System.

Dear Ms. Smith:

You will find enclosed a certified copy of the above referenced ordinance adopted by Berkeley County Council at a Regular Meeting of Council on November 24, 2014.

If any additional information is required, please do not hesitate to give our office a call.

With kind regards,

Catherine R. Windham
Clerk to Council

Enclosure: as stated

Copy w/enclosure to:
Mr. Frank Carson, County Engineer
Mary P. Brown – For Filing

14-11-36

Berkeley County

Stormwater Management Ordinance

14-11-36

STORMWATER MANAGEMENT ORDINANCE

TABLE OF CONTENTS

Bill No. 14-37

ORDINANCE NO. 14-11-38

AN ORDINANCE TO AMEND ORDINANCE NO. 07-07-44, AN ORDINANCE ESTABLISHING REGULATIONS TO DEVELOP AND ENFORCE A STORMWATER MANAGEMENT PROGRAM TO REDUCE THE DISCHARGE OF POLLUTANTS ASSOCIATED WITH STORMWATER RUNOFF AND BERKELEY COUNTY'S STORM SEWER SYSTEM.

WHERAS, Berkeley County Council adopted a Stormwater Management Ordinance for Berkeley County, on July 24, 2007;

WHEREAS, uncontrolled stormwater runoff may have significant, adverse impact on the health, safety and general welfare of Berkeley County and the quality of life of its citizens; and

WHEREAS, Berkeley County is required by federal and State law to obtain a National Pollutant Discharge Elimination System (NPDES) permit from the South Carolina Department of Health and Environmental Control for stormwater discharges from Berkeley County's stormwater systems; and

WHEREAS, the NPDES permit requires that Berkeley County develop, implement, and enforce a stormwater management program in its regulated area designed to reduce the discharge of pollutants from its small municipal separate storm sewer systems to the maximum extent practicable, to protect water quality, and to satisfy the appropriate water quality requirements of the Clean Water Act.

NOW, THEREFORE BE IT ENACTED by Berkeley County Council, in a meeting duly assembled, that Ordinance No. 07-07-44, is amended and revised as follows:

DIVISION 1
GENERAL PROVISIONS

Section 1.1 Title

This ordinance shall be known as the "Stormwater Management Ordinance of Berkeley County, South Carolina."

Section 1.2 Authority

This ordinance is adopted pursuant to the authority conferred upon Berkeley County by the South Carolina Constitution, Act No. 194 of the Acts and Joint Resolutions of 1971 enacted by the General

Assembly of the State of South Carolina, approved April 23, 1971, in 1976 South Carolina Code of Laws Sections 4-9-30, 4-9-40, 5-7-30, and 5-7-60.

Section 1.3 Jurisdiction

The boundaries and jurisdiction of this Ordinance shall encompass those portions of unincorporated Berkeley County defined as the "regulated area" and such additional areas lying inside the corporate limits of other governments as approved by Berkeley County Council.

Section 1.4 Findings

Berkeley County Council makes the following findings:

(a) Uncontrolled stormwater runoff may have significant, adverse impact on the health, safety and general welfare of Berkeley County and the quality of life of its citizens. The potential impacts of uncontrolled stormwater can lead to the degradation of water quality and general riverine ecosystem through excessive or illegal pollutant discharges, erosion, and flooding thereby limiting or removing its designated and potential uses.

(b) Berkeley County is required by federal law [33 U.S.C 1342(p) and 40 CFR 122.26] and by State law [S. C. Code Reg. 61-9 122.32 & 122.33] to obtain a National Pollutant Discharge Elimination System (NPDES) permit from the South Carolina Department of Health and Environmental Control ("SCDHEC") for stormwater discharges from Berkeley County's stormwater systems. The NPDES General Permit for Storm Water Discharges from Regulated Small Separate Storm Sewer Systems (SMS4), SCR030000, requires that Berkeley County develop, implement, and enforce a stormwater management program (SWMP) in its regulated area designed to reduce the discharge of pollutants from its small municipal separate storm sewer systems (SMS4) to the maximum extent practicable (MEP), to protect water quality, and to satisfy the appropriate water quality requirements of the Clean Water Act.

Section 1.5 Purpose

(a) It is the purpose of this ordinance to protect, maintain, and enhance water quality and the environment of Berkeley County and the short-term and long-term public health, safety, and general welfare of the citizens of Berkeley County. This ordinance is also designed to minimize property damage by establishing requirements and procedures to control the potential adverse effects of increased stormwater runoff and related pollutant loads associated with both future development and existing developed land. Proper management of stormwater runoff will further the purpose of this Ordinance to insure a functional drainage system, reduce the effects of development on land and stream channel erosion, attain and maintain water quality standards, enhance the local environment associated with the drainage system, reduce local flooding, maintain to the maximum extent practical pre-developed runoff characteristics of the area in terms of flow rate, volume and pollutant concentration, and facilitate economic development through residential, commercial, and industrial construction and development while mitigating associated pollutant, flooding, erosion, and drainage impacts.

(b) It is further the purpose of this ordinance to direct the development and implementation of a Stormwater Management Program (SWMP) and to establish legal authority which authorizes or enables Berkeley County at a minimum to:

(1) Comply with State and Federal requirements related to stormwater management developed pursuant to the Clean Water Act;

(2) Prohibit illicit connections and discharges to Berkeley County stormwater management systems and facilities and waters of the State;

(3) Control to the maximum extent practical the discharge of spills, dumping, or disposal of materials other than stormwater to Berkeley County stormwater management systems and facilities and waters of the State;

(4) Address specific categories of non-stormwater discharges and similar other incidental non-stormwater discharges listed in the SWMP;

(5) Require that violators cease and desist illicit discharges of stormwater in violation of any ordinance, permits, contracts or orders;

(6) Require installation, implementation, and maintenance of control measures from owners/operators of construction sites, new development and redevelopment to minimize the discharge of pollutants to the MEP and to protect water quality;

(7) Require from operators of construction sites, new or redeveloped land, including industrial and commercial facilities information including, but not limited to, specific requirements to control construction and post-construction discharges of pollutants in stormwater;

(8) Enforce, penalize, stop work, and require compliance for controlling pollutants from construction sites, new or redeveloped land, including industrial and commercial facilities;

(9) Where necessary, require stormwater discharge rate and volume control during and following development, redevelopment, or construction;

(10) Define and implement procedures of site plan review and site inspection of all applicable construction projects within regulated areas of Berkeley County;

(11) Control the discharge from Berkeley County stormwater management systems and facilities of pollutants in such quantity that water quality standards are met or to otherwise address post-construction, long-term water quality. This includes the necessary means needed to comply with State and Federal regulations regarding stormwater management quantity and quality;

(12) Define procedures for addressing citizen complaints of stormwater-related issues within Berkeley County;

(13) Provide for adequate long term operation and maintenance of Best Management Practices (BMPs);

(14) Prior to applying for approval of construction activities within the Regulated Area of Berkeley County that require DHEC construction general permit coverage, the County must receive notification from DHEC's Office of Ocean and Coastal Resource

Management (OCRM) that states the proposed project is consistent with the Coastal Zone Management Plan;

(15) Carry out inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions and Ordinance requirements including the prohibition on illicit discharges to Berkeley County stormwater management systems and facilities and waters of the State;

(16) Enter private property for the purpose of inspecting any facilities, equipment, practices, or operations related to Stormwater discharges to determine whether there is compliance with conditions in ordinances, permits, contracts or orders;

(17) Encourage the use of non-traditional strategies to control stormwater discharges;

(18) Encourage the creation of stream buffers and preservation of natural spaces to provide areas that could be used for flood storage, stormwater treatment and control, and recreation. Such areas may be required in special protection areas needed to protect, maintain, or enhance water quality and protect property from flooding problems;

(19) Develop, implement, and enforce action plans to address pollutant load reductions required in impaired waterbodies and to work towards compliance with Total Maximum Daily Loads (TMDLs) established by EPA or SCDHEC and to work towards meeting water quality standards.

(20) Enable enforcement of all said authorizations.

(c) It is still further the purpose of this ordinance to establish authority for the County Engineer for determining consistency of construction projects with the Berkeley County SWMP.

Section 1.6 Construction and Scope

(a) The provisions of this Ordinance shall apply throughout those portions of unincorporated Berkeley County defined as the "regulated area" and such additional areas lying inside the corporate limits of other governments as approved by Berkeley County Council. The County Council will approve the designation of the "regulated area".

(b) The Berkeley County Engineer or his designee shall be primarily responsible for the coordination and enforcement of the provisions of this Ordinance and the SWMP.

(c) The application of this Ordinance and the provisions and references expressed herein shall be the minimum stormwater management requirements and shall not be deemed a limitation or repeal of any other ordinances of Berkeley County or powers granted to Berkeley County by the State of South Carolina statues, including, without limitation, the power to require additional or more stringent stormwater management requirements. If site characteristics on new development and/or redevelopment indicate that complying with these minimum requirements will not provide adequate designs or protection for local property, residents, or the environment, the property owner, operator, or person responsible for land disturbing activities shall be required to provide additional and appropriate management practices, control techniques, system design, and engineering methods to attain an adequate level of protection.

Section 1.7 Severability

Should any word, phrase, clause or provision of this ordinance be declared invalid or unconstitutional by a court of competent jurisdiction, such declaration shall not affect this ordinance as a whole or any part hereof except that specific provision declared by such court to be invalid or unconstitutional.

Section 1.8 Rules of Language and Interpretation

(a) The word "shall" is mandatory; the word "may" is permissive.

(b) The particular shall control the general.

(c) Words used in the present tense shall include the future, and words used in the singular include the plural, and the plural the singular, unless the context clearly indicates the contrary.

(d) All public officials, bodies and agencies to which reference is made are those of Berkeley County, unless otherwise indicated.

Section 1.9 Relationship with Other Laws, Regulations and Ordinances

Whenever the provisions of this Ordinance impose more restrictive standards than are required in or under any other law, regulation or ordinance, the requirements contained in this article shall prevail. Whenever the provisions of any other law, regulation or ordinance require more restrictive standards than are required in this article, the requirements of such law, regulation or ordinance shall prevail.

Section 1.10 Amendments

Berkeley County Council, may, in its discretion and following procedures specified by State law, amend or change this Ordinance or adopt additional regulations or resolutions to implement this Ordinance, implement the SWMP, or to otherwise further the goal of protecting the quality of the waters into which Berkeley County stormwater management systems and facilities outfall.

Section 1.11 Conflicting Ordinances Repealed

All ordinances or parts of ordinances related to stormwater management in conflict with the provisions of this Ordinance are hereby repealed. This Ordinance shall prevail in any and all conflicts with guidelines, manuals, or other publications pertaining to stormwater management.

Section 1.12 Definitions

"Applicant" is a person, firm, governmental agency, partnership, or any other entity who seeks to obtain approval under the requirements of this Ordinance and who will be responsible for the land disturbing activity and related maintenance thereof.

"As-built drawings" are revised construction drawings that show in the installed location of the new facilities on a project, including the stormwater system. This term and "record drawings" shall be synonymous.

"Best Management Practices (BMPs)" are any structural or non-structural measure or facility used for the control of stormwater runoff, be it for quantity or quality control. BMPs also includes schedules of activities, prohibitions of practices, maintenance procedures, treatment requirements, operating procedures, and other management practices to control site runoff, spillage or leaks, sludge or waste disposal, drainage from raw material storage, or otherwise prevent or reduce the pollution of waters of the State.

"Construction" or "Construction Activity" is a land-disturbing activity involving clearing, grading, excavating, transporting, filling, or any other activity which results in a change in the natural cover or topography that may cause erosion and contribute to sediment and alter the quality and quantity of stormwater runoff.

"Design Manual" refers to the Berkeley County Stormwater Design Standards Manual.

"Developer" means any person, or others who act on his own behalf, who is required to submit an application for approval of construction activities and is thereafter responsible for maintaining compliance with this Ordinance and conditions of the approved application.

"Easement" is an authorization by a property owner to the general public, a corporation, or a certain person or persons for the use of any designated part of his property for a specific purpose.

"Erosion" means the wearing away of the land surface by the action of wind, water, gravity, ice, or any combination of those forces.

"Flood/flooding" is a temporary rise in the level of water which results in the inundation of areas not ordinarily covered by water.

"Hazardous material" is any item or agent (biological, chemical, physical) which has the potential to cause harm to humans, other living organisms, or the environment, either by itself or through interaction with other factors.

"Illicit connection" means a man-made conveyance connecting an illicit discharge directly to a Berkeley County stormwater management system or facility that results in a discharge that is not composed entirely of stormwater runoff except discharges pursuant to an NPDES permit (other than the NPDES MS4 permit for Berkeley County).

"Improper disposal" means any disposal other than through an illicit connection that results in an illicit discharge, including, but not limited to the disposal of used oil and toxic materials resulting from the improper management of such substances.

"Illicit discharge" or "Illegal discharge" is defined in South Carolina Water Pollution Control Permits Regulation 61-9 122.26(b)(2) and refers to any discharge to a Berkeley County stormwater management system or facility or waters of the State that is not composed entirely of stormwater except (a) discharge pursuant to an NPDES permit (other than the NPDES MS4 Permit for Berkeley County) and (b) discharges resulting from the fire-fighting activities.

"Low Impact Development (LID)" means an approach to land development (or re-development) that works with nature to manage stormwater as close to its source as possible.

"Maintenance" means any action necessary to preserve stormwater system component, including conveyances, facilities and BMPs in proper working condition, in order to serve the intended purposes set forth in this ordinance and to prevent structural failure of such components.

"MS4" means municipal separate storm sewer system and includes all conveyances or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains) which is (a) owned or operated by Berkeley County; (b) designed or used for collecting or conveying stormwater; (c) not a combined sewer system; and (d) not part of a Publicly Owned Treatment Works (POTW).

"New Development" or "Re-Development" means any of the following actions undertaken by any person, including, without limitation, any public or private individual or entity:

(a) division of a lot, tract, or parcels or other divisions by plat or deed;

(b) the construction, installation, or alteration of land, a structure, impervious surface or drainage facility;

(c) clearing, scraping, grubbing or otherwise significantly disturbing the soil, vegetation, mud, sand or rock of a site; or

(d) adding, removing, exposing, excavating, leveling, grading, digging, burrowing, dumping, piling, dredging, or otherwise disturbing the soil, vegetation, mud, sand or rock of a site.

"NPDES" means National Pollutant Discharge Elimination System.

"NPDES MS4 permit" means the General Permit for Storm Water Discharges from Regulated Small Separate Storm Sewer Systems (SMS4), SCR030000, issued by SCDHEC pursuant to the Clean Water Act and the federal stormwater discharge regulations (40 CFR 122.26) that allows for restricting pollutant loads as necessary to meet water quality standards.

"Operator" means the person who has operational control of the property, including an operator or person who is in charge of any activity related to land disturbance, construction or post construction stormwater quality or quantity.

"Outfall" or "Discharge point" means a point source as defined by section 122.2 of SC Regulation 61-9 at the point where a Berkeley County stormwater management system or facility discharges to waters of the State and does not include any conveyances connecting two municipal separate storm sewers, or pipes, tunnels or other conveyances which connect segments of the same stream or other waters of the State and are used to convey waters of the State.

"Owner" means the property owner, or any person who acts in his own behalf, that submits an application for approval to disturb land or vegetation or encroachment and the person, if so designated by default or on legal documents, as the responsible party for maintenance of a stormwater system(s) and facility(s).

"Person" means any individual, public or private corporation, political subdivision, association, partnership, corporation, municipality, State or Federal agency, industry, firm, trust, estate, any other legal entity whatsoever, or an agent or employee thereof.

"Pollutant" is defined at §122.2 of SC Regulation 61-9 as dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged into water. Typical construction site pollutants include sediment, oil and grease, pesticides and fertilizers, pollutants from construction wastes, and pollutants from construction materials.

"Property Owner" means the legal owner of the property.

"Receiving waters" or "receiving water body" refers to any lakes, bays, sounds, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Atlantic Ocean within the territorial limits of the State of South Carolina, and all other bodies of surface or underground water, natural or artificial, public or private, inland or coastal, fresh or salt.

"Regulated Area" refers to the boundaries of Berkeley County's urbanized areas as determined by Decennial Census Data from the United States Bureau of the Census. Regulated Area also includes any portion of the County that is so designated by Berkeley County Council. The Regulated Area designated by Berkeley County Council is established by the map, titled "Berkeley County Regulated Area Map", dated November 24, 2014. This map may be amended from time to time by Berkeley County Council. Any amendments to this map for the purpose of removing properties from annexation do not require the approval of County Council.

"Regulation" means any regulation, rule or requirement prepared by and/or adopted by Berkeley County Council pursuant to this Ordinance.

"Spill" means any accidental or purposeful discharge of any pollutants, hazardous materials, or other substance which is otherwise potentially detrimental to the designated use of a receiving water.

"SWMP" means Berkeley County Stormwater Management Program, which may describe the components to be used by Berkeley County to control stormwater discharges, address flooding, and meet water quality standards discharged from the Berkeley County stormwater management systems and facilities.

"Stormwater" is defined at South Carolina Water Pollution Control Permits Regulation 61-9 122.26(b)(13) and means stormwater runoff, snowmelt runoff, and surface runoff and drainage.

"Stormwater management" means the collection, conveyance, storage, treatment and disposal of stormwater runoff in a manner to meet the objectives of this ordinance and its terms, including, but not limited to, measures that control the increased volume and rate of stormwater runoff and water quality impacts caused by manmade changes to the land.

"Stormwater management systems and facilities" means those natural and man-made channels, swales, ditches, swamps, rivers, streams, creeks, branches, reservoirs, ponds, drainage ways, inlets, catch basins, pipes, head walls, storm sewers, lakes and other physical works, properties, and improvements which transfer, control, convey, or otherwise influence the movement of stormwater runoff, be it for quantity or quality control.

"TMDL" is a Total Maximum Daily Load wasteload allocation designation. It is a regulatory value developed to represent the amount of a pollutant that a waterbody can incorporate while meeting water quality standards. TMDL is further defined as the legal document developed by EPA and SCDHEC designating the pollutant load a permitted discharge is allowed to input into a waterbody. It is a

calculation of the maximum amount of a specific pollutant that a waterbody can receive and still meet water quality standards. It is the sum of the allowable loads or allocations of a given pollutant from all contributing point (wasteload allocation (WLA)) and nonpoint (load allocation (LA)) sources. It also incorporates a margin of safety and consideration of seasonal variation. For an impaired waterbody, the TMDL document specifies the level of pollutant reductions needed for waterbody use attainment. TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure.

"Variance" means the modification of the minimum stormwater management requirements contained in this Ordinance and the SWMP for specific circumstances where strict adherence to the requirements would result in unnecessary hardship and not fulfill the intent of this Ordinance.

"Watercourse" is any natural or man-made conveyance used to transport runoff from one location to the next.

"Watershed" is a drainage area or drainage basin contributing to the flow of stormwater to a single point into a receiving watercourse or water body."

"Waters of South Carolina, or Waters of the State" means lakes, bays, sounds, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Atlantic Ocean within the territorial limits of the State, and all other bodies of surface or underground water, natural or artificial, public or private, inland or coastal, fresh or salt, which are wholly or partially within or bordering the State or within its jurisdiction and all waters of the United States within the political boundaries of the State of South Carolina. Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA are not waters of the South Carolina. This exclusion applies only to manmade bodies of water which neither were originally created in waters of South Carolina (such as disposal areas in wetlands) nor resulted from the impoundment of waters of South Carolina.

"Waters of the United States, or Waters of the U.S." means:

(a) All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
(b) All interstate waters, including interstate "wetlands";
(c) All other waters such as interstate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, wet meadows, or natural ponds the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters:
    (1) Which are or could be used by interstate or foreign travelers for recreational or other purposes;
    (2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
    (3) Which are used or could be used for industrial purposes by industries in interstate commerce;
(d) All impoundments of waters otherwise defined as waters of South Carolina under this definition;
(e) Tributaries of waters identified in paragraphs (a) through (d) of this definition;
(f) The territorial sea; and
(g) Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition.

"Water Quality" means those characteristics of stormwater runoff that relate to the physical, chemical, biological, or radiological integrity of water.

"Water Quantity" means those characteristics of stormwater runoff that relate to the rate and volume of the stormwater runoff.

Section 1.13 Reserved

DIVISION 2
ORGANIZATION AND ADMINISTRATION

Section 2.1 Berkeley County Stormwater Management Program (SWMP)

The SWMP being developed by Berkeley County to implement the purposes of this Ordinance shall serve as the basis for directing Berkeley County's efforts to control stormwater and to comply with all applicable State and federal regulatory and permitting requirements. The SWMP and any modifications and/or revisions to the SWMP are incorporated by reference and is hereby a part of this Ordinance. The SWMP requirements and any modifications and/or revisions to the SWMP are to be complied with and shall be enforced in accordance with the provisions of this Ordinance.

Section 2.2 Coordination with Other Agencies

The County Engineer may coordinate Berkeley County's activities with other federal, State, and local agencies that manage and perform functions relating to the protection of receiving waters through written agreement.

Section 2.3 Right of Entry

(a) The County Engineer or his designee shall have right-of-entry on or upon the property of any person subject to this Ordinance. The County Engineer or his designee shall, upon showing satisfactory credentials, be provided ready access to the necessary parts of the premises for the purposes of inspecting, monitoring, sampling, inventorying, examining and copying of records, and performing any other duties necessary to determine compliance with this Ordinance.

(b) Where the property owner or operator has security measures in force requiring proper identification and clearance before entry onto the premises, the person shall make necessary arrangements with the necessary parties so that, upon presentation of suitable identification, the County Engineer or his designee will be permitted to enter without delay for the purposes of performing such responsibilities identified in (a).

Section 2.4 Reserved

DIVISION 3
STORMWATER QUANTITY AND QUALITY MANAGEMENT REQUIREMENTS

Section 3.1 Regulations

(a) The County Engineer shall be responsible for day to day coordination, implementation, and enforcement of this Ordinance and the SWMP as well as the long-term management of the

County's drainage. Without limitation, the County Engineer shall have the following authority:

(1) To issue any approval, certification, or license that may be required to comply with this Ordinance.

(2) To deny a connection to a Berkeley County stormwater management system or facility, if State requirements and this Ordinance are not met.

(3) To enact and amend the Berkeley County Stormwater Designs Standards Manual (Design Manual). The Design Manual may be used to convey design and engineering standards, construction management processes and procedures, and other aspects necessary for compliance with this Ordinance.

The Design Manual shall be amended by staff with approval of the County Engineer.

(4) To require the submittal of an application for all applicable construction activities that result in construction activities with a land disturbance area of greater than or equal to one (1) acre, or other sites as deemed necessary by the Stormwater Design Standards Manual.

These applications must include a plan to control stormwater pollutants and other components detailed in Berkeley County's Stormwater Design Standards Manual.

(5) To require the development of stormwater management and sediment/erosion control plans for all applicable new and re-development projects and enforcement of these plans.

(6) To approve applicable construction activities and to require as a condition of such approvals, structural or non-structural controls, practices, devices, operating procedures, or other mechanisms to protect public and private property from flooding and erosion and attain TMDL-mandated pollutant load reductions and water quality standards.

(7) To require performance bonds as necessary of any person to secure that person's compliance with approval, certificates, licenses, or authorizations issued by the County Engineer pursuant to this Ordinance, the SWMP and Federal and State laws. The County Engineer shall develop a process that organizes the closure of bonds and construction projects to accommodate development phases and property ownership transfers.

(8) To conduct all activities necessary to carry out the SWMP and other requirements included in this Ordinance, and to pursue the necessary means and resources required to properly fulfill this responsibility.

(9) To require appropriate post construction best management practices and appropriate continued maintenance of those best management practices.

(10) To require maintenance bonds as necessary to ensure the long-term maintenance of stormwater management best management practices.

(11) To determine appropriate fees, to impose penalties, and to take necessary and appropriate actions to enforce this Ordinance.

(12) To require encroachment permits as necessary.

Section 3.2 Prohibitions and Exemptions

No person shall (1) develop any land; (2) engage in any industry or enterprise; (3) construct, operate or maintain any landfill, hazardous waste treatment, disposal or recovery facility, or any other industrial or related facility; (4) dispose of any hazardous material or toxic substance or other pollutant; or (5) otherwise allow the transport of sediment and other pollutants associated with stormwater runoff beyond their property boundaries without having provided for compliance with this Ordinance.

In cases where an imminent threat to the health or safety of the general public or the environment is suspected, the County Engineer or his designee shall perform an assessment to determine if immediate action is necessary. Such assessment may be made with or without the consent of the owner or operator. If such consent is refused, the County Engineer or his designee may utilize the enforcement measures authorized in this Ordinance to remove such threat. In such cases, the owner or operator, as the case may be, shall reimburse the County for its direct and related expenses. If the owner or operator, as the case may be, fails to reimburse the County, the County is authorized to file a lien for said costs against the property, file an action in magistrate or civil court for recovery of incurred expenses, and enforce such actions in magistrate or civil court.

The following development activities are exempt from the provisions of this Ordinance.

(a) Land disturbing activities undertaken on forestland for the production and harvesting of timber and timber products and conducted in accordance with best management practices and minimum erosion protection measures established by the South Carolina Forestry Commission pursuant to Section 48-18-70 of the 1976 Code of Laws of South Carolina, as amended.

(b) Land disturbing activities on agricultural land for production of plants and animals, including but not limited to: forages and sod crops, grains and feed crops, tobacco, cotton, and peanuts; dairy animals and dairy products; poultry and poultry products; livestock, including beef cattle, sheep, swine, horses, ponies, mules, or goats, including the breeding and grazing of these animals; bees, fur animals, and aquaculture. The construction of an agricultural structure that requires the disturbance of one or more acres, such as, but not limited to, broiler houses, machine sheds, repair shops, coops, barns, and other major buildings shall require the submittal and approval of necessary application materials as outlined in the Design Manual prior to the start of the land disturbing activity.

(c) Linear utility installation activities that are covered under their own DHEC approved utility general permit requiring associated assurance of proper stormwater management.

(d) Activities undertaken by persons who are otherwise regulated by the provisions of Chapter 20 Title 48, the South Carolina Mining Act.

(e) Discharges of dredged or fill material into waters of the United States which are regulated under section 404 of the Clean Water Act (CWA).

Section 3.3 Design and Engineering Standards

Design and engineering standards must define the desired level of quality and performance for stormwater management systems on all applicable construction activities in order to meet the purpose

of this Ordinance. The standards establish the minimum technical requirements needed to express compliance through calculations, maps and drawings, or others as necessary.

The County Engineer is authorized to develop and adopt policies, criteria, specifications, and standards for the proper implementation of the requirements of this Ordinance, Federal and State laws, and the SWMP, and to provide a sound technical basis for the achievement of stormwater management, including water quality and quantity objectives. These standards may be presented in the Stormwater Design Standards Manual.

It shall be the responsibility of the property owner, operator, or person responsible for land disturbing activities to provide adequate controls to meet the design and engineering standards.

Section 3.4 Application Approval Process

The entire application process and requirements as described in the Design Manual must be adhered to for all applicable construction activities.

It shall be the responsibility of the applicant (property owner, operator, or person responsible for construction activities) to provide a complete application package that meets the requirements of this Ordinance, the SWMP, and other State and Federal regulations.

Section 3.5 Stormwater Design Standards Manual

The County Engineer is authorized to develop and adopt a Stormwater Design Standards Manual. The Design Manual may include design standards, procedures and criteria for conducting hydrologic, hydraulic, pollutant load evaluations, and downstream impact for all components of the stormwater management system. Although the intention of the manual is to establish uniform design practices, it neither replaces the need for engineering judgment nor precludes the use of information not presented. Other accepted engineering procedures may be used to conduct hydrologic, hydraulic and pollutant load studies if approved by the County Engineer.

The Design Manual, shall contain at a minimum the following components:

(a) Required application and approval procedures for all applicable construction activities;

(b) Construction completion and closeout processes;

(c) Hydrologic, hydraulic, and water quality design criteria (i.e., design standards) for the purposes of controlling the runoff rate, volume, and pollutant load. Suggested reference material shall be included for guidance in computations needed to meet the design standards;

(d) Information and requirements for new and re-development projects in special protection areas necessary to address TMDLs, known problem areas and other areas necessary to protect, maintain, and enhance water quality and the environment of Berkeley County and the public health, safety, and general welfare of the citizens of Berkeley County.

(e) Construction document requirements;

(f) Minimum easement requirements;

(g) Required and recommended inspection schedules and activities for all components of the stormwater management system, including construction-related BMPs.

The Design Manual shall be updated periodically to reflect the advances in technology and experience gathered with time.

Section 3.6 Ownership and Berkeley County Participation

(a) Property owners are responsible for maintaining stormwater quantity and quality facilities and all conveyance structures located on their property. Prior to the issuance of any approval of construction plans or applications required by the Design Manual, the property owner shall execute a legal document entitled "Covenants for Permanent Maintenance of Stormwater Systems". The property owner shall record the Covenants in the Office of the Berkeley County Register of Deeds. The location of the facility, the recorded location of the Covenants document, and a statement of the property owner's responsibility for maintenance shall be included and also shown on a plat. In the case of an operator other than the property owner, a copy of a maintenance agreement between the operator and the property owner shall be included with the Covenants, defining the operators' duties and responsibilities and that the property owner shall be responsible for maintenance activities upon the termination of the agreement.

(b) The property owner shall grant to Berkeley County a perpetual, non-exclusive, transferable easement, beginning or ending at a public street or other access point that allows for public inspection and emergency repair of all components of the drainage system, including all conveyances and all water quantity and quality control facilities. At the request of the County Engineer or his designee, the property owner shall grant to Berkeley County right-of-ways.

(c) Stormwater quantity and quality control facilities shall be located so that required easements can be effectively used and ownership and maintenance responsibility can be clearly defined in deeds and plats.

(d) Berkeley County shall be responsible for maintenance activities for stormwater collection/conveyance systems associated with County accepted public roads and County projects.

(e) For projects that are not County accepted public road projects, Berkeley County may in its sole discretion either accept or decline ownership and maintenance of all or part of a stormwater system.

(f) The minimum maintenance requirements will be performed at necessary intervals by the property owner or operator during construction and for as long as a stormwater management system or component is in use. Failure to perform such activities will constitute a violation of this Ordinance.

(g) If a facility or any portion of the stormwater system is not being maintained as required, the County Engineer or his designee will notify the property owner or operator in writing. If the property owner or operator fails to repair or maintain the facility within the allotted time, the County Engineer may authorize the work to be performed by the County or others. In such cases, the property owner or operator shall reimburse the County for its direct and related expenses. If the property owner or operator fails to reimburse the County, the County is

authorized to file a lien for said costs against the property, file an action in magistrate or civil court for recovery of incurred expenses, and enforce such actions in magistrate or civil court.

(h) A property owner or operator may hire or contract others to perform necessary maintenance actions, but Berkeley County will hold the person named in the Covenants as the responsible party should legal actions described in (g) be necessary.

(i) When the County Engineer or his designee determines that additional storage capacity or pollution reduction beyond that required by the applicant for on-site stormwater management is necessary in order to enhance or provide for the public health, safety and general welfare, to correct unacceptable or undesirable existing conditions or to provide protection in a more desirable fashion for future development, Berkeley County may:

(1) require that the applicant grant any necessary easements over, through or under the applicant's property to provide access to or drainage for such a facility;

(2) require that the applicant obtain from the owners of property over, through or under where the stormwater management facility is to be located, any easements necessary for the construction and maintenance of same;

Section 3.7 Maintenance, Construction, Inspection, and Closeout

Maintenance of the stormwater management system is critical for the achievement of its purpose of controlling stormwater runoff quantity and quality and the short-term and long-term public health, safety, and general welfare of the citizens of Berkeley County.

(a) A maintenance plan for the stormwater management system shall be included as part of the submittal required by the Design Manual to perform a construction activity, and must address activities to be conducted during and after construction. As part of the maintenance plan, the property owner or operator of such facility shall specifically agree, through recordation of Covenants, to be responsible for keeping the system and facilities in working order. The County Engineer shall develop procedures to provide reasonable assurance that maintenance activities are performed for both Berkeley County and privately maintained systems. The County Engineer shall also define procedures for transferring maintenance responsibilities to another entity.

(b) The County Engineer shall define procedures for conducting site inspections during construction and after construction until a stormwater management system or facility is no longer in use. Such inspections may be performed by County staff or an approved inspector. Berkeley County has the authority to levy fees for inspections and re-inspections as described in the Stormwater Design Standards Manual.

(c) As required in the Design Manual, the applicant shall submit his own maintenance and inspection schedules to be implemented during construction and for as long as a stormwater management system or facility is in use. Required and recommended schedules for BMP maintenance and inspection are to be provided in the Design Manual.

(d) If the construction is to be phased, no stage work, related to the construction of stormwater management facilities shall commence until the preceding stage of work is completed in accordance with any approved construction plans or applications required by the Design

Manual. The procedure for construction phases beginning and ending and what constitutes such conditions shall be developed.

(e) The applicant shall notify the County Engineer or his designee before commencing any work and upon completion of any phase or designated component of the site. Notification schedules shall be provided for in the Design Manual. All self-inspections, maintenance actions, BMP replacements, and changes to the approved application shall be documented and presented upon request to the County Engineer or his designee.

(f) The construction project completion and closeout process must be completed prior to any of the following actions, as applicable:

(1) The use or occupancy of any newly constructed components of the site.

(2) Final acceptance of any road into the official Berkeley County road inventory or designation of road owner and associated stormwater management system.

(3) Release of any bond held by Berkeley County.

(4) Approval and/or acceptance for recording of maps, plats, or drawings, the intent of which is to cause a division of a single parcel of land into two or more parcels, and/or acceptable bonding is provided.

Section 3.8 Watercourse Protection

Every person owning or operating property through which a watercourse passes shall keep and maintain that part of the watercourse within the property free of trash, debris, and other obstacles that would pollute, contaminate, or significantly retard the flow of water through the watercourse. In addition, the owner or operator shall maintain existing privately owned structures within or adjacent to a watercourse so that such structures will not become a hazard to the use, function, or physical integrity of the watercourse.

To assist in the compliance with State and Federal laws and regulations, the County Engineer may develop special protection areas which require additional control of stormwater quality and quantity than provided by minimum design standards. Such areas may consist of watersheds corresponding to established TMDLs, known flooding problems and pollution impairments, or other areas necessary to protect, maintain, and enhance water quality and the environment of Berkeley County and the public health, safety, and general welfare of the citizens of Berkeley County. These areas can be expected to change with time as development continues and as federal and state law demands.

New stormwater systems created as the result of any new and re-development project shall be connected to the existing drainage system in a manner so as not to degrade the integrity of the existing system, whether natural or manmade, and shall have demonstrated this prior to project closeout. Discharge points shall be confined to connections with an existing natural or man-made drainage system. When there is a direct stormwater discharge into collection systems not owned and maintained by Berkeley County, the owners of these systems shall maintain the right to disapprove new connections to their system.

Section 3.9 Notification of Spills

Notwithstanding other requirements of law, as soon as any person responsible for a facility or the facility's operation and maintenance, or responsible for emergency response for a facility or operation has information of any known or suspected release of materials which are resulting or may result in illegal discharges or pollutants discharging into stormwater, the storm drain system, or waters of the State, said person shall take all necessary steps to discover, contain, and cleanup any such releases. The person shall also take immediate steps to protect against future recurrences of the discharge. In the event of such a release of hazardous materials, including but not limited to oils, greases, engine fluids and fuels, chemicals, herbicides and pesticides, and fertilizers, said person shall immediately notify all necessary agencies of the occurrence. This shall include E911, Berkeley County Emergency Preparedness, and the County Engineer. Such notifications of hazardous spills shall be confirmed by written notice addressed and mailed to the County Engineer within five (5) business days of the spill event. In the event of a release of non-hazardous materials, said person shall record an on-site written record of the spill. The owner or operator of such facility shall retain an onsite written record of any and all spills that will include information on cleanup measures taken and the actions to prevent its recurrence. Such records shall be retained for at least five (5) years. Failure to provide notification of a release as provided above is a violation of this ordinance.

Section 3.10 Cleanup Procedures

Berkeley County may develop spill procedures on how spills are cleaned up, and who is responsible for the cleanup in terms of the activities to be performed and cost of such actions.

Section 3.11 Reserved

DIVISION 4
DETECTION AND ELIMINATION OF ILLICIT CONNECTIONS AND ILLICIT DISCHARGES AND IMPROPER DISPOSAL

Section 4.1 Illicit Connections, Illicit Discharges, and Improper Disposal

(a) It is unlawful for any person to connect any pipe, open channel, or any other conveyance system that discharges anything except stormwater or other approved discharges into a Berkeley County stormwater management system or waters of the State.

(b) It is unlawful for any person to continue the operation of any such illicit connection regardless of whether the connection was permissible when constructed. Improper connections in violation of this ordinance must be disconnected and redirected, if necessary, to the satisfaction of the County Engineer or his designee and any other federal, state, or local agencies or departments regulating the discharge.

(c) It is unlawful for any person to throw, drain, or otherwise discharge to a Berkeley County stormwater management system or facility or to waters of the State or to cause, permit, or allow a discharge that is composed of anything except stormwater or unpolluted water which is approved by the County Engineer.

(d) The County Engineer shall develop procedures for detecting, tracking, and eliminating illicit discharges and improper disposals to the stormwater system.

(e) The County Engineer or his designee may require controls for or exempt the following discharges from the prohibition provision in (a), (b), and (c) above, provided that a reasonable determination is made that they are not a significant source of pollution:

(1) Unpolluted industrial cooling water, but only under the authorization and direction of the County Engineer or his designee and if an appropriate Industrial NPDES permit is in place.

(2) Water line flushing, diverted stream flows, rising ground waters, and uncontaminated pumped ground waters, and uncontaminated ground water infiltration.

(3) Discharges from potable water sources, foundation drains, air conditioning condensation, landscape irrigation, springs, water from crawl space pumps, footing drains, lawn watering, individual car washing, dechlorinated swimming pool discharges, flows from riparian habitats and wetlands, and street wash water.

(4) Discharges or flows from fire fighting.

(f) The County Engineer may develop procedures for allowing other non-stormwater discharges.

Section 4.2 Detection of Illicit Connections, Illicit Discharges, and Improper Disposal

(a) The County Engineer shall take appropriate steps to detect and eliminate illicit connections and illicit discharges to Berkeley County stormwater management systems and facilities, including the adoption of a program to screen illicit discharges and identify their source or sources, perform inspections, and levy fines if not removed.

(b) County staff shall take appropriate steps to detect and eliminate improper disposal. These steps may include programs to screen for disposal, programs to provide for public education and public information, inspection, levying fines, and other appropriate activities to facilitate the proper management and elimination of improper disposal.

Section 4.3 Waste Disposal Prohibitions

No person shall throw, deposit, leave, maintain, keep, or permit to be thrown, deposited, left, or maintained, in or upon any public or private property, driveway, parking area, street, alley, sidewalk, component of the storm drain system, or waters of the State, any refuse, rubbish, garbage, litter, pet fecal matter, or other discarded or abandoned objects, articles, and accumulations, so that the same may cause or contribute to pollution. Yard debris, including natural foliage, may be deposited in the public right of way but not in or on any stormwater conveyance structures, including inlets and gutters, but only if a collection service is available. Wastes in proper waste receptacles may be placed in the street for collection, but again only if collection by or through Berkeley County is in place. No waste or yard debris shall be placed in the street without such a collection service.

Section 4.4 Reserved

DIVISION 5
MONITORING AND INSPECTIONS

Section 5.1 Monitoring

The County staff may monitor the quantity and concentration of pollutants in stormwater discharges from the areas and/or locations designated in Berkeley County's SWMP.

Section 5.2 Inspections

(a) The County Engineer or his designee, bearing proper credentials and identification, may enter and inspect all properties for regular inspections, periodic investigations, monitoring, observation measurement, enforcement, sampling and testing, to effectuate the provisions of this ordinance and the SWMP programs. Such inspections may be made at active construction sites or at any stormwater management system or facility in perpetuity. The County Engineer or his designee shall duly notify the owner of said property or the representative on site and the inspection shall be conducted at reasonable times.

(b) Upon refusal by any property owner to permit an inspector to enter or continue an inspection, the inspector shall terminate the inspection or confine the inspection to the areas where no objection is raised. The County Engineer or his designee shall document the refusal and the grounds for such and promptly seek appropriate compulsory process.

(c) In the event that the County Engineer or his designee reasonably believes that discharges from the property into a Berkeley County stormwater management system or facility may cause an imminent and substantial threat to human health or the environment, the inspection may take place at any time and without notice to the owner of the property or a representative on site. The inspector shall present proper credentials upon reasonable request by the owner or representative.

(d) Inspection reports shall be maintained in a file located in the Engineering Department's office.

(e) At any time during an inspection or at such other times as the County Engineer or his designee may request information from an owner or representative, the owner or representative may identify areas of his facility or establishment, material, or processes that contain or might reveal a trade secret. If the County Engineer or his designee has no clear and convincing reason to question such identification, all material, processes and information obtained within such areas shall be conspicuously labeled "CONFIDENTIAL -- TRADE SECRET." The trade secret designation shall be freely granted to any material claimed to be such by the owner or representative unless there is clear and convincing evidence for denying such designation. In the event the County Engineer or his designee does not agree with the trade secret designation, the material shall be temporarily designated a trade secret and the owner or representative may request an appeal of the Engineering Department's decision in the manner in which all such appeals are handled in this ordinance.

Section 5.3 Reserved

DIVISION 6
ENFORCEMENT, PENALTIES, AND ABATEMENT

Section 6.1 Enforcement

(a) The County Engineer or his designee may initiate an enforcement action when violations of this Ordinance occur, including:

(1) When the County Engineer or his designee finds that work done for new development and re-development fails to conform to any approved applications or plans as required by the Design Manual, or finds that the approved work has not been done;
(2) When the County Engineer or his designee determines that an owner or operator has failed to maintain a stormwater management facility;

(3) When the County Engineer or his designee determines that an owner of any property is causing or partially causing flooding, erosion, or non-compliance with water quality standards or this Ordinance.

(b) The County Engineer or his designee shall direct conformity to approvals and this Ordinance by written Notice of Violation (NOV). The NOV shall serve as a legal requirement to remove the violation(s). The written NOV shall be provided to the owner or the person responsible for land disturbing activities, illicit connections, illicit discharges, and improper disposals, stating the nature of the violation, the amount of time in which to correct deficiencies, the date on which an inspection will be made to make sure that corrective action has been performed, and the proposed penalty structure if corrective action is not taken by the inspection date. It shall be sufficient notification to deliver the notice to the person to whom it is addressed, or to deposit a copy of such in the United States Mail, properly stamped, certified and addressed to the address used for tax purposes or the address provided on submittals required by the Design Manual. The NOV may address the entire site or a specific portion of the site so as not to unduly impede the development of areas being managed for the control of stormwater runoff and associated pollutants.

(c) After the issuance of the NOV, the County Engineer or his designee is hereby given the authority to proceed with enforcement actions which may include:

(1) Issuing a written order to comply, to suspend work, or to revoke the approval issued;

(2) Seeking redress through legal action;

(3) Withholding the release of permanent electric power to the site or certificate of occupancy;

(4) Withholding or revoking other permits related to the site; and/or

(5) Levying fines.

(d) The County Attorney is hereby directed to take all legal actions necessary to correct situations described in (a), (b) and (c), including actions that are necessary to remove from the property such objectionable conditions constituting non-compliance with this Ordinance.

(e) Nothing contained in this Ordinance shall impair the right or ability of the County Attorney to exercise any and all other remedies available, of-law or in equity, including without limitation, the pursuit of injunctive relief, under emergency circumstances where there exists the danger of bodily injury or death.

(f) The authorized enforcement agency or its appointed agent may obtain injunctive relief to enjoin violations of the provisions of this Ordinance, and any person damaged as a result of

such violations may, upon a proper showing of such damages, obtain payment therefore by a civil action.

(g) This Ordinance may be enforced by any other remedy of law or equity that the County Attorney is authorized to pursue, to include the authorities and powers conferred to local governments by the General Assembly of South Carolina. The penalties and other remedies provided in this Ordinance are cumulative and not exclusive, and may be independently and separately pursued against the same person for the activity constituting a violation of this Ordinance. The enforcement of any remedy provided herein shall not prevent the enforcement of any other remedy or remedies in other provisions of this Code or other laws and regulations.

Section 6.2 Fines

Any person violating any provision of this ordinance shall be subject to a fine of not more than one thousand dollars ($1,000) for each violation. Each separate day of violation constitutes a new and separate violation. Notice of civil penalty shall be provided via the issuance of a uniform summons.

Section 6.3 Additional Legal Measures

(a) Where Berkeley County is fined and/or placed under a compliance schedule by the State or federal government for a violation(s) of its NPDES permit, and Berkeley County can identify the person(s) who caused such violation(s) to occur, Berkeley County may pass through the penalty and cost of compliance to that person(s).

(b) The County Attorney may institute injunctive, mandamus or other appropriate action or proceedings at law or equity, including criminal conviction, for the enforcement of this Ordinance or to correct violations of this Ordinance, and any court of competent jurisdiction shall have the right to issue restraining orders, temporary or permanent injunctions, mandamus or other appropriate forms of remedy or relief.

Section 6.4 Criminal Penalties

In addition to any applicable civil penalties, any person who willfully, with wanton disregard, or intentionally violates any provision of this Ordinance shall be guilty of a misdemeanor and upon conviction shall pay a fine of not more than $500.00 or imprisoned for not more than thirty (30) days. Each day of violation shall constitute a new and separate offense.

Section 6.5 Corrective Action

In the event a violation of this Ordinance has not been corrected within the applicable time period for correction, Berkeley County, or its contractor, may enter upon the lot or parcel of land and correct the violation, and the costs incurred as a result of such action (including inspection, administration, labor and equipment costs) shall be collected from the bond, if in place and sufficient to cover such costs, or shall become a lien upon the property and shall be collected in the same manner as Berkeley County taxes are collected.

Section 6.6 Stop Work Order

The County Engineer, his designee, or other authorized personnel may issue a stop work order if it is found that a construction activity is being conducted in violation of this Ordinance.

The stop work order may allow or require correction of Notice of Violation (NOV) issues, but shall otherwise stop all other construction related activities. A stop work order may carry with it civil penalties as well. Any person in violation of a stop work order is subject to payment of all fees, bonds, and penalties prior to the lifting of the stop work order.

Section 6.7 Approval Suspension and Revocation

Any approved plans or applications required by the Design Manual may be suspended or revoked if one or more of the following violations have been committed:

(a) Violations of the conditions in any approved plans or applications required by the Design Manual;

(b) Construction is not in accordance with the approved plans;

(c) Non-compliance with correction notice(s) or stop work order(s);

(d) The existence of an immediate danger to a downstream area (in the judgment of the County Engineer or his designee);

(e) Other violations of this Ordinance.

Section 6.8 Reserved

DIVISION 7
VARIANCES

Section 7.1 Variance Criteria

The County Engineer may grant a variance only upon a determination that:

(a) The variance will not be detrimental to the public health, safety, and general welfare of the County, and

(b) The variance will not adversely affect the reasonable development of adjacent property, and

(c) The variance is justified because of topography or other special conditions unique to the property involved, and the variance is not requested due to mere inconvenience or financial disadvantage, and

(d) The variance is consistent with the objectives of this Ordinance and will not have the effect of nullifying the intent or purpose of this Ordinance, or any other pertinent County or State regulations.

A written request for a variance shall be required and shall state the specific variance sought and the reasons, with supporting data, a variance should be granted. The request shall include all information necessary to evaluate the proposed variance.

Section 7.2 Reserved

DIVISION 8
APPEALS

Section 8.1 Appeals Process

Any person aggrieved by a decision, Notice of Violation, or denial of a variance by the County Engineer or his designee may appeal the same by filing a written notice of appeal with the Berkeley County Council within fifteen (15) days of the issuance of said decision, Notice of Violation, or denial of a variance. The Berkeley County Council will review the appeal and will either reverse or preserve the previous decision. In either case, a notice of appeal from the Berkeley County Council will state the reason for their appeal decision.

The Berkeley County Council shall hear such appeals in a quasi-judicial capacity within forty-five (45) days, at the next regularly scheduled meeting or such other time as may be mutually agreed upon and will render a decision within ten (10) working days after the appeal has been heard.

If Berkeley County Council fails or neglects to repeal the said decision, Notice of Violation, or denial of a variance within sixty (60) days of the appeal request, the appeal of the said decision, Notice of Violation, or denial of a variance is automatically granted.

Any person aggrieved by the decision of the Berkeley County Council may appeal the decision to the Berkeley County Circuit Court in accordance with its rules and procedures.

Section 8.2 Reserved

DIVISION 9
CHARGES AND FEES

Section 9.1 Stormwater Management Utility Fee

Berkeley County has implemented a Stormwater Management Utility and established Stormwater Management Utility Fees and Classifications to help fund implementation of this Stormwater Management Ordinance and its associated programs.

Section 9.2 Stormwater Plan Review Fee

Costs associated with stormwater plan review of land development construction documents other than those routinely performed by the County staff will be assessed a fee to compensate for the cost in labor, equipment, and materials expended in the conduct of the review. Stormwater plan review fees have been established by Resolution and revision of such fees shall be approved by Berkeley County Council.

Section 9.3 Stormwater Inspection Fee

Costs associated with stormwater inspection and re-inspections for land development or construction activities other than those routinely performed by the County Staff as part of compliance monitoring will be assessed a fee to compensate for the cost in labor, equipment, and materials expended in the conduct of the inspection. In addition, post-construction maintenance inspection fees may be assessed by the County Engineer. Stormwater inspection and re-inspection fees have been established by Resolution and revision of such fees shall be approved by Berkeley County Council.

Section 9.4 Connection to Conveyances

The County shall have the right to establish a schedule of appropriate fees for any person or property owner establishing a new discharge to Berkeley County stormwater management systems or facilities. Application fees shall be established on the basis of facility classes relating to the quantity and quality of approved discharge. Establishment and revision of such fees shall be established by Resolution and revision of such fees shall be approved by Berkeley County Council

Section 9.5 Reserved

14-11-36

THE WITHIN ORDINANCE SHALL BECOME EFFECTIVE IMMEDIATELY UPON ITS ADOPTION BY BERKELEY COUNTY COUNCIL.

ADOPTED this 24th day of **November 2014.**

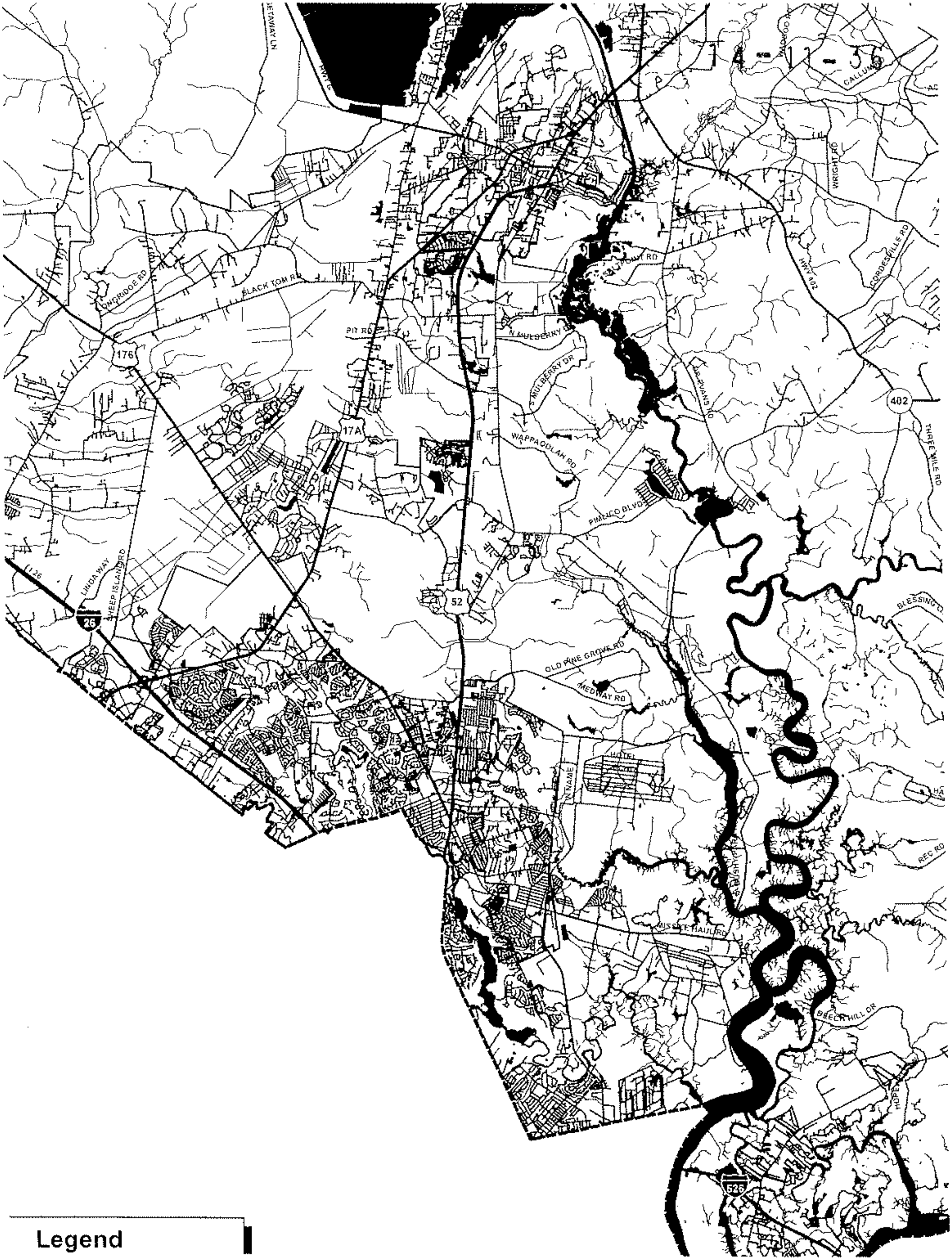
BERKELEY COUNTY, SOUTH CAROLINA

DANIEL W. DAVIS, CHAIRMAN
Berkeley County Council

Attest:

Catherine R. Windham
Clerk of County Council

First Reading:	September 22, 2014
Second Reading:	October 27, 2014
Public Hearing:	November 24, 2014
Third Reading:	November 24, 2014


HWY 6
BLACK TOM RD
PIT RD
N MULBERRY
S MULBERRY DR
WRIGHT RD
HWY 402
CORDESVILLE RD
176
17A
402
WAPPAOOLAH RD
PIMLICO BLVD
THREE MILE RD
LINDA WAY
SHEEP ISLAND RD
126
26
52
OLD PINE GROVE RD
MEDWAY RD
REC RD
BEECH HILL DR
526

Legend

14-11-36

MEMBERS OF COUNTY COUNCIL

PHILLIP FARLEY Voting YES

DENNIS L. FISH Voting YES

TIMOTHY J. CALLANAN Voting YES

JACK H. SCHURLKNIGHT Voting YES

KENNETH E. GUNN, JR. Voting YES

CALDWELL PINCKNEY, JR. Voting

CATHY S. DAVIS Voting

STEVE C. DAVIS Voting

Annual Report Appendix B: Water Quality Monitoring Data

N/A – Berkeley County, City of Goose Creek & City of Hanahan
are not conducting water quality monitoring

Annual Report Appendix C: Revised/Updated Monitoring and Assessment Plan

N/A – Berkeley County, City of Goose Creek & City of Hanahan
don't have updates or revisions

Annual Report Appendix D: Implementation Schedule

SWMP Requirements					
Measure	Section	Brief Description	Start Date	Deadline	Frequency
SWMP	4.1.2	Develop and Implement SWMP	January 1, 2014	July 1, 2014	Once during permit term
Ordinance	4.1.3	Update Stormwater Management Ordinance	July 1, 2014	January 1, 2015	Once during permit term
Enforcement	4.1.5	Implement an Enforcement Response Plan (ERP)	July 1, 2014	January 1, 2015	Once during permit term
1st Report	5.3	Complete 1st year Report	n/a	January 1, 2015	Once during permit term
		Complete 2nd year Report	n/a	January 1, 2016	
		Submit 1st Report (covering years 1 and 2)	n/a	April 01, 2016	
TMDL Monitoring and Assessment	3.2	Complete and Submit TMDL Monitoring and Assessment Plan for New TMDLs		12 months, effective date of TMDL	Once during permit term
TMDL Monitoring/ Sampling	3.2.1.2.1	Initiate Sampling for New TMDLs			
TMDL Implementation and Analysis	3.3	Complete and Submit TMDL Implementation and Analysis Plan for New TMDLs		48 months, effective date of TMDL	Once during permit term
2nd Report	5.3	Complete 3rd year Report	n/a	January 1, 2017	Once during permit term
		Complete 4th year Report		January 1, 2018	
		Submit 2nd Report (covering years 3 and 4)		July 4, 2018	
NOI	2.5	Deadline to submit a re-application	n/a	July 4, 2018	Once during permit term

Minimum Control Measure Requirements Year 1 – 2014					
Measure	Section	Brief Description	Start Date	Deadline	Frequency
PEO	4.2.1.1 & 4.2.1.1.3	Continue Carolina Clear Contract and Support Ashley-Cooper Stormwater Consortium		Throughout permit term	Ongoing
PIP	4.2.2.1.1	Continue Carolina Clear Contract		Throughout permit term	Ongoing
PIP	4.2.2.1.2	Provide Access to Information for the SWMP	July 1, 2014	January 1, 2015	Once during permit term
IDDE	4.2.3.2.1	Update Storm Sewer Map		January 1, 2015	Annually
IDDE	4.2.3.2.2	Identify Priority Areas	July 1, 2014	January 1, 2015	Annually
IDDE	4.2.3.2.2.a.i	Identify Screening Points	July 1, 2014	January 1, 2015	Annually
IDDE	4.2.3.2.4/5/8	Review/Update SOP for Field Screening Procedures	July 1, 2014	January 1, 2015	Once during permit term
IDDE	4.2.3.2.4/5/8	Review/Update SOP for Illicit Tracking Procedures	July 1, 2014	January 1, 2015	Once during permit term
IDDE	4.2.3.2.5/6/7/8	Conduct Field Screening of Outfalls to Detect Illicit Discharges		Throughout permit term	Ongoing
		Conduct Tracking of Illicit Discharges			
		Determine and Document Source of Illicit Discharges			
		Corrective Action to Eliminate Illicit Discharge			
IDDE	4.2.3.2.8	Develop spill response procedure	July 1, 2014	January 1, 2015	Once during permit term
		Establish hotline for reporting illicit discharge			
IDDE	4.2.3.2.9	Provide Employee Training		Throughout permit term	Annually
CSR	4.2.4.4.2/3/4	Update Stormwater Management Design Standards	July 1, 2014	January 1, 2015	Once during permit term
CSR	4.2.4.5	Update Stormwater Management Design Standards to Develop SWP3 Plan Review Procedures	July 1, 2014	January 1, 2015	Once during permit term
		Review SWP3 Plan		Throughout permit term	Ongoing

CSR	4.2.4.6	Develop Inventory of all Permitted Construction Sites and Update Inventory		January 1, 2015	Ongoing
CSR	4.2.4.6.(b-d)	Update Stormwater Management Design Standards for Site Inspection Procedures	July 1, 2014	January 1, 2015	Once during permit term
		Inspect all Phases of Construction		Throughout permit term	Ongoing
		Documentation and Tracking of all Inspections			
CSR	4.2.4.7	Develop Section of ERP for Construction Activities	July 1, 2014	January 1, 2015	Once during permit term
		Pursue Enforcement Action to Correct Violation		Throughout permit term	Ongoing
CSR	4.2.4.7 4.2.4.4.1	Update Stormwater Management Ordinance	July 1, 2014	January 1, 2015	Once during permit term
CSR	4.2.4.8	Train MS4 Staff		January 1, 2015	Ongoing
PCR	4.2.5.1/2/3	Update Stormwater Management Design Standards to Update Water Quality Design Requirements/Site Performance Standards and Post Construction Site Plan Review	July 1, 2014	January 1, 2015	Once during permit term
		Review Plans for Compliance		Throughout permit term	Ongoing
PCR	4.2.5.4	Review and Update Long Term Maintenance Requirements	July 1, 2014	January 1, 2015	Update as needed
		Develop Maintenance Verification Process			
PCR	4.2.5.5	Develop a Post Construction BMP Inventory and Update Inventory	July 1, 2014	January 1, 2015	Ongoing
PCR	4.2.5.6	Develop Procedures and Forms for Post-Construction BMP Installation Inspection	July 1, 2014	January 1, 2015	Once during permit term
		Conduct Post-construction BMP Inspections on County Permitted Post-construction BMPs within 30 days of Construction Completion		Throughout permit term	Once
		Conduct Post-construction BMP Inspections on County Permitted Post-construction BMPs after NOT is Received.		Throughout permit term	At least one time during permit term
		Document and Maintain Records of Inspection Findings and Enforcement Actions.		Throughout permit term	Ongoing

PP&GH	4.2.6.1	Develop Inventory of County Owned/Operated Non-permitted Facility Develop a list of County Owned Facilities Covered Under Separate NPDES Permit	July 1, 2014	January 1, 2015	Once during permit term
PP&GH	4.2.6.5	Conduct Employee Training		January 1, 2015	Annually
PP&GH	4.2.6.5	Create a list of Employees Identified for PP&GH Training		January 1, 2015	Annually

Year 2 – 2015					
Measure	Section	Brief Description	Start Date	Deadline	Frequency
PEO	4.2.1.1	Continue Carolina Clear Contract and Ashley-Cooper Stormwater Consortium	January 1, 2015	January 1, 2016	Annually
PEO	4.2.1.1.3	Sponsor/Support Community Events	January 1, 2015	January 1, 2016	Annually
PEO	4.2.1.1.7	Distribute Campaign Materials	January 1, 2015	January 1, 2016	Annually
PIP	4.2.2.1.1	Sponsor/Support Citizen Participation Events	January 1, 2015	January 1, 2016	Annually
IDDE	4.2.3.2.1	Update Storm Sewer Map		January 1, 2015	Annually
IDDE	4.2.3.2.3.a	Conduct Field Screening of Year 2 Screening Points	January 1, 2015	January 1, 2016	Annually
IDDE	4.2.3.2.4/5	Conduct Illicit Tracking of Year 2 Potential Illicit Discharges	January 1, 2015	January 1, 2016	As Needed
IDDE	4.2.3.2.5/6	Document Illicit Discharges	January 1, 2015	January 1, 2016	As Needed
IDDE	4.2.3.2.2	Identify Year 3 Priority Areas	January 1, 2015	January 1, 2016	Annually
IDDE	4.2.3.2.2.a.i	Identify Year 3 Screening Points	January 1, 2015	January 1, 2016	Annually
IDDE	4.2.3.2.9	Provide Employee Training	January 1, 2015	January 1, 2016	Annually
CSR	4.2.4.4.5.f	Develop SWP3 Review Procedures for Discharges to Impaired Waters	July 1, 2014	January 1, 2016	Once during permit term
CSR	4.2.4.6.a	Maintain Site Inspection Inventory	January 1, 2015	January 1, 2016	Annually
CSR	4.2.4.9	Construction Operator Training	January 1, 2015	January 1, 2016	Annually
CSR	4.2.4.4.3	Update Pollution Prevention Requirements	January 1, 2015	January 1, 2016	Once during permit term
CSR	4.2.4.4.5.b/c	Revise SWP3 Submittal and Review Requirements	January 1, 2015	January 1, 2016	Once during permit term
CSR	4.2.4.6.a	Modify Site Inspection Inventory	January 1, 2015	January 1, 2016	Once during permit term
CSR	4.2.4.6.a	Maintain Site Inspection Inventory	January 1, 2015	January 1, 2016	Annually
CSR	4.2.4.6.b-d	Develop/Modify Site Inspection Procedures	January 1, 2015	January 1, 2016	Once during permit term
CSR	4.2.4.9.b	Develop Public Involvement Procedures	January 1, 2015	January 1, 2016	Once during permit term
PCR	4.2.5.6.2	Develop Post Construction BMP Installation Inspection Procedures	July 1, 2014	January 1, 2016	Once during permit term
PCR	4.2.5.6.1	Develop Post Construction BMP Maintenance Inspection Procedures	July 1, 2014	January 1, 2016	Once during permit term
PCR	4.2.5.2	Develop/Modify Site Performance Standards	July 1, 2014	January 1, 2016	Once during permit term

PCR	4.2.5.5	Update Post Construction BMP Inventory	January 1, 2015	January 1, 2016	Annually
Measure	Section	Brief Description	Start Date	Deadline	Frequency
PCR	4.2.5.6.2	Conduct and Document Post Construction BMP Installation Inspections	January 1, 2015	January 1, 2016	As Needed
PCR	4.2.5.6.1	Conduct and Document Post Construction BMP Maintenance Inspections	January 1, 2015	January 1, 2016	Annually
PP&GH	4.2.6.2.1	Assessment of Non Permitted Municipal Facilities	January 1, 2015	October 31, 2015	Once during permit term
PP&GH	4.2.6.2.1	Document Results for Facility Evaluations	January 1, 2015	October 31, 2015	Once during permit term
PP&GH	4.2.6.2.1	Identify High Priority Facilities	November 1, 2015	January 1, 2016	Once during permit term
PP&GH	4.2.6.3	Create Inspection Report Template for High Priority Facilities	January 1, 2015	January 1, 2016	Once during permit term
PP&GH	4.2.6.4.2	Implement Pollution Prevention Measures for Operation and Maintenance Activities	June 1, 2015	January 1, 2016	Annually
PP&GH	4.2.6.4.3	Inspect County-Owned Structural Controls	January 1, 2015	April 31, 2015	Annually
PP&GH	4.2.6.4.3	Maintain County-Owned Structural Controls	May 1, 2015	January 1, 2016	Annually
PP&GH	4.2.6.5	Conduct PP&GH Training	January 1, 2015	January 1, 2016	Annually
Year 3 – 2016					
Measure	Section	Brief Description	Start Date	Deadline	Frequency
PEO	4.2.1.1	Continue Carolina Clear Contract and Ashley-Cooper Stormwater Consortium	January 1, 2016	January 1, 2017	Annually
PEO	4.2.1.1.3	Sponsor/Support Community Events	January 1, 2016	January 1, 2017	Annually
PEO	4.2.1.1.7	Distribute Campaign Materials	January 1, 2016	January 1, 2017	Annually
PEO	4.2.1.1.8	Assess the PEO Plan	January 1, 2016	June 30, 2016	Annually
PEO	4.2.1.1.8	Develop Annual Adjustments for the PEO Plan	July 1, 2016	January 1, 2017	Annually
PIP	4.2.2.1.1	Sponsor/Support Citizen Participation Events	January 1, 2016	January 1, 2017	Annually
IDDE	4.2.3.2.1	Update Storm Sewer Map	January 1, 2016	January 1, 2017	Annually
IDDE	4.2.3.2.3.a	Conduct Field Screening of Year 3 Screening Points	January 1, 2016	January 1, 2017	Annually
IDDE	4.2.3.2.4/5	Conduct Illicit Tracking of Year 3 Potential Illicit Discharges	January 1, 2016	January 1, 2017	As Needed
IDDE	4.2.3.2.5/6	Document Illicit Discharges	January 1, 2016	January 1, 2017	As Needed

Measure	Section	Brief Description	Start Date	Deadline	Frequency
IDDE	4.2.3.2.2	Identify Year 4 Priority Areas	January 1, 2016	January 1, 2017	Annually
IDDE	4.2.3.2.2.a.i	Identify Year 4 Screening Points	January 1, 2016	January 1, 2017	Annually
IDDE	4.2.3.2.3b	Conduct Field Screening Assessment	January 1, 2016	January 1, 2017	Once during permit term
IDDE	4.2.3.2.9	Provide Employee Training	January 1, 2016	January 1, 2017	Annually
CSR	4.2.4.6.a	Maintain Site Inspection Inventory	January 1, 2016	January 1, 2017	Annually
CSR	4.2.4.9	Construction Operator Training	January 1, 2016	January 1, 2017	Annually
PCR	4.2.5.5	Update Post Construction BMP Inventory	January 1, 2016	January 1, 2017	Annually
PCR	4.2.5.6.2	Conduct Post Construction BMP Installation Inspections	January 1, 2016	January 1, 2017	Annually
PCR	4.2.5.6.1	Conduct Post Construction BMP Maintenance Inspections	January 1, 2016	January 1, 2017	Annually
PP&GH	4.2.6.3	Conduct and Document High Priority Facility Inspections.	January 1, 2016	January 1, 2017	Annually
PP&GH	4.2.6.4.1	Prioritize MS4 Stormwater System	January 1, 2016	July 1, 2016	Once during permit term
PP&GH	4.2.6.4.1	Develop and Implement Maintenance Schedule for Stormwater System	January 1, 2016	July 1, 2016	Once during permit term
PP&GH	4.2.6.4.2	Continue to Implement Pollution Prevention Measures for O&M Activities	January 1, 2016	January 1, 2017	Annually
PP&GH	4.2.6.4.3	Inspect County-Owned Structural Controls	January 1, 2016	April 31, 2016	Annually
PP&GH	4.2.6.4.3	Maintain County-Owned Structural Controls	May 1, 2016	January 1, 2017	Annually
PP&GH	4.2.6.5	Conduct PP&GH Training	January 1, 2016	January 1, 2017	Annually
Year 4 – 2017					
Measure	Section	Brief Description	Start Date	Deadline	Frequency
PEO	4.2.1.1	Continue Carolina Clear Contract and Ashley-Cooper Stormwater Consortium	January 1, 2017	January 1, 2018	Annually
PEO	4.2.1.1.3	Sponsor/Support Community Events	January 1, 2017	January 1, 2018	Annually
PEO	4.2.1.1.7	Distribute Campaign Materials	January 1, 2017	January 1, 2018	Annually
PEO	4.2.1.1.8	Assess the PEO Plan	January 1, 2017	June 30, 2017	Annually
PEO	4.2.1.1.8	Develop Annual Adjustments for the PEO Plan	July 1, 2017	January 1, 2018	Annually
PIP	4.2.2.1.1	Sponsor/Support Citizen Participation Events	January 1, 2017	January 1, 2018	Annually

IDDE	4.2.3.2.1	Update Storm Sewer Map	January 1, 2017	January 1, 2018	Annually
IDDE	4.2.3.2.3.a	Conduct Field Screening of Year 4 Screening Points	January 1, 2017	January 1, 2018	Annually
IDDE	4.2.3.2.4/5	Conduct Illicit Tracking of Year 4 Potential Illicit Discharges	January 1, 2017	January 1, 2018	As Needed
IDDE	4.2.3.2.5/6	Document Illicit Discharges	January 1, 2017	January 1, 2018	As Needed
Measure	Section	Brief Description	Start Date	Deadline	Frequency
IDDE	4.2.3.2.2	Identify Year 5 Priority Areas	January 1, 2017	January 1, 2018	Annually
IDDE	4.2.3.2.2.a.i	Identify Year 5 Screening Points	January 1, 2017	January 1, 2018	Annually
IDDE	4.2.3.2.9	Provide Employee Training	January 1, 2017	January 1, 2018	Annually
CSR	4.2.4.6.a	Maintain Site Inspection Inventory	January 1, 2017	January 1, 2018	Annually
CSR	4.2.4.9	Construction Operator Training	January 1, 2017	January 1, 2018	Annually
PCR	4.2.5.5	Update Post Construction BMP Inventory	January 1, 2017	January 1, 2018	Annually
PCR	4.2.5.6.2	Conduct Post Construction BMP Installation Inspections	January 1, 2017	January 1, 2018	Annually
PCR	4.2.5.6.1	Conduct Post Construction BMP Maintenance Inspections	January 1, 2017	January 1, 2018	Annually
PP&GH	4.2.6.3	Conduct High Priority Facility Inspections.	January 1, 2017	January 1, 2018	Annually
PP&GH	4.2.6.4.2	Continue to Implement Pollution Prevention Measures for O&M Activities	January 1, 2017	January 1, 2018	Annually
PP&GH	4.2.6.4.3	Inspect County-Owned Structural Controls	January 1, 2017	April 31, 2017	Annually
PP&GH	4.2.6.4.3	Maintain County-Owned Structural Controls	May 1, 2017	January 1, 2018	Annually
PP&GH	4.2.6.5	Conduct PP&GH Training	January 1, 2017	January 1, 2018	Annually
Year 5 – 2018					
Measure	Section	Brief Description	Start Date	Deadline	Frequency
PEO	4.2.1.1	Continue Carolina Clear Contract and Ashley-Cooper Stormwater Consortium	January 1, 2018	January 1, 2019	Annually
PEO	4.2.1.1.3	Sponsor/Support Community Events	January 1, 2018	January 1, 2019	Annually
PEO	4.2.1.1.7	Distribute Campaign Materials	January 1, 2018	January 1, 2019	Annually
PEO	4.2.1.1.8	Assess the PEO Plan	January 1, 2018	June 30, 2018	Annually
PEO	4.2.1.1.8	Develop Annual Adjustments for the PEO Plan	July 1, 2018	January 1, 2019	Annually

PIP	4.2.2.1.1	Sponsor/Support Citizen Participation Events	January 1, 2018	January 1, 2019	Annually
IDDE	4.2.3.2.1	Update Storm Sewer Map	January 1, 2018	January 1, 2019	Annually
IDDE	4.2.3.2.3.a	Conduct Field Screening of Year 5 Screening Points	January 1, 2018	June 30, 2018	Annually
IDDE	4.2.3.2.4/5	Conduct Illicit Tracking of Year 5 Potential Illicit Discharges	January 1, 2018	January 1, 2019	As Needed
IDDE	4.2.3.2.5/6	Document Illicit Discharges	January 1, 2018	January 1, 2019	As Needed
IDDE	4.2.3.2.9	Provide Employee Training	January 1, 2018	January 1, 2019	Annually
CSR	4.2.4.6.a	Maintain Site Inspection Inventory	January 1, 2018	January 1, 2019	Annually
Measure	Section	Brief Description	Start Date	Deadline	Frequency
CSR	4.2.4.9	Construction Operator Training	January 1, 2018	January 1, 2019	Annually
PCR	4.2.5.5	Update Post Construction BMP Inventory	January 1, 2018	January 1, 2019	Annually
PCR	4.2.5.6.2	Conduct Post Construction BMP Installation Inspections	January 1, 2018	January 1, 2019	Annually
PCR	4.2.5.6.1	Conduct Post Construction BMP Maintenance Inspections	January 1, 2018	January 1, 2019	Annually
PP&GH	4.2.6.3	Conduct High Priority Facility Inspections.	January 1, 2018	January 1, 2019	Annually
PP&GH	4.2.6.4.2	Continue to Implement Pollution Prevention Measures for O&M Activities	January 1, 2018	January 1, 2019	Annually
PP&GH	4.2.6.4.3	Inspect County-Owned Structural Controls	January 1, 2018	April 31, 2018	Annually
PP&GH	4.2.6.4.3	Maintain County-Owned Structural Controls	May 1, 2018	January 1, 2019	Annually
PP&GH	4.2.6.5	Conduct PP&GH Training	January 1, 2018	January 1, 2019	Annually

Annual Report Appendix E: ACSEC Annual Reports

ASHLEY COOPER
STORMWATER EDUCATION CONSORTIUM




Annual Report of Activities

YEAR 10 / JANUARY 2018 - DECEMBER 2018

MARCH 2019

Carolina CLEAR
A Service of Clemson Extension

CLEMSON
COOPERATIVE EXTENSION

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ASHLEY COOPER
STORMWATER EDUCATION CONSORTIUM

Executive Summary

The Ashley Cooper Stormwater Education Consortium's Year Ten Annual Report of Activities summarizes outreach and involvement programming offered by the Ashley Cooper Stormwater Education Consortium (ACSEC) community and education partners in 2018. The ACSEC implements a region-wide outreach strategy to educate Charleston Tri-County residents on water quantity, quality, and the cumulative impacts of stormwater. Education programming is steered by the ACSEC Stormwater Outreach Strategic Plan 2018-2023, which identifies priority issues to address through messaging and outreach that targets residential and commercial audiences.

Through partner collaboration, new initiatives in stormwater outreach offered creative methods to work with communities to address pollution in the region.

2018 Highlights

- In 2018, the ACSEC helped launch the Master Rain Gardener certification program. This hybrid training approach provides participants the information and skills needed to design, install, and maintain residential-scale rain gardens and rainwater harvesting systems. The pilot year resulted in 83 participants and two new demonstration sites that showcase stormwater best management practices.
- There were many mass-media opportunities in 2018, including the Street Interview Series, Hurricane Sponsorships on local news affiliates, and a statewide mass-media campaign focused on responsible dog waste management. The dog waste pickup campaign included billboard and commercial television segments and resulted in more than 400,000 impacts in the Tri-County.
- The fourth biannual Charleston Area Stormwater Pond Management Conference was held in 2018. This conference saw a new format that provided opportunities for research-sharing and audience engagement and interaction with scientists and stormwater managers in their community. Approximately 140 pond owners and management professionals attended the one-day event, hosted at Trident Technical College in North Charleston.

ACSEC Co-Coordinators

Kim Morganello (left) and Guinn Wallover (right) are Water Resource Agents for the Clemson Extension Cooperative Extension Service. As part of their work with the Carolina Clear program, they co-coordinate the Ashley Cooper Stormwater Education Consortium. Kim's professional interests include landscape-level best management practices, rainwater harvesting, rain gardens, and community involvement projects. Guinn's professional interests include water quality monitoring, stormwater pond management, and commercial and construction best management practices. In their spare time, both Kim and Guinn can be found outside enjoying SC's water resources.

ASHLEY COOPER
STORMWATER EDUCATION CONSORTIUM

- Keep Berkeley Beautiful hosted Adopt-A-Landing, an unique river stewardship involvement activity. Similar to Adopt-A-Highway, volunteers becomes stewards of a local boat landing and host seasonal cleanups to help prevent streamside litter. Since the start of the program, 14 of the 16 recognized adoptable boat landings have been incorporated into the program.

Additional ACSEC education and involvement programming included shoreline restoration youth programs, new trainings for commercial and residential audiences, print articles and electronic resources, and more.

In 2018, the 2018-2023 Strategic Plan of Activities was finalized through multiple meetings and engagement opportunities with consortium members. This strategy will guide consortium efforts and offer new opportunities to engage the community in working together to address bacteria, nutrient control, and litter pollution in stormwater. The Strategic Plan can be found at www.ashleycooper.org. Education timelines for the next five years are included in the Appendix of this report.

The ACSEC celebrated ten-years of partnership and collaboration in 2018. This anniversary was recognized with a group meeting and work session at Middleton Plantation, in which community and education partners looked forward to continuing their work to address stormwater pollution in the Tri-County region. The ACSEC is thankful for continued collaboration opportunities to protect water resources for current and future generations.

OUTREACH ACTIVITIES AND TOTAL NUMBER REACHED (*estimated*)

1. ACSEC Internet Resources including ACSEC E-newsletter "Ripple Effect," Facebook page, and website.
   NUMBER REACHED: 177,859

2. Mass Media Campaign including television and billboard efforts to reach homeowners and dog owners.
   NUMBER REACHED: 1,462,438

3. Permanent Demonstration Sites across the Ashley Cooper region demonstrate diverse best management practices for protecting water quality.
   NUMBER REACHED: 17,445

4. ACSEC representation at fairs and festivals, providing information on ACSEC and ways to protect water quality.
   NUMBER REACHED: 492,266

5. Diverse array of public workshops, trainings, presentations, and conferences pertaining to stormwater.
   NUMBER REACHED: 10,643

6. ACSEC Public Involvement opportunities including storm drain marking, litter sweeps, oyster reef construction, water quality monitoring, and rain barrel sales.
   NUMBER REACHED: 37,041

ASHLEY COOPER STORMWATER EDUCATION CONSORTIUM

Executive Summary

2018: A Year in Pictures

The October 2018 Healthy Pond Series helped install a shoreline planting project at Clemson's Coastal Research and Education Center pond.

Twiggy the Tree makes a visit to local schools to celebrate Arbor Day and discuss the importance of trees in our landscape, and to stormwater.

The 2018 Street Interview asked residents "What do you do to remember your reusable shopping bag?" Answers were compiled into a 30-second commercial piece that aired on local Fox television.

Students at Orange Grove Charter Middle School helped install a South Carolina-themed storm drain mural on their school campus.

The 2018 Beach Sweep/River Sweep saw 15 miles of Tri-County shoreline cleaned through the effort of 319 volunteers. This group of volunteers helped clean Vardell Creek under the Ravenel Bridge. *(Photo courtesy Cheryl Carmack, Charleston Waterkeeper.)*

ASHLEY COOPER
STORMWATER EDUCATION CONSORTIUM

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From blackwater swamps at Old Santee Canal Park to the beach at Capers Island, 40 campers explored the Ashley and Cooper River watersheds as part of the 2018 4H2O Summer Camp's June and July session.

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Community Partners

The majority of designated Small Municipal Separate Storm Sewer Systems (SMS4) communities in the Charleston Urbanized Area, representing approximately 90% of the population, have committed to the ACSEC regional collaboration. These communities are represented by a dedicated group of public servants who have been engaged for many years in building the partnership.

Local SMS4 Consortium Representatives: 2018

Berkeley County	Kelsey Gagnon, Thurman Simmons, Kevin Kubiak
Charleston County	Chris Wannamaker, John Carullo, Frank Pandullo, Yaenette Dixon, Brett Champion
Dorchester County	Kacy Byrd, Julian Seraphin
City of Charleston	Kinsey Holton
City of Folly Beach	Represented by Charleston County via Inter-Governmental Agreement (IGA)
City of Goose Creek	Represented by Berkeley County via IGA
City of Hanahan	Represented by Berkeley County via IGA
City of Isle of Palms	Represented by Charleston County via IGA
Town of James Island	Represented by Charleston County via IGA
Town of Lincolnville	Represented by Charleston County via IGA
Town of Mount Pleasant	Hillary Repik, Emily Raby, Devay Dandy
City of North Charleston	Mike Dalrymple, John Peckham, Merry Barton
Town of Sullivan's Island	Represented by Charleston County via IGA
Town of Summerville	Russ Cornette, Bonnie Miley, Matt Halter, Jr.

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Education Partners

Collaboration is integral in developing and delivering a successful watershed-scale outreach program that reaches diverse audiences. The ACSEC is fortunate to have a variety of organizations in the Charleston Tri-County region that have joined the effort. Education partners include universities, state and local government agencies, utilities, and non-profits. Each brings unique expertise, resources, ideas, and programs to the ACSEC. The ACSEC fosters communication among organizations and through this cooperative effort programs are being created or enhanced. Lead and supporting partners are noted in the following report of activities.

ACSEC Education Partners

Sea Grant
S.C. Sea Grant Consortium

South Carolina Department of Natural Resources
DNR

Carolina CLEAR
A Service of Clemson Extension

CLEMSON
COOPERATIVE EXTENSION

ACE Basin
National Estuarine Research Reserve

KEEP BERKELEY BEAUTIFUL
KEEP AMERICA BEAUTIFUL AFFILIATE

Keep Charleston Beautiful
KEEP AMERICA BEAUTIFUL AFFILIATE

The South Carolina Native Plant Society
1996

Charleston Berkeley Dorchester
TRI-COUNTY MASTER GARDENER

CHARLESTON WATERKEEPER®

South Carolina Oyster Restoration and Enhancement Program

COLLEGE of CHARLESTON

Audubon
SOUTH CAROLINA

SURFRIDER FOUNDATION
CHARLESTON CHAPTER

Charleston Conservation District

SOUTH CAROLINA MARINE ASSOC.

Keep Dorchester County Beautiful
Be like Ollie the Otter and, "Make recycling part of your HABITat"

South Carolina Aquarium

The Sustainability Institute

CHARLESTON COUNTY PARK & RECREATION COMMISSION

RECYCLE
CHARLESTON COUNTY

ADOPT-A-HIGHWAY

PalmettoPride

Mount Pleasant Waterworks
CLEAN WATER

Charleston Water System

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Mission and Goals

ACSEC MISSION STATEMENT

Improve water quality within the Ashley and Cooper River basins by providing educational opportunities on stormwater impacts and our community roles in supporting healthy, fishable, and swimmable waterways.

PROGRAM GOALS

- Develop and implement an education plan that defines a cohesive education strategy which outlines target audiences and associated target pollutants relevant to the region using a prioritized approach.
- Facilitate compliance with existing and future educational regulatory requirements by capitalizing on local resources and service providers.
- Foster citizen involvement in stormwater management through ACSEC education and participation programs.
- Encourage behavioral change towards environmental quality improvement through stormwater education.
- Utilize mainstream and developing technologies and tools to maximize citizen exposure to ACSEC stormwater goals and objectives.
- Create an interactive reporting process to facilitate information exchange and dissemination among member entities.

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Education and Involvement Program History

To meet the ACSEC program goals, community and education partners meet twice a year or more frequently as needed to work collaboratively in the development, implementation, and evaluation of new and existing programming. These meetings and decision making process is also open to the public.

ACSEC programming priorities were identified and developed through the Ashley Cooper Stormwater Education Consortium Stormwater Outreach Strategic Plan 2018-2023. The Strategic Plan can be found online at: www.ashleycooper.org. The Strategic Plan provides a framework for prioritizing regional issues, developing target outreach methods, and determining program evaluation metrics to improve the delivery and impact of ACSEC efforts. It is considered a "living" document to allow for refinement, supplementation, and flexibility as regional efforts evolve over the five-year period. The development of the Strategic Plan was a multi-year effort that involved community and education partner input and an evaluation of geography, pollutant concerns, and public perception as identified from the 2008 and 2013 Carolina Clear Statewide Survey.

The Strategic Plan process helped identify priority issues, contributing issues, target behaviors, and education strategies to address pollutants of concern in the region. The ACSEC residential and commercial audience priorities are as follows:

Bacteria

CONTRIBUTING ACTION	TARGET AUDIENCE	TARGET BEHAVIOR
Dog owners do not pick up and dispose of dog waste.	Dog owners who walk their dog.	Increase the number of dog owners who carry a bag for dog waste on walks.
Residents do not maintain their septic tank system.	New homeowners with septic tank systems.	Increase the number of new homeowners with septic tank systems who are working with a professional to perform maintenance.

Litter

CONTRIBUTING ACTION	TARGET AUDIENCE	TARGET BEHAVIOR
People use single-use plastics.	Shoppers who want to use a reusable bag but forget to bring to the store.	Increase the number of shoppers who bring a reusable shopping bag.
Smokers improperly dispose of cigarette butts.	Smokers that do not dispose of cigarette butts in trash.	Increase the number of smokers who carry a personal ashtray or throw away butts in the trash can.

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Education and Involvement Program History

Nutrients

CONTRIBUTING ACTION	TARGET AUDIENCE	TARGET BEHAVIOR
Residents improperly apply fertilizer.	Home gardeners that perform their own landscaping.	Increase the number of home gardeners who install native plants.
Lawncare companies improperly apply fertilizer.	Landscape professionals that do not currently offer soil testing to clients.	Increase the number of landscape professionals who offer soil testing as part of their services.

These priority issues, and subsequent contributing actions, target audiences, and target behaviors, have formed the core of efforts by the ACSEC; education strategies include five-year timelines for program implementation (see Appendix). To evaluate the effectiveness of outreach and involvement campaigns, evaluation metrics include but are not limited to:

- Five-year surveys to gauge perceptions, knowledge gained, and behavior change of residents living in the consortium area.
- Google Analytics to evaluate impacts of web-based programming and outreach.
- Short and long-term program evaluation to evaluate workshop and training success in delivering information, assisting participants in overcoming barriers to practice implementation, and meeting the needs of the target audience.
- Other methods including analysis of distribution numbers.

The ability of the ACSEC to implement and deliver consistent messaging and programming as well as leverage partner-lead initiatives helps the Consortium-model to successfully address community priorities and concerns across multiple waterway “lines.”

ASHLEY COOPER STORMWATER EDUCATION CONSORTIUM

Year Ten Highlight

Clemson Extension Launches Master Rain Gardener: A Hybrid Certification Program for Rain Garden and Rainwater Harvesting System Design

In 2018, Clemson Extension launched Master Rain Gardener (MRG), a new hybrid-certification training focused on residential-scale rain garden and rainwater harvesting system design and installation. As interest in South Carolina increases for low impact landscapes, in-depth training was needed for residential communities and for professional audiences seeking to offer installation as a service.

The hybrid approach offers an online classroom and in-person field training over multiple weeks of instruction through a two-track approach. The MRG Certification Track is designed for professional audiences including landscape designers, contractors and installers; the Letter of Completion Track is intended for Master Gardeners, Master Naturalist and home gardeners. Professionals in the Certification Track can use Master Rain Gardener as a marketing tool and add these services as part of a niche market.

THE LAUNCH OF MASTER RAIN GARDENER IN SPRING 2015 INCLUDED AN RAIN GARDEN AND 700-GALLON CISTERN INSTALLATION AT MEDWAY PARK ON JAMES ISLAND.

ASHLEY COOPER STORMWATER EDUCATION CONSORTIUM

Year Ten Highlight

During three weeks of online instruction, all participants learn skills related to rain garden installation including site assessment, soil analysis, soil amendment recipe, design elements, plant selection and planning for long term maintenance. A fourth week of online instruction is focused on rainwater harvesting system design and includes elements of system sizing, use, safety considerations and maintenance. Various aspects of online instruction include audio-recorded presentations, videos, "at home" hands-on activities, worksheets, quizzes and discussion forums.

The Certification Track includes a required field day that offers hands-on installation activities. In spring 2018, the MRG program partnered with the Charleston Parks Conservancy, the ACSEC and the Clemson University Architecture Program to install a 700 gallon cistern and rain garden at the Medway Community Garden. In fall 2018, the MRG program partnered with MUSC and the ACSEC to install a 500 gallon cistern and rain garden at the MUSC Urban Farm. Both locations include interpretive signage and will serve as high visibility demonstration sites.

Master Rain Gardener was offered twice in 2018 with 83 individuals participating from 40 different cities and towns in South Carolina, and two from out-of-state. The pilot year resulted in 41 individuals achieving Certification. Participant evaluation results indicate that 97% felt participation in this course was a good use of their time, 97% enjoyed the format of the course and 100% plan to use practices learned.

To learn more visit clemson.edu/raingarden/mrg.

THE FALL 2018 CLASS BROUGHT PARTICIPANTS TO MUSC'S CAMPUS IN DOWNTOWN CHARLESTON TO INSTALL THE DEMONSTRATION SITE AT THE MUSC URBAN FARM.

ASHLEY COOPER STORMWATER EDUCATION CONSORTIUM

Year Ten Highlight

Don't Forget Your Bag! Pet Waste Mass Media Campaign

In 2018, Clemson Extension's Carolina Clear launched its newest mass media campaign focused to address the impacts of dog waste left behind in the landscape. Consortiums across the state, including the Ashley Cooper Stormwater Education Consortium, have identified bacteria in waterways as a pollutant of concern and improper disposal of dog waste as a target behavior to address through its education strategy. Previous Carolina Clear surveys of South Carolina residents indicate that while the majority of residents know that leaving dog waste on the ground impacts water quality, only a fraction of them pick it up every time. A commonly identified barrier to proper disposal is forgetting to bring a bag on walks. A Community-Based Social Marketing/Behavior Change process was used to target dog owners that pick up after their pets sometimes, but not every time, and to "always bring a bag."

The multi-part mass media campaign included a billboard series and television commercial. Graphics and text for the billboard were tested with a South Carolina focus group to determine messaging that motivated viewer action or adoption of the desired behavior to "don't forget, always bring a bag." In fall of 2018, seventeen copies of the billboard were installed around the state through a partnership with the Outdoor Advertising Association of South Carolina. These billboards are viewed weekly by a combined total of over 1.5 million people. Locally, billboards are rotating through select county locations and have included Rivers Avenue, U.S. Highway 78, and U.S. Highway 17 and resulted in a combined 265,130 estimated views.

THE 2018 BILLBOARD CAMPAIGN TARGETED DOG OWNERS WHO KNEW THAT IMPROPERLY DISPOSED OF DOG WASTE COULD IMPACT WATERWAYS, BUT DID NOT ALWAYS PICK UP AFTER THEIR PET.

ASHLEY COOPER STORMWATER EDUCATION CONSORTIUM

Year Ten Highlight

A "SCOOPER HERO" WAS CREATED FOR A TELEVISION COMMERCIAL THAT LENT A LIGHTHEARTED, HUMOROUS SPIN TO DOG WASTE PICK UP MESSAGING.

Development of the commercial was based on research that examined the effectiveness of previous pet waste campaigns around the country and led us to several key recommendations: include humor, demonstrate the positive behavior adoption, share a clear message, and target social diffusion of neighbors learning from other neighbors. As a result, a "scooper hero" was created who arrives just in time to deliver a pet waste bag when the need arises. Using three different vignettes of dog owners caught in the act of leaving pet waste on the ground, the person who receives a bag from the "scooper hero" in one scene becomes the scooper hero providing a bag in the next one. The commercial was shared on five stations around the state and reached over 1.5 million viewers across South Carolina during the two months it aired in the fall of 2018. Locally, total impressions delivered to adults ages 25-54 in the WYFF-affiliate market were an estimated 200,598 weekly.

The billboard and commercial is part of a larger pet waste outreach strategy that includes the development of commercials, pledge cards, rack cards, pet waste dispenser installations, and bag giveaways.

ASHLEY COOPER STORMWATER EDUCATION CONSORTIUM

Year Ten Highlight

2018 Stormwater Pond Management Conference

The year 2018 saw the return of the Stormwater Pond Management Conference, a one-day event that provides the latest research and management strategies to stormwater pond owners and managers. First offered in 2012, the Stormwater Pond Management Conference is a biannual event hosted in collaboration between the Ashley Cooper Stormwater Education Consortium, Clemson Extension, SC Department of Natural Resources (SC DNR) ACE Basin NERR Coastal Training Program, and SC Sea Grant Consortium. The 2018 conference, the fourth hosted in the area, included an agenda that highlighted coastal research on stormwater pond management and communication opportunities with local and county government staff.

Sessions of note included:

- Plenary session that included speakers from the University of South Carolina and SC Department of Natural Resources that provided an overview of how stormwater ponds function in the landscape and their relationship with tidal creek systems in the Tri-County.

DR. DENISE SANGER'S (SC DNR) PLENARY SESSION ON THE HEALTH OF LOCAL TIDAL CREEKS AND THEIR RELATIONSHIP WITH STORMWATER PONDS SET THE STAGE FOR THE DAY'S DISCUSSION ON PROACTIVE MANAGEMENT STRATEGIES.

- A SLAM Session that included researchers representing projects associated with the SC Sea Grant Consortium's State of the Knowledge on coastal stormwater ponds. Speakers shared findings from their work, management implications, and answered audience questions during a Question and Answer panel.

- Technical sessions focused on pond design and regulations for both pond owners and pond managers.

ASHLEY COOPER STORMWATER EDUCATION CONSORTIUM

Year Ten Highlight

- Breakout presentations on topics that included: wildlife management, upland management, aquatic plant control, financial planning, dredging and sedimentation, a pond tour and inspection, and more.
- An Ask-An-Expert and Vendor Showcase tabling event. The Ask-An-Event included tabling opportunities for residents to meet their local or county government stormwater staff and discuss inspection and maintenance requirements that apply to their community.

In total, 140 people attend the 2018 Stormwater Pond Management Conference. The Ashley Cooper Stormwater Education Consortium funded the registration of home owner association members and other pond owners who attended the event and directly involved in pond management decision making in their communities. Evaluation of the event showed that 100% of respondents agreed the conference was a good use of their time and 92% said they intended to apply information they learned in their pond management strategies. Favorite sessions included the morning Plenary and SLAM Sessions, the technical sessions on pond design and roles and responsibilities, and the information on aquatic plant management.

The next Stormwater Pond Management Conference will be hosted in Fall 2020. We look forward to seeing you there!

A PARTICIPANT FAVORITES AT THE POND CONFERENCE INCLUDED THE SLAM SESSION AND QUESTION AND ANSWER SESSION (LEFT). THE ASK-AN-EXPERT TABLING EVENT AND VENDOR SESSION (RIGHT) PROVIDED A WAY FOR POND OWNERS AND REPRESENTATIVES TO MEET WITH AND NETWORK WITH COMMUNITY GOVERNMENT STAFF AND POND MANAGEMENT COMPANIES IN THEIR AREA.

ASHLEY COOPER STORMWATER EDUCATION CONSORTIUM

Year Ten Highlight

Adopt-A-Landing

The Keep Berkeley Beautiful (KBB) Adopt-A-Landing (AAL) Program began in March of 2017 with a "Pilot Project" held at the Hatchery Boat Landing in Pinopolis, SC. KBB held a one-time cleanup, partnering with Santee Cooper, the Berkeley High School Bass Club, and other Berkeley County residents. The event was a success, and it was decided the AAL program would move forward with the adoption of several other boat landings throughout the County. The Berkeley High School Bass Club was the first official AAL group to sign-up to pick-up litter at the Hatchery Boat landing. Adoption of a boat landing requires, at least, four pick-ups a year for two years. Volunteer and safety waivers are signed by participating groups, and supplies (bags, gloves, safety vests, and litter pick-up sticks) are distributed by KBB. In exchange for keeping the landing clean via adoption, the group's name is printed on a permanent metal sign to recognize them for their hard work, efforts, and time dedicated to the program's efforts of litter reduction.

This program opened the possibility to partner with Berkeley County Roads and Bridges, Santee Cooper, and the Department of Natural Resources to expand the adoptable landings to sixteen. Since the inception of the program, fourteen of the sixteen landings have been adopted by Girl Scout Troops, Boy Scout Troops, Berkeley County residents, businesses, civic clubs, religious organizations, and Fishing Clubs. A large quantifiable amount and aesthetically pleasing reduction of litter at the Berkeley County Boat Landings has been the result of the program. The effect of the program has been the creation of community pride in Berkeley County.

(Text provided by Sarah McCarthy Smith, Keep Berkeley Beautiful Director)

YOUTH FROM A LOCAL GIRL SCOUT TROOP (RIGHT) AND BERKELEY BASS CLUB (LEFT) HELP CLEAN LOCAL BOAT RAMPS THROUGH THE ADOPT-A-LANDING PROGRAM.

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Annual Report of Activities Format

The annual report utilizes the same general format as the first seven ACSEC reports and the other regional stormwater consortiums in South Carolina. This annual report, the eight for the consortium, is intended to give the reader a comprehensive look at the ACSEC from January 1, 2018 through December 31, 2018. This report delineates activities into public education and public involvement categories. For each activity, a brief description is provided as well as information on lead provider, supporting partners, date, number of impacts, and target audiences. Furthermore, public education activities are identified as either direct or indirect outreach strategies.

Clemson Extension's Carolina Clear program developed an online database in the first ACSEC reporting cycle to record detailed information on activities conducted by consortium partners. The data collected in the online database includes information on target audiences, pollutants addressed, activity type, lead service providers, supporting partners, number of impacts, location, and several other categories. This annual report provides a condensed version of the information collected in the online database as well as additional, supplementary information sourced from ACSEC partners.

Public education activities are classified into two broad categories, **direct** and **indirect** outreach methods, to express mechanisms by which information has been communicated to the public. Direct methods include activities that are implemented via direct personal contact. Examples of direct methods include workshops, presentations, trainings, and public involvement activities. In contrast, indirect outreach methods refer to contacts through traditional media channels including television, radio, print, and billboards. Indirect methods generally reach a much greater portion of the population due to the nature of their mediums; however, it is often more difficult to gauge specific impacts. When dealing with direct methods, smaller numbers of people are reached yet the ones that are reached generally provide a forum for direct evaluation and feedback. Each method is important in the overall education campaign, and both are part of the five year educational strategy for the ACSEC. Throughout the document, the words "direct" or "indirect" are provided at the top of each reporting table.

*Data provided are as accurate as possible and are reviewed by multiple individuals involved in the reporting process. However, due to the nature of indirect outreach initiatives, indirect impact numbers are typically estimates.

The activities in the report are listed in table format.

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Public Education: Indirect

DATE	ACTIVITY DESCRIPTION	PARTNERS	NUMBER OF IMPACTS
2018	INTERNET: Total unique views in 2018 for the Carolina Clear, ACSEC, Clemson Extension Water Team, Stormwater Pond Management, Carolina Rain Garden Initiative & Carolina Yards.	Clemson Extension, Clemson University	111,960
2018	INTERNET: Total views for the ACSEC Facebook page in 2018.	Clemson Extension	1,009
2018	INTERNET: Total views for the Carolina Clear Facebook page in 2018.	Clemson Extension	47,879
2018	INTERNET: Total views on Carolina Clear YouTube page (19,800 minutes viewed).	Clemson Extension	9,900
2018	INTERNET: ACSEC's "Ripple Effect" is published four times annually and provides information on ACSEC education and involvement opportunities.	Clemson Extension	2,911
2018	INTERNET: SC Coastal Information Network (SCCIN) hosts an online event calendar and resource portal providing educational and training opportunities for coastal community officials, staff, and public. The SCCIN is a coastal partnership of local, state, and federal partners (23) coordinated through the SC Sea Grant Consortium.	SC Sea Grant	4,200
Summer/Fall 2018	TELEVISION AND INTERNET: Hurricane sponsorship with local NBC news affiliate included television and internet advertising space; content discussed included the connection between storm drains and receiving waterways, and actions to prevent stormwater pollution during storm events.	Clemson Extension, NBC	743,217
November 2018	TELEVISION AND INTERNET: Television and internet advertising partnership with local NBC affiliate; media focused on stormwater pond purpose and function in the landscape, maintenance responsibilities of pond owner, and highlighted the registration for the 2018 Stormwater Pond Management Conference.	Clemson Extension, NBC	49,760
2018	TELEVISION: SCETV and Clemson Extension's "Making It Grow" shares home and garden information for South Carolina residents; a water quality tip is included each week during the broadcast.	SCETV, Clemson Extension	23,376
2018	TELEVISION: The "Be the Scooper Hero" pet waste campaign encouraged dog walkers to always bring their bag on dog walks. The 30-second commercial was shown on local WYFF networks.	Clemson Extension	200,598

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Public Education: Indirect

DATE	ACTIVITY DESCRIPTION	PARTNERS	NUMBER OF IMPACTS
Summer/Fall 2018	TELEVISION: The 2018 Street Interview Series, hosted in partnership with the local FOX news affiliate, focused on reducing plastic pollution through the use of reusable shopping bags. Participants provided tips on how they remember their reusable shopping in a one-minute snapshot that included educational messaging on stormwater pollution and its impact on our waterways.	Clemson Extension, Fox 24	172,657
November 2018	TELEVISION: Interview with FOX affiliate midday news show, Fox24 News Now; the five-minute segment included a discussion of the purpose of stormwater ponds, maintenance activities to be performed, and a plug for the 2018 Stormwater Pond Management Conference.	Clemson Extension, Fox 24	4,400
May, 2018	TELEVISION: Interview with FOX affiliate midday news show, Fox24 News Now; the five-minute segment included a discussion of rainwater harvesting and managing stormwater on personal property.	Clemson Extension, Fox 24	3,300
1/31/18	PUBLICATION: The quarterly Coastal Heritage magazine, a publication of the SC Sea Grant Consortium, Fall 2017/2018 edition was entitled "Stormwater Ponds The Coast Re-Plumbed." It focused on the expansion of engineered ponds as stormwater control devices that alter how water moves across the coastal landscape , and potential effects of these practices.(Vol.30, No.4, Fall/Winter 2017-18)	SC Sea Grant	5,500
4/22/18	PUBLICATION: Article in the Sunday edition of The Post and Courier, the "Smart Irrigation Saves Water" article focused on conservation and irrigation management tips to reduce runoff from the landscape.	Clemson Extension, Post and Courier	219,000
5/30/18	PUBLICATION: Article "Put Plants To Work To Solve Problems, Save You Time and Money" in the Sunday edition of the Post & Courier, focused on conservation landscaping practices with emphasis on water quality benefits.	Clemson Extension, Post and Courier	219,000
9/10/18	PUBLICATION: "Clemson Extension offers tips, resources to prepare stormwater ponds" article was published through Morning Ag Clips. The article provided tips and resources for resident on a stormwater pond's purpose and maintenance, particularly during hurricane season preparations.	Clemson Extension, Morning Ag Clips	100,000
10/17/18	NEWSLETTER: The "Conservation Corner" Annual Newsletter reports on Soil and Water Conservation District water quality outreach initiatives and other programs of the District.	Charleston County Soil and Water Conservation District	2,500

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Public Education: Indirect

DATE	ACTIVITY DESCRIPTION	PARTNERS	NUMBER OF IMPACTS
February-March, 2018	PRINT ADVERTISING: The Town of Mount Pleasant sponsored several advertising print purchases in The Moultrie News. Advertising space focused on illicit discharge awareness, storm drainage system connection to waterways, dog waste, and more.	The Town of Mount Pleasant, Clemson Extension, The Moultrie News	120,000
11/12/18 - 12/18/18	EXECUTIVE SUMMARY: S.C. Stormwater Pond Research and Management Collaborative: Executive Summary of the State of current knowledge regarding SC stormwater ponds completed and published. Available in print and PDF at: http://www.scseagrant.org/SWP-SOK-Summary.pdf	SC Sea Grant Consortium	220
January 2018	MAILER: City of Charleston included information on stormwater management in the Charleston Water Systems billing mailers	City of Charleston	105,000
Continuous	MANUAL: Low Impact Development in Coastal SC: A Planning and Design Guide. This guidance manual is available for download from the SC Sea Grant Consortium's and NI-WB NERR websites. It continues to be a popular download from the SC Sea Grant's site totaling 2,270 copies downloaded from January through December 2018.	SC DNR ACE Basin NERR, SC Sea Grant Consortium, North Inlet-Winyah Bay NERR, and the Center for Watershed Protection	2,270
2018	BILLBOARD: Responsible pet waste management billboards were located in high-visibility locations in 2018 as the following: • Rivers Ave (0.1 mi W/O Remount Rd) — 137,111 weekly impressions; • US 78 (0.1 mi W/O Richardson Ave) — 69,929 weekly impressions; • US 17 (1.1 mi S/O State Rouge 162) — 58,090 weekly impressions	Clemson Extension	265,130
Continuous	PERMANENT EXHIBIT: A large shoreline planting project and floating wetland at a stormwater pond on the Charleston County Public Services Building campus serves as a demonstration site for stormwater pond best management practices.	Charleston County Government, Clemson Extension	500
Continuous	PERMANENT EXHIBIT: Clemson REC "Ed Shed" includes education signage and stormwater best management practices. This space is used to host workshops, trainings and meetings for diverse groups/classes.	Clemson Extension, Tri-County Master Gardeners	1,000

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Public Education: Indirect

DATE	ACTIVITY DESCRIPTION	PARTNERS	NUMBER OF IMPACTS
Continuous	PERMANENT EXHIBIT: Rain garden and cistern installed at a Berkeley County library "Pollinator Garden" location in Hanahan.	Berkeley County, Tri-County Master Gardeners, Keep Hanahan Beautiful	1,000
Continuous	PERMANENT EXHIBIT: Clemson REC Urban Research and Demonstration Area showcases native plants, a rain garden, rain barrels, and educational signage; open to the public during daylight hours.	Tri-County Master Gardeners, Clemson Extension	1,000
Continuous	PERMANENT EXHIBIT: Rain garden and rain barrel at a North Charleston park and Keep North Charleston Beautiful office location.	City of North Charleston, Tri-County Master Gardeners, Clemson Extension, Keep North Charleston Beautiful	1,000
Continuous	PERMANENT EXHIBIT: Rain garden and signage installed at Mount Pleasant fire station and recreation area.	Town of Mount Pleasant	800
Continuous	PERMANENT EXHIBIT: As part of Carolina Schoolyards, a rain garden and rain barrel located at the CREEC School.	Cape Romain Environmental Education School	175
Continuous	PERMANENT EXHIBIT: Rain garden at "Whirlin' Waters" at Wannamaker County Park.	CCPRC	500
Continuous	PERMANENT EXHIBIT: Rain garden and signage at Caw Caw Interpretive Center.	CCPRC	2,000
Continuous	PERMANENT EXHIBIT: Two rain barrels and drip irrigation at St. Julian Divine Community Center.	St. Julian Divine Community Center	1,500
Continuous	PERMANENT EXHIBIT: Two rain gardens, cistern and native plants installed at Fort Johnson Community Garden.	SCDNR	5,000
Continuous	PERMANENT EXHIBIT: Cistern at Mitchell Elementary School's Green Hearts Project Garden.	Mitchell Elementary School, Green Hearts	350
Continuous	PERMANENT EXHIBIT: Cistern, rain garden, rain barrels, composing station and native plants at the College of Charleston's Grice Marine Lab's Green Teaching Garden.	College of Charleston	500
Continuous	PERMANENT EXHIBIT: Cistern and drip irrigation installed for raised beds at College of Charleston's Political Science Building.	College of Charleston	200
Installed 4/26/18	NEW PERMANENT EXHIBIT: Cistern and adjacent rain garden located at the Medway Community Garden. Rainwater harvested is utilized to irrigate adjacent raised beds; rain garden doubles as a pollinator garden.	Charleston Parks Conservancy, Clemson Architecture Community Design Build, Clemson Extension	1,000
Installed 11/16/18	NEW PERMANENT EXHIBIT: 700 gallon cistern and adjacent rain garden installed at the Medical University of South Carolina's Urban Farm.	MUSC, Clemson Extension	920

ASHLEY COOPER STORMWATER EDUCATION CONSORTIUM

Public Education: Indirect

DATE	ACTIVITY DESCRIPTION	PARTNERS	NUMBER OF IMPACTS
1/30/18-2/1/18	FAIRS/FESTIVALS: South Carolina Green Industry Trade Show: Provided information on sustainable landscaping practices and resources to green industry professionals	Clemson Extension	125
2/3/17	FAIRS/FESTIVALS: ACSEC and 4-H hosted a booth at Charleston STEM Festival to provide hands-on activities for youth on water and nature topics.	Multiple	10,000
2/15/18-2/18/18	FAIRS/FESTIVALS: The Charleston Soil and Water Conservation District provided information at the Southeastern Wildlife Exposition	Charleston Soil and Water Conservation District	35,000
3/10/18	FAIRS/FESTIVALS: Black Expo (Charleston Economic Empowerment Summit) table hosted by Charleston County Government provided information on stormwater management.	Charleston County Government	198
3/31/18	FAIRS/FESTIVALS: Naturescope Kids Who Care Event; ACSEC provided hands-on activities to discuss stormwater and food chains.	Multiple	2,000
4/10/18	FAIRS/FESTIVALS: The Lowcountry Math and Science Fair is sponsored by the Charleston County Soil and Water Conservation District. The District evaluates environmental projects and sponsors student awards.	Charleston County Soil and Water Conservation District	200
4/14/18	FAIRS/FESTIVALS: Plantasia at Old Towne Park. ACSEC booth provided information on conservation landscaping, plant selection, and pond management.	Multiple	200
4/11/18	FAIRS/FESTIVALS: MUSC Earth Day Event. Charleston County's Stormwater program hosted a booth and provided resources available through the ACSEC.	Charleston County Government	421
7/10/18	FAIRS/FESTIVALS: Flood Expo at North Charleston's Park Circle was a community event hosted by the SC Sea Grant Consortium and the City of North Charleston.	SC Sea Grant Consortium, City of North Charleston, Clemson Extension	70
8/5/18-8/6/18	FAIRS/FESTIVALS: Annual Association of Counties Conference: Discussed stormwater permits, water quality regulations, and Carolina Clear program with county leaders. A rain garden model, interpretive sign, and rack cards promoted the use of rain gardens.	Clemson Extension	300
October 2018	FAIRS/FESTIVALS: Clemson Extension hosted a water resource display at the South Carolina State Fair.	Clemson Extension	443,712
11/8/2018	FAIRS/FESTIVALS: Be Flood Ready Event in Mount Pleasant.	Town of Mount Pleasant, SC Sea Grant Consortium	40

ASHLEY COOPER STORMWATER EDUCATION CONSORTIUM

Public Education: Direct

DATE	ACTIVITY DESCRIPTION	PARTNERS	NUMBER OF IMPACTS
Continuous	IN-PERSON, PHONE, EMAIL: In the Tri-County, Master Gardeners answered questions relating to a variety of home landscaping issues, topics including compost, mulch, fertilizers, native plants, irrigation, etc.	Clemson Extension, Tri-County Master Gardeners Association	32,869
Continuous	IN-PERSON, PHONE, EMAIL: Clemson Extension Agents answered questions and provided services to a variety of Tri-County audiences regarding water resources and stormwater BMPs.	Clemson Extension	1,000
Continuous	SOIL SAMPLES: Clemson Extension in cooperation with Clemson's Agricultural Service Lab, processed soil samples for the Tri-County residents and commercial audiences. Impact represents Tri-County total.	Clemson Extension, Clemson's Agricultural Service Lab	4,124
Continuous	PRESENTATION: Presentations topics included native plants, rain gardens, rainwater harvesting, shoreline buffers, conservation landscaping, pollution prevention, LID, gardening for pollinators and stormwater pond management. Audiences included Master Naturalist, Trident Technical College, Landscape Design School, Master Gardeners, Seabrook Island Naturalist Club, Palmetto Scholars Academy, Cummins Turbo Technologies, Blue Thumb Conference, etc	Clemson Extension	555
5/22/18	PRESENTATION: Charleston SCWD Environmental Awards Dinner, hosted by the Charleston County Soil and Water. The program honored outstanding educators and Conservationists who promote stormwater, water, and soil quality conservation issues.	Charleston County Soil and Water Conservation District	45
Continuous	PRESENTATION: "Oysters as Living Shorelines" presentation provided information on water quality, shoreline stabilization and habitat effects of oyster reefs.	SCDNR SCORE	4,876
April-May 2018	PRESENTATION: "Watersheds: Our Water, Our Home" Poster-Essay Contest School Awards and Programs hosted at nine local schools. Presentations all focused on watersheds in our community and environment.	Charleston County Soil and Water Conservation District	375
12/7/18	YOUTH PRESENTATION: As part of Arbor Day's celebration, Charleston District's "Twiggy the Tree" visited a local school to discuss the benefits of trees in our landscape. This was followed by a tree planting ceremony and installation of a plaque on campus.	Charleston County Soil and Water Conservation District, Edith L. Frierson Elementary School	50
Continuous	YOUTH PRESENTATION: Enviroscape loaned to various schools/organizations including Charleston County Park and Recreation Commission, Sullivan's Island Elementary, Philip Simmons Elementary and home school group.	SC Sea Grant Consortium	457

ASHLEY COOPER
STORMWATER EDUCATION CONSORTIUM

Public Education: Direct

DATE	ACTIVITY DESCRIPTION	PARTNERS	NUMBER OF IMPACTS
Continuous	YOUTH PRESENTATION: Keep Charleston Beautiful offers environmental education programs to local K-12 schools.	Keep Charleston Beautiful, Charleston County School District	1,192
2/22/18	WORKSHOP; Soil Health and Tractor Field Day was hosted by the Charleston Soil and Water Conservation District and included a tour of the Clemson Research Farm and discussion on the use of cover crops in production. A rainfall simulator demo showed the impact of erosion on soils and best practices to manage on the farm.	Charleston County Soil and Water Conservation District, Clemson University, Clemson Extension, USDA-NRCS	60
3/1/18	WORKSHOP: Healthy Pond Series: Integrated Aquatic Plant Management; provided aquatic plant control and prevention tips to pond owners in the Tri-County. The Healthy Pond Series is a free networking event for stormwater pond owners in Berkeley, Charleston, and Dorchester counties.	Clemson Extension, SCDNR, ACE Basin NERR Coastal Training Program	32
4/13/18	WORKSHOP: "Rainwater Harvesting System Design & Installation" offered by Clemson Extension & College of Charleston on CofC campus in downtown Charleston.	Clemson Extension, College of Charleston	12
6/13/18	WORKSHOP: Healthy Pond Series: Shoreline Management Solutions; provided shoreline erosion and prevention tips to pond owners in the Tri-County. The Healthy Pond Series is a free networking event for stormwater pond owners in Berkeley, Charleston, and Dorchester counties.	Clemson Extension, SCDNR, ACE Basin NERR Coastal Training Program	60
6/13/18	WORKSHOP: Tidal Creeks, Development and Water Quality Workshop: Researchers and community and state resource managers, planners, and staff gathered to learn and discuss research results from several SC Sea Grant-funded projects related to tidal creeks and stormwater ponds. Participants discussed next steps for mitigation strategies and public outreach efforts, as well as gaps and potential priorities for future study.	SC Sea Grant Consortium, University of SC, NI-WB NERR, SCDNR, ACE Basin NERR	38
6/17/2018; 7/17/2018	WORKSHOP: "Water, Water Everywhere" These youth and family workshops held as part of a series at Berkeley County Library locations in Sangaree and St. Stephen's. Participants learned about water conservation, impacts of stormwater pollution, and how to reduce litter through recycling and reuse. The workshop included a hands-on "Build-A-Bug" craft using recycled water bottle lids.	Clemson Extension	15
8/8/19	WORKSHOP: "From Seeds to Shoreline" New Teacher Workshop provided hands-on experience in growing salt marsh plants and leading activities with students.	SC Sea Grant Consortium, SCDNR, Clemson Extension	17

ASHLEY COOPER
STORMWATER EDUCATION CONSORTIUM

Public Education: Direct

DATE	ACTIVITY DESCRIPTION	PARTNERS	NUMBER OF IMPACTS
8/9/18	WORKSHOP: "From Seeds to Shoreline" Veteran Teacher Workshop provided an opportunity for teachers to share lessons learned, activity ideas and emerging resources.	SC Sea Grant Consortium, SCDNR, Clemson Extension	15
8/30/19	WORKSHOP: S.C. Stormwater Pond Research and Management Collaborative: S.C. Stormwater Pond Research and Management Collaborative members met to discuss the future steps of the collaborative including outreach material, prospectus, and publication process of the full report.	SC Sea Grant Consortium, University of SC, NI-WB NERR, SCDNR, ACE Basin NERR	20
10/25/18	WORKSHOP: Healthy Pond Series: Shoreline Planting Design; participants learned basics on shoreline planting design and helped install a 200 square foot shoreline planting project at Clemson's Coastal Research and Education Center in Charleston. The Healthy Pond Series is a free networking event for stormwater pond owners in Berkeley, Charleston, and Dorchester counties.	Clemson Extension, SCDNR, ACE Basin NERR Coastal Training Program	20
11/16/18	WORKSHOP: "Pollinator Gardening in the Home Landscape" taught participants techniques related to soil preparation, plant selection and irrigation when designing and installing a pollinator garden. Participants installed a garden at the community center in Moncks Corner, SC.	Clemson Extension, Tri-County Master Gardeners, Berkeley County Conservation District, Keep Berkeley Beautiful,Daughters of the American Revolution	20
12/7/18	WORKSHOP: Integrated Aquatic Plant Management Short Course: Designed for commercial and non-commercial aquatic pesticide applicators, this short course taught information on plant identification, integrated aquatic plant control, and safe handling and spill response for pesticide use.	Clemson Extension	30
Spring 2018, Fall 2018	TRAINING: Master Naturalist Certification Programs hosted in spring and fall of 2018. A 13-week field study course led by a variety of experts, participants learn about coastal ecology with emphasis on environmental stewardship.	Charleston County Park and Recreation Commission, Clemson Extension	24
Continuous	TRAINING: Clemson provides training and certification for the Certified Erosion Prevention and Sediment Control Inspector (CEPSCI) program to assist in pollution prevention control on construction projects. Impacts reflect statewide trainings	Clemson University, Clemson Extension	763
Continuous	TRAINING: Clemson's Department of Pesticide Regulation provides training and certification for commercial, non-commercial, and private licensed applicators. Number of impacts represent Tri-County licensed applicators current through 2018.	Clemson University, Clemson Extension	1,145

ASHLEY COOPER
STORMWATER EDUCATION CONSORTIUM

Public Education: Direct

DATE	ACTIVITY DESCRIPTION	PARTNERS	NUMBER OF IMPACTS
Spring 2018, Fall 2018	TRAINING: Master Pond Manager teaches recreational and stormwater pond management training to participants through online classroom and field-based curriculum. The Master Pond Manager class was offered twice in 2018, with field days hosted in Charleston, SC area and in the Clemson, SC. In total, 72 participants took part in the multi-week courses, with 13 participants becoming certified managers.	Clemson Extension	72
Fall 2018	TRAINING: Carolina Yards Online provides online learning opportunity to focus on environmentally friendly landscaping practices.	Clemson Extension	35
Spring 2018, Fall 2018	TRAINING: Post Construction BMP Inspector; online and field-based training focused on inspection and maintenance of best management practices used for stormwater management. The class was offered twice in 2018, with field days hosted at the Trident Technical College campus in North Charleston and Furman University in Greenville, SC.	Clemson University, Clemson Extension	52
Spring 2018, Fall 2018	TRAINING: Master Rain Gardener; online and field-based training focused on rain garden and rainwater harvesting system design and implementation. The class was offered twice in 2018 and field day portions were held at the Medway Community Garden and MUSC Urban Farm. The pilot year of Master Rain Garden had 83 participants resulting in 41 individuals certified and 33 obtaining a letter of completion.	Clemson Extension	83
10/17/18-10/18/18	CONFERENCE: South Carolina Water Resources Conference held in Columbia, SC brings together research and diverse disciplines to share information on the state of South Carolina's water resources.	Clemson University	340
11/14/18	CONFERENCE: 2018 Stormwater Pond Management Conference: This one-day conference shared research and management strategies for stormwater pond owners and management professionals. The hands-on conference included plenary, panel discussions, field tours, an Ask-An-Expert tabling event, and vendor showcase. The conference was held at Trident Technical College in North Charleston and had 140 people in attendance.	SC DNR Ace Basin NERR CTP, SC Sea Grant Consortium, Clemson Extension	140

ASHLEY COOPER STORMWATER EDUCATION CONSORTIUM

Public Involvement

DATE	ACTIVITY DESCRIPTION	PARTNERS	NUMBER OF IMPACTS
1/12/18; 1/16/18	STORM DRAIN MARKING: Approximately 60 students at Philip Simmons Middle School in Berkeley County helped mark 34 storm drains in and around the school campus and neighborhoods.	Clemson Extension	34
1/12/18	STORM DRAIN MARKING: Approximately 40 students as part of Eagle Nest Elementary School's Beta Club in North Charleston helped mark 64 storm drains in the Taylor's Plantation neighborhood.	Clemson Extension	40
1/25/18	STORM DRAIN MARKING: Approximately 80 students from Orange Grove Charter Middle School helped mark 16 storm drains on the school campus.	Clemson Extension	80
December 2018	STORM DRAIN MARKING: Eagle Scout organized volunteers to mark 50 storm drains on James Island. The group also distributed 300 door hangers with stormwater pollution prevention information.	Boy Scouts of America, Town of James Island, Clemson Extension	300
March 2018	STORM DRAIN MURAL PAINTING PROJECT: Approximately 55 students with Phillip Simmons Middle School painted an octopus mural project on the school blacktop that educated classmates on the connection between storm drains and waterways.	Clemson Extension	55
March 2018	STORM DRAIN MURAL PAINTING PROJECT: Approximately 30 Students at Orange Grove Charter Middle School worked with their art teacher to design and install a South Carolina-themed storm drain mural project on their campus.	Clemson Extension	30
February 2018	LITTER SWEEP: The Town of Summerville Beautification Committee and Keep Dorchester County Beautiful hosted a litter cleanup along a four-mile stretch of Central Avenue in Summerville; 2,200 lbs of litter were removed.	Town of Summerville, Keep Dorchester County Beautiful	15,500
March 2018	LITTER SWEEP: The Town of Summerville Beautification Committee and Dorchester School District 2 hosted a cleanup at Gahagan Playground and surrounding area that included 9,000 volunteers.	Town of Summerville, Dorchester School District 2	9,000
5/28/18-9/3/18	LITTER SWEEP: Strawless Summer litter prevention campaign offered by Surfrider Foundation, Charleston Chapter. 135 restaurants participated, helping to reduce plastic pollution by approximately 660,000 straws.	Surfrider Foundation, Charleston Chapter	135
Continuous	LITTER SWEEP: Adopt-A-Boat Landing offered by Berkeley County and Keep Berkeley Beautiful removed 1,785 pounds of litter from waterways and wetlands.	Berkeley County Government, Keep Berkeley Beautiful	220

ASHLEY COOPER STORMWATER EDUCATION CONSORTIUM

Public Involvement

DATE	ACTIVITY DESCRIPTION	PARTNERS	NUMBER OF IMPACTS
Continuous	LITTER SWEEP: Keep Berkeley Beautiful worked with multiple partners to host cleanups at locations across Berkeley County. More than 22,000 pounds of litter were removed through the effort of more than 1,000 volunteers.	Keep Berkeley Beautiful, Berkeley Blueways, Palmetto Pride, Berkeley County Sheriff's Department, Keep America Beautiful	1,007
Continuous	LITTER SWEEP: The Adopt-A-Stop program maintains litter free bus stops throughout the City of Charleston. Adopt-A-Stop volunteers have the opportunity to adopt an unsheltered CARTA bus stop within the City, and Keep Charleston Beautiful provides a beautified trash can and supplies for maintenance and litter cleanup.	Keep Charleston Beautiful, CARTA	9
Continuous	LITTER SWEEP: Community groups host two-hour cleanups in marshes, parks, and green spaces.	Keep Charleston Beautiful	2,025
Four per year	LITTER SWEEP: Charleston County Adopt-A-Highway conducts seasonal sweeps each year; volunteers sign up to adopt a two-mile stretch of road. During 2018, 2, 258 volunteers removed 69,808 pounds of trash.	Charleston County Community Pride, Clemson Extension	2,258
Fall 2018	LITTER SWEEP: SC Sea Grant Consortium and SC DNR organize the annual, statewide Beach Sweep River Sweep cleanup along South Carolina's shorelines. In 2018, 319 people helped remove almost 3,500 pounds of trash from approximately 15 miles of shoreline in Berkeley, Charleston, and Dorchester county.	SC Sea Grant Consortium, SC Department of Natural Resources	319
Continuous	LITTER SWEEP: Berkeley County Adopt-A-Highway; Volunteers adopt a two-mile stretch of road and conduct regular and special cleanups. During 2018, 54,980 pounds of litter were removed through the help of 529 volunteers.	Adopt-A-Highway, Keep Berkeley Beautiful	529
Continuous	OYSTER REEF CONSTRUCTION: SCORE facilitated oyster reef building events and bagging events across the region in 2018, which include a combined 2,985 volunteers.	SCDNR SCORE	2,985
Continuous	WATER QUALITY MONITORING: SCORE program utilized trained volunteers to gather water quality parameters at multiple sites. During 2018, 15 volunteers donated monitored water quality in locations in the Tri-County area.	SCDNR SCORE	15
Continuous	WATER QUALITY MONITORING: Charleston Waterkeeper implements two volunteer-based monitoring programs. The water quality monitoring program conducts bacteria monitoring in the Charleston Harbor vicinity from May to October. The "Creek Watchers Program" is a citizen science program that uses volunteers to monitor health of local waterways using a variety of parameters. In 2018, 15 participants take part in the two programs.	Charleston Waterkeeper, College of Charleston	18

ASHLEY COOPER STORMWATER EDUCATION CONSORTIUM

Public Involvement

DATE	ACTIVITY DESCRIPTION	PARTNERS	NUMBER OF IMPACTS
6/1/2018; 6/2/2018	RAIN BARREL SALE: ACSEC general public sale held at two centralized locations in the Tri- County; barrels were sold at a discounted rate through partnership with Rainwater Solutions and community partners. in 2018, a total of 333 rain barrels were sold as part of this effort.	Clemson Extension, Rainwater Solutions, Charleston County Government, Town of Summerville	236
03/17/18, 10/20/18	NATIVE PLANT SALE: The biannual SCNPS native plant sale is open to the public and offers a variety of native plants for home landscaping.	SC Native Plant Society, Charles Towne Landing State Park	400
4/20/2018	YOUTH INVOLVEMENT: SC Envirothon is an educational outreach week-long program at Sandhills Research Center in Columbia. Students study soils, water quality, aquatics, and other conservation topics. In 2018, two Wando High School teams were sponsored. Eighteen teams that consist of five members and one alternate, participated this year.	Charleston Soil and Water Conservation District, SCDNR, Clemson University	108
06/18/18-06/22/18; 07/23/18-07/27/18	YOUTH INVOLVEMENT: 4-H2O "Exploring Lowcountry Waterways" summer camp for youth ages 10-13; a week-long day camp emphasizing watershed stewardship and water resource protection.	Clemson Extension, SCDNR, Old Santee Canal Park, SC Sea Grant Consortium, CCPRC, Fish & Wildlife Service	40
Continuous	YOUTH INVOLVEMENT: The From Seeds to Shoreline initiative involves students in germination and planting of *Spartina alterniflora* to emphasize the significance of the salt marsh and actions for clean water.	SC Sea Grant Consortium SCDNR, Clemson Extension	1,274
2018	YARD CERTIFICATION: 424 yards are certified in South Carolina in 2018, 93 of those are new and 9 of those occurred in the Tri-County region.	Clemson Extension	424

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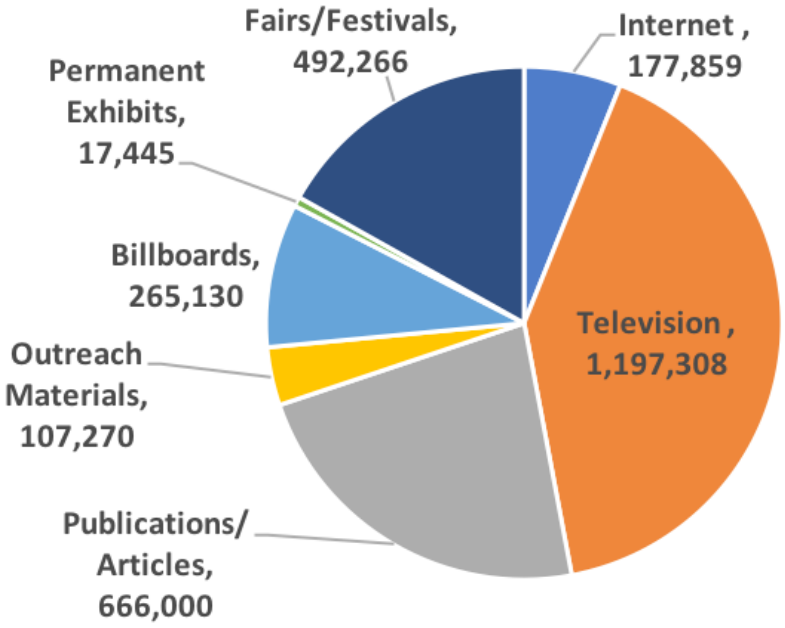
STORMWATER EDUCATION CONSORTIUM

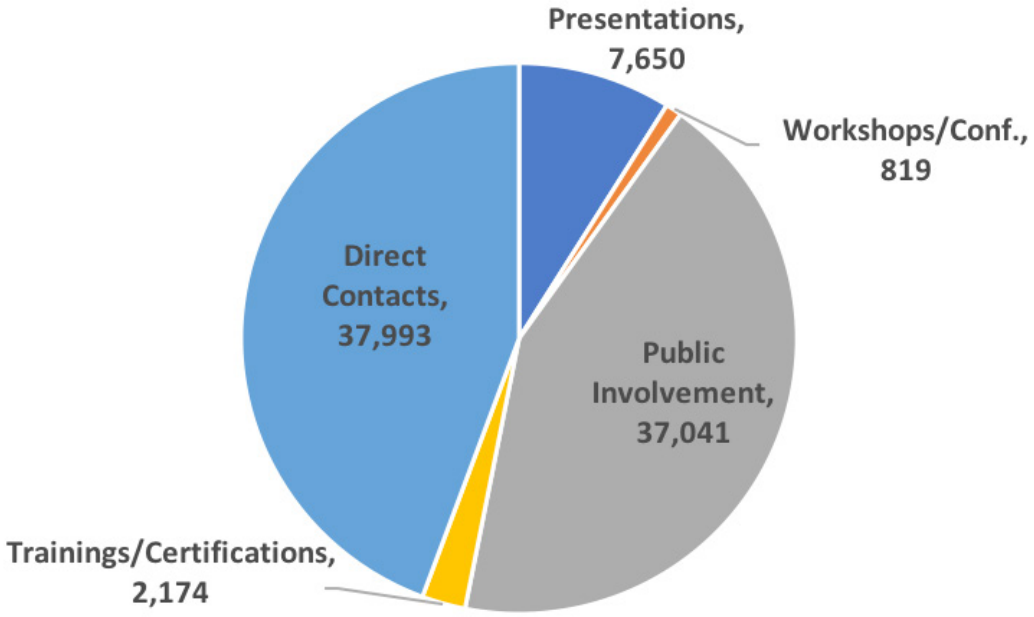
Outreach Summary

ACSEC program success is, in part, measured by outreach impacts that represent an estimate of individuals reached through direct and indirect education and involvement activities. **Total impacts for the Year Nine reporting year (January 1, 2018 - December 31, 2018) total an estimated 3,008,955 individuals.**

INDIRECT METHODS SUMMARY, TOTAL ESTIMATED IMPACTS: 2,923,278



DIRECT METHODS SUMMARY, TOTAL ESTIMATED IMPACTS: 85,677



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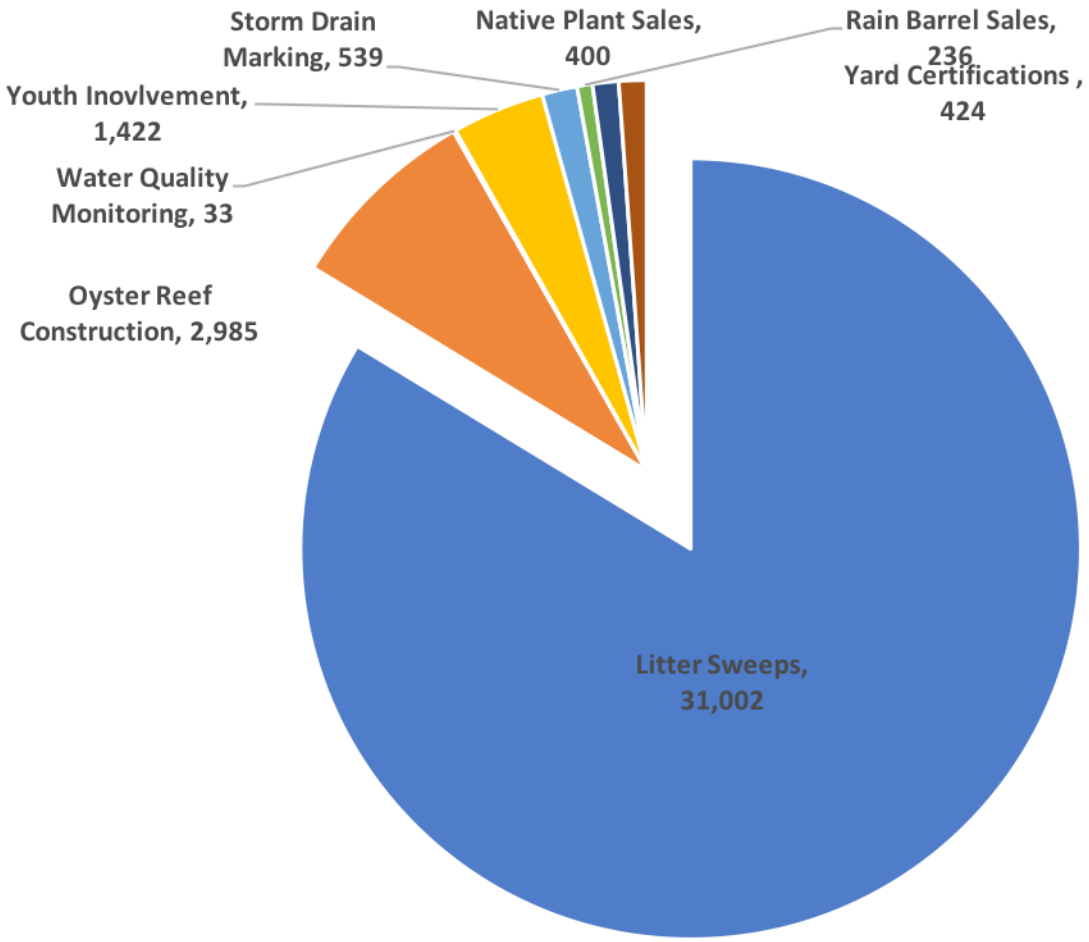
STORMWATER EDUCATION CONSORTIUM

Outreach Summary

Public Involvement is considered an activity that provided hands-on opportunities for target audiences to take part in stormwater management and pollution prevention. Public involvement opportunities include oyster reef construction, water quality monitoring, litter sweeps, storm drain marking, rain barrel sales, native plant sales, and youth involvement activities. During 2018, estimated impacts attributed to public involvement were 37,041 individuals.

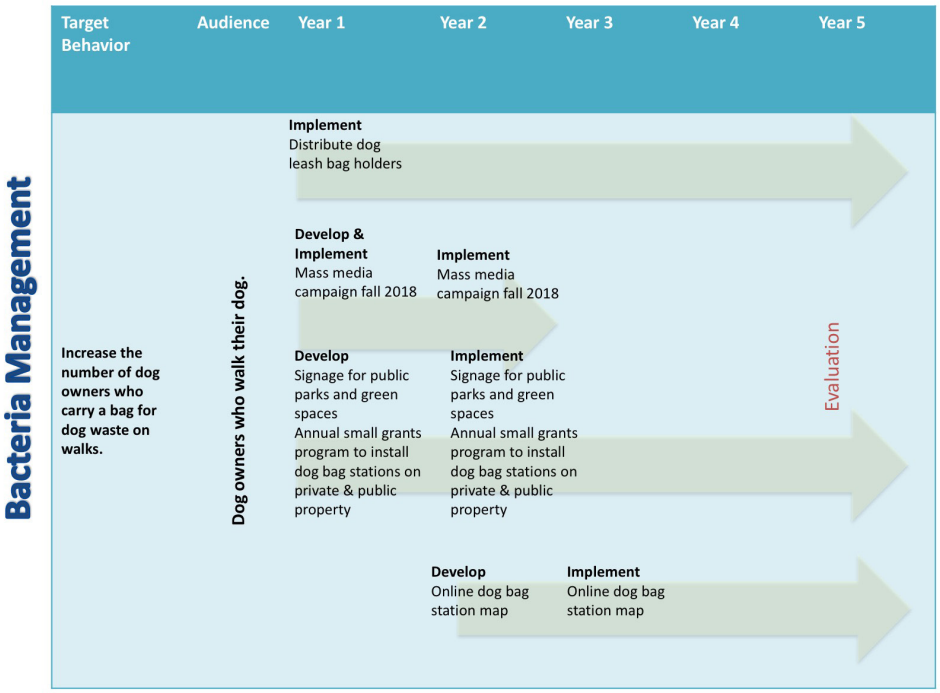
PUBLIC INVOLVEMENT SUMMARY, TOTAL ESTIMATED IMPACTS: 37,041

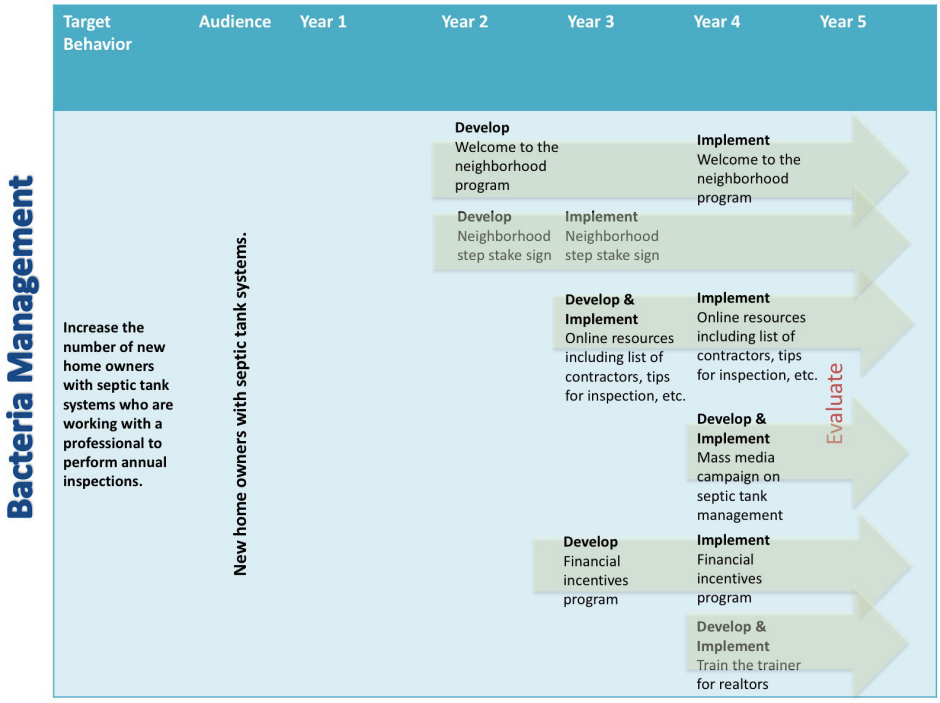


ASHLEY COOPER STORMWATER EDUCATION CONSORTIUM

Appendix

ACSEC 2018-2023 Strategic Plan: Education Timelines

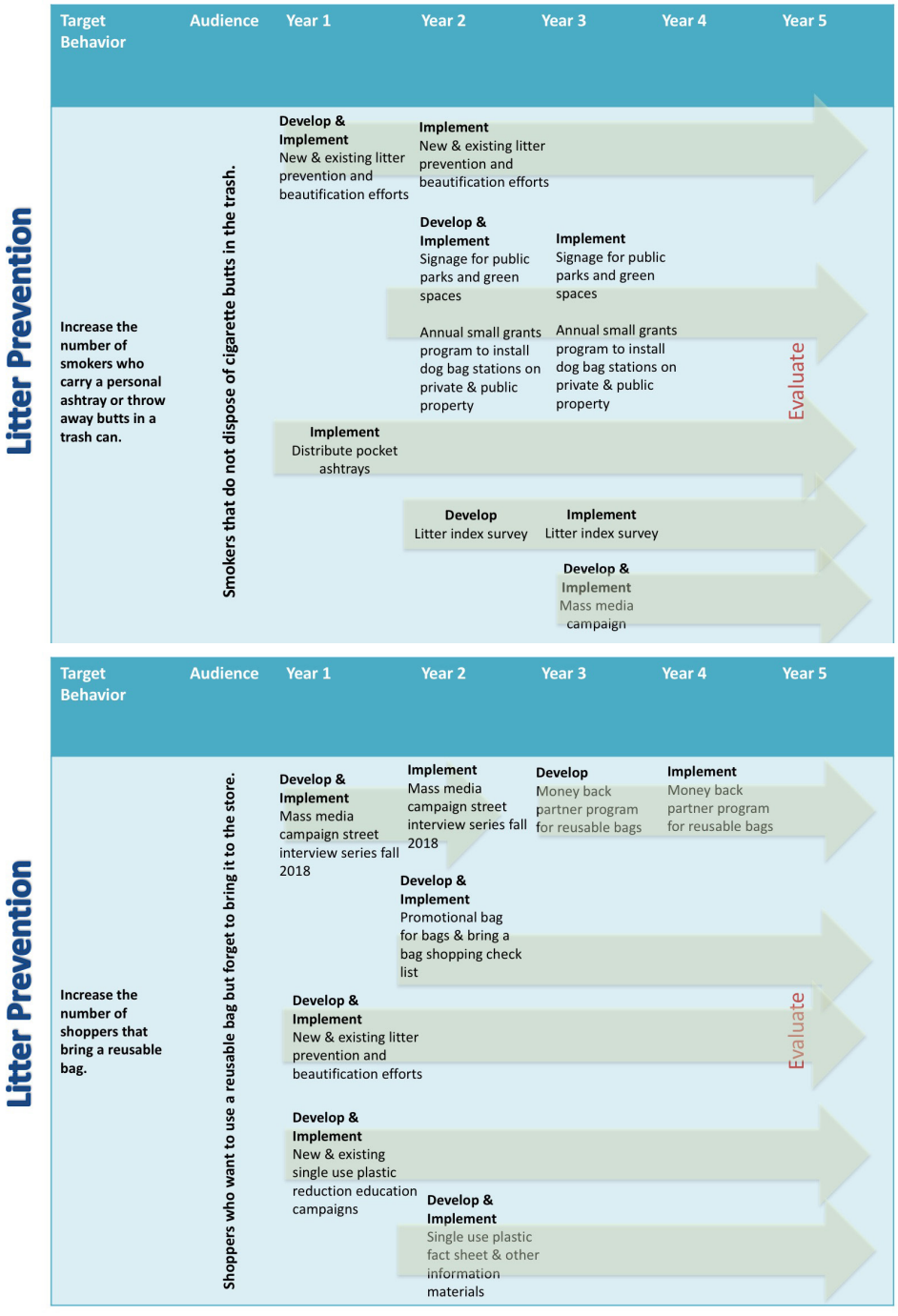




ASHLEY COOPER STORMWATER EDUCATION CONSORTIUM

Appendix

ACSEC 2018-2023 Strategic Plan: Education Timelines



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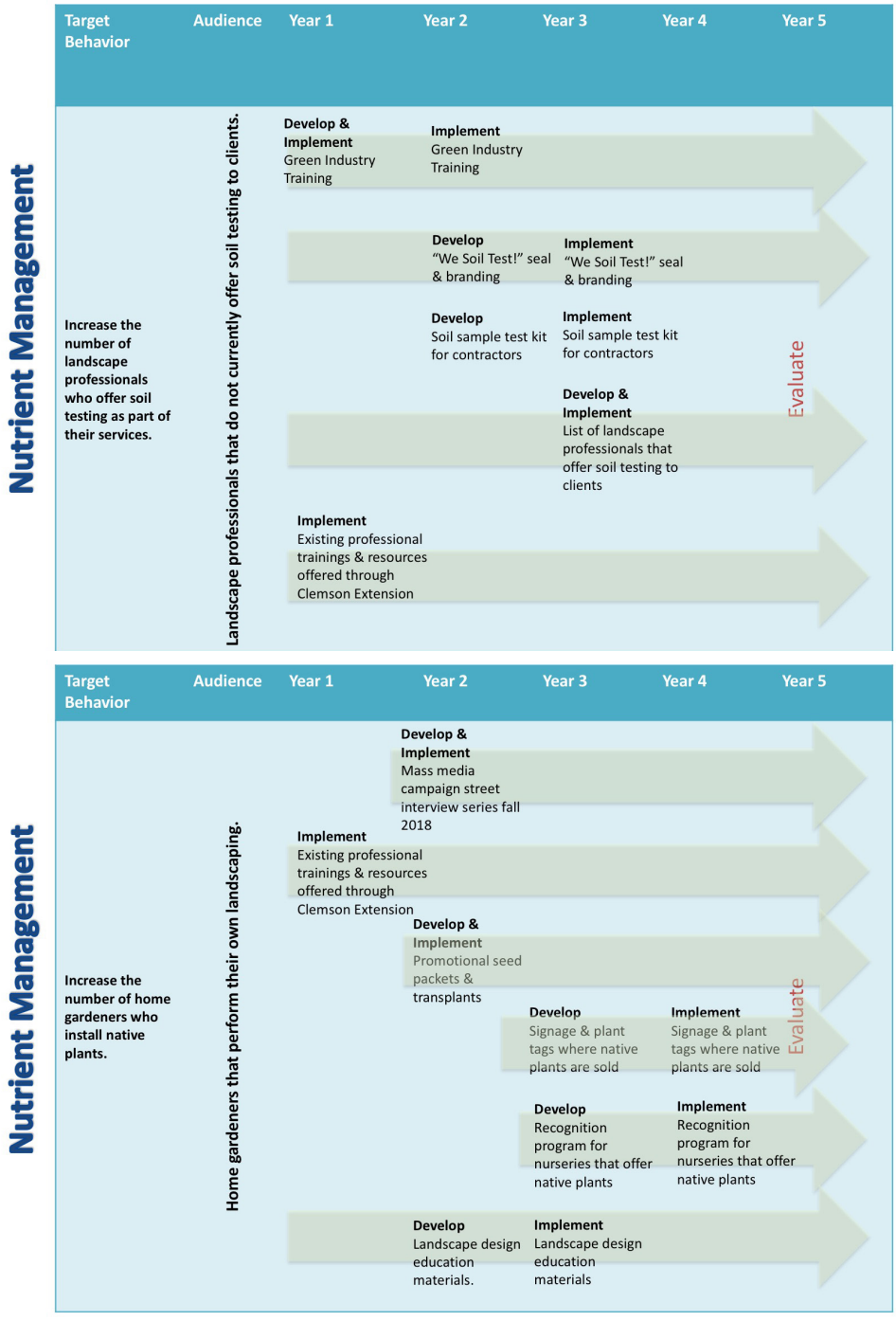
Appendix

ACSEC 2018-2023 Strategic Plan: Education Timelines



ASHLEY COOPER STORMWATER EDUCATION CONSORTIUM

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SPECIAL THANKS TO ACSEC REPRESENTATIVES FOR REVIEW

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Produced 03/15/2019

Notes

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Members of the Ashley Cooper Stormwater Education Consortium celebrate their ten years of collaboration in stormwater education and involvement at the November 2018 meeting.

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STORMWATER EDUCATION CONSORTIUM

Annual Report of Activities

YEAR 11 / JANUARY 2019 - DECEMBER 2019

MARCH 2020

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STORMWATER EDUCATION CONSORTIUM

Executive Summary

The Ashley Cooper Stormwater Education Consortium's Year Eleven Annual Report of Activities summarizes outreach and involvement programming offered by the Ashley Cooper Stormwater Education Consortium (ACSEC) community and education partners in 2019. The ACSEC implements a region-wide outreach strategy to educate Charleston Tri-County residents on water quantity, quality, and the cumulative impacts of stormwater. Education programming is steered by the ACSEC Stormwater Outreach Strategic Plan 2018-2023, which identifies priority issues to address through messaging and outreach that targets residential and commercial audiences.

Through partner collaboration, new initiatives in stormwater outreach offered creative methods to work with communities to address pollution in the region.

2019 Highlights

- In 2019, Clemson Extension in the Lowcountry introduced Low Impact Development (LID) Hot Topics in Mount Pleasant and Myrtle Beach, SC. This focused on the economic costs and benefits of implementation stormwater BMP's in site designs in SC coastal communities and coastal SC residents'.
- In the mix of our internet efforts for 2019, included SepticSmart Week. We created an email with the help of WCBD-TV targeting the areas within the regions that have TDML's associated with bascteria.
- There were many mass-media opportunities in 2019, including the Street Interview Series, "Why you should use native plants in your local landscape." This was for Charleston County viewers thanks to Fox 24. This commercial estimated reach is already over 137,000 viewers. The numbers will continue to grow with the help of social media.
- Charleston Waterkeeper with a team of many of our partner member gathered together for the October 2019 Goose Creek Reservoir Cleanup at Bettis Landing. This land base and water base cleanup successfully had 80 attendees.

ACSEC Co-Coordinators

In August 2019, Beatrice Calhoun (right) joined the Clemson Extension Water Resource Team. Bea comes to us from the SC Department of Natural Resources and brings a wealth of knowledge in water quality education and community engagement. Bea, teams up with Kim Morganello (Center) and Guinn Wallover (Left) who also serve as Water Resource Agents for the Clemson Cooperative Extension. As part of their work with the Carolina Clear program, Kim, Guinn and Bea work to Coordinate the efforts of the Ashley Cooper Stormwater Education Consortium. Building upon one another's diverse interest, the agents are better suited to meet the needs of the ACSEC region.

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STORMWATER EDUCATION CONSORTIUM

Executive Summary

2019: A Year in Pictures

The Spring 2019 Rain Garden Installation with SCDNR's Coastal Exploration Series at SCDNR Permit and License Office.

4-H2O 2019 campers enjoying the lowcountry.

Teachers constructs a floating wetland as part of a teacher workshop in summer 2019.

Students planting salt marsh as part of a "From Seeds to Shoreline" Restoration day.

Tri-County Master Gardeners help retrofit the farm pond at the Clemson Coastal Research and Education Center.

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STORMWATER EDUCATION CONSORTIUM

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A participant in the Master Rain Gardener 2019 offering prepares the site at Corrine Jones Park.

ASHLEY COOPER STORMWATER EDUCATION CONSORTIUM

Community Partners

The majority of designated Small Municipal Separate Storm Sewer Systems (SMS4) communities in the Charleston Urbanized Area, representing approximately 90% of the population, have committed to the ACSEC regional collaboration. These communities are represented by a dedicated group of public servants who have been engaged for many years in building the partnership.

Local SMS4 Consortium Representatives: 2019

Berkeley County	Kelsey Gagnon, Thurman Simmons, Kevin Kubiak
Charleston County	Chris Wannamaker, John Carullo, Frank Pandullo, Yaenette Dixon, Brett Champion
Dorchester County	Mike Goldston, Kacy Byrd, Julian Seraphin
City of Charleston	Kinsey Holton
City of Folly Beach	Represented by Charleston County via Inter-Governmental Agreement (IGA)
City of Goose Creek	Represented by Berkeley County via IGA
City of Hanahan	Represented by Berkeley County via IGA
City of Isle of Palms	Represented by Charleston County via IGA
Town of James Island	Represented by Charleston County via IGA
Town of Lincolnville	Represented by Charleston County via IGA
Town of Mount Pleasant	Hillary Repik, Emily Raby, Devay Dandy
City of North Charleston	Mike Dalrymple, John Peckham, Merry Barton
Town of Sullivan's Island	Represented by Charleston County via IGA
Town of Summerville	Russ Cornette, Bonnie Miley, Matt Halter, Jr.

ASHLEY COOPER STORMWATER EDUCATION CONSORTIUM

Education Partners

Collaboration is integral in developing and delivering a successful watershed-scale outreach program that reaches diverse audiences. The ACSEC is fortunate to have a variety of organizations in the Charleston Tri-County region that have joined the effort. Education partners include universities, state and local government agencies, utilities, and non-profits. Each brings unique expertise, resources, ideas, and programs to the ACSEC. The ACSEC fosters communication among organizations and through this cooperative effort programs are being created or enhanced. Lead and supporting partners are noted in the following report of activities.

ACSEC Education Partners

Sea Grant
S.C. SEA GRANT CONSORTIUM

South Carolina Department of Natural Resources
DNR

Carolina CLEAR
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CLEMSON
COOPERATIVE EXTENSION

ACE Basin
National Estuarine Research Reserve

KEEP BERKELEY BEAUTIFUL
KEEP AMERICA BEAUTIFUL AFFILIATE

Keep Charleston Beautiful
KEEP AMERICA BEAUTIFUL AFFILIATE

The South Carolina Native Plant Society
1996

CHARLESTON WATERKEEPER®

South Carolina Oyster Restoration and Enhancement Program

Charleston Berkeley Dorchester
TRI-COUNTY MASTER GARDENER

COLLEGE of CHARLESTON

Audubon
SOUTH CAROLINA

SURFRIDER FOUNDATION
CHARLESTON

Charleston Conservation District

SOUTH CAROLINA MARINE ASSOC.

Keep Dorchester County Beautiful
Be like Ollie the Otter and, "Make recycling part of your HABITat"

South Carolina Aquarium

The Sustainability Institute

CHARLESTON COUNTY PARK & RECREATION COMMISSION

RECYCLE
CHARLESTON COUNTY

ADOPT-A-HIGHWAY

PalmettoPride

Mount Pleasant Waterworks
CLEAN WATER

Charleston Water System

ASHLEY COOPER
STORMWATER EDUCATION CONSORTIUM

Mission and Goals

ACSEC MISSION STATEMENT

Improve water quality within the Ashley and Cooper River basins by providing educational opportunities on stormwater impacts and our community roles in supporting healthy, fishable, and swimmable waterways.

PROGRAM GOALS

- Develop and implement an education plan that defines a cohesive education strategy which outlines target audiences and associated target pollutants relevant to the region using a prioritized approach.
- Facilitate compliance with existing and future educational regulatory requirements by capitalizing on local resources and service providers.
- Foster citizen involvement in stormwater management through ACSEC education and participation programs.
- Encourage behavioral change towards environmental quality improvement through stormwater education.
- Utilize mainstream and developing technologies and tools to maximize citizen exposure to ACSEC stormwater goals and objectives.
- Create an interactive reporting process to facilitate information exchange and dissemination among member entities.

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STORMWATER EDUCATION CONSORTIUM

Education and Involvement Program History

To meet the ACSEC program goals, community and education partners meet twice a year or more frequently as needed to work collaboratively in the development, implementation, and evaluation of new and existing programming. These meetings and decision making process is also open to the public.

