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## Chapter 3. PLAN SUBMITTAL

### 3.1 Stormwater Management Planning

#### 3.1.1 Purpose

The purpose of Stormwater Management Planning is to ensure that stormwater management is considered and fully integrated at the early planning stages of the site-development process. This involves a more comprehensive approach to site planning and a thorough understanding of the physical characteristics and resources associated with the project site. Site designers are encouraged to develop comprehensive Stormwater Management Plans for proposed development. This planning includes addressing each of the following categories separately:

-  Stormwater quantity controls;
-  Erosion and sediment control;
-  Stormwater quality controls;
-  Stormwater conveyance controls; and,
-  Pollution abatement controls.

The result of this planning is a comprehensive report that contains technical information and analysis to submit to the Greenville County Land Development Division to determine if the proposed development meets the Greenville County stormwater regulations and the standards contained in this Design Manual.

#### 3.1.2 Preferred Stormwater Management Facilities

Stormwater management facilities may include structural and non- structural practices. Natural swales and other natural runoff conduits shall be retained where practicable.

Where additional stormwater management facilities are required to satisfy the minimum control requirements, the following measures are examples of what may be used in their order of preference:

1. Low impact development (LID) practices, such as minimizing the area of streets, parking lots and rooftops; bio-retention swales and basins; porous pavement; or other innovative measures to reduce runoff volume and protect water quality.
2. Facilities designed to encourage overland flow, slow velocities of flow, and flow through buffer zones;
3. Regional stormwater detention structures (dry basins);
4. Regional stormwater retention structures (wet basins);
5. On-site stormwater detention structures (dry basins);
6. On-site stormwater retention structures (wet basins); and
7. Infiltration practices, where permeable soils are present.

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## **3.1.3 Fee-in-Lieu of Stormwater Management Facilities**

### **3.1.3.1 Introduction**

Greenville County's Stormwater Ordinance provides a mechanism to allow for the payment of a fee-in-lieu of providing stormwater detention on a development site. This fee may be allowed in certain areas of the county or for certain sites in lieu of a detention structure. This fee is also set to encourage the use of low impact development (LID) practices to reduce runoff and improve water quality.

### **3.1.3.2 Application**

If the impervious area of a proposed development site is one acre or less it may qualify for a detention waiver and acceptance based on a fee-in-lieu of stormwater detention requirements and fee schedule. Development sites with impervious areas greater than one acre may be eligible for a waiver from site specific stormwater detention requirements based on contributing a fee-in-lieu of stormwater detention requirements and a fee based on the cost to design, build, maintain, landscape, etc., where the land cost is not part of the fee equation.

Greenