



STORMWATER DESIGN MANUAL

FOR

GEORGETOWN COUNTY, SC

March April 2023

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ACRONYMS AND ABBREVIATIONS

ASTM – American Society for Testing and Materials

BMP – Best Management Practice

CEPSCI – Certified Erosion Prevention and Sediment Control Inspector

CGP – Construction General Permit

C-SWPPP – Comprehensive Stormwater Pollution Prevention Plan

CZC – Coastal Zone Consistency

EPA – Environmental Protection Agency

EPSC – Erosion Prevention and Sediment Control

HSG – Hydrologic Soil Group

LCP – Larger Common Plan

LID – Low Impact Development

MTD – Manufactured Treatment Device

NOI – Notice of Intent

NOT – Notice of Termination

NPDES – National Pollutant Discharge Elimination System

NRCS – Natural Resources Conservation Service

OCRM – Ocean and Coastal Resource Management

OS-SWPPP – On-site Stormwater Pollution Prevention Plan

PAM – Polyacrylamide

SCDHEC – South Carolina Department of Health and Environmental Control

SCS – Soil Conservation Service

SHWT – Seasonally High Water Table

SMS4 – Small Municipal Separate Storm Sewer System

TMDL – Total Maximum Daily Load

USACOE – United States Army Corps of Engineers

USGS – United States Geological Survey

WLA – Waste Load Allocation

SECTION 1 GENERAL

1.2 Introduction

Georgetown County (County) is an important coastal area that offers a wide range of employment opportunities, business and professional services, as well as historical, cultural, and recreational attractions. Georgetown County residents desire to maintain the character of their communities and sustain and improve the excellent quality of life that the area provides. Equally important to the residents of Georgetown County is the protection of the environment and the preservation of the unique aquatic ecosystem that help make Georgetown County a cherished coastal community.

The Georgetown County Stormwater Design Manual (Manual) defines minimum standards, requirements, and procedures for the design, permitting, construction, and maintenance of stormwater drainage systems within the jurisdiction of the County. As an integral part of the County's stormwater program, this Manual applies to land disturbance activities to provide erosion prevention, sediment control, flood control, water quality improvement and critical area protection.

This Manual presents minimum stormwater standards that apply to physical development and land disturbance within the County. However, the minimum standards will not apply for all situations. Compliance with these standards does not relieve the applicant of the responsibility to use sound professional judgment or compliance with other local, state or federal requirements. The County intends for these standards to assist, but not substitute for, competent work by qualified design professionals.

1.3 Purpose

Georgetown County understands the importance of protecting the lands and waters from the effects of stormwater runoff. The Georgetown County Stormwater Management Program Ordinance (Ordinance) was enacted by the County to protect lands and waters from the effects of excessive soil erosion and sedimentation; to prevent siltation of rivers, streams and lakes; to prevent clogging of drainage channels; to prevent excessive flood damage; to prevent adverse impacts to the property of adjacent landowners; and to reduce pollutants in stormwater runoff from new development and redevelopment.

The Georgetown County Stormwater Management Program (Program) operates to meet current and anticipated needs of the County. The Department of Public Services, through the Stormwater Management Program, administers stormwater services for the protection of public and private properties, rivers, estuaries, and other water bodies from the potential damage resulting from uncontrolled stormwater releases and non-point source pollution. The purposes of the Program and this Manual are as follows:

1. Protect human life and health.
2. Improve the quality of stormwater runoff discharge to surface waters and groundwater.
3. Minimize upstream and downstream private and public property damage resulting from erosion, sedimentation, and flooding.

4. Prevent new development and redevelopment from creating a demand for public investment in flood control and water quality improvements works.
5. Provide an effective stormwater management system that will not result in excessive public or private monies being used for maintenance and replacement of existing portions of the stormwater system.
6. Facilitate the design of drainage systems that are consistent with good engineering practice and design and in accordance with the County's overall planning efforts and stormwater management planning.
7. Provide a mechanism that allows development with minimum adverse effects to the natural environment.
8. Encourage preservation of the natural drainage systems in an aesthetically pleasing condition as best possible.
9. Ensure County compliance with all applicable federal and state regulations.

1.4 Applicability

The standards in this Manual apply to new development and redevelopment projects within Georgetown County. New development and redevelopment projects require a comprehensive stormwater pollution prevention plan (C-SWPPP) for submittal by the applicant and approval by the County to obtain a Land Disturbance Permit (permit). For the purposes of this Manual, a C-SWPPP represents the collection of documents required by the County to apply for a Land Disturbance Permit, as is detailed in Section 3. The County has the responsibility for review of:

1. All projects that result in land disturbance of equal to or greater than one (1) acre.
2. All projects that result in disturbance of less than one (1) acre of total land area that is part of a Larger Common Plan (LCP) of development or sale.
3. Any land disturbance greater than one-half (1/2) acre and within one-half (1/2) mile of a coastal receiving water body (but not for single-family homes which are not part of a subdivision).

Individual lots that are located in a residential subdivision development, or those parcels that have been divided and platted with the intent of residential or other development, shall not be considered to be separate land disturbing activities and shall not require individual land disturbance permits. Instead, the development as a whole shall be considered to be a single land disturbing activity and shall comply with the requirements in this Manual. Hydrologic parameters that reflect the built-out development shall be used in all engineering calculations. If individual lots or sections in a residential subdivision are being developed by different property owners, all land disturbing activities related to the residential subdivision shall be covered by the approved permit for the residential subdivision. Individual lot owners or developers must sign the individual Lot Notice of Intent (SCDHEC Form 0432) to confirm all activities on that lot will be carried out in accordance with the approved permit for the residential subdivision. Failure to provide this form will result in individual lot owners being required to develop a C-SWPPP meeting the requirements of the Ordinance and this Manual for each individual lot.

1.4.1 Redevelopment

Redevelopment shall generally include changes or improvements to any property that has previously been developed which results in the addition or modification to the existing property, irrespective of the condition of the existing surface upon which the redevelopment is performed. This may include but is not limited to changing of land characteristics as a result of demolition and reconstruction, structural additions, paving, and re-grading of the existing property.

Redevelopment projects shall be evaluated for the following:

1. If the project site has an existing stormwater conveyance system that is serviceable and operational, perform an evaluation of the system in the redeveloped condition to determine if it is capable of conveying the redevelopment flows in accordance with the Manual for the following:
 - A. If the existing stormwater conveyance system is capable of handling the redevelopment flows and meeting the peak discharge requirements in accordance with this Manual, then water quality treatment is required for only the redeveloped area (any area modified from the existing condition) as indicated in this Manual. A downstream analysis is also required in accordance with Section 4.5 of this Manual. If the project connects to a public system, the downstream analysis must show that the redevelopment project will not have an adverse impact on the public system capacity.
 - B. If the existing stormwater conveyance system is not capable of handling the redevelopment flows in accordance with this Manual, then all standards of the Manual apply for the entire site. Pre-development conditions shall be evaluated as open space, fair condition for the onsite soil type(s) for the project site. If the project connects to a public system, a downstream analysis must show that the redevelopment project will not have an adverse impact on the public system capacity.
2. If the site intended for redevelopment does not have an existing stormwater conveyance system, no detention or retention, or no water quality treatment, then perform the following:
 - A. If the redevelopment project area is less than fifty (50) percent of the existing developed condition area and includes the addition of impervious area, then all standards of this Manual apply to the additional impervious area.
 - B. If the redevelopment project area equals or exceeds fifty (50) percent of the existing developed condition area, then all standards of this Manual apply for the entire redevelopment project area. Pre-development conditions shall be evaluated as open space, fair condition for the onsite soil type(s) for the project site.

The County shall review all C-SWPPP submittals for general compliance with these specific standards. An acceptance by the County does not relieve the applicant from the responsibility of ensuring all systems are safe; that calculations, plans, specifications, construction, and record drawings comply with normal engineering standards; the requirements of this Manual; and other

applicable local, state, and federal rules and regulations. The functionality and compliance of the site and its infrastructure is the sole responsibility of the design engineer of record. Where any other law, ordinance, resolution, rule, or regulation of any kind also encompass the requirements included in this document, the more restrictive shall govern.

The County Stormwater Manager may require more stringent requirements than would normally be required under these standards depending on special protection areas, existing flooding concerns, and/or environmental constraints. The Stormwater Manager has the option of accepting alternatives to the plans, specifications, and design details of this Manual if the alternatives proposed meet or exceed the adopted performance standards.

1.5 Authority

The Clean Water Act of 1972, as amended in 1987, prohibits the discharge of pollutants into waters of the United States unless the discharge complies with a National Pollutant Discharge Elimination System (NPDES) permit. The County is subject to the Phase II Stormwater NPDES permitting requirements and was issued NPDES General Permit for Storm Water Discharges from Regulated Small Municipal Separate Storm Sewer System (SMS4) coverage by the South Carolina Department of Health and Environmental Control (SCDHEC). The Federal and state NPDES permit program requires the County to “develop, implement, and enforce a program to address stormwater runoff from new development and redevelopment projects that discharge into the regulated SMS4.” Within this regulatory context, the County implements development requirements that reduce water pollution carried in stormwater runoff.

Laws that provide the County with the authority to regulate stormwater drainage within the County’s jurisdiction include, but are not limited to the following:

1. Constitutional authority as a municipal corporation to promulgate regulations governing the discharge of stormwater.
2. Section 48-14-10 et seq. of the Code of Laws of South Carolina, 1976, amended.
3. The Stormwater Management Program Ordinance; Ordinance 2014-44.

1.6 Updates

This Manual is intended to be a dynamic document. As design technology and criteria evolve, the Manual may and/or will require updates, modifications, and improvements. As updates are made, they will be available for download from the County’s website. It will be each user’s responsibility to maintain a current edition of the Stormwater Design Manual. The website format will allow the user to easily obtain or update new Manual information.

1.7 Disclaimer

This Manual is established to provide Georgetown County Department of Public Services Director; County Stormwater Manager, or their duly appointed representative; property owners; developers; engineers; surveyors; and builders a better understanding of acceptable engineering methods to

meet the intent of the County's Stormwater Management Program Ordinance. Design of stormwater management for development and redevelopment requires the experienced judgment of the designer. The County accepts no responsibility for any loss, damage, or injury as a result of the use of this Manual.

The application of this Manual, the Stormwater Management Program Ordinance, and the provisions expressed herein are the minimum stormwater management requirements and shall not be deemed a limitation or repeal of any other powers granted by statute. In addition, if site characteristics indicate that complying with the County's minimum stormwater management requirements will not provide adequate design or protection for local property or residents, the County, as part of the review process, will require the Permittee to exceed the minimum stormwater management practices, control techniques, design and engineering methods, and such other programs and controls as are required to comply with the County's NPDES permit.

SECTION 2 STORMWATER PERMITTING PROCEDURES

This section provides developers, owners, engineers, contractors, and others with the information needed to obtain a Georgetown County Land Disturbance Permit as required in accordance with Section 1.3 of this Manual. This section includes the process to receive a permit, comply with that permit during construction, and close-out procedures. Detailed information about the required C-SWPPP components and the design requirements are included in Sections 3 and 4 of this Manual.

2.1 SCDHEC-OCRM Permit Requirements

Unless otherwise exempt, all land disturbing activities disturbing one (1) or more acres of land, including sites smaller than one (1) acre that are part of a Larger Common Plan of development ultimately disturbing one (1) or more acres, are required to obtain permit coverage for their stormwater discharges by submitting an approvable Comprehensive Stormwater Pollution Prevention Plan (C-SWPPP) to the County.

A Larger Common Plan is broadly defined by SCDHEC as any announcement or piece of documentation (including a sign, public notice or hearing, sales pitch, advertisement, drawing, permit application, zoning requires, computer design, etc.) or physical demarcation (including boundary signs, lot stakes, survey markings, etc.) indicating construction activities may occur on a specific plot. A common plan for development or sale identifies a site where multiple separate and distinct construction activities (areas of disturbance) are occurring on contiguous areas. Such sites may have one operator or owner or several operators and owners. Construction activities may take place at different times on different schedules, in separate stages, in separate phases, in combination with other construction activities. Each Developer, Operator, or Owner for each site or project determined to be a part of a Larger Common Plan is subject to permitting requirements of this Manual.

Land disturbances less than one (1) acre, but greater than one-half (1/2) acre, which are located within one-half (1/2) mile of a coastal receiving water (Coastal Zone) are also required to obtain permit coverage for their stormwater discharges. Coastal receiving waters are defined in the Policies and Procedures of the South Carolina Coastal Zone Management Program updated July 1995.

Projects or developments located in the Coastal Zone that are not part of a Larger Common Plan of development or sale, that disturb one-half (1/2) acre or less, and are located within one-half (1/2) mile of a coastal receiving water are automatically granted coverage under the Construction General Permit SCR100000 provided the appropriate notifications are submitted and Best Management Practices are being used during construction activities. These construction activities require a Coastal Zone Consistency (CZC) determination, which is issued by DHEC's Office of Ocean and Coastal Resource Management and must be submitted to the County. Coastal Zone Management and CZC requirements are available at:

<https://www.scdhec.gov/ocrm/>

<http://www.scdhec.gov/environment/PermitCentral/ApplicationForms/>

2.2 Responsibility of the Applicant

The applicant shall prepare a Comprehensive Stormwater Pollution Prevention Plan (C-SWPPP) in accordance with the requirements of this Manual herein and shall submit the plan to the County for review and approval. The applicant is responsible for providing sufficient information to determine compliance with this Manual, the Ordinance, and SCDHEC Stormwater Regulations. The applicant is responsible for ensuring that the information presented is a true and factual representation of the existing conditions and proposed conditions after development. The applicant is also responsible for ensuring that the activities and control measures specified in the C-SWPPP shall be constructed according to the approved plan.

2.3 Categories of Operators

Each category of operator is specified by the operator's ownership, responsibilities and/or development of a construction site. These categories include Primary Permittees, Secondary Permittees and Contractors.

Primary Permittees may include, but are not limited to a developer, landowner, realtor, builder, utility provider, public or private entity, etc. This person has the option of employing contractors to conduct land-disturbing activities under their general permit coverage. Primary Permittees may rely on, or require, Secondary Permittees and/or Contractors to assist with project activities necessary to ensure compliance with the Construction General Permit (CGP) and implementation of the On-Site Stormwater Pollution Prevention Plan). The primary permittee is ultimately responsible for the site's compliance with the approved C-SWPPP.

Secondary Permittees are owners/builders seeking individual control of a portion or portions of a construction site, independent of the Primary Permittee, but still using the same C-SWPPP approved when initial coverage was granted. These Permittees are required to submit an Individual Lot Notice of Intent (SCDHEC Form 0432) to obtain their permit coverage before conducting any land-disturbing activities. Examples of Secondary Permittees are individual lot(s) owners within a residential subdivision.

Contractors are operators that are employed by either the Primary or Secondary Permittee and have confirmed their understanding and promise to maintain compliance with the approved SWPPP by completing a Contractor Certification Form (SCDHEC Form 0437).

2.4 Application for Permit and C-SWPPP Review

A pre-submittal meeting is required for every land disturbance activity within the County that requires a Land Disturbance Permit from the County Stormwater Department. The site owner and/or the person who will be responsible for the land disturbance should contact the Stormwater Manager via email at stormwater@gtcounty.org to request a pre-submittal meeting, and shall include the location of the site in the email. The meeting will be at a time agreeable to all parties, and in most situations this meeting can be a virtual meeting. For larger areas of land disturbance,

larger common plans, sites with existing flooding concerns, or other sites with potentially complex submittals, a meeting on site may be requested. This meeting is intended to briefly review the submittal requirements, identify any known issues or problem areas near or downstream from the site, and discuss potential challenges at the identified site. The County will not provide any approvals during this meeting but can discuss the concept design and provide feedback.

The person responsible for the land disturbing activity shall apply in writing to the County for a Land Disturbance Permit for such activity by submitting a C-SWPPP for review. The complete submittal package shall be sent in an email to stormwater@gtcounty.org. Each item shall be properly labeled and included as a separate attachment and identified it in the body of the email. As an option, large files can be submitted through a cloud based storage service such as Dropbox. This C-SWPPP shall be complete as described in Section 3 and prepared in accordance with the provisions of this Manual and the Ordinance. For those proposed activities outside of the MS4 area, the applicant can submit the permit application for NPDES coverage to SCDHEC concurrently (contact SCDHEC for additional information on SCDHEC requirements for submission). Proposed activities inside the MS4 area will be discussed in more detail in Section 2.5.

Specific requirements of the permit application and approval process are based upon the extent of the land disturbing activity, as discussed in Section 1.3. The person responsible for land disturbing activity shall also be required to obtain building permits and/or land disturbance permits prior to beginning construction. The permit application and approval procedures are as follows:

1. Upon receipt of a complete C-SWPPP per the requirements in this Manual, the County shall conduct an initial review. ALL items from the Georgetown County Stormwater Submittal Checklist (Appendix A) are required or applicant shall provide an applicable explanation. Missing items on subsequent reviews may be allowed if the applicant provides confirmation that the item had been previously reviewed and approved by Stormwater Division Staff. Incomplete submittals shall not be reviewed. If an incomplete submittal is received. The applicant will be notified and the items will be held for a period of 48 hours. Afterward, the items will be discarded, and the review fee returned.
2. When the land disturbing activity consists of the construction of a pond, lake or reservoir which is individually built and not part of a permitted land disturbing activity, a C-SWPPP will not be required if the pond, lake or reservoir is permitted under the state Dams and Reservoirs Safety Act (Regulation 72-1 through 72-9) or has received a certificate of exemption under the state Dams and Reservoirs Safety Act. Best management practices shall be used to minimize the impact of erosion and sediment.
3. If, after review, the application for a land disturbance permit is denied, written notification indicating the reason or reasons for denial shall be forwarded to the applicant. The applicant may correct the deficiencies in conformance with this Manual and the Ordinance and re-submit the application one additional time with no additional fee.
4. All re-submittals following the second re-submittal shall be subject to a re-review fee equal to the original fee for each re-submittal. This re-review fee shall only apply to those re-submittals that require changes to the design of the site; minor comments (i.e. updating a table for consistency, adding a detail to the plan set, etc) will not require a re-review fee. See Appendix B for more details.

5. If the revised application is approved, the County shall issue the C-SWPPP approval (Section 2.5).
6. These requirements may be modified by the County on a case-by-case basis to address specific stormwater quantity or quality problems or to meet other regulatory requirements which are more stringent than the requirements of this Manual.
7. Any C-SWPPP approval shall be suspended, revoked, or modified by the County upon finding that the holder is not in compliance with this Manual, the Ordinance, or the approved C-SWPPP.

The C-SWPPP contains supporting calculations, reports, drawings, and sufficient information describing the manner, location, and type of measures in which stormwater runoff will be managed from the entire land disturbing activity. The County shall review the C-SWPPP to determine compliance with the requirements of this Manual prior to approval. The approved C-SWPPP shall serve as the basis for water quantity and water quality control on all subsequent construction activities specific to the site.

All C-SWPPPs submitted for approval shall contain a certification by the person responsible for the land disturbing activity (owner, developer, etc.) that the land disturbing activity shall be accomplished pursuant to the approved C-SWPPP and that responsible personnel will be assigned to the project. This certification is included in Section 1.6 of the SCDHEC SWPPP Template.

All C-SWPPPs shall contain a certification by the person responsible for the land disturbing activity acknowledging the right of the County to conduct on-site inspections.

All C-SWPPPs submitted to the County for approval shall be prepared, amended when necessary, certified, and stamped by a qualified designer. The following disciplines may certify and stamp/seal plans as allowed by their respective licensing act and regulations:

1. Registered professional engineers as described in S.C. Code 1976, § 40-22-10 et seq.
2. Registered landscape architects as described in S.C. Code 1976, § 40-28-10(a).
3. Tier B land surveyor as described in S.C. Code 1976, § 40-22-10 et seq.

Pursuant to S.C. Code 1976, § 40-22-280, C-SWPPPs may also be prepared by employees of the federal government and submitted by the person responsible for the land disturbing activity to the County for approval.

The Ordinance does not prohibit other disciplines or certified professionals, including, but not limited to, certified professional erosion and sediment control specialists, which have appropriate background and experience from taking active roles in the preparation of the C-SWPPP and design process. All stormwater plans and specifications submitted to the County for approval shall be stamped/sealed by one of the qualified disciplines listed above.

2.4.1 Waivers

The County may grant waivers from the requirements of this Manual for individual construction activities if there are exceptional circumstances applicable to the site such that strict adherence to these provisions shall not meet the intended purpose of the County's Ordinance and this Manual. A standalone written request from the applicant shall contain descriptions, drawings, and any other information that is necessary to evaluate the proposed waiver. A separate written waiver request shall be required if there are subsequent additions, extensions, or modifications which would alter a previously approved waiver. Waivers are not available for water quality controls. A project may be eligible for a waiver of stormwater management for water quantity if the applicant can demonstrate that:

1. The proposed project shall have no significant adverse impact on the receiving natural waterway or downstream properties; or
2. Attenuation of the runoff within the subject basin shall alter the release rate such that downstream systems shall 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).
3. 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 watershed 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.

2.5 C-SWPPP Approval

Upon County approval of the permit application in areas within the MS4 area, the County will issue a Conditional Letter of Approval (CLA) to the applicant. The applicant shall send a copy of the County's CLA, the County approved Notice of Intent (NOI), and the NPDES review fee to SCDHEC for NPDES CGP permit coverage. For those areas outside of the MS4 area, the applicant is encouraged to submit for SCDHEC approval concurrently with submission to the County. The land disturbing activity shall not begin until the applicant submits the SCDHEC issued NPDES permit to the County and the County delivers official approval and official stamped plans to the applicant. The County cannot approve C-SWPPPs and issue a Land Disturbance Permit until NPDES permit coverage is received from SCDHEC. The C-SWPPP shall not be considered approved without an approval stamp signed and dated by an authorized person with the County. The County stamp of approval on the plans is solely an acknowledgement of satisfactory compliance with the requirements of this Manual and the Georgetown County Stormwater Management Ordinance. The approval stamp does not constitute a representation or warranty to the applicant or any other person concerning the safety, appropriateness, or effectiveness of any provision of or omission from the stormwater and sediment control plan.

Upon approval of the submitted C-SWPPP and submission of SCDHEC approval where necessary, the County will issue a Letter of Approval, via e-mail, to the applicant and site owner, as listed on the County Land Disturbance Permit. The email will include information regarding next steps, which includes providing the County with three (3) hard copy sets of construction plans to be stamped by the County and directions to schedule a pre-construction meeting for the project.

Approval by the County does not relieve applicants from responsibility for ensuring system performance, safety, and compliance with other local, state and federal regulations. Applicants must ensure that calculations, designs, specifications, construction, and record drawings comply with acceptable engineering standards and this Manual. County approval does not constitute a guarantee of system performance nor does it relieve the applicant of liability for the sufficiency, suitability, or performance of facilities. For projects regulated by other jurisdictions, applicants must comply with any additional or varying requirements and receive approval from those entities. Applicants are to provide proof of approval to the County as deemed necessary.

Approved C-SWPPPs remain valid for five years from the date of approval. Extensions or renewals of C-SWPPP approvals may be granted by the County upon approval of an updated application by the person responsible for the land disturbing activity. If changes to the original C-SWPPP are not required, only a completed NOI and the appropriate application fee are required.

2.6 Start of Construction

The County requires that a pre-construction conference be performed on-site for all projects prior to the beginning of land disturbing activities to ensure all permittees and contractors performing the work know their responsibilities under the approved C-SWPPP. The applicant shall request an on-site pre-construction meeting on a date that is agreeable to County staff and all parties. The SWPPP Preparer will conduct the meeting with input from County Staff. The County will provide the applicant with the Land Disturbance Permit and Placard as well as the stamped set of approved plans at this meeting. At its discretion, the County may make inspector attendance at the pre-construction conference a requirement to receive the permit.

The applicant shall notify the County at least three (3) business days prior to commencement of any land disturbing activity or construction under an approved C-SWPPP. All required building permits must be obtained. Notification shall be e-mailed to Stormwater@gtcounty.org.

2.7 SWPPP Availability (OS-SWPPP)

The person(s) responsible for day-to-day operational control over implementation, shall have a copy of the On-site Stormwater Pollution Prevention Plan (OS-SWPPP) available at a central location on-site for the use of all those identified as having responsibilities under the OS-SWPPP whenever they are on the construction site. The OS-SWPPP shall be retained at the construction site from the date of commencement of construction activities to the date of final stabilization. If an on-site location is unavailable to store the OS-SWPPP, notice of the OS-SWPPPs location along with any updated contact information shall be posted at the construction site. OS-SWPP locations shall be easily accessible (not more than a 15-minute drive away from the project site) and shall be accessible during normal business hours to SCDHEC, Environmental Protection Agency (EPA), local government officials, and the County for review.

For linear construction of roads or utilities (such as utility construction including electrical power lines, gas lines, main sewer trunk lines, and water distribution lines) that are not part of a Larger Common Plan of development, where it is not practical to have the OS-SWPPP on location, the

Permittee and/or Operator shall, upon request, make the OS-SWPPP available by the end of normal business hours, or by the following business day under extenuating circumstances.

OS-SWPPPs shall be made available upon request and at the time of a construction site inspection by the County. Updated copies of the approved OS-SWPPP shall be sent to the appropriate SCDHEC Environmental Quality Control (EQC) Regional Office in situations where it is not practical to have the approved OS-SWPPP on location. Electronic copies of third-party inspections shall be submitted to the County via e-mail to Stormwater@gtcounty.org on a weekly basis throughout the project. Failure to submit these inspections may result in a notice of violation or penalty.

The OS-SWPPP includes:

1. All items required for the C-SWPPP except for the engineering calculations and engineering reports;
2. NOI (stamped and approved copy), copy of the CGP coverage letter from SCDHEC; This includes any Individual Lot NOIs (SCDHEC Form 0432) as required by Secondary Permittees.
3. Copy of local approvals (additional letters, approvals, or certifications necessary to implement the OS-SWPPP, when necessary);
4. Copy of United States Army Corps of Engineers (USACOE) approvals (certifications to allow impacts to Waters of the State or Jurisdictional wetlands) when necessary;
5. Contractor certifications, (certifications necessary to allow contractors to conduct construction activities within the construction site);
6. Any logs necessary to track the progress, compliance, modifications and those associated with the construction site. These logs may include, but are not limited to, a pre-construction conference log, an inspection log, a stabilization log, a rain log, a contractor log and/or any additional record keeping as deemed necessary by the County, Contractor, SCDHEC, SMS4 or an entity delegated under Regulation 72-300;
7. SCDHEC Construction General Permit SCR100000 (One copy, excluding the appendices. Provisions may be made for the copy of the general permit to be accessed electronically as long as a hard copy can be made available by the end of the working day when required); and
8. CZC Certification.

2.7.1 Modifications

Each OS-SWPPP shall be modified if it is determined during inspections or investigations by the County, state, tribal or federal officials that the OS-SWPPP is ineffective in minimizing pollutants in stormwater discharges or controlling peak runoff rates from the construction site.

Each OS-SWPPP shall be modified as necessary to include additional or modified BMPs, which are designed to correct problems identified during the construction site inspection by any qualified inspector, or by local, state, tribal or federal officials. Revisions to each OS-SWPPP shall be completed within seven (7) calendar days following the inspection.

1. Major Modifications - The C-SWPPP shall be modified and submitted for review and receive approval by the County prior to implementation if any of the following conditions are met:
 - A. Whenever there is a significant change in design, construction, operation, or maintenance at the construction site resulting in discharges that will cause, have the reasonable potential to cause, or contribute to violations to Water Quality Standards.
 - B. Whenever a change in the design, construction, operation, or maintenance calls for a revision of any approved C-SWPPP based on the following list of major modifications:
 - i. Modifications that will affect the hydrology or trapping efficiency calculations including the following:
 - a. Resizing Sediment or Detention Basins that either reduces the stormwater volume capacity and/or is resized to handle increase/decrease incoming peak flows or runoff volumes due to revised site development plans;
 - b. Deletion of Sediment or Detention Basin or Sediment Trap;
 - c. Relocation of Sediment or Detention Basins resulting in increases/decreases in receiving drainage area and/or resulting in a new/relocated basin outlet location, which is directed towards an outfall that was not approved within the C-SWPPP;
 - d. Addition/Removal of Sediment or Detention Basin;
 - e. Modification of Sediment or Detention Basin Outlet Structure;
 - f. Changes in grading that alter drainage patterns that may result in increased or decreased flow to a Sediment or Detention Basin; and
 - g. Amending Construction Sequence in a fashion that the Detention Basin is not installed before Grubbing Operations begin.
 - ii. Point Discharge or Outfall location changes.
 - iii. Any modification to regulated water quality structural control measures.
 - iv. Adding a new point discharge.
 - v. Addition of Impervious Area due to revised site development plans.
 - vi. Addition of Disturbed Area.
 - vii. Changes to Navigable Water Crossing.
 - viii. Addition of Sediment Trap(s) when required to obtain 80% Trapping Efficiencies for disturbed areas not previously permitted or redirected away from an approved water quality BMP.
 - ix. Site layout changes that require redesigning the stormwater management system.
 - x. Any additional modifications as determined by the County.
2. Minor Modifications -The Permittee shall modify the OS-SWPPP and keep a record of each modification within the OS-SWPPP if any of the following conditions are met:

- A. Addition of BMPs - Addition of Silt Fence, Slope Drains, Inlet Protection, Outlet Protection that does not involve additional wetland impacts, or Check Dams to improve the overall stormwater management and sediment and erosion control at the construction site.
- B. BMP Relocations - Relocation of construction entrance, pond inlet pipes (within a pond), and any other proposed BMP to improve the overall stormwater management and sediment and erosion control at the construction site.
- C. Removal of Disturbed Areas - As long as the removal of the disturbed area does not also remove any BMPs required to meet Water Quality or Quantity Standards. Removal of disturbed area only qualifies for disturbed area that was included in the initial coverage approval and that was never disturbed (i.e., cleared, grubbed or graded).
- D. Modifying Individual Lot Drainage - Unless the changes affect the inflow to a Detention Structure or Analysis Point, to which the lot drains, that was not previously approved.

2.8 End of Construction

Upon project completion related to the land disturbing activity, a Georgetown County Stormwater Project Close Out Package along with the SCDHEC Notice of Termination (NOT) is sent to the County Stormwater Division. For submission of a Project Close Out Package, one or more of the following conditions shall be met prior to issuance of a County Certificate of Occupancy:

- 1. Final stabilization has been achieved on all portions of the site for which the Permittee is responsible;
- 2. Another Operator has assumed control, according to §122.41(l)(3) of SC Regulation 61-9, over all areas of the site that have not been finally stabilized;
- 3. Coverage under another County Land Disturbance Permit and a general NPDES permit has been obtained;
- 4. For residential construction only, permanent stabilization has been completed and the residence has been transferred to the homeowner;
- 5. Land disturbance activities were never initiated on the construction site and the construction site remains permanently stabilized.

A full review of the close out package will be conducted. Once the project's close out package is approved, a final inspection shall be conducted to review the project site for compliance with the approved C-SWPPP. The Georgetown County Stormwater Project Close Out Package includes:

- 1. The Georgetown County Close-Out Application Form (Appendix C)
- 2. The Georgetown County As-Built Certification Form (Appendix D)
- 3. Electronic and hard-copy as-builts that comply with the County's As-Built Survey Requirements (Appendix E)

The Georgetown County Project Close Out Package and SCDHEC NOT shall be signed by the Project's Design Engineer and Permittee and submitted within thirty (30) days of one of the above

conditions being met. The Georgetown County Project Close Out Package and SCDHEC NOT is not valid until the County concurs and notifies the Permittee of County acceptance of the Georgetown County Project Close Out Package and SCDHEC NOT. Upon County approval, the Permittee shall submit the NOT to SCDHEC. If a Georgetown County Project Close Out Package and SCDHEC NOT has been submitted and the construction site does not meet the criteria for termination, then the construction site remains subject to the provisions of the C-SWPPP.

If there are any permanent BMPs on the site, a revised maintenance agreement shall be submitted along with the Georgetown County Project Close Out Package and SCDHEC NOT, when the responsible party(ies) or individual(s) accepting ownership or maintenance of permanent stormwater control devices have changed from what was originally approved. The Design Engineer for each project must sign off on the installation of the BMP to certify it's been installed correctly. For infiltration BMPs, the design engineer and a County Representative must be present on-site during installation in order to certify the construction of the BMP.

For residential subdivisions, Primary Permittees do not need to terminate permit coverage in areas where Secondary Permittees have received permit coverage to perform work under the permit. Primary Permittees can request to terminate coverage when Secondary Permittees are authorized to conduct construction activities, independent of the Primary Permittee, for the remaining disturbed areas on the construction site and final stabilization has been achieved on all other areas of the construction site.

SECTION 3 C-SWPPP Contents

This Section provides detailed information on the documents and information required for submission for a complete C-SWPPP to obtain a Land Disturbance Permit in accordance with the Manual and Ordinance. This is a comprehensive list and omission of any item shall require an explanation within the submittal. It is encouraged that the application use the SCDHEC C-SWPPP template as a basis with the additional documents as Appendices, to be submitted as stand-alone documents for review, as described in Section 2.4.

3.1 C-SWPPP Contents

All C-SWPPPs shall contain the following information as applicable.

1. A fully completed Georgetown County Stormwater Submittal Checklist (Appendix A).
2. A fully completed SCDHEC Notice of Intent (NOI) form for a permit. SCDHEC's NOI is provided in Appendix F.
3. Georgetown County Land Disturbance Application, signed (Appendix G).
4. C-SWPPP document body in a format in line with the SCDHEC template, to include:
 - A. A project narrative that describes the scope of the project, including detailed pre- and post-development conditions. This project narrative shall include a signed certification by a registered professional as described in Section 2.3 of this Manual.
 - B. A description of the Erosion Prevention BMPs, Sediment Control BMPs, and water quality BMPs, including their use, drainage area, maintenance, and inspections.
 - C. Description of all post-construction stormwater management measures that will be installed during the construction process to address water quality in stormwater discharges after the construction operations have been completed.
 - D. Summary tables for the pre and post development peak discharge rates at each point of analysis for the 2-, 10-, 25-, and 100-year, 24 hour storm events.
 - E. Summary tables for any ponds or other stormwater detention/retention features, including the bottom, normal water level (NWL), if applicable, top of bank, and water surface elevation (WSE) at the 2-, 10-, 25-, and 100-year, 24-hour storm events.
5. Maps showing the existing project area, including the following:
 - A. A vicinity map indicating north arrow, scale, property boundary, and other information necessary to locate the property or tax parcel. The map shall show the proposed site, adjacent roads, and existing drainage structures including pipes, ditches, streams, lakes, catch basins, and similar facilities. The map shall be of sufficient scale to determine features of the proposed site. Any off-site facilities or property located upstream and downstream that might be impacted by the stormwater runoff from the project shall be shown on the location sketch. Multiple maps may be included to convey this information.
 - B. The location of the land disturbing activity with the property boundary outlined shown on a United States Geological Survey (USGS) 7.5 minute topographic map or copy, with the route of stormwater runoff from the site to the nearest waterbody shown.

- C. Federal Emergency Management Agency (FEMA) flood maps and, if available, federal and state wetland maps. The maps or plat shall show the location of the 100-year flood plain with known floodways, if applicable.
- D. Soils map, including the soil type and associated Hydrologic Soil Group (HSG).
- E. Pre- and post- drainage maps both showing stormwater runoff directions and drainage areas, time of concentration flow paths, outfall locations, points of analysis, and receiving waters.
- 6. Full-size construction plans at an appropriate scale with the limits of disturbance, north arrow, scale, datum, and other pertinent information included on all sheets. The plan set, at a minimum, shall indicate:
 - A. The existing and proposed topography showing spot elevations with contours not greater than one (1)-foot intervals, as required by the County. The plat and topographic map shall conform to provisions of applicable state regulations. Existing contours should extend off-site to the extent necessary to show how the proposed site is tying into the existing area.
 - B. Existing site conditions to include, at a minimum, existing buildings, structures, drainage features, stormwater infrastructure, utilities, and waters of the state (including wetlands).
 - C. Proposed buildings, structures, parking areas, roads, stormwater conveyance system, BMPs, and other planned features. The proposed improvements associated with the Stormwater Management Plan, shown with a scale of no greater than 1-inch = 50-feet, should include their proposed elevations, including finished floor elevations.
 - D. All ponds and basins shall have the stage/storage tables on the Grading and Drainage plan sheet (or other appropriate sheet). Include the max water surface elevations for each pond for all storm events (2-, 10-, 25-, 50-, and 100-year), the normal water surface, and the top of bank. Show location and elevation of emergency spillway and outlet control structure. The location, size, and elevation of any internal or external stormwater management facilities shall be shown with sufficient details to determine the materials of construction and the manner of construction.
 - E. A detailed construction sequence specific to the site, to include removal of sediment from the stormwater system and sediment basins prior to final site stabilization.
 - F. The location of any existing or proposed private or public drainage easements shall be shown. Private easements shall be obtained when stormwater management facilities are located on property not within the proposed site. Private easements shall be established when the stormwater system crosses more than one parcel. See Section 4.2.13 for determination of easement widths.
 - G. Limits of grading, including limitations of mass clearing, and the surface area involved.
 - H. Erosion and Sediment Control plan sheets with required phasing per the CGP.
 - I. Pipe Profiles showing, at a minimum, pipe size, invert elevations, rim elevations, existing and proposed ground surface, 25-year HGL, and any utility crossings.
 - J. Details for each proposed erosion and sediment control measure and stormwater system component.

7. A Stormwater Management Report with all stormwater management and stormwater drainage computations and calculations, including:
 - A. Pre-development and post-development hydrologic analysis (including the name of the model/procedure used, i.e. ICPR model), velocities, peak flow rates of discharge, retention volumes, and inflow and outflow hydrographs of stormwater runoff at all existing and proposed points of discharge from the site. If a computer program is used, assure model schematic showing connectivity and key input and output parameters are provided. If the standard program inputs and outputs are inadequate, provide annotations and additional narrative to adequately describe the model.
 - B. Clearly defined discharge points with tailwater assumptions discussed in the narrative.
 - C. Average slope and hydraulic flow length for both existing conditions and for the future developed conditions.
 - D. The existing land use description, in accordance with land use and soil groups from TR-55 (i.e. Wooded-fair cover).
 - E. A Curve Number Analysis for existing and proposed conditions. Wet ponds, wetlands, surface waters, and gravel areas intended for vehicular traffic must be assigned a curve number of 98.
 - F. The amount of pervious and impervious surfaces for both the existing and developed conditions.
 - G. Delineation and tabulation of drainage areas contributing to each inlet, pipe, culvert, ditch, or swale for both existing and proposed conditions.
 - H. The delineated drainage basin and sub-basin areas in acres for both the site and any off-site areas which drain onto or through the site for pre and post development. Include basin areas, curve numbers, time of concentration paths, soils, discharge points (points of analysis, boundary points), and model connectivity. Be sure labels are consistent with calculations and modeling.
 - I. Analysis and calculations showing the proposed project does not cause adverse upstream impacts.
 - J. Runoff routing calculations for all detention basins showing discharge flow rates, elevations, and volumes retained or detained during applicable storm events. Calculations for storm events with more frequent return periods may be required by the County to be performed to ensure the effectiveness of the system in controlling lesser events.
 - K. For surface storage facilities, stage storage computation and stage discharge computations for major outfall structures shall be based upon appropriate hydraulics.
 - L. For infiltration and subsurface exfiltration systems, the calculations shall be based upon the testing results obtained from a licensed professional geotechnical company as will be described in Section 4.
 - M. Site conditions around points of all surface water discharge, including vegetation and method of flow conveyance from the land disturbing activity.
 - N. Storm sewer analysis, if applicable.

- O. Water Quality Calculations showing how the water quality volume was calculated and supporting calculations for releasing the water quality volume for at least 24 hours, but no greater than 72 hours. See Section 4.4.
8. Erosion and sediment control provisions for during construction, including:
- A. Provisions to minimize soil compaction, preserve topsoil, and limit disturbance.
 - B. Provisions to control stormwater volume and velocity within the site to minimize soil erosion during construction activity. For outfalls from drainage areas with ten or more disturbed acres, a sediment basin or equivalent sediment control BMP is required. Sediment basins shall include skimmers and baffles.
 - C. Provisions to control stormwater discharges, including both peak flow rates and total stormwater volume, to minimize erosion at outlets and to minimize downstream channel and stream bank erosion during construction activity.
 - D. Provisions to minimize the amount of soil exposed during construction activity including, but not limited to, the following:
 - i. Implement a phased stormwater management plan that limits the amount of exposed soil during construction by outlining the Limits of Disturbance for each phase and by labeling areas that are not to be disturbed throughout the course of construction activities or until a later phase of construction activities;
 - ii. Outline the Limits of Disturbance on the construction plans and label areas within the construction site that are not to be disturbed;
 - iii. Stabilize exposed areas as soon as practical to limit the duration of large areas of exposed soil; and
 - iv. Implement temporary seeding/grassing techniques.
 - E. Provisions to minimize the disturbance of existing steep slopes (i.e., slopes of 30% (~3H:1V) or greater), unless infeasible.
 - F. Provisions to minimize sediment discharges from the site during construction activity.
 - G. Provisions to provide and maintain natural buffers after stormwater runoff is treated by construction site BMPs, unless infeasible during construction activity. Buffer zone management requirements listed in Section 3.2.4 of the SCDHEC CGP and Georgetown County Zoning Regulations are applicable to all site development projects in Georgetown County.
 - H. Provisions to provide soil stabilization (temporary and permanent).
 - I. Provisions to minimize the discharge of pollutants from dewatering trenches and excavations. Discharges are prohibited unless managed by appropriate BMPs for stormwater and non-stormwater discharges.
 - J. Provisions to design, install, implement, and maintain effective pollution prevention measures to minimize the discharge of pollutants during construction activity. At a minimum, such measures shall be designed, installed, implemented and maintained to:

- i. Minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other wash waters. Wash waters shall be treated in a sediment basin or alternative control that provides equivalent or better treatment prior to discharge;
 - ii. Minimize the exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, detergents, sanitary waste and other materials present on the site to precipitation and to stormwater; and
 - iii. Minimize the discharge of pollutants from spills and leaks and implement chemical spill and leak prevention and response procedures.
 - K. Provisions to manage the following prohibited discharges:
 - 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.
 - L. Design details for structural stormwater controls, which include diversions and swales.
- 9. Identification and location of water bodies and surface waters adjacent to the site with details of size, side slopes, capacity, and depth.
 - 10. Project specifications (where applicable) for work related to stormwater management and sediment and erosion control.
 - 11. CZC Certification(s), if applicable.
 - 12. USACOE Jurisdictional Determination, third-party wetlands delineation, and/or wetlands permit.
 - 13. Geotechnical Report. This shall include percolation tests and soil borings done by a licensed professional geotechnical company if wet ponds, dry pond, exfiltration, infiltration, percolation, or any other subsurface system is proposed. The percolation tests and soil boring shall be representative of the design conditions as described in Section 4.
 - 14. Downstream Analysis, as described in Section 4.5, to include an exhibit showing the drainage path from the site discharge points to the receiving waterbody, pictures along the way of the receiving system and points of interest, and descriptions of any concerns along the drainage path.
 - 15. A determination that the development is in compliance with the Storm Management and Flood Damage Protection requirements of the Georgetown County Code of Ordinances or a designated variance.

16. Signed Georgetown County BMP Maintenance Agreement and attached Maintenance Plan as provided in Appendix H. The person(s) or organization(s) responsible for operation and maintenance of the facilities included in the C-SWPPP shall be clearly identified.
17. A list of all contiguous property and addressed, stamped envelopes for each property.
18. SCDOT Encroachment permit, if applicable. Or similar permissions from the receiving property owner if the site is contributing runoff to an existing system.
19. Response to comments letter, with a response to each comment provided to the applicant (resubmittals only). Provide specific locations in the submittal for each comment.

Additional information necessary for a complete project review may be required by the County as deemed appropriate. This additional information may include items such as location of public sewers, waterlines, septic fields, wells, etc.

All contents of the C-SWPPP and supporting documents shall be submitted electronically. Each item listed on the Stormwater Submittal Checklist shall be sent as a separate labeled file and sent electronically to the Stormwater Division as described in Section 2.4. Indicate the number of attachments included within each email. The following items must be mailed or hand delivered: check with proper review fees (Appendix B), addressed and stamped envelopes for each contiguous property, signed Land Disturbance Application, signed BMP Maintenance Agreement, the C-SWPPP signature page, and any other page requiring original signatures, stamps, or seals.

3.2 C-SWPPP Specific Requirements

Specific requirements for the C-SWPPP are described here. The County may modify the following items for a specific project or type of project.

Specifications for a sequence of construction operations shall be contained on all plans describing the relationship between the implementation and maintenance of sediment controls, including permanent and temporary stabilization and the various stages or phases of earth disturbance and construction. The specifications for the sequence of construction should, at a minimum, include:

- A. Clearing and grubbing for those areas necessary for installation of perimeter controls.
- B. Construction of perimeter controls.
- C. Installation of sediment basins and sediment traps.
- D. Remaining clearing and grubbing.
- E. Utility installation and whether storm drains shall be used or blocked until after completion of construction.
- F. Road grading (if applicable).
- G. Grading for the remainder of the site.
- H. Final grading, landscaping, or stabilization.
- I. Clean out of sediment and debris from stormwater system, to include ponds, inlets, pipes, channels, ditches, and all other components of the system.

- J. Completion of County Close-Out process.
- K. Removal of sediment controls.

3.2.1 Jurisdictional Waters and Critical Areas

If surface waters, to include wetlands, are on-site or within 50 feet of the proposed disturbed area and construction site, these must be located and delineated. An Approved Jurisdictional Determination and USACOE wetlands permit is required when the limits of disturbance will be within 50 feet of the edge of the feature. Preliminary Jurisdictional Determinations shall be provided for all other submittals. A wetland delineation performed by a third party qualified professional will be accepted in lieu of a jurisdictional determination if no impacts are proposed.

If Critical Areas (coastal waters, tidelands, beaches, and beach/sand dune system) are within and/or directly adjacent to the proposed disturbed area and construction site, these shall be located and delineated. Any impacts to Critical Areas shall be identified on the C-SWPPP with a description of the proposed activities and the amount and type of impact(s).

- A. Identified Critical Area impact(s) shall be labeled on the C-SWPPP that no work can begin in these areas until all necessary Critical Area authorizations have been obtained for the work.
- B. If a structural or water quality BMP is proposed to be installed within a Critical Area, the water quality BMP shall be designed, installed and maintained to achieve maximum pollutant removal.

3.2.2 Discharge to a TMDL Watershed or Impaired Waters

If a TMDL Water with a pollutant of concern applicable to stormwater discharges from the proposed land development or an Impaired Water with a pollutant of concern applicable to stormwater discharges from the proposed land development has been established and is in effect, then the SWPPP must address the following:

1. For construction projects that disturb less than 25 acres, carefully evaluate all selected BMPs and their ability to control the pollutant(s) of concern.
2. For construction projects that disturb 25 acres or more, provide a written quantitative and qualitative assessment showing that the selected BMPs 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.

Design professionals shall determine whether runoff from the proposed land development contains pollutants that are already causing impairment of the adjacent waterbody. These pollutant discharges will vary from site to site. If stormwater runoff from the proposed land development will contribute pollutants that already cause water quality impairment, the design professional must demonstrate to the extent practicable that measures and controls will be implemented to prevent further problems to the impairment.

There is not a specific methodology that must be followed in determining the BMPs selected and utilized. However, the calculations and descriptions must show that the BMPs to be installed will ensure that runoff from the site will not cause or contribute to further degradation of the impaired waterbody.

The selection of BMPs to achieve the required results shall be determined through review of monitoring studies of similar BMPs, applicable computation methods and methodologies, application of computer models such as WASP, IDEAL or other methods acceptable to the County Stormwater Engineer.

Computer models can be used by designers to calculate the annual loading for the pollutant of concern for the pre-developed condition as a baseline and the developed condition (with no increase) for impaired waters discharge compliance.

SCDHEC has determined that construction activity contributes to specific impairments. For sites that drain to a waterbody with a TMDL or impairments for Macroinvertebrate Community (BIO), Turbidity, Total Phosphorus (TP), Total Nitrogen (TN), Chlorophyll-a (CHLA), and Fecal Coliform (FC)(in Shellfish Harvesting waters), specific measures have been listed in the SCDHEC SWPPP to address these pollutants. They include measures such as soil testing, specific locations of portable toilets, limiting disturbance, etc. These measures need to be included within the Stormwater Management Plan.

If the receiving water is listed on the most current South Carolina 303(d) List of Impaired Waters, the C-SWPPP shall be developed so that any stormwater discharges from the construction site do not cause, have the reasonable potential to cause, or contribute to an excursion above any state water quality standard.

3.2.3 Sediment and Erosion Control

Phased Erosion Prevention and Sediment Control (EPSC) Plans are required for all construction sites with greater than five (5) acres of disturbance.

- A. Projects less than ten (10) acres in disturbance are required to submit, at a minimum, a 2-Phased EPSC Plan that includes an Initial Land Disturbance Phase and Final Stabilization phases.
- B. Projects with disturbances greater than or equal to ten (10) acres are required to submit, at a minimum, a 3-Phased EPSC Plan that includes an Initial Land Disturbance Phase, Construction Phase, and Final Stabilization Phase.
- C. Each phase is required to be identified on at least one (1) separate construction plan sheet and contain a phase specific construction sequence.

When permitted work in a live waterway is performed, precautions shall be taken to minimize encroachment, control sediment transport and stabilize the work area to the greatest extent possible during construction.

The C-SWPPP shall identify all allowable sources of non-stormwater discharges, except for flows from firefighting activities that are combined with stormwater discharges associated with construction activity at the Site. Non-stormwater discharges should be eliminated or reduced to the extent where these discharges shall not cause or contribute to violations of water quality standards.

3.2.4 Special Protection Areas

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. Special Protection Areas are those areas that were identified through the Georgetown County Stormwater Master Plan or those areas with reported flooding issues that have been identified as areas of concern. These Special Protection Areas (SPAs) can be found on the Georgetown County Stormwater GIS map, available on the Georgetown County website.

Those wishing to develop or redevelop lands within these protected areas shall 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)). The site's presence in a special protection area will be identified during the pre-submittal meeting and should be discussed in the Stormwater Management Report.

To relieve existing flooding problems, the following list of design criteria shall be required in designated special protection areas. The requirements 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 is restricted to one-half (1/2) 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 predevelopment 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.

SECTION 4 DESIGN STANDARDS

4.1 Stormwater Management General Standards

The purpose of this section is to establish minimum engineering standards for the design, construction and maintenance activities of land disturbance in Georgetown County. Land Disturbance shall be approved, consistent with procedures in this Manual and the Ordinance, when the applicant has demonstrated that the proposed development activity has been designed and shall be constructed and maintained to meet each of the following performance standards:

1. To encourage the use of Best Management Practices, i.e. maximum use of on-site storage facilities to reduce runoff flow rates and volumes and minimize erosion and sedimentation.
2. To design, construct, and maintain stormwater management facilities in a manner to control post-development runoff to simulate the time discharge function for pre-development runoff provided residual capacity is available in off-site facilities to accommodate the runoff.
3. To design, construct, and maintain stormwater management facilities in such a manner that erosion or sedimentation does not exceed natural pre-development conditions.
4. To assure that no adverse impacts result from improper location, design, and construction of stormwater management facilities.
5. To design, construct, and maintain stormwater management facilities consistent with mosquito objectives and programs.
6. To protect the water quality of the ocean and the physical characteristics of the beach area by minimizing flow rates, volumes, and velocities of stormwater entering drainage systems discharging to the beach.
7. To design, construct, and maintain stormwater management facilities in compliance with all applicable state regulations, including SCDHEC Standards for Stormwater Management and Sediment Reduction Regulation 72-300, NPDES General Permit for Storm Water Discharges from SMS4'S SCR030000, SCDHEC/OCRM Stormwater Management Guidelines for Coastal Resources, and NPDES Permit SCR035106.

4.2 Stormwater Management Design Requirements

The design criteria presented within this Manual represent good engineering practices and should be utilized in the preparation of the C-SWPPP. These design criteria are intended to establish guidelines, minimum standards, and methods for sound planning, design, and review process, and are not to be considered iron-clad rules. Alternative methods of design that meet the intentions of this Manual may be submitted to the County for consideration.

Table 1 provides a brief overview of the design requirements for Georgetown County. This table is intended to be used as a quick reference guide but is not all inclusive of the requirements within Georgetown County. It is the responsibility of the permittee to ensure all design requirements within this Manual are met.

Table 1: Overview of Design Criteria and Requirements

Criteria	Design Requirements
Size of Development	Any disturbed area over 1.0 acre , or a disturbed area of <u>one-half (1/2) acre</u> but located within one-half mile of a coastal receiving waters, must develop a C-SWPPP. See Section 1.3 for more details.
Water Quantity Design Storms	Post-development peak discharge rates shall not exceed pre-development peak discharge rates for the 2-, 10-, and 25-year, 24-hour storm events . The 100-year storm event must pass safely through the system without damage to structures or the stormwater drainage system.
Water Quality Detention/Retention	The greater of the first one-half (1/2) inch of runoff from the entire drainage area or the first one (1) inch of runoff from the impervious acreage must be retained on-site for a minimum of 24 hours; all detention volumes must be released within 72 hours of the beginning of the rainfall event. Land disturbance within 1,000 feet of shellfish beds must be designed to retain the first one and one-half (1.5) inches of runoff from the disturbed area.
Emergency spillway	Detention and retention basins must have an emergency spillway to discharge flows above the 25-year, 24-hour storm event water surface elevation.
Freeboard	The pond must have one (1) foot of freeboard above the 100-year, 24-hour storm event peak water surface elevation.
Coastal Zone Certification (CZC)	Required for every site in Georgetown County; must get CZC <i>before</i> submitting application to the County.
Phased Erosion and Sediment Control Plan	Phased Erosion Prevention and Sediment Control Plan required for disturbances over 5 acres. See Section 3.2 for details.
Construction Sediment Basin	Must be designed to meet a removal efficiency of 80 percent or 0.5 ml/L peak settleable solids concentration, whichever is less; surface dewatering required, porous baffles and forebays shall be used when feasible.
Downstream Analysis	Provide a map showing the drainage flow path from the site to the receiving water body. Include pictures at the point of the site's discharge and along the downstream system.
Special Protection Areas	Detain the excess runoff volume difference between the pre-development and post development conditions for the 24-hours for the 2-, 10-, and 25-year storm event.
Discharge Velocities	Must be reduced to the pre-developed 10-year, 24-hour storm runoff velocity or a non-erosive velocity.
Drainage/conveyance channels	Must be designed to convey the 10-year, 24-hour storm event with a one-half (1/2) foot freeboard and must completely contain the 25-year 24-hour event (for channels less than three feet in depth); velocities must not exceed 5 ft/sec or must have permanent protection against higher velocities.
Geotechnical Report	Required for most projects to know the SHWT and infiltration rates.

4.2.1 General Requirements

The following items are general design requirements to be met for land disturbance activities in Georgetown County.

1. Plans, calculations, and supporting documentation as required by this Manual and the Ordinance for the design, construction, and maintenance of stormwater management facilities shall be prepared and sealed by a Professional Engineer currently licensed in the state of South Carolina or a Professional Land Surveyor currently licensed by the state of South Carolina when permitted by the Ordinance.
2. Innovative approaches to stormwater management are encouraged and the concurrent control of flooding, erosion, sedimentation, and stormwater pollution are mandatory.
3. The use of Low Impact Development (LID) in the creation of stormwater infrastructure within a site is highly encouraged. LID can reduce construction and maintenance costs of the stormwater infrastructure, balance growth needs with water quality protection, and create green landscapes that add amenity value to new development.
4. Projects that are developed in phases shall require the submission of a master plan of the entire project. The initial submittal shall control the area proposed in the initial phase to the requirements of this Manual and establish a procedure and obligation for total site control. Applications for individual projects shall be considered only when the phases are totally independent of or make sufficient provisions for subsequent phases.
5. Development should maximize the amount of rainfall that infiltrates into the soils and minimize the amount of direct overland flow into public drainage facilities, adjoining streets, water bodies, surface waters, and wetlands to the extent feasible. Channeling runoff directly into surface waters is prohibited; instead runoff must be routed to reduce velocities, allow suspended solids to settle and remove pollutants.
6. Where existing wetlands are intended as a component of an overall stormwater management system (for quantity, use of wetlands for water quality treatment is not allowed), the permit application will not be approved until all necessary federal and state permits have been obtained.
7. A positive outfall for all runoff in excess of that retained shall be provided to a surface water through appropriate easements or rights of way. If the downstream facilities are inadequate to convey the peak discharge for the design rainfall event(s), the proposed development shall accommodate that portion of runoff above the actual capacity.
8. The soil types of a development and contiguous watershed area are of a prime consideration in the design and maintenance of all stormwater management facilities. A Soil Erosion and Sediment Control Plan shall be prepared and submitted as a part of the Stormwater Management Plan.

4.2.2 Hydrologic/Hydraulic Design Requirements

A complete watershed hydrologic and hydraulic analysis must be done using a complete model/procedure acceptable to the County. The name of the model/procedure used for the analysis must be included in the C-SWPPP.

Design Storms

Post-development peak discharge rates shall not exceed pre-development discharge rates for the 2-, 10-, and 25-year frequency 24-hour duration storm event, using the National Resource Conservation Service (NRCS) Type III rainfall distribution with 323 peaking factor. Discharge rates shall be evaluated at designated boundary points identified on the drainage area maps. Boundary points must remain at the same location from pre-development to post-development conditions.

Post-development peak discharge rates for the 100-year, 24-hour duration Type III storm event shall be evaluated to ensure that the system can safely pass the storm event without damage to stormwater control structures and without causing increased water elevations or flooding on adjacent properties or to on-site structures.

Method of Runoff Rate and Volume Computations

The following methods and programs are acceptable for use in determining the peak runoff rate and runoff volumes. Any assumptions used in the computations shall be clearly delineated. The computation results shall be presented in a format that will permit confirmation of the results. For methods not outlined below, the applicant shall provide sufficient detail to determine the accuracy of the method or program used.

1. The design discharge rate for a single pipe or culvert that is not part of a pipe network or system and that drains a watershed of 2 acres or less may be calculated using the Rational Formula.
2. Runoff calculations involving any watershed of over 2 acres, multiple sub-watersheds or multiple drainage inlets, stormwater pipe networks, ponds, detention system or BMPs must be analyzed using computer or numerical models that model complex hydrologic and hydraulic watershed responses. For these circumstances, the NRCS/SCS method may be used.
3. Stormwater pipe systems that include one or more junctions must be included in the model.

Rainfall Data

United States Weather Service Rainfall Data compiled for Georgetown County by the South Carolina Water Resources Commission shall be used. The SCDHEC CGP requires that each C-SWPPP must use rainfall data from the South Carolina DHEC Stormwater Management BMP Handbook or another appropriate source such as a local NOAA gauge. Rainfall data from the SCDHEC BMP manual is provided below as well as a link to the NOAA Precipitation Frequency Data Server (PFDS) webpage.

Rainfall Data for 24-Hour Type III Storm Events (Inches)

Location	2-yr	10-yr	25-yr	100-yr
Georgetown (East)	4.6	7.0	8.5	11.1
Georgetown (West)	3.9	6.0	7.4	9.6

NOAA PFDS: <http://hdsc.nws.noaa.gov/hdsc/pfds>

The Natural Resources Conservation Service (NRCS) has recently developed new rainfall distributions that replace the standard NRSC (SCS) Type distributions. The new NRCS distributions have default averaged curves based on geospatial location, as well as a procedure to create custom site-specific distributions using the Atlas 14 rainfall data. These curves may also be used. The Stormwater Management Report should indicate what source was used for rainfall data.

Soils

Soils properties influence the relationship between rainfall and runoff with their various rates of infiltration. Soil maps and data can be obtained from the NRCS Web Soil Survey using the link below to determine the Hydrologic Soil Groups (HSG).

NRCS Web Soil Survey: <http://websoilsurvey.sc.egov.usda.gov/>

Soil types are divided into four major HSGs denoted by the letters A through D. “A” soils are those which have high infiltration capacity and subsequently low runoff rates. “D” soils are those with very low infiltration capacity and very high runoff rates.

Consideration should be given to the effects of urbanization on the natural HSG. If heavy equipment can be expected to compact the soil during construction, if fill material is brought in to raise the ground surface elevation, or if grading will mix the surface and subsurface soils, appropriate changes should be made in the HSG selection.

When encountering Hydrologic Soil Group A/D soils or B/D soils, either A, B, or D may be selected based on site specific characteristics and groundwater levels. However, the HSG selected for pre-development must be the same HSG selected for post-development.

Land Cover

Land use data shall be taken from the most recent aerial photograph and field checked and updated. The land cover and associated curve number assigned to each portion of the site and any off-site areas as applicable should be clearly described in the Stormwater Management Report with tables and/or figured.

Wet ponds, dry ponds intended for stormwater detention, wetlands, surface waters, and gravel areas intended for vehicular traffic must be assigned a curve number of 98. For surfaces not clearly defined in commonly available tables (i.e. permeable pavement), provide supporting documentation of the assigned curve number.

The County reserves the right to require verification of hydrologic and hydraulic computations by use of a second computational method at its discretion. The County may require drainage systems to be designed assuming future conditions or build-out of the contributing watershed.

Time of Concentration

The time of concentration (T_c) shall be determined by calculating the time for a particle of water to travel from the most hydraulically remote point of the project area to the point of interest. Georgetown County will accept commonly used time of concentration calculations and methodologies.

The maximum allowable overland (sheetflow) flow path is 100 feet.

Tailwater

The design must account for the stage of receiving waters, or the tailwater, to accurately determine the impacts of the land disturbance activities. The applicant may use one or more of the following methodologies to determine the tailwater conditions:

- Assume the next downstream pipe of the receiving system is full.
- Assume the ditch is flowing 1/2 full if normally dry.
- Use the 100-year Base Flood Elevation (BFE) from the FEMA maps if reasonable.
- Check the Mean High High Tide (MHHHT) and the downstream location and set the tailwater no lower than this elevation.
- Examine the downstream system for high water marks.

Tailwater conditions may not be based on existing water surface elevations as examined during a field visit. Conditions must consider water levels in the receiving system during storm events and during wet seasons. The reasoning and justification for the tailwater depth should be included in the Stormwater Report. The tailwater depth may be set to vary with time and for different storm events provided evidence is presented to support each situation.

Discharge Velocities and Outlet Protection

Appropriate Velocity Dissipation devices and/or erosion prevention BMPs must be placed at discharge locations and along the length of any outfall channel to provide non-erosive flow from the outfall to a surface water so that the natural physical and biological characteristics and functions are maintained and protected. Outlet protection measures, such as riprap, may be required to minimize erosion and scour potential. Provide calculations or procedures utilized to select the proper outlet protection and protection dimensions. Silt fence may not be used as an energy dissipater.

Stagnant Water Conditions

Dead end flow configurations, which create stagnant water conditions, shall not be allowed. All BMPs shall be designed, constructed, and maintained with consideration for the proper control of mosquitoes and other vectors.

Off-Site Runoff

Runoff from higher adjacent or upstream lands that runs into or through the site shall be considered and provisions for conveyance of such runoff shall be included in drainage plans. As

directed by the County Engineer, upstream analysis shall be conducted to ensure the project has capacity to convey upstream runoff and does not cause adverse upstream impacts, such as flooding.

4.3 Stormwater BMP Design Requirements

Site designs must include Stormwater BMPs to meet the water quantity and water quality requirements of this Manual and the Ordinance. Runoff from impervious surfaces shall be discharged through retention basins, detention basins, filtering BMPs, Manufactured Treatment Devices (MTDs) and/or subject to some type of BMP prior to discharge from the project site. BMP means a practice or combination of practices determined by the design professional to be the most effective means of preventing or reducing the amount of siltation and pollution discharged from the project site.

SCDHEC has developed a Stormwater Management BMP Handbook and BMP Field Manual that should serve as guidance documents to design BMPs required by this Manual. The BMP Handbook and BMP Field Manual include lists of acceptable BMPs, including their specific design performance criteria and operation and maintenance requirements for each stormwater practice. Copies of these two manuals can be obtained through the local SCDHEC EQC office or can be downloaded from the stormwater section of SCDHEC's website (www.scdhec.gov/stormwater).

In addition to the guidance provided by the SCDHEC BMP Handbook, the County has requirements associated with certain BMP measures to account for the unique topographic and hydrologic conditions in the County.

4.3.1 Detention / Retention Design Requirements

Detention/Retention ponds are often referred to as wet/dry ponds and are designed to detain stormwater to allow pollutants to settle out and to control the release of stormwater to pre development peak discharge rates. If a detention/ retention pond is used for water quantity control, this feature shall also be used for water quality control. They may be used in addition to LID practices. Detention/Retention ponds in Georgetown County must comply with the following design criteria:

- A. Outlet structures shall be designed in accordance with accepted engineering principles, with particular attention to appropriate hydraulics including orifice, weir, and culvert hydraulics.
 - If an orifice is equal to or smaller than three (3) inches in diameter, an appropriate trash rack or downturned elbow must be installed on the orifice.
- B. Use a water tight pipe outlet barrel to riser connection. All pipes that extend through an embankment shall have anti-seep collars or filter diaphragms to control the migration of soil materials and, so prevent potential embankment failure from "piping" within the backfill soil along the conduit. This must be shown on the detail.
- C. All constructed dams or embankments shall have a clay core with an excavated cutoff trench.

- D. All ponds should have easements or other means of access around the entire pond for maintenance and repair activities. This access should be at least fifteen (15) feet in width and no more than 10% in slope, measures perpendicular to the pond.
- E. For water quantity control, outlet structures shall be designed to discharge a peak flow rate equal to or less than the pre-development runoff peak flow rates for the 2-year, 10-year, and 25-year frequency 24-hour duration Type III storm event.
- F. The pond shall have one (1) foot of freeboard above the 100-year, 24-hour storm event peak water surface elevation.
- G. Any pond shall not overtop the banks or utilize the emergency spillway during the 2-year, 10-year, or 25-year 24-hour storm events.
- H. If the pond is intended to be a dry pond, the pond bottom must be at least 0.5 ft above the SHWT, as determined by a licensed geotechnical engineer.
- I. If the pond is intended to be a wet pond, there must be at least four (4) feet of water between the bottom of the pond and the NWL.
- J. Inside and outside pond bank slopes shall be no steeper than 3H:1V
- K. If the downstream drainage facilities are inadequate to convey the peak discharge for the design storm events such that the proposed land disturbance will cause increased downstream water surface elevations, storage volume shall be added to accommodate that portion of the runoff above the actual downstream carrying capacity and/or the outlet structure shall be sized to restrict the peak discharge rates to accommodate downstream conditions.
- L. Where a basin discharges into a stream, ditch, swale or water body, an energy dissipater shall be installed to reduce discharge velocities to minimize soil erosion and sediment transport.
- M. For detention and retention basins, an emergency spillway shall be required at an elevation above the 25-year, 24-hour storm event peak water surface elevation to discharge flows in excess of the 25 and to safely pass the 100-year, 24-hour storm event. It should be located so the discharge does not erode the basin or receiving channel.
- N. The pond shall have one (1) foot of freeboard above the 100-year, 24-hour storm event peak water surface elevation
- O. Ponds should have permanent forebays at all locations where pipes discharge into the pond above the normal water surface elevation.

4.3.2 Infiltration BMP Requirements and Soil Testing

Infiltration BMPs are systems in which surface water is directly delivered to the system, which relies on infiltration for the treatment and release of stormwater runoff from the BMP. These systems may not rely solely on infiltration for the release of stormwater.

1. Design

- A. Permanent infiltration practices, when used, shall be designed to accept, at a minimum, the first one (1) inch of runoff from all impervious areas of the site.
- B. The storage capacity must account for 20 percent reduction in storage space to account for sediment deposition.
- C. Soil testing with soil borings performed by a registered licensed geotechnical engineer must be done to determine the infiltration rates, soil composition, and Seasonal High Ground Water Table (SHWT).
- D. Infiltration practices are limited to soils having an infiltration rate of at least 0.5 (one-half) inches per hour. 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, as described below.
- E. 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 20 foot length of vegetative filter prior to stormwater runoff entering the infiltration practice.
- F. The bottom of the infiltration practice shall be at least one (1.0) foot above the seasonal high water table, whether perched or regional, determined by direct piezometer measurements, which can be demonstrated to be representative of the maximum height of the water table on an annual basis during years of normal precipitation, or by the depth in the soil at which mottling first occurs.
- G. The infiltration practices shall be designed to completely drain of water within 72 hours.
- H. If the infiltration practice is entirely underground, underdrains are required.
- I. Infiltration BMPs shall be designed for the prevention of clogging by fine materials and for ease of cleaning with conventional vacuum cleaning equipment. This may include but not necessarily be limited to wrapping of the Infiltration BMP (perforated pipes/chambers/trenches) with an appropriate nonwoven geotextile fabric and providing sufficient clean outs for the system.
- J. Systems shall have an overflow to a positive drainage system with a control device, if necessary, between the subsurface system and the positive drainage system. The overflow pipe shall be sized for the allowable discharge with measures to provide a non-erosive velocity of flow along its length and at the outfall.
- K. Infiltration practices greater than 3 feet deep shall be located at least 10 feet from basement walls.
- L. Infiltration practices designed to handle runoff from impervious parking areas shall be a minimum of 150 feet from any public or private water supply well.
- M. The slope of the bottom of the infiltration practice shall not exceed 5 percent.
- N. The practices shall not be installed in fill material as piping along the fill/natural ground interface may cause slope failure.

- O. An infiltration practice shall not be installed on or atop a slope whose natural angle of incline exceeds 20 percent.
 - P. If the infiltration practice is entirely or partly underground:
 - a. It shall be designed for the prevention of clogging by fine materials and for ease of cleaning with conventional vacuum cleaning equipment. This may include but not necessarily be limited to wrapping of the Infiltration BMP (perforated pipes/chambers/trenches) with an appropriate nonwoven geotextile fabric and providing sufficient clean outs for the system.
 - b. Clean outs will be provided, at a minimum, every 100 feet along the infiltration practice to allow for access and maintenance.
 - c. If the infiltration practice is under a roadway, building, or other structures, a load analysis must be performed for the system by a qualified engineer to show an H20 loading.
2. Soil Testing – Infiltration Rates and SHWT
- A. Soil testing for infiltration rates shall be performed by a registered licensed geotechnical engineer
 - B. A minimum of 1 location shall be tested for infiltration rates for each BMP. Additional locations may be needed depending on the size and layout of the BMP. In general, these test shall be conducted in the center of the BMP.
 - C. The initial test elevation location shall be at the same contour elevation as the bottom/invert of the Infiltration BMP. Tests shall also be conducted to a depth 2 feet below the bottom/invert of the BMP.
 - D. Infiltration BMPs shall be designed and validated on the basis of actual test data. Tests shall be consistent as to soil conditions, proposed Infiltration BMP elevations, Infiltration BMP locations and water table depths with the proposed Infiltration BMP system.
 - E. The following tests are allowable to determine infiltration rate for soils (Other test methods must be approved by County):
 - i. Laboratory Permeameter Test for saturated hydraulic conductivity on undisturbed soil samples (ASTM D 5084).
 - ii. Double Ring Infiltrometer Test to estimate the initial vertical unsaturated permeability data of the upper soil layer (ASTM D 3385).
 - iii. Constant Head Test in soils with permeability that allow keeping the test hole filled with water during the field test (AASHTO T 215).
 - iv. Falling Head Test in areas with excellent soil percolation where keeping the test hole filled with water is not feasible during the test.
3. The County must be notified at least three (3) business days prior to the installation of any underground infiltration practices. A County Inspector must be on site during the installation of any underground infiltration systems.

4.3.3 Underground Exfiltration BMPs Requirements and Soil Testing

Exfiltration BMPs are underground systems, such as perforated pipes, in which stormwater runoff is delivered to the system via inlets, catch basins, or other such structures.

1. Design

- A. Soil testing with soil borings performed by a registered licensed geotechnical engineer must be done to determine the infiltration rates, soil composition, Seasonal High Ground Water Table (SHWT), and a determination of the Hydraulic Gradient using ground water profiles.
- B. The bottom of the exfiltration trench shall be a minimum of one (1.0) foot above the SHWT.
- C. Design must account for 20 percent reduction in storage space to account for sediment deposition.
- D. Exfiltration systems must be accessible from catch basins spaced no further than 100 feet apart to allow for maintenance. Catch basins shall not be smaller than 2 ft by 3 ft and the system must terminate at a catch basin.
- E. The slope of the exfiltration system shall be a slope of zero percent (0%) between the catch basins.
- F. The system shall have an emergency overflow.
- G. When rock is part of the system, the treatment volume shall be calculated using the void volume of the rock used in the exfiltration trench and the volume of the pipe or underground chamber.
- H. The voids ratio of No. 57 stone shall not exceed 40% and washed No. 57 stone shall not exceed 33%, Only wash stone or rock without fines are acceptable for use in the exfiltration trench
- I. Filter fabric must be laid perpendicular to the direction of the trench.
- J. Installation shall require continuous on-site observation by the Engineer and Site Inspection Reports shall be provided to the County for the entire installation of the exfiltration system.

2. Soil Testing

- A. The permeability of the soil must be greater than one (1) in/hr.
- B. Soil testing for infiltration rates shall be performed by a registered licensed geotechnical engineer.
- C. The initial test elevation location shall be at the same contour elevation as the bottom/invert of the Exfiltration BMP.
- D. Exfiltration BMPs shall be designed on the basis of actual test data. Tests shall be consistent as to soil conditions, proposed Infiltration BMP elevations, Infiltration BMP locations and water table depths with the proposed Infiltration BMP system.
- E. The following tests are allowable to determine infiltration rate for soils (Other test methods must be approved by County):
 - i. Laboratory Permeameter Test for saturated hydraulic conductivity on undisturbed soil samples (ASTM D 5084).

- ii. Double Ring Infiltrometer Test to estimate the initial vertical unsaturated permeability data of the upper soil layer (ASTM D 3385).
 - iii. Constant Head Test in soils with permeability that allow keeping the test hole filled with water during the field test (AASHTO T 215).
 - iv. Falling Head Test in areas with excellent soil percolation where keeping the test hole filled with water is not feasible during the test.
3. The Recover Time Calculation shall be based on Darcy's Law, $Q=KiA$
- A. The Recover Calculation can only consider horizontal flow through the one third of the side area of the exfiltration trench that is filled with water at any given time for any given storm event.
 - i. The Recovery Calculation must have a factor of safety of 2.
 - B. The County must be notified at least three (3) business days prior to the installation of any underground infiltration practices. A County Inspector must be on site during the installation of any underground infiltration systems.

4.3.4 BMP Maintenance Plan

The effectiveness of each BMP implemented on a site depends upon appropriate design and maintenance. The C-SWPPP must contain a BMP Maintenance Plan and Georgetown County Stormwater Management BMP Maintenance Agreement, included in Appendix H of this Manual, for each BMP incorporated into the stormwater system. The maintenance plan must address both maintenance and monitoring procedures as outlined in the SCDHEC BMP Handbook and Field Manual, which, when followed, will prevent:

- 1. Blocking hindering, or obstructing the natural or intended flow of surface waters
- 2. Improper operation of stormwater retention or impoundment device used for water quality improvement
- 3. Any condition that would damage the County's stormwater collection system or the quality of the County's waters
- 4. Any conditions specifically declared to be dangerous to the public health, safety, and general welfare of the County's inhabitants

Once approved by the County, the original signed BMP Maintenance Plan will be placed at the County's Register of Deeds Office. The permittee shall set up an appointment with the Register of Deeds office to record the signed BMP Agreement and Maintenance Plan.

4.4 Water Quality Requirements

Water quality control is also an integral component of stormwater management and must be provided for all new impervious area on the site. The following design criteria are established for water quality protection. The site must capture and slowly release the greater of: one (1) inch over the impervious area on the site, or one-half inch over the entire site. Land disturbance within 1,000 feet of shellfish beds must be designed to retain the first one and one-half (1.5) inches of runoff from the disturbed area.

Calculations must be provided showing the required treatment volume for each of these conditions, with the greater of the two volumes clearly identified. The calculations should show a direct product of the area times the two rainfall amounts, not accounting for land use or soil conditions. Calculations or hydrographs must show that this volume is released over a period of at least 24 hours, with the volume being completely released within 72 hours of the beginning of the storm event.

Other design standards may be acceptable to the County if they achieve an equivalent removal efficiency of 80 percent for total suspended solids based on annual removal. These will be evaluated on a case-by-case basis.

Design MTDs to treat, at a minimum, the peak flow rate of the stormwater runoff from the 1.8-inch, 1-year, 24-hour storm event for the entire drainage area to the BMP. Refer to SCDOT Supplemental Technical Specification for Stormwater Manufactured Treatment Devices (MTDs) SC-M-815-13 or latest revision for design requirements.

4.5 Downstream Analysis

Downstream analysis shall be required for all new development and redevelopment sites to determine the downstream effects from any development activity. The downstream analysis shall include the assumptions, results and supporting calculations to show safe passage of post-development design flows downstream. The analysis of downstream conditions in the report shall address each discharge point along the project site's boundaries at which runoff exits the property. The analysis shall focus on the portion of the drainage channel or surface water immediately downstream from the project. In calculating runoff volumes and discharge rates, consideration may need to be given to any planned or known future upstream land use changes.

Engineering analysis shall be implemented to investigate the downstream effects from any development activity. This analysis shall extend downstream to the ultimate receiving water body or to the point in the watershed downstream of the site where the area of the site comprises 10% of the total drainage area. The analysis needs to identify points of concern. The following are typical points of concern to consider when conducting a complete downstream analysis to the ultimate outfall:

1. The first downstream road crossing.
2. Any downstream road crossing or system, or any overbank areas, that shows evidence of being undersized or of receiving erosive or damaging flows.
3. Downstream development.

4. Location of known existing flooding, drainage, or erosion problems.
5. Any point as directed by the County.

At each point of concern, the engineer needs to take a photograph and document any concerning observations or evidence of existing issues. The analysis shall determine whether the proposed development will have the potential to increase flooding, drainage, or erosion impacts to downstream properties or road crossings during the 100-year, 24-hour storm event.

If the downstream analysis determines that the development of a particular site may contribute to flooding, drainage, or erosion problems, then at least one the following improvements shall be implemented:

1. On-site water quantity control. Control of runoff peak discharges and volumes in excess of the requirements of this Manual to prevent downstream impacts.
2. Off-site water quantity control. Use of off-site publicly or privately owned facility to prevent adverse downstream impacts. Hydrologic and hydraulic modeling are required to support the design and the owner/entity must provide written acceptance of such an agreement.
3. Improvements to the downstream storm water conveyance system. Increase the conveyance capacity or implement other improvements to the downstream system. Hydrologic and hydraulic modeling are required to support the design and the owner/entity must provide written acceptance of such an agreement. Evidence must be provided that these improvements will not cause other downstream or upstream impacts.

4.6 Sediment and Erosion Control Requirements

The purpose of the Sediment and Erosion Control Plan is to provide effective measures to control erosion and sedimentation caused by the removal of ground surface cover. Effective erosion and sediment control design requires consideration of stormwater flow and soils to be encountered. Proper design includes measures for erosion control and provisions for the establishment of vegetation that shall help avoid erosion problems during and after development activities. Alignment, grades, area of disturbed soil and bank slopes are based upon soil erodibility, climate exposure, geology, proposed vegetative restoration and expected maintenance.

Standards and Guidelines for Design

- A. Slopes shall be protected from erosion by quick establishment of vegetative cover, erosion control blankets, turf reinforcement mats, benches, terraces, slope protection structures, mulches, polyacrylamide (PAM), or a combination of these practices as required.
- B. Except as provided below, initiate soil stabilization measures as soon as practicable whenever land-disturbing activities have been temporarily or permanently ceased, but in no case more than fourteen (14) days after land-disturbing activity in that portion of the construction site has temporarily or permanently ceased.

- i. Where snow cover or frozen ground conditions preclude stabilization by the 14th day, stabilization measures shall be initiated as soon as practicable.
 - ii. Where construction activity on a portion of the construction site is temporarily ceased, and earth-disturbing activities shall be resumed within fourteen (14) days, temporary stabilization measures do not have to be initiated on that portion of the construction site.
- C. Drainage channels and conveyance measures shall be designed to avoid erosion problems. Wide channels with flat slopes lined with grass or other vegetation should be used where practical. All conveyance measures shall be designed to meet the following requirements/standards:
- i. Each conveyance measure shall be stabilized and capable of handling the 10-year 24-hour storm event with non-erosive flow conditions during construction and post-construction.
If the velocity exceeds five (5) feet/sec, then permanent velocity dissipation measures, devices, and/or erosion prevention BMPs shall be installed to provide non-erosive flow conditions.
 - ii. Complete stabilization of stormwater conveyance channels within seven (7) days of the completion of channel construction. Examples of vegetative and non-vegetative stabilization techniques include channel liners, rolled erosion control products (e.g., erosion control blankets and turf reinforcement mats), riprap, geotextiles, or other armoring materials that are suitable for use in areas with concentrated or channelized flow. Application of mulch, hydro-mulch, tackifier, or similar erosion prevention practices that are erodible, conveyable, or that obstruct flow when used in areas with concentrated or channelized flow in stormwater conveyance channels is prohibited.
 - iii. Design channels to avoid disturbed areas and to reduce erosion. Divert concentrated flows of off-site stormwater running onto the site and within the construction site to avoid contact with soils exposed during construction, unless infeasible. Prevent erosion of channel embankments, outlets, adjacent streambanks, slopes and downstream waters during discharge conditions through the use of velocity dissipation devices (e.g., check dams, sediment traps, riprap, or grouted riprap at outlets) within and along the length of any constructed stormwater conveyance channel, and at any outlets to provide a non-erosive flow velocity.
 - iv. New point discharges onto adjacent property where there was not a point discharge previously are not allowed, unless written permission from the adjacent property owner is provided. A twenty (20) foot minimum buffer shall be provided, where feasible, between the property line and the discharge point. Level spreaders, plunge pools, etc. shall be provided when the proposed outlet is near the property line and not directed to an existing outfall, such as a creek or ditch. All outlets from a storm sewer system shall not discharge on fill slopes.
 - v. Appropriate velocity dissipation devices and/or erosion prevention BMPs shall be placed at discharge locations and along the length of any outfall channel to provide non-erosive flow from the structure to a surface water so that the natural physical and biological characteristics and functions are maintained and protected. Silt fence may not be used as an energy dissipater.

- D. Stormwater runoff and drainage to a single outlet from land disturbing activities, which disturb ten (10) acres or more, shall be controlled during the land disturbing activity by a sediment basin where sufficient space and other factors allow these controls to be used until the final inspection. The sediment basin shall be designed and constructed to accommodate the anticipated sediment loading from the land disturbing activity and meet a removal efficiency of eighty (80) percent suspended solids or 0.5 ml/L peak settleable solids concentration, whichever is less. The efficiency shall be calculated for disturbed conditions for the 10-year, 24-hour design event. In addition, the sediment basin shall be designed to meet the following requirements:
- i. Consider public safety as a design factor for the sediment basin, and alternative sediment controls must be used where construction site limitations would preclude a safe design.
 - ii. The County may on a case-by-case or watershed-by-watershed basis require the use of a larger storm event and/or a larger storage volume when designing sediment basins or equivalent sediment control BMPs.
 - iii. Unless infeasible, properly design, install and maintain porous baffles, or similar control measures capable of enhancing settling capabilities and restricting the accumulation of sediment around the outlet structure, in all temporary sediment traps and sediment basins to reduce velocity, turbulence, and improve sediment trapping efficiency.
 - iv. Unless infeasible, sediment forebays, or similar control measures capable of providing sediment trapping at inlets of sediment basins, such as porous baffles, should be installed as practicable based on sediment storage requirements of each sediment basin.
 - v. Unless infeasible, each sediment basin should be equipped with a cleanout stake indicating when the basin is to be cleaned.
 - vi. When discharging from sediment basins, utilize outlet structures that only withdraw water from near the surface of the basin or impoundment unless infeasible. This outlet structure should be capable of conveying the flow for the 10-year, 24-hour storm event. Select an appropriate riser structure which operates in weir or barrel flow control and prevent orifice/riser flow control.
 - vii. Detention basins may also be used to trap sediment during and after development. When used for this purpose, the basin shall continue to detain stormwater in accordance with the hydraulic design criteria, but storage volume for stormwater shall be required to account for the volume lost to sedimentation. Sediment shall be removed periodically to ensure the intended performance of the basin.
- E. Good stands of existing vegetation adequate to control erosion shall be preserved wherever possible. Regeneration of trees and other large vegetation should be encouraged wherever possible.
- F. Inlet protection shall be provided at all existing and newly installed inlets that receive stormwater runoff from the disturbed areas.
- G. Outlet protection shall be provided at all existing and newly installed outlets, within the construction site's boundary, that discharge stormwater runoff from the disturbed areas. Silt fence shall not be used as outlet protection.

4.7 Vector Control

All BMPs shall be designed, constructed and maintained with consideration for the proper control of mosquitoes and other vectors. Practices may include, but are not limited to:

1. The bottom of retention and detention ponds should be graded and have a slope not less than 0.5 percent.
2. There should be no depressions in a normally dry detention facility where water might pocket when the water level is receding.
3. Normally dry detention system and swales should be designed to drain within 72 hours.
4. Normally wet detention and retention systems should have a permanent pool of at least four (4) feet to discourage the production of moquitos and other vectors.
5. An aquatic weed control program should be utilized in permanently wet structures to prevent an overgrowth of vegetation in the pond. Manual harvesting is preferred.
6. Fish may be stocked in permanently wet retention and detention ponds.
7. Normally, dry swales and detention pond bottoms should be constructed with a gravel blanket or other measure to minimize the creation of tire ruts during maintenance activities.

4.8 Easements

All storm sewer, storm water conveyance drainage systems and open channels must be constructed within either public right-of-ways, or public or privately owned easements. The easement shall conform substantially in relation to the lines of the system and be of sufficient width to convey stormwater. Adequate access for maintenance and equipment shall be required and provided. No approval will be given for the construction or improvement of any public storm sewer, storm water conveyance systems or open channels without provision of suitable permanent easement or right-of-way. Restriction on easements shall include prohibiting all fences and structures that would interfere with access to the easement areas and/or the maintenance function of the drainage system.

1. Existing Easements: Each existing easement to be used shall be shown on the plans included in the C-SWPPP submittal package. The information on the plans shall include the deed book and page number of the recorded instrument. All restrictive clauses as to the use of the easement shall be noted on the plan adjacent to the specific easement. The restrictions may include but are not limited to:
 - Utility (gas, electric, telephone, and water) purposes only,
 - Drainage purposes only; and,
 - Sanitary sewer purposes only.

Construction of storm water conveyance drainage systems will not be permitted in existing exclusive gas, electric, water, telephone, or sanitary easements unless a drainage easement is acquired overlapping the existing easement with approval from the County and the affected utility.

2. Culvert/ Buried Pipe Easement Widths: Drainage and maintenance easements shall provide adequate room for a contractor or owner to construct and perform maintenance of the stormwater structure or feature. Minimum drainage easement widths for buried pipes or culverts shall be calculated as follows:

$W = (O.D. + (2.5' \times 2)) + ((\text{Depth of Trench} \times 2) + (12' + 5'))$ Rounded up to the next 5' increment.

Where:

O.D. = Outside Diameter of the pipe

(2.5' x 2) = 30" either side of the pipe

(Depth of Trench x 2) = 1:1 Slope of trench on either side of the pipe

12' = Access for equipment

5' = Access opposite side of equipment access

Open Channel Easement Widths: Drainage and maintenance easements for open channels shall be dependent on the size of the channel. For those open channels three (3) or less in depth, the easement width shall be calculated based on the following equation:

$W = (\text{Depth of Swale} \times 6) + 10'$ Rounded up or down to a 5' increment.

Where:

(Depth of Swale x 6) = 3:1 Slope of the swale on each side

10' = 5' access pm each side

For those open channels greater than three (3) feet in depth, the easement width shall be calculated based on the following equation:

$W = B + ((\text{Depth of Trench} \times 2) + (12' + 5'))$ Rounded up to the next 5' increment

Where:

B. = bottom width of ditch

(Depth of Trench x 4) = 2:1 Slope of the trench on each side

12' = Access for equipment

5' = Access opposite side of equipment access

3. Minimum Easement Widths for Maintenance Access: Access easements shall be a minimum of 15 feet in width.

SECTION 5 STORM SEWER COLLECTION SYSTEM

Effective drainage of roadways is essential to the maintenance of roadway service level and to traffic safety. Water on the pavement can interrupt traffic, reduce skid resistance, increase potential for hydroplaning, limit visibility due to splash and spray, and cause difficulty in steering a vehicle when the front wheels encounter puddles.

Design criteria for the collection and conveyance of runoff on public roadways are typically based on roadway classification and reasonable frequency of traffic interference. Roadway collection systems are comprised of roadway sections, gutters to collect runoff, inlets to capture runoff, and stormwater pipes to convey the runoff. This section presents guidance for the design of surface drainage, gutter flow, inlet capacity, and storm sewer capacity.

5.1 General Design Criteria

Stormwater systems shall be designed to convey the 25-year, 24-hour design flow under non-surcharged conditions. Stormwater culverts under arterial and multi-lane collector roadways shall be designed to convey the 50-year, 24-hour design storm. Convey shall mean to pass the flow without any backwater effects on the upstream system.

If the stormwater system is part of a roadway to be accepted by the SCDOT, the system design is governed by SCDOT design criteria.

5.2 Gutters

There are various types of gutter sections available for use in roadway design. The gutter type may be determined by the needs for additional carrying capacity to accommodate the allowable spread or the requirement for safe passage of pedestrian traffic. The following types of gutter sections are allowable for use in Georgetown County:

1. Conventional Gutters
2. Composite Gutters
3. Valley Gutters

These gutter sections shall be designed based on the design criteria in the HEC-22, Urban Drainage Design Manual (Federal Highway Administration (FHWA), 2009) and AASHTO's Drainage Manual (American Association of State Highway Transportation Officials (AASHTO) 2014). Other gutters deemed practical and technically sound to meeting the criteria of this design manual may be submitted prior to design commencement for approval by the County Stormwater Manager on a case-by-case basis.

5.3 Inlets

Inlet design and location limit the amount of inundation, or spread, on a roadway. It is important that the spread of flow, the distance from the face of the curb to the edge of the flow in the roadway, does not impede traffic or cause a safety concern. General design criteria for inlets are as follows:

1. For local and single-lane collector roadways, the total spread (both sides) of runoff should not exceed 16 feet at any given cross section, and in no case be greater than 10 feet on one side of the street
2. For arterial and multi-lane collector roadways, the spreads should not exceed one-half of the travel lane on a two-lane roadway and may encroach a full travel lane on a four-lane roadway
3. No curb overtopping may occur in sags
4. Depth of spread shall not exceed 6 inches during the 100-year, 24-hour storm event
5. Inlet spacing shall not exceed 400 feet

Inlets accepted by Georgetown County can be divided into three categories:

1. Curb-opening inlets: vertical openings in the curb covered by a top slab. Curb inlets should be used on roadways where the expected flow depth at the curb is sufficient for the inlet to perform efficiently.
2. Grate inlets: openings in the gutter covered by one or more grates. Grate inlets intercept all gutter flow that passes over the grate if the grate is sufficiently long and the gutter flow velocity is low.
3. Combination inlets: inlets that include both a curb opening and a grate inlet and act as a single unit. Combination inlets do not appreciably increase the capacity of a grate alone, but can account for larger amounts of debris without decreasing the inlet capacity.

The placement of two inlets side by side is referred to as a double inlet and are acceptable for use. Capacity, size, and efficiency shall all be accounted for when designing inlets. These inlets shall be designed based on the design criteria in the HEC-22, Urban Drainage Design Manual (Federal Highway Administration (FHWA), 2009) and AASHTO's Drainage Manual (American Association of State Highway Transportation Officials (AASHTO) 2014). Other inlets deemed practical and technically sound to meeting the criteria of this design manual may be submitted prior to design commencement for approval by the County Stormwater Engineer on a case-by-case basis.

5.4 Conveyance System

Stormwater conveyance systems consists of both open and closed conduits which convey stormwater to outlets. These systems must be designed to accommodate surface runoff from the 25-year, 24-hour storm event with no damage to physical facilities and minimum interruption of normal traffic.

The conveyance system shall have a maximum reliability of operation with respect to being structurally sound to its environment where it is placed and performing hydraulically as intended for

the entire life of design. The system shall require minimum maintenance (cleaning and clearing of obstructions) and must be accessible for maintenance operations. The system shall be adaptable to accommodate future expansion with minimal additional cost and design.

Site design, swales, and natural flow features should be used whenever possible to reduce the need for extensive storm sewer systems.

5.4.1 Stormwater Pipes

1. Stormwater Pipe Materials

Culverts and closed storm drainage systems may be constructed using any of the materials listed in this section. In selecting the culvert material, consider structural requirements and corrosion potential at the site as well as hydraulic requirements. Alternative materials may be considered by the County Stormwater Manager if specifications are provided showing it's comparable strength and longevity to the products listed herein.

A. Reinforced Concrete Pipe (RCP)

RCP pipe is required in all Georgetown County rights-of-way. It should meet SCDOT Specification SC-M-714. County staff shall be notified prior to installation of pipe in Georgetown County rights-of-way and may require that County Staff must be on site during installation.

B. Concrete Box Culverts

Cast in place or precast concrete box culverts are acceptable. Project plans should include structural details for cast in place concrete, or shop plans for precast that have been signed and sealed by a competent licensed professional engineer in the State of South Carolina. Concrete Box must be SCDOT standards. Prefabricated Structures

Prefabricated culvert structures such as CONSPAN® or similar structures are acceptable if designed and installed in accordance with the manufacturer's recommendations. Project plans should include structural details and shop plans that are signed and sealed by a competent licensed professional engineer in the State of South Carolina.

C. High Density Polyethylene (HDPE) Pipe

HDPE pipe culverts and storm drainage systems are acceptable outside of County Road rights-of-way. when designed and constructed in accordance with the manufacturer's recommendation, and County Standards. The County only allows RCP within the right-of-way. HDPE pipe culverts and storm drainage systems shall meet SCDOT standards. .

2. Minimum Size

All pipes used as part of the stormwater conveyance system shall be circular in shape and have a minimum diameter of 15 inches if the pipes are to become part of the public stormwater system. Pipes shall be designed and installed to meet the manufacturer's recommendations for minimum depth of cover.

Alternative pipe shapes required for utility clearance or special conditions must be approved by the County prior to design commencement.

3. End Treatments and Transitions

Acceptable end treatments may consist of, but are not limited to, plan end pipe with riprap, concrete headwalls, flared end sections, DOT approved safety ends, and any other end treatment that is approved by the County or County appointed designee. HDPE flared end treatments are not allowed.

Transition from pipe of dissimilar materials shall require a Dissimilar Materials Adapter incorporating a geotextile coupler with mastic coating and stainless steel straps that is properly backfilled per general pipe installation instructions.

4. Installation

All excavations and trenches shall be clean, dry and free of debris before placing pipe. Minimum compaction shall be 90% SPD for all pipes and structures, unless higher compaction levels are required by the design engineer. Verification of compaction throughout the pipe's backfill zone trench shall be provided by a registered geotechnical engineer. Open graded backfill such as washed stone, shall be wrapped with a minimum 8-ounce non-woven geotextile to prevent migration of fines into the backfill. Fabric design shall be verified by a registered geotechnical engineer. The County must be notified at least 24-hour notice prior to installation; the County may require that a County Inspector be onsite to verify installation.

5. Final Inspection

The permittee shall notify GTC Stormwater Division at the end of the project for a final inspection. A final inspection must pass in order to close the permit and start the warranty period. If a final inspection is not conducted and approved, the permittee shall be responsible for any and all failures. Another inspection shall be made at the end of the 1-year warranty period. If at any time during the warranty period the encroachment is not consistent with the original approved permit, the permittee will be responsible for complying with the original encroachment permit requirements.

In addition, all newly constructed pipe systems shall be visually inspected, with 100% of the pipe runs video inspected. Joints shall all be panned and inspected and any visible issues such as joint separation, cracking, holes in pipe, or excessive deflection shall be noted. This should be completed and provided to the County before the final inspection is scheduled.

6. Design

- A. Design culverts to support a minimum of an AASHTO HL-93 live load together with the appropriate dead load. Heavier live loads may be required if conditions dictate.
- B. Bury depths greater than 15 feet shall have written approval by the County Engineer or County appointed designee.
- C. Minimum life expectancy for all culvert materials is 75 years as certified by the manufacturer. This shall include meeting the design requirements on which the design life is based, such as bedding requirements.
- D. Pipe sizes and slopes must be designed to ensure that the flow velocity increases progressively at inlets, bends, or other changes in geometry or configuration. Designs shall not allow a larger pipe to discharge into a smaller pipe, regardless of the pipe capacity.

- E. Pipes that are expected to be partially or completely submerged for any part of the year must be RCP.
- F. Equalizer pipes to be used between interconnected ponds must be at least 24 inches in diameter and no longer than 600' in length. Junction box access with no inlets should be provided at least every 100' for maintenance. The equalizer pipes should have 0% slope with no other stormwater inlets or pipes connected.
- G. Storm drainage pipe discharging into wet ponds 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 one (1) foot below the normal pool elevation. Submerged stormwater systems shall be avoided and shall only be permissible with a variance and approval by the County. Submerged pipes must comply with the following:
 - a. Pre-treatment required for any inlet connected to a submerged pipe system. The BMP owner will be responsible for cleaning and maintaining any insert devices.
 - b. Ponds must have permanent forebays at all pipe ends.
 - c. Catch basins must have a 1' sump in the bottom.
 - d. Details and a narrative shall be included in the SWPPP explaining the pipe and pond pump down plan for pond and stormwater system maintenance.
 - e. A third-party inspector is required to document installation of all submerged runs with pictures/videos/reports. A report of the installation shall be submitted and certified by the engineer of record prior to county acceptance of infrastructure.
 - f. Pipes are to be inspected before installation and all defective pipes removed from site – provide in report
 - g. Pipes must be gasketed and joints wrapped a minimum of 18" in either direction
 - h. A third-part geotechnical professional must confirm compaction around the pipe in 6" lifts at 95% modified proctor
 - i. Georgetown County Stormwater shall be provided 48 hours' notice and given the opportunity to view installation of all submerged runs.
- H. Manholes shall be located at pipe junctions; changes in alignment, size, and slope; and ends of curved sections. Manholes shall be placed at intervals not to exceed 100 feet.
- I. Pipe alignments shall be straight when feasible. Long radius curves may be allowed to conform to street alignments; short radius curved may be used on larger pipes to reduce head losses at junctions. These curves may be produced by angling the joints (keep this at a minimum to maintain a tight joint) or by fabricating beveled heads. Pipe deflection shall not exceed the manufacturer's recommendations, unless precast or cast-in-place bends are specifically designed for deflection. All curved alignments must be approved by the County Stormwater Engineer prior to design commencement.
- J. Stormwater pipe flow should be calculated using the Manning's equation, either directly or through use of a model that implements the Manning's equation. The County will accept commonly used computers models or methodologies capability of analyzing the hydraulic capacity of proposed storm drain pipelines and systems.

- K. All pipes must have a slope at or greater than 0.25%, or the minimum mean flow velocity in a stormwater pipe flowing full shall be 2.0 feet per second. Flow velocities must be sufficient to prevent excess deposition of solid material that could result in clogging. Table 2 shows the grades required to produce a velocity of 2.0 feet per second. Any variances must be approved by the County Stormwater Engineer prior to design commencement.
- L. Maximum velocities are important to prevent excessive erosions on the stormwater inverts and outlets. Table 3 lists the maximum velocities allowed for each type of pipe. Energy dissipaters are required at outfalls where the stormwater pipe flow exceeds the maximum permissible velocity.

Table 3: Maximum Velocity in Stormwater Pipes

Description	Maximum Permissible Velocity
Culverts (all types)	15 ft/s
Collector Pipes	15 ft/s
Main Pipes	12 ft/s

- M. It is important to consider the energy gradient and profile of storm sewers to prevent operating the pipes under pressure when possible. If (1) the slope and pipe sizes are chosen such that the pipe slope is equal to or greater than the friction slope, (2) the inside top surfaces of successive pipes are lined up at size changes, and (3) the water surface at the outlet will not rise above the top of the outlet, then the pipes should not be operating under pressure. The slope of the water surface at capacity will be approximately equal to the slope of the pipes. If these conditions are not met, hydraulic and energy grade lines shall be computed.

5.4.2 Open Channels

Open channels are frequently an integral component of urban drainage system design. Open channels may be natural channels, constructed channels, ditches, or swales.

- Freeboard:** Open channels shall be designed to convey the 10-year storm event below its freeboard elevation and the 25-year storm event below its bankfull elevation.
 - Channels three feet or less in depth, the **freeboard** shall be one half of foot;
 - Channels deeper than three feet and up to five feet deep, one foot of freeboard is required; and
 - Channels deeper than five feet, freeboard shall be at least 20 percent of the total channel depth.
- It should be confirmed that the 100-year storm event can be conveyed without impacting the finished floor elevations of structures. Additional design information can be found in the HEC-22, Urban Drainage Design Manual.
- The channel **geometry** may vary based on the site conditions and conveyance needs. Channel side slopes shall be stable, with a slope no more steep than 2:1 (H:V). For channels with bottom width greater than ten (10) feet, the bottom cross-slope shall be no less than 12:1 (H:V).

4. **Channel linings** may be natural materials, imported materials, vegetated, or manufactured. The cost, site requirements, design criteria (peak flow, maximum velocity, and shear stress), and existing conditions may dictate the channel lining type. Channel linings shall emulate natural conditions whenever possible.
5. Channel **velocity** shall be maintained as non-erosive during the design storm event for the channel material type. Peak flows expected during the design storm event shall be permissible for the channel lining type. For channels with manufactured channel linings, the velocity limits shall be established by the manufacturer.
6. If the channel is to be maintained by the County, the corridor must be within a dedicated easement sized according to Section 4.8. If the channel is not to be maintained by the County, the maintenance of the channel shall be included in the BMP Maintenance Agreement (Appendix H).

5.4.3 Outlet Protection

1. The purpose of outlet protection is to dissipate the energy of concentration stormwater flow through conveyance systems thereby reducing erosion and scouring at the outlets and lowering the potential for downstream erosion. Outlet protection can be turf reinforcement mats, stone or riprap, concrete aprons, paved sections, or other structural measures. This applies to the immediate outlet area or reach below the outlet and does not apply to continuous lining of channels or streams. Outlet protection should be placed at all stormwater conveyance systems outlets.
2. Appropriate velocity dissipation devices and/or erosion prevention BMPs must be placed at culvert discharge locations and along the length of any outfall channel to provide non-erosive flow from the culvert to a surface water so that the natural physical and biological characteristics and functions are maintained and protected. The protection shall have no slope along its length and shall have a straight alignment.
3. Provide calculations or procedures utilized to select the proper outlet protection and protection dimensions. Outlet protection design criteria can be found in the SCDHEC Stormwater Management BMP Handbook. For additional design information or for areas with excessive flow, use the design criteria in HEC-14, Hydraulic Design of Energy Dissipaters for Culverts and Channels (Federal Highway Administration (FHWA), 2006).

5.5 Culverts And Bridges

1. Culverts and bridges must be designed to safely pass the peak flow under roadways, railroads, or other features that cross open channel conveyance systems. It is important that culverts and bridges do not cause excessive backwater or velocities. These features have larger design storm requirements than the stormwater conveyance system:
 - A. Residential and collector roadways cross-drain culverts: must convey the 25-year storm event.
 - B. Arterial road culverts: must convey the 50-year storm event.

- C. All culverts and bridges must pass the 100-year storm event without damage to physical facilities (i.e. finished floor elevations of buildings, roadway embankments and subgrades).
2. Inlet and outlet Discharge velocities shall not impact channel stabilities. A scour analyses shall be performed for critical culvert and bridge structures if requested by the County Stormwater Engineer, municipality, state, or federal jurisdictions. At a minimum, all inlet and outlet locations impacted by flow velocities near structures shall include channel protection where erosive flow velocities occur. The mean minimum velocity through a culvert flowing full shall be 2.0 feet per second, the lower limit of scouring velocity, to prevent the settling of materials.
 3. Allowable culvert material shall be according to Section 5.4.1 of this Manual.
 4. Culvert **length** shall be adequate to accommodate required headwalls, sloping of embankments, end wall treatments, and any other applicable inlet/outlet protections. The **slope** of the culvert shall conform to the existing naturalized channel slope and shall not impede flows along the bottom of the open channel. For culverts the minimum **geometry** for circular culverts is 15 inches in diameter. Bridges shall be designed to not impact channel flow characteristics.
 5. **Headwalls** shall be used for any inlets at pipes larger than 24 inches diameter. These inlets shall not impact embankment stability or erosion. Wingwalls, inlet aprons, and other structural means may be used to provide additional inlet protection.
 6. If the exit velocity is high and/or the receiving channel conditions are prone to erosion and destabilization of the channel, **outfall energy dissipaters** for culverts or channel armor shall be required. Materials may include properly sized stone riprap, stilling basins, hardened control devices, or natural structures, designed in accordance with FHWA HEC-14, Hydraulic Design of Energy Dissipaters for Culverts and Channels, 1983.
 7. The culvert or bridge must be in compliance with the **National Flood Insurance Program**. It is necessary to consider the 100-year storm event at the local identified special flood hazard areas.
 8. The County Stormwater Manager may require the use of a computer model to accurately evaluate the complex hydraulic conditions of culverts and bridges to ensure compliance with this manual.

SECTION 6 INSPECTIONS

6.1 Permittee/Owner Construction Inspections

Inspections performed by the Permittee/Owner shall be conducted by qualified personnel. “Qualified personnel” means a person knowledgeable in the principles and practice of erosion and sediment control who possesses the skills to assess conditions at the construction site that could impact storm water quality and to assess the effectiveness of any sediment and erosion control measures selected to control the quality of storm water discharges from the construction activity. This person must be either the preparer of the C-SWPPP or an individual who is under the direct supervision of the preparer of the approved C-SWPPP and who meets the requirements in this paragraph or an individual who has been certified through the Certified Erosion Prevention and Sediment Control Inspector (CEPSCI) program that has been approved by SCDHEC. Inspections may also be conducted by a person with a registration equivalent to the registration of the preparer of the C-SWPPP and who meets the qualifications of this paragraph or an individual who is under the direct supervision of the person with an equivalent registration and who meets the requirements in this paragraph.

After construction begins, inspections shall be conducted at least once every calendar week and within 24-hours after each rainfall event that produces one (1) inch or more of rainfall. Inspection frequencies for portions of the construction site that have reached temporary or final stabilization may be reduced to at least once every month, as long as the stabilization is maintained and there is no additional disturbance in these areas. Once a definable area has reached final stabilization, mark on the OS-SWPPP and no further inspection requirements apply to that portion of the Site. Inspection of common BMPs, such as sediment basins and sediment traps, may be required to resume if areas that drain to them become disturbed during future construction. The County, on a case-by-case basis, may require any Permittee to conduct inspections on a more frequent basis than prescribed. Examples include, but are not limited to, Permittees who have compliance problems and Permittees with stormwater discharges to environmentally sensitive waters. The County may require on a case-by-case basis that the Permittee submit a monthly report summarizing the inspections at the site and any associated maintenance activity.

Inspections shall include all areas of the site disturbed by construction activity and areas used for storage of materials that are exposed to precipitation. Inspectors shall look for evidence of, or the potential for, pollutants entering the storm water conveyance system. Sedimentation and erosion control measures identified in the C-SWPPP shall be observed to ensure proper operation. Discharge locations shall be inspected to ascertain whether erosion control measures are effective in preventing violations to SC’s Water Quality Standards, where accessible. Where discharge locations are inaccessible, nearby downstream locations shall be inspected to the extent that such inspections are practicable. Locations where vehicles enter or exit the site shall be inspected for evidence of off-site sediment tracking.

Utility line installation, pipeline construction, and other examples of long, narrow, linear construction activities may limit the access of inspection personnel to the areas described above. Inspection of these areas could require that vehicles compromise temporarily or even permanently stabilized areas, cause additional disturbance of soils, and increase the potential for erosion. In these circumstances, controls shall be inspected on the same frequencies as other construction projects,

but representative inspections may be performed. For representative inspections, personnel shall inspect controls along the construction site for 0.25 mile above and below each access point where a roadway, undisturbed right-of-way, or other similar feature intersects the construction site and allows access to the areas described above. The conditions of the controls along each inspected 0.25 mile segment may be considered as representative of the condition of controls along that reach extending from the end of the 0.25 mile segment to either the end of the next 0.25 mile inspected segment, or to the end of the project, whichever occurs first. Representative inspections shall include any areas where stormwater discharges to environmentally sensitive waters.

Permittees shall either maintain an on-site rain gauge or use data from a certified weather record (such as a personal weather station or an airport) located within a reasonable proximity of the construction site to record rainfall records from any significant rainfall event, 0.5 inches or greater. These recorded rainfall amounts shall be maintained in a Rain Log located in the OS-SWPPP. Rainfall records for the day of an inspection and any rainfall since the last inspection shall be reported on each weekly inspection report.

For each inspection required above, an inspection report (SCDHEC Form D-0496) shall be completed. At a minimum, the inspection report shall include:

1. The inspection date and duration of inspection (arrival and departure times).
2. Names, titles, and, if not previously given in an inspection report, the qualifications of personnel making the inspection, unless those qualifications change.
3. Weather information for the period since the last inspection (or since commencement of construction activity if the first inspection) including a best estimate of the beginning of each storm event, duration of each storm event, approximate amount of rainfall for each storm event (in inches), and whether any known discharges have occurred.
4. Weather information and a description of any discharges occurring at the time of the inspection.
5. Location(s) of discharges of sediment or other pollutants from the site.
6. Location(s) of BMPs that need maintenance.
7. Location(s) of BMPs that failed to operate as designed or proved inadequate for a particular location.
8. Location(s) where additional BMPs are needed that did not exist at the time of inspection.
9. Corrective action required including any changes to the OS-SWPPP necessary and implementation dates.
10. Site name, operator name and permit number.
11. Verification that all BMPs and stormwater controls identified in the OS-SWPPP have been installed and are operating as designed.

A record of each inspection and of any actions taken in accordance with this section shall be retained as part of the C-SWPPP for at least three years from the date that permit coverage expires or is terminated. The report shall be signed in accordance with §122.22 of SC Regulation 61-9.

Inspectors employed by the Primary Permittee retain the authority to inspect, report, and document areas of the construction site that are under direct control of the Secondary Permittee, but only when a lack of compliance by the Secondary Permittee inhibits the Primary Permittee's ability to maintain compliance with the overall OS-SWPPP.

Third party inspections, by a qualified individual who is independent of the owner, may be required at the discretion of the County Engineer at sites that have compliance problems and at sites where stormwater discharges to environmental sensitive waters (such as waters classified as Outstanding Resource Waters, Shellfish Harvesting Waters, etc.). Inspections must be done by qualified professionals as outlined in the SCDHEC's Construction General Permit (SCR-100000). Inspection reports shall be submitted to the County every two weeks or 30 days if the site has been temporarily stabilized and approved by the County showing results of inspections, weather conditions, corrective actions and other information as may be required by the County Engineer.

6.2 Construction Maintenance

Proper operation and maintenance of BMPs is critical to ensure that the effectiveness and integrity of the BMPs as water quality controls is maximized. This insurance is critical in a performance-based program of stormwater runoff controls. BMP maintenance is the responsibility of the facility owner.

All BMPs and other protective measures identified in the OS-SWPPP shall be maintained in effective operating condition. If construction site inspections identify BMPs that are not operating effectively, maintenance shall be performed within seven (7) calendar days, before the next inspection, or as soon as reasonably possible, and before the next storm event whenever practicable to maintain the continued effectiveness of the BMPs.

If periodic inspection or other information indicates that a BMP has been used inappropriately, or incorrectly, the Permittee shall address the necessary replacement or modification required to correct the BMP within a time frame of forty-eight (48) hours of identification. If existing BMPs need to be modified or if additional BMPs are necessary, implementation shall be completed before the next storm event whenever practicable. If implementation before the next storm event is impracticable, the situation shall be documented in the OS-SWPPP and alternative BMPs shall be implemented as soon as reasonably possible.

Remove deposited sediment from sediment traps or sedimentation basins when the design capacity has been reduced by fifty (50) percent or the sediment has reached the clean out point on the cleanout stake (whichever occurs first).

Remove deposited sediment collected by sediment control measure (silt fence, check dams, sediment tubes, etc.) when the deposited sediment reaches one-third (1/3) the height of the above-ground portion of these BMPs, or before it reaches a lower height based on the manufacturer's specifications.

6.3 County Inspection

All elements of the storm drainage system must be inspected by the County during construction as a prerequisite for acceptance by the County. It is the contractor's responsibility to ensure that the County is notified and has the opportunity to make those inspections before the system is backfilled or covered.

The inspections conducted by the County are for the protection of the County only. They are not intended to certify the contractor's satisfactory discharge of his contractual obligation to the owner, nor do they relieve the engineer-of-record from any of his responsibilities concerning certification of the project.

County Inspectors are authorized by the County to inspect and enforce the requirements of this Manual and the approved C-SWPPP. The inspectors shall be:

1. Authorized to conduct inspections on behalf of the County and file reports for periodic inspections as necessary during construction of stormwater systems to assure compliance with the approved SWPPP.
2. Authorized to furnish the permittee or agent the results of inspection in a timely manner after the completion of each required inspection.
3. Authorized to issue a Correction Notice to the permittee or agent when any portion of the work does not comply with the approved plans.
4. Authorized to issue a Notice of Violation (NOV) to the permittee or agent when any portion of the work does not comply with the approved plans.
5. Authorized to Issue a Stop Work Order as the result of unsafe conditions, working without a permit, unsatisfactory work, progress, or other non-compliance.
6. Authorized to perform a final inspection upon the completion of the storm water system to determine if the completed work is constructed in accordance with the approved storm water design plan, approved "As-built" plan, in accordance with the County's As-Built Survey Requirements (Appendix E), certified by the permittee's registered professional engineer.

Any enforcement actions or corrective actions will be issued to the permittee as listed on the approved NOI and County Land Disturbance Application. If the site has an Individual NOI, the owner listed on the Individual NOI shall be the responsible party.

SECTION 7 PERMANENT BMP MAINTENANCE

The land owner or person in possession or control of the land shall maintain all stormwater BMPs and devices and all open space areas required by the approved SWPPP unless those measures, devices, and open space areas are accepted for maintenance by another agency.

For all stormwater BMPs, a signed Maintenance Agreement and approved attached Maintenance Plan is required.

A clear statement of defined maintenance responsibility shall be established during the plan review and approval process. This statement ensures that structural BMPs will be maintained post-construction. If they are not being properly maintained, the County has the authority to require maintenance to be done at the expense of the person responsible for maintenance as listed on the Maintenance Agreement.

The maintenance agreement shall be recorded with the County Register of Deeds prior to the recording of any new lot served by the stormwater BMP or prior to the issuance of any development permit for any existing lot except for improvements. The maintenance covenant shall be binding on all subsequent owners of land served by the stormwater BMP. A recorded copy of the maintenance covenant shall be provided to the County prior to the issuance of a County Land Disturbance Permit.

Where a pipe or other man-made conveyance is used to transport runoff to an off-site facility and that conveyance passes through a public street ROW or other publicly owned property, an encroachment and maintenance agreement shall be approved by the County prior to the issuance of permits.

7.1 County Permanent Structure Maintenance Inspections

The purpose of County maintenance inspections is to ensure that permanent stormwater management BMP structures are working properly and remain functional.

No later than 30 days after completion of construction of any project that utilizes BMPs to meet the site performance standards, the County will conduct a post-construction inspection to verify that the BMP has been installed per approved plans.

The operators/owners must notify the County of their completion of active construction so the post-construction inspection may be conducted by the County.

The County has the authority to inspect any BMP at least once a year as needed.

1. The County will attempt to contact the owner before a maintenance inspection and will notify the owner after an inspection. The County shall conduct maintenance inspections at reasonable times.
2. If the owner cannot be contacted, the inspection shall be performed and a report shall be sent to the owner.

3. 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 areas where no objection is raised. The inspector shall immediately report the refusal and grounds to the County. The County shall promptly seek the appropriate compulsory process.
4. In the event where it is believed that discharges from the property may cause imminent and substantial threat to human health or the environment, the inspection may take place at any time without notice.
5. Inspection Reports shall be maintained in a permanent file located in the Stormwater office.
6. A Correction Order and/or Notice of Violation shall be issued for any required maintenance needed.
7. After a notice to comply is given in writing, a specified period of time shall be allocated for the owner/permittee to begin the required maintenance activities.

If an imminent hazard exists and the owner fails to comply with the required maintenance activities, the County shall employ the necessary labor and materials to perform the required work as expeditiously as possible. The owner shall be assessed the costs of the maintenance labor and materials. The costs shall become a lien on the property and shall be collected in the same manner as County taxes.

7.2 Owner Maintenance Inspections

Inspections of permanent BMPs and other stormwater controls are to be conducted by the Owner or person in possession or control of the land in accordance with the maintenance schedule and plan depending on the specific BMP. This will be done to ensure that routine and remedial maintenance is being performed and that the BMPs are operating properly. The inspection includes a certification by a South Carolina registered professional engineer, registered landscape architect, or registered land surveyor, or other qualified individual that appropriate maintenance is being performed. The following certification is to be made with accompanying stamp or seal, signature and date.

"I certify that the BMPs, stormwater management facilities, and open space areas referenced in this document have been maintained in conformance with the approved stormwater management plan and maintenance manual. This certification is made based on personal observation or on the observation by someone under my direct supervision of the site and review of maintenance records."

These inspections should be provided to the County at their request to show compliance with the approved BMP Maintenance Agreement and Maintenance Plan.