ACSEC programming priorities were identified and developed through the Ashley Cooper Stormwater Education Consortium Stormwater Outreach Strategic Plan 2018-2023. The Strategic Plan can be found online at: www.ashleycooper.org. The Strategic Plan provides a framework for prioritizing regional issues, developing target outreach methods, and determining program evaluation metrics to improve the delivery and impact of ACSEC efforts. It is considered a "living" document to allow for refinement, supplementation, and flexibility as regional efforts evolve over the five-year period. The development of the Strategic Plan was a multi-year effort that involved community and education partner input and an evaluation of geography, pollutant concerns, and public perception as identified from the 2008 and 2013 Carolina Clear Statewide Survey.

The Strategic Plan process helped identify priority issues, contributing issues, target behaviors, and education strategies to address pollutants of concern in the region. The ACSEC residential and commercial audience priorities are as follows:

Bacteria

CONTRIBUTING ACTION	TARGET AUDIENCE	TARGET BEHAVIOR
Dog owners do not pick up and dispose of dog waste.	Dog owners who walk their dog.	Increase the number of dog owners who carry a bag for dog waste on walks.
Residents do not maintain their septic tank system.	New homeowners with septic tank systems.	Increase the number of new homeowners with septic tank systems who are working with a professional to perform maintenance.

Litter

CONTRIBUTING ACTION	TARGET AUDIENCE	TARGET BEHAVIOR
People use single-use plastics.	Shoppers who want to use a reusable bag but forget to bring to the store.	Increase the number of shoppers who bring a reusable shopping bag.
Smokers improperly dispose of cigarette butts.	Smokers that do not dispose of cigarette butts in trash.	Increase the number of smokers who carry a personal ashtray or throw away butts in the trash can.

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Education and Involvement Program History

Nutrients

CONTRIBUTING ACTION	TARGET AUDIENCE	TARGET BEHAVIOR
Residents improperly apply fertilizer.	Home gardeners that perform their own landscaping.	Increase the number of home gardeners who install native plants.
Lawncare companies improperly apply fertilizer.	Landscape professionals that do not currently offer soil testing to clients.	Increase the number of landscape professionals who offer soil testing as part of their services.

These priority issues, and subsequent contributing actions, target audiences, and target behaviors, have formed the core of efforts by the ACSEC; education strategies include five-year timelines for program implementation (see Appendix). To evaluate the effectiveness of outreach and involvement campaigns, evaluation metrics include but are not limited to:

- Five-year surveys to gauge perceptions, knowledge gained, and behavior change of residents living in the consortium area.
- Google Analytics to evaluate impacts of web-based programming and outreach.
- Short and long-term program evaluation to evaluate workshop and training success in delivering information, assisting participants in overcoming barriers to practice implementation, and meeting the needs of the target audience.
- Other methods including analysis of distribution numbers.

The ability of the ACSEC to implement and deliver consistent messaging and programming as well as leverage partner-lead initiatives helps the Consortium-model to successfully address community priorities and concerns across multiple waterway “lines.”

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Year Eleven Highlight

Clemson Extension Presents Low Impact Development (LID) Hot Topics

With the ever increasing training needs related to Low Impact Development, the ACSEC worked with partnering entities to launch the LID Hot Topics series in 2019. The first offering of the series took place in Mount Pleasant, SC (August 28) and focused on the economic costs and benefits of implementing stormwater BMPs in site design in SC coastal communities. This initial offering also provided information on coastal SC residents' perceptions of these stormwater management practices, and reviewed the application and use of a maintenance cost calculator tool to help during the process. Speakers include specialists with Clemson University and North Carolina State University. The workshop was intended for stormwater managers, engineers, landscape architects, developers, and other design and maintenance professionals working in coastal South Carolina. This offering was made possible by the following partners: ACSEC, Clemson University, Clemson Extension, NC State University, SC Sea Grant and the Town of Mount Pleasant.

The second LID Hot Topics offering introduced the uses of permeable pavement. The workshop was housed at the Citadel Alumi Building on December 6, 2019 ; this location provided an in-the-ground example of permeable pavement. The workshop focused on the installation, cost, and maintenance of permeable pavement for a commercial placement. Like the first portion of the LID Hot Topics, this workshop was intended for stormwater managers, engineers, landscape architects, developers, and other design and maintenance professionals working in coastal South Carolina. Speakers included Michael Ulmer, Arthur B. Schirmer, Kinsey Holton, and Chuck Jarman.

PERMEABLE PAVEMENT LID WORKSHOP AT THE CITADEL ALUMI BUILDING CONNECTED BY ARTHUR B SCHIRMER,III

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Year Eleven Highlight

Be Septic Smart! Email Blast

Through a partnership with WCBD-TV, a targeted email blast was sent to septic tank owners in geographic areas associated with TMDLs. The email included septic tank tips and was launched during "SepticSmart" week in September 2019. As septic tank management is often misunderstood or overlooked by owners, the need exists to help homeowners and renters learn information on proper use and maintenance. Improperly maintained septic systems are associated with pollution of adjacent water bodies and can lead to recreational and shellfish harvesting closures. Multiple emails were sent to over 60,000 users highlighting the following important tips:

- Perform routine inspections on a one- to two-year basis.
- Have your tank cleaned out (pumped) when necessary, typically every three to five years.
- Avoid damage to septic systems; don't dispose of chemicals and kitchen grease down the drain.
- Conserve water and reduce strain on your system; for example, limit laundry to one or two loads a day.
- Steer clear of garbage disposals, which can add more solids to your tank and increase the need for maintenance.

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EMAIL WAS DISTRIBUTED TO 60,000 SEPTIC TANK OWNERS, WITH 7,000 UNIQUE VIEWS.

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Year Eleven Highlight

Why use Native Plants? Media Campaign

In September 2019, Clemson Extension jumped back into our Street Interview media campaign focused on addressing the importance of using Native Plants in home landscape. The one minute segment highlighted native plants as the locals of the plant world; associated benefits include reduced irrigation and fertilizer needs, support of biodiversity and less inputs than a traditional lawn. Due to these benefits, native plants can assist with protection of downstream water quality. Members of Tri-County Master Gardener Program and attendees of the SC Native Plant Society fall plant sale provided interview answers for the segment. Helpful participants stated *"I find them to be resilient and low maintenance!"* and *"It's a awesome way to help the native wildlife have food to eat and a place to live."* In partnership with FOX 24, this ACSEC street interview segment aired on WTAT-TV Charleston from November 27, 2019 to December 10, 2019 during the midday. This time slot reached over 137,000 viewers and the numbers continue to grow on social media.

THE 2019 STREET INTERVIEW AT THE COASTAL RESEARCH AND EDUCATION CENTER. RYAN CLUCAS (LEFT) KAREN PIRET(RIGHT) AND BEATRISS CALHOUN (CENTER).

KIM MORGANELLO (LEFT) AND BEATRISS CALHOUN (RIGHT) WORKED TOGETHER TO HOST THIS YEARS STREET INTERVIEW REACHING OVER 137,000 VIEWERS.

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Year Eleven Highlight

Goose Creek Reservoir Cleanup

Charleston Waterkeeper, Keep Berkeley Beautiful, Blueway Adventures, Berkeley County Blueways, Berkeley County Stormwater Management Program, and Clemson Extension all teamed up and visited the Bettis Boat Landing in Hanahan, SC. Through collaboration, a one time cleanup of the Goose Creek Reservoir using boots to the ground was held in fall 2019. Members of the public had the opportunity to participate on foot or via kayak. Supplies (bags, gloves, free volunteer shirts, and litter pick up sticks) were given to each participant. Before we kicked off the clean up, those who brought a kayak or used one of our donated kayak went through a safety check. This event was a major success with over one ton of debris removed from the reservoir and after all that hard work we shared box lunches with volunteers.

With over 80 attendees this cleanup highlighted the awareness of keeping our waterways clean. Volunteers range from age 8 to adults. Many of the attendees stated this was their first time being involved with a litter removal effort. Also, this collaboration provide a good connection with additional groups for future projects.

EXTRA KAYAKS WERE DONATED BY BLUEWAY ADVENTURES FOR THE GOOSE CREEK RESERVOIR CLEANUP.

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Annual Report of Activities Format

The annual report utilizes the same general format as the first seven ACSEC reports and the other regional stormwater consortiums in South Carolina. This annual report, the eight for the consortium, is intended to give the reader a comprehensive look at the ACSEC from January 1, 2019 through December 31, 2019. This report delineates activities into public education and public involvement categories. For each activity, a brief description is provided as well as information on lead provider, supporting partners, date, number of impacts, and target audiences. Furthermore, public education activities are identified as either direct or indirect outreach strategies.

Clemson Extension's Carolina Clear program developed an online database in the first ACSEC reporting cycle to record detailed information on activities conducted by consortium partners. The data collected in the online database includes information on target audiences, pollutants addressed, activity type, lead service providers, supporting partners, number of impacts, location, and several other categories. This annual report provides a condensed version of the information collected in the online database as well as additional, supplementary information sourced from ACSEC partners.

Public education activities are classified into two broad categories, **direct** and **indirect** outreach methods, to express mechanisms by which information has been communicated to the public. Direct methods include activities that are implemented via direct personal contact. Examples of direct methods include workshops, presentations, trainings, and public involvement activities. In contrast, indirect outreach methods refer to contacts through traditional media channels including television, radio, print, and billboards. Indirect methods generally reach a much greater portion of the population due to the nature of their mediums; however, it is often more difficult to gauge specific impacts. When dealing with direct methods, smaller numbers of people are reached yet the ones that are reached generally provide a forum for direct evaluation and feedback. Each method is important in the overall education campaign, and both are part of the five year educational strategy for the ACSEC. Throughout the document, the words "direct" or "indirect" are provided at the top of each reporting table.

*Data provided are as accurate as possible and are reviewed by multiple individuals involved in the reporting process. However, due to the nature of indirect outreach initiatives, indirect impact numbers are typically estimates.

The activities in the report are listed in table format.

ASHLEY COOPER STORMWATER EDUCATION CONSORTIUM

Public Education: Indirect

DATE	ACTIVITY DESCRIPTION	PARTNERS	NUMBER OF IMPACTS
2019	INTERNET: Total unique views in 2019 for the Carolina Clear, ACSEC, Clemson Extension Water Team, Stormwater Pond Management, Carolina Rain Garden Initiative & Carolina Yards.	Clemson Extension, Clemson University	161,346
2019	INTERNET: Total views for the ACSEC Facebook page in 2019.	Clemson Extension	53,694
2019	INTERNET: Total views for the Carolina Clear Facebook page in 2018.	Clemson Extension	6,300
2019	INTERNET: Total views on Carolina Clear YouTube page (12,840 minutes viewed).	Clemson Extension	9,900
2019	INTERNET: ACSEC's "Ripple Effect" is published four times annually and provides information on ACSEC education and involvement opportunities.	Clemson Extension	2,911
2019	INTERNET: SC Coastal Information Network (SCCIN) hosts an online event calendar and resource portal providing educational and training opportunities for coastal community officials, staff, and public. The SCCIN is a coastal partnership of local, state, and federal partners (23) coordinated through the SC Sea Grant Consortium.	SC Sea Grant	5,200
September October 2019	TELEVISION AND INTERNET: Hurricane sponsorship with local NBC news affiliate included television and internet advertising space; content discussed included the connection between storm drains and receiving waterways, and actions to prevent stormwater pollution during storm events.	Clemson Extension, NBC	220,384
2019	INTERNET: During "SepticSmart Week" we sent out an email to 62,500 of septic tips through WCBD-TV Email Marketing Program to individuals with septic tanks on their property.	Clemson Extension, WCBD-TV	7,291
Fall 2019	TELEVISION: The 2019 Street Interview Series, hosted in partnership with the local FOX news affiliate, focused on the use of native plants in local natural landscape. Participants provided benefits of using native plants and included educational messaging on environmentally friendly practices.	Clemson Extension, Fox 24	137,976
2019	TELEVISION: SCETV and Clemson Extension's "Making It Grow" shares home and garden information for South Carolina residents; a water quality tip is included each week during the broadcast.	SCETV, Clemson Extension	23,376
2019	TELEVISION: The "Be the Scooper Hero" pet waste campaign encouraged dog walkers to always bring their bag on dog walks. The 30-second commercial was shown on local WYFF networks.	Clemson Extension	150,864

ASHLEY COOPER STORMWATER EDUCATION CONSORTIUM

Public Education: Indirect

DATE	ACTIVITY DESCRIPTION	PARTNERS	NUMBER OF IMPACTS
November 2019	TELEVISION: Interview with WCBD affiliate midday news show "Living Local", A short segment based on providing highlights on Rain Water Harvesting and Rain Barrel Sale	Clemson Extension, WCBD	13,271
February 2019	PUBLICATION: The quarterly Coastal Heritage magazine, a publication of the SC Sea Grant Consortium, focuses on diverse coastal resource management strategies, current research and concerns.	SC Sea Grant	5,000
2019	PUBLICATION: Article in Clemson Extension Newstand, the "Blue Green Algae in Ponds" article focused on conservation and irrigation management tips to reduce runoff from the landscape.	Clemson Extension	87,606
2019	PUBLICATION: Article focused on Drought in the area in Clemson Extension Newstand focused on conservation landscaping practices with emphasis on water quality benefits.	Clemson Extension	92,300
2019	PUBLICATION: Pond Management Program Information article was published through Clemson's Newstand. The article provided tips and resources for resident on a stormwater pond's purpose and maintenance, particularly during hurricane season preparations.	Clemson Extension	104,181
2019	PUBLICATION: Survey was conducted aim to keep the waterways clean. This was posted in Clemson Newstand	Clemson Extension	98,039
2019	PUBLICATION: S.C. Stormwater Pond Research and Management Collaborative: Conducted a field tour focused on pond functionality and best practices for management and maintenance. Available in print and PDF at: http://www.scseagrant.org/SWP-SOK-Summary.pd	SC Sea Grant Consortium	28
2019	PRINT ADVERTISING: The Town of Mount Pleasant sponsored several advertising print purchases in The Moultrie News. Advertising space focused on illicit discharge awareness, storm drainage system connection to waterways, dog waste, and more.	The Town of Mount Pleasant, Clemson Extension, The Moultrie News	120,000?
2019	MAILER: City of Charleston included information on stormwater management in the Charleston Water Systems billing mailers	City of Charleston	105,000

ASHLEY COOPER STORMWATER EDUCATION CONSORTIUM

Public Education: Indirect

DATE	ACTIVITY DESCRIPTION	PARTNERS	NUMBER OF IMPACTS
Continuous	MANUAL: Low Impact Development in Coastal SC: A Planning and Design Guide. This guidance manual is available for download from the SC Sea Grant Consortium's and NI-WB NERR websites. It continues to be a popular download from the SC Sea Grant's site totaling 2,270 copies downloaded from January through December 2019.	SC DNR ACE Basin NERR, SC Sea Grant Consortium, North Inlet-Winyah Bay NERR, and the Center for Watershed Protection	2,412
2019	BILLBOARD: Responsible pet waste management billboards were located in high-visibility locations in 2019 as the following: • Rivers Ave (0.1 mi W/O Remount Rd) – 137,111 weekly impressions; • US 78 (0.1 mi W/O Richardson Ave) – 69,929 weekly impressions; • US 17 (1.1 mi S/O State Rouge 162) – 58,090 weekly impressions	Clemson Extension	265,130
5/24/2019	Touch-A-Truck Event: Children were able to see large equipment up close. They were able to see the Town's CCTV truck used for stormwater investigations also including educational materials.	Town of Mount Pleasant	500
Continuous	PERMANENT EXHIBIT: A large shoreline planting project and floating wetland at a stormwater pond on the Charleston County Public Services Building campus serves as a demonstration site for stormwater pond best management practices.	Charleston County Government, Clemson Extension	500
Continuous	PERMANENT EXHIBIT: Clemson REC "Ed Shed" includes education signage and stormwater best management practices. This space is used to host workshops, trainings and meetings for diverse groups/classes.	Clemson Extension, Tri-County Master Gardeners	1,000
Continuous	PERMANENT EXHIBIT: Rain garden and cistern installed at a Berkeley County library "Pollinator Garden" location in Hanahan.	Berkeley County, Tri-County Master Gardeners, Keep Hanahan Beautiful, Berkeley County Government	1,000
Continuous	PERMANENT EXHIBIT: Clemson REC Urban Research and Demonstration Area showcases native plants, a rain garden, rain barrels, and educational signage; open to the public during daylight hours.	Tri-County Master Gardeners, Clemson Extension	1,000
Continuous	PERMANENT EXHIBIT: Rain garden and rain barrel at a North Charleston park and Keep North Charleston Beautiful office location.	City of North Charleston, Tri-County Master Gardeners, Clemson Extension, Keep North Charleston Beautiful	1,000

ASHLEY COOPER STORMWATER EDUCATION CONSORTIUM

Public Education: Indirect

DATE	ACTIVITY DESCRIPTION	PARTNERS	NUMBER OF IMPACTS
Continuous	PERMANENT EXHIBIT: Rain garden and signage installed at Mount Pleasant fire station and recreation area.	Town of Mount Pleasant	800
Continuous	PERMANENT EXHIBIT: As part of Carolina Schoolyards, a rain garden and rain barrel located at the CREEC School.	Cape Romain Environmental Education School	175
Continuous	PERMANENT EXHIBIT: Rain garden at "Whirlin' Waters" at Wannamaker County Park.	CCPRC	500
Continuous	PERMANENT EXHIBIT: Rain garden and signage at Caw Caw Interpretive Center.	CCPRC	2,000
Continuous	PERMANENT EXHIBIT: Two rain barrels and drip irrigation at St. Julian Divine Community Center.	St. Julian Divine Community Center	1,500
Continuous	PERMANENT EXHIBIT: Two rain gardens, cistern and native plants installed at Fort Johnson Community Garden.	SCDNR	5,000
Continuous	PERMANENT EXHIBIT: Cistern at Mitchell Elementary School's Green Hearts Project Garden.	Mitchell Elementary School, Green Hearts	350
Continuous	PERMANENT EXHIBIT: Cistern, rain garden, rain barrels, composing station and native plants at the College of Charleston's Grice Marine Lab's Green Teaching Garden.	College of Charleston	500
Continuous	PERMANENT EXHIBIT: Cistern and drip irrigation installed for raised beds at College of Charleston's Political Science Building.	College of Charleston	200
Continuous	PERMANENT EXHIBIT: Cistern and adjacent rain garden located at the Medway Community Garden. Rainwater harvested is utilized to irrigate adjacent raised beds; rain garden doubles as a pollinator garden.	Charleston Parks Conservancy, Clemson Architecture Community Design Build, Clemson Extension	1,000
Continuous	PERMANENT EXHIBIT: 700 gallon cistern and adjacent rain garden installed at the Medical University of South Carolina's Urban Farm.	MUSC, Clemson Extension	920
2019	NEW DEMONSTRATION SITE: Farm pond retrofit at the CU CREC to include best practices of shorescaping and invasive plant management.	Clemson Extension	Upcoming
2019	NEW DEMONSTRATION SITE:Corrine Jones Park- includes wetland plant garden and cistern at the community garden shed. This was installed as part of the Master Rain Gardener course.	Clemson Extension	1,000
2019	FAIRS/FESTIVALS: South Carolina Green Industry Trade Show: Provided information on sustainable landscaping practices and resources to green industry professionals	Clemson Extension	125

ASHLEY COOPER STORMWATER EDUCATION CONSORTIUM

Public Education: Indirect

DATE	ACTIVITY DESCRIPTION	PARTNERS	NUMBER OF IMPACTS
2/15-17/2019	FAIRS/FESTIVALS: The Charleston Soil and Water Conservation District provided information at the Southeastern Wildlife Exposition	Charleston Soil and Water Conservation District	3,000
March 2019	FAIRS/FESTIVALS: Black Expo (Charleston Economic Empowerment Summit) table hosted by Charleston County Government provided information on stormwater management.	Charleston County Government	198
4/10/2019	FAIRS/FESTIVALS: Naturescope Kids Who Care Event; ACSEC provided hands-on activities to discuss stormwater and food chains.	Multiple	2,000
4/9/2019	FAIRS/FESTIVALS: The Lowcountry Math and Science Fair is sponsored by the Charleston County Soil and Water Conservation District. The District evaluates environmental projects and sponsors student awards.	Charleston County Soil and Water Conservation District	300
4/27/2019	FAIRS/FESTIVALS: Summerville's first annual Earth Day Echoes Festival highlighting individuals and businesses providing eco-friendly services at the Cuthbert Center.	Keep Dorchester County Beautiful	100
4/28/2019	FAIRS/FESTIVALS: Blessings of the Fleet. The town of Mount Pleasant provided an educational booth on pollution prevention, erosion control, pond maintenance and other programs. Partner educational Material was distributed	Town of Mount Pleasant	1000
3/23/2019	FAIRS/FESTIVALS: Firefest Outreach Event: The District and NRCS shared a educational outreach table, along with other local vendors, to promote our soil and water outreach events. Handouts were given.	Charleston County Soil and Water Conservation District, USDA-NRCS	Unknown

ASHLEY COOPER STORMWATER EDUCATION CONSORTIUM

Public Education: Direct

DATE	ACTIVITY DESCRIPTION	PARTNERS	NUMBER OF IMPACTS
Continuous	IN-PERSON, PHONE, EMAIL: In the Tri-County, Master Gardeners answered questions relating to a variety of home landscaping issues, topics including compost, mulch, fertilizers, native plants, irrigation, etc.	Clemson Extension, Tri-County Master Gardeners Association	32,869
Continuous	IN-PERSON, PHONE, EMAIL: Clemson Extension Agents answered questions and provided services to a variety of Tri-County audiences regarding water resources and stormwater BMPs.	Clemson Extension	1,000
Continuous	SOIL SAMPLES: Clemson Extension in cooperation with Clemson's Agricultural Service Lab, processed soil samples for the Tri-County residents and commercial audiences. Impact represents Tri-County total.	Clemson Extension, Clemson's Agricultural Service Lab	4,124
Continuous	PRESENTATION: Presentation topics included native plants, rain gardens, rainwater harvesting, shoreline buffers, conservation landscaping, pollution prevention, LID, gardening for pollinators and stormwater pond management. Audiences included Master Naturalist, Trident Technical College, Landscape Design School, Master Gardeners, Seabrook Island Naturalist Club, Palmetto Scholars Academy, Cummins Turbo Technologies, Blue Thumb Conference, etc	Clemson Extension	555
5/22/2019	PRESENTATION: Charleston SCWD Environmental Awards Dinner, hosted by the Charleston County Soil and Water. The program honored outstanding educators and Conservationists who promote stormwater, water, and soil quality conservation issues.	Charleston County Soil and Water Conservation District	45
2019	PRESENTATION: Dutch Dialogues: As part of the Dutch Dialogues process, Clemson Extension provided information to citizens about water management strategies in home landscaping decisions.	Clemson Architecture Center, Clemson Extension	100
Continuous	PRESENTATION: "Oysters as Living Shorelines" presentation provided information on water quality, shoreline stabilization and habitat effects of oyster reefs.	SCDNR SCORE	4,876
April May 2019	PRESENTATION: "Life in the Soil: Dig Deeper" Poster-Essay Contest School Awards and Programs hosted at nine local schools. Presentations all focused on watersheds in our community and environment.	Charleston County Soil and Water Conservation District	375
9/24/2019	PRESENTATION: Grant Watershed Interview: Charleston Soil & Water Conservation District Manager were asked to craft a behavior change campaign focused on septic system maintenance for coastal SC. This communication campaign to encourage people to maintain their septic system.	Clemson University, Carolina Clear, Charleston Soil & Water Conservation District	150

ASHLEY COOPER STORMWATER EDUCATION CONSORTIUM

Public Education: Direct

DATE	ACTIVITY DESCRIPTION	PARTNERS	NUMBER OF IMPACTS
12/6/19	YOUTH PRESENTATION: As part of Arbor Day's celebration, Charleston District's "Twiggy the Tree" visited a local school to discuss the benefits of trees in our landscape. This was followed by a tree planting ceremony and installation of a plaque on campus.	Charleston County Soil and Water Conservation District, Edith L. Frierson Elementary School	400
Continuous	YOUTH PRESENTATION:Enviroscape loaned to various schools/organizations including Charleston County Park and Recreation Commission, Sullivan's Island Elementary, Philip Simmons Elementary & home school group.	SC Sea Grant Consortium	457
Continuous	YOUTH PRESENTATION: Keep Charleston Beautiful offers environmental education programs to local K-12 schools.	Keep Charleston Beautiful, Charleston County School District, City of Charleston	2,167
12/11/2019	WORKSHOP: Seasonal High Tunnel Workshop & Demonstration Project. Charleston District partnered with USDA-NRCS sponsor an educational workshop located in Winsome Winn Farm, LLC. Used to teach Urban Farmers of Seasonal High Tunnel Installation process.	Charleston County Soil and Water Conservation District, Clemson University, Clemson Extension, USDA-NRCS	35
5/23/19; 9/12/19; 10/16/19; 12/5/19	WORKSHOP: Healthy Pond Series: Integrated Aquatic Plant Management; provided aquatic plant control and prevention tips to pond owners in the Tri-County. The Healthy Pond Series is a free networking event for stormwater pond owners in Berkeley, Charleston, and Dorchester counties.	Clemson Extension, SCDNR, ACE Basin NERR Coastal Training Program	99
December 2019	WORKSHOP: Tidal Creeks, Development and Water Quality Workshop: Researchers and community and state resource managers, planners, and staff gathered to learn and discuss research results from several SC Sea Grant-funded projects related to tidal creeks and stormwater ponds. Participants discussed next steps for mitigation strategies and public outreach efforts, as well as gaps and potential priorities for future study.	SC Sea Grant Consortium, University of SC, NI-WB NERR, SCDNR, ACE Basin NERR	Upcoming

ASHLEY COOPER STORMWATER EDUCATION CONSORTIUM

Public Education: Direct

DATE	ACTIVITY DESCRIPTION	PARTNERS	NUMBER OF IMPACTS
8/8/2019	WORKSHOP: "From Seeds to Shoreline" New Teacher Workshop provided hands-on experience in growing salt marsh plants and leading activities with students.	SC Sea Grant Consortium, SCDNR, Clemson Extension	15
12/6/2019	WORKSHOP: LID Hot Topics Workshop focussing on the benefits of using Permeable Pavement from installation to maintenance. Location of workshop the Citadel (see highlight).	Clemson Extension	55
8/28/2019	WORKSHOP: LID Hot Topic Workshop focussing on the economic cost and benefits of Stormwater BMP's in site design. Location of event was the Town Hall of Mount Pleasant and Myrtle Beach (see highlight).	Clemson Extension, Town of Mt. Pleasant	147
2019	WORKSHOP: Healthy Pond Series: Shoreline Planting Design; participants learned basics on shoreline planting design and helped install a 200 square foot shoreline planting project at Clemson's Coastal Research and Education Center in Charleston. The Healthy Pond Series is a free networking event for stormwater pond owners in Berkeley, Charleston, and Dorchester counties.	Clemson Extension, SCDNR, ACE Basin NERR Coastal Training Program	124
6/24/2019	WORKSHOP: Junior Bee Camp Outreach: Charleston District sponsored a student to attend the Bee Camp. A typical day in the camp consisted of starting each day with short classroom lessons about honey bees and pollinators. Then the campers suited up in protective equipment and made the short walk to three hives which were located near the pond.	Charleston County Soil and Water Conservation District, Charleston Community Bee Garden	14
2019	WORKSHOP: The SCORE Program implements oyster reef dissection lessons with K-12 schools groups. A total of 6 bag dissection lessons were implemented. The SCORE Program also gives educational presentations to interested groups and 2 of these activities took place during this reporting period. Locations include James Island, Folly Beach, and Mt. Pleasant.	SCDNR SCORE	227
5/15/19	WORKSHOP: Seeds to Shoreline Event at Waterfront Memorial Park in Mount Pleasant	SCDNR	99
Spring 2019, Fall 2019	TRAINING: Master Naturalist Certification Programs hosted in spring and fall of 2019. A 13-week field study course led by a variety of experts, participants learn about coastal ecology with emphasis on environmental stewardship.	Charleston County Park and Recreation Commission, Clemson Extension	26
Continuous	TRAINING: Clemson provides training and certification for the Certified Erosion Prevention and Sediment Control Inspector (CEPSCI) program to assist in pollution prevention control on construction projects. Impacts reflect statewide trainings.	Clemson University, Clemson Extension	1775

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Public Education: Direct

DATE	ACTIVITY DESCRIPTION	PARTNERS	NUMBER OF IMPACTS
Continuous	TRAINING: Clemson's Department of Pesticide Regulation provides training and certification for commercial, non-commercial, and private licensed applicators. Number of impacts represent Tri-County licensed applicators current through 2019.	Clemson University, Clemson Extension	1,264
Spring 2019, Fall 2019	TRAINING: Master Pond Manager teaches recreational and stormwater pond management training to participants through online classroom and field-based curriculum. The Master Pond Manager class was offered twice in 2019, with field days hosted in Charleston, SC area and in the Clemson, SC. In total, 72 participants took part in the multi-week courses, with 13 participants becoming certified managers.	Clemson Extension	64
Fall 2019	TRAINING: Carolina Yards Online provides online learning opportunity to focus on environmentally friendly landscaping practices. 40 Yards were certified and 28 were certified through the course. There are 119 CY certified yards in the Tri-County area.	Clemson Extension, Carolina Clear	488
Spring 2019, Fall 2019	TRAINING: Post Construction BMP Inspector; online and field-based training focused on inspection and maintenance of best management practices used for stormwater management. The class was offered twice in 2019, with field days hosted at the Trident Technical College campus in North Charleston and Furman University in Greenville, SC.	Clemson University, Clemson Extension	52
Spring 2019, Fall 2019	TRAINING: Master Rain Gardener; online and field-based training focused on rain garden and rainwater harvesting system design and implementation. The class was offered once in 2019; the field day portion were held at the Corrine Jones Park in the upper peninsula of Charleston.	Clemson Extension	43
9/4/19	CONFERENCE: Master Naturalist Statewide Conference workshop on " Green Thumb Gardening" practices to include native plants, rain gardens and rainwater harvesting. Location Camp SEWEE	Clemson Extension	20

ASHLEY COOPER STORMWATER EDUCATION CONSORTIUM

Public Involvement

DATE	ACTIVITY DESCRIPTION	PARTNERS	NUMBER OF IMPACTS
October 2019	LITTER SWEEP: GOOSE CREEK RESERVOIR CLEANUP: Approximately 80 members of the public joined us and our partners for a one time clean up of the Goose Creek Reservoir (see highlight).	Multiple	80
February 2019	LITTER SWEEP: ASHLEY RIVER CLEANUP: One day cleanup of the Ashley River, surrounding tributaries and stormwater runoff locations. This effort took place at the Jessen Boat Landing in Summerville, SC.	Multiple	120
Continuous	LITTER SWEEP: Adopt-A-Boat Landing: Volunteers maintain litter removal at boat landings.	Berkeley County Government, Keep Berkeley Beautiful	Unknown
Continuous	LITTER SWEEP: Keep Berkeley Beautiful worked with multiple partners to host cleanups at locations across Berkeley County. More than 22,000 pounds of litter were removed through the effort of more than 1,000 volunteers.	Keep Berkeley Beautiful, Berkeley Blueways, Palmetto Pride, Berkeley County Sheriff's Department, Keep America Beautiful	1,007
Continuous	LITTER SWEEP: Community groups host two-hour cleanups in marshes, parks, and green spaces.	Keep Charleston Beautiful	2,025
Four per year	LITTER SWEEP: Adopt-A-Highway Charleston County conducts seasonal sweeps each year totaling 36; volunteers sign up to adopt a two-mile stretch of road. During 2019, 2, 855 volunteers removed 7,030 pounds of trash.	Charleston County Community Pride, Clemson Extension	855
Fall 2019	LITTER SWEEP: SC Sea Grant Consortium and SC DNR organize the annual, statewide Beach Sweep River Sweep cleanup along South Carolina's shorelines. In 2019, 788 people helped remove almost 6,769 pounds of trash from approximately over 59 miles of shoreline in Berkeley, Charleston, and Dorchester county.	SC Sea Grant Consortium, SC Department of Natural Resources	788
Continuous	LITTER SWEEP: Berkeley County Adopt-A-Highway; Volunteers adopt a two-mile stretch of road and conduct regular and special cleanups. During 2019, 54,980 pounds of litter were removed through the help of 529 volunteers.	Adopt-A-Highway, Keep Berkeley Beautiful	529
Continuous	OYSTER REEF CONSTRUCTION: SCORE facilitated oyster reef building events and bagging events across the region in 2019, which include a combined 3,909 volunteers.	SCDNR SCORE	3,909

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Public Involvement

DATE	ACTIVITY DESCRIPTION	PARTNERS	NUMBER OF IMPACTS
Continuous	WATER QUALITY MONITORING: Charleston Waterkeeper implements two volunteer-based monitoring programs. The water quality monitoring program conducts bacteria monitoring in the Charleston Harbor vicinity from May to October. The "Creek Watchers Program" is a citizen science program that uses 355 volunteers to monitor health of local waterways using a variety of parameters. In 2019, 15 participants take part in the two programs.	Charleston Waterkeeper, College of Charleston	18
5/24/2019	RAIN BARREL SALE: ACSEC general public sale held at two centralized locations in the Tri-County; barrels were sold at a discounted rate through partnership with Rainwater Solutions and community partners. In 2019, a total of 333 rain barrels were sold to 236 participants as part of this effort. Tri-County Master Gardeners volunteered at the event to provide information on system setup and use.	Clemson Extension, Rainwater Solutions, Charleston County Government, Town of Summerville, Tri-County Master Gardeners.	236
4/12/2019	YOUTH INVOLVEMENT: SC Envirothon is an educational outreach week-long program at Sandhills Research Center in Columbia. Students study soils, water quality, aquatics, and other conservation topics. In 2019, two Wando High School teams were sponsored by the Charleston Soil and Water Conservation District. Eighteen teams that consist of five members and one alternate, participated this year.	Charleston Soil and Water Conservation District, SCDNR, Clemson University	108
06/24/19-06/28/19;	YOUTH INVOLVEMENT: 4-H2O "Exploring Lowcountry Waterways" summer camp for youth ages 10-13; a week-long day camp emphasizing watershed stewardship and water resource protection.	Clemson Extension, SCDNR, Old Santee Canal Park, SC Sea Grant Consortium, CCPRC, Fish & Wildlife Service	40
6/16/19-6/21/19	YOUTH INVOLVEMENT: Camp Wildwood Sponsorship: Charleston Soil & Water Conservation sponsored 2 high school students from James Island Charter High School to attend Camp Wildwood	Charleston County Soil and Water Conservation District	1700

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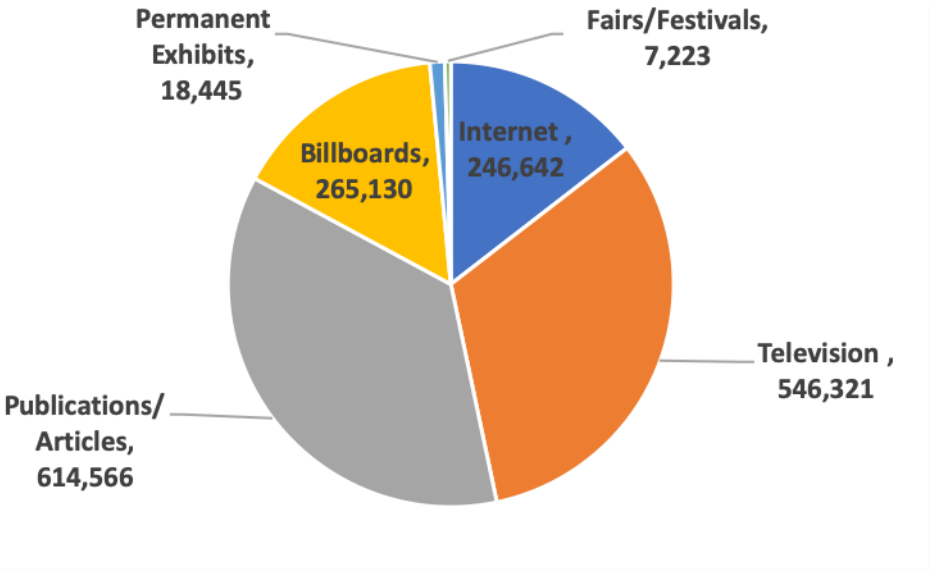
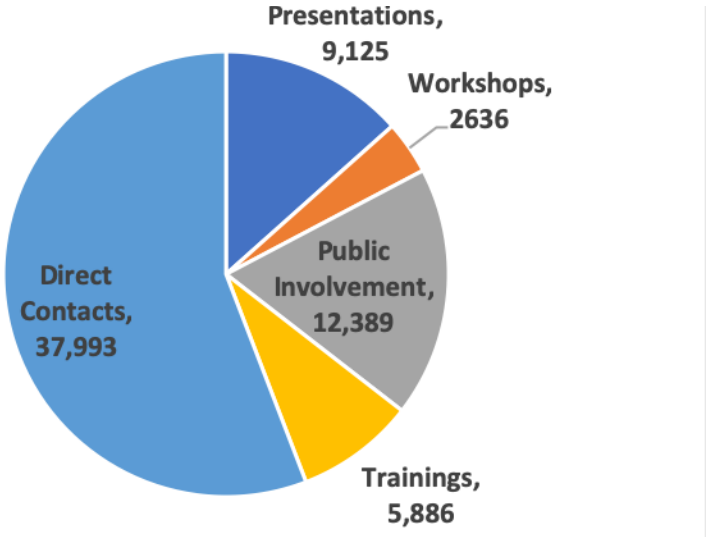
Outreach Summary

ACSEC program success is, in part, measured by outreach impacts that represent an estimate of individuals reached through direct and indirect education and involvement activities. **Total impacts for the Year Eleven reporting year (January 1, 2019 - December 31, 2019) total an estimated 1,770,563 individuals.**

INDIRECT METHODS SUMMARY, TOTAL ESTIMATED IMPACTS: 1,698,327



DIRECT METHODS SUMMARY, TOTAL ESTIMATED IMPACTS: 68,029



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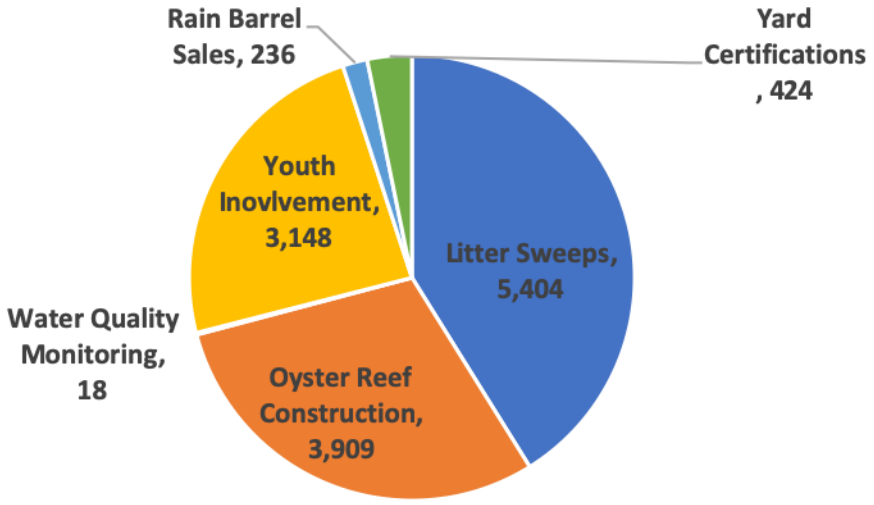
Outreach Summary

Public Involvement is considered an activity that provided hands-on opportunities for target audiences to take part in stormwater management and pollution prevention. Public involvement opportunities include oyster reef construction, water quality monitoring, litter sweeps, storm drain marking, rain barrel sales, native plant sales, and youth involvement activities. During 2019, estimated impacts attributed to public involvement were 13,139 individuals.

PUBLIC INVOLVEMENT SUMMARY, TOTAL ESTIMATED IMPACTS: 13,139



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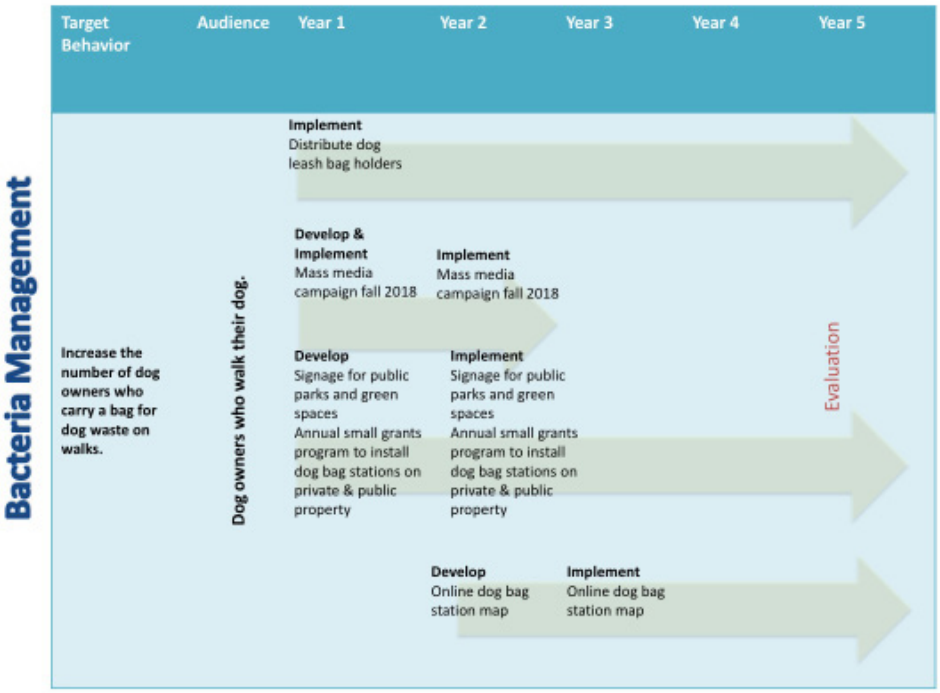
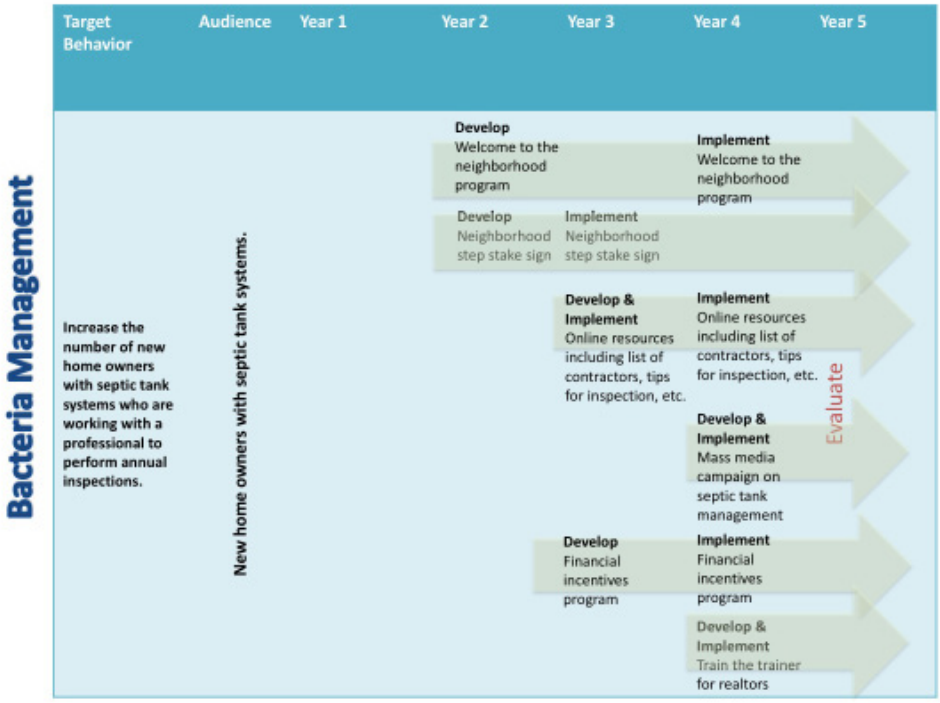
Appendix

ACSEC 2018-2023 Strategic Plan: Education Timelines





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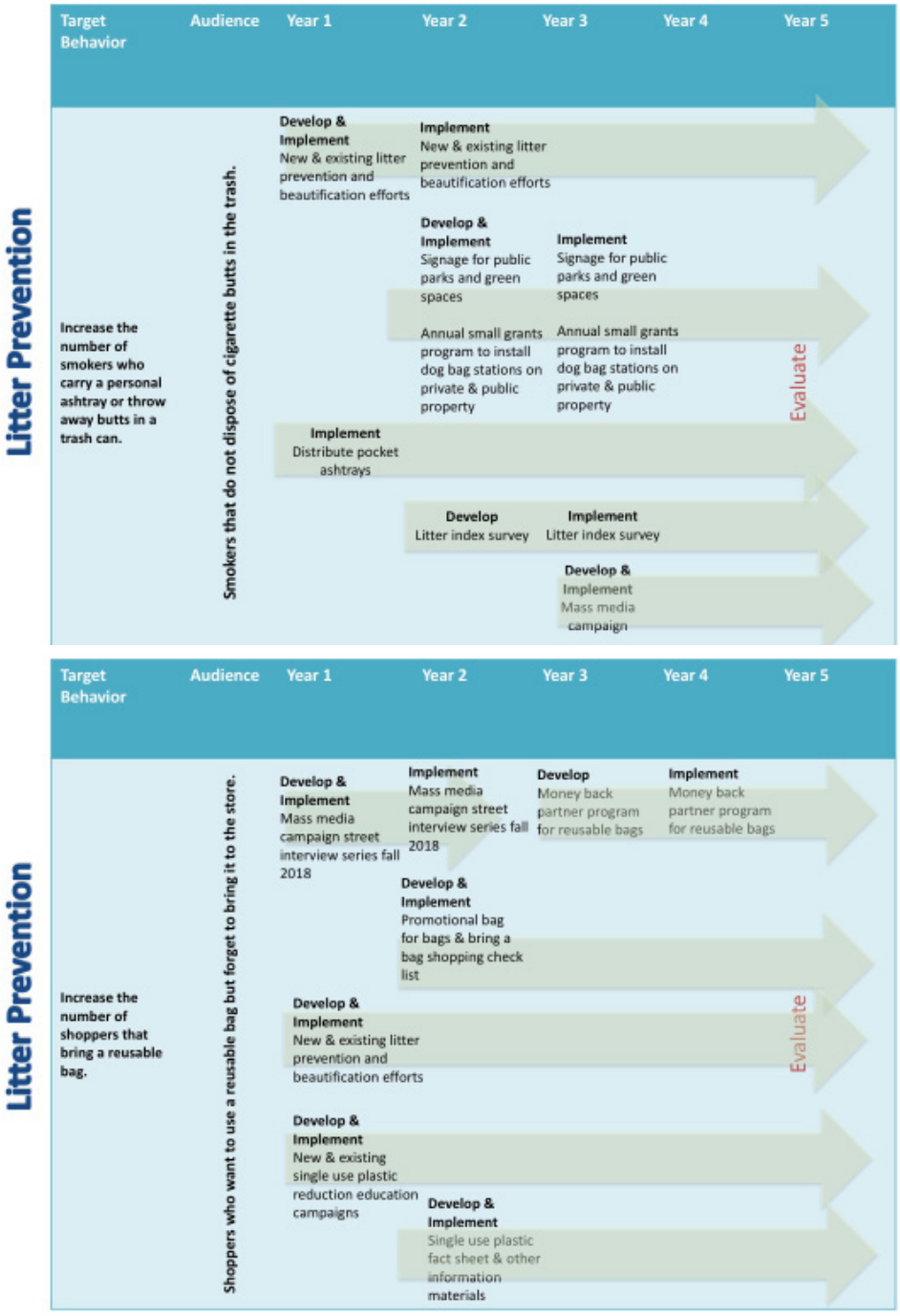
ACSEC 2018-2023 Strategic Plan: Education Timelines



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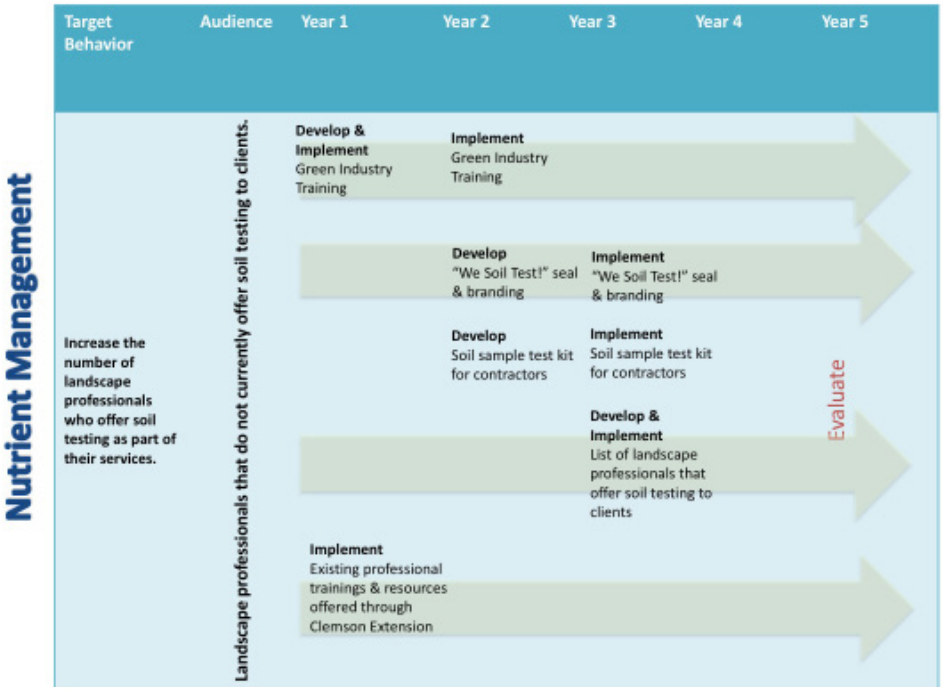
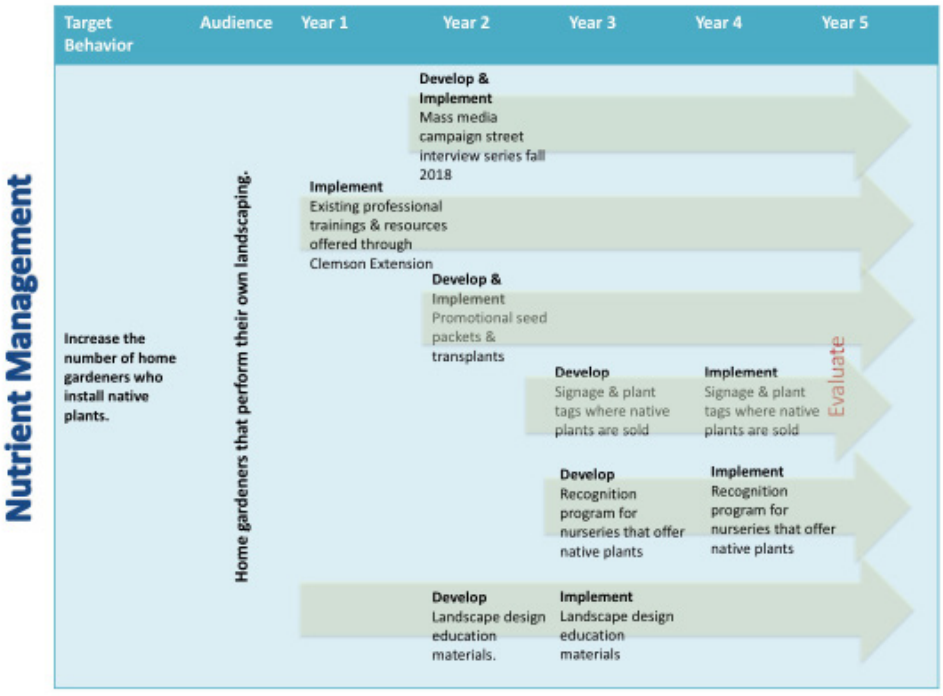
ACSEC 2018-2023 Strategic Plan: Education Timelines





ASHLEY COOPER STORMWATER EDUCATION CONSORTIUM

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Members of the Ashley Cooper Stormwater Education Consortium celebrate their ten years of collaboration in stormwater education and involvement at the November 2018 meeting.

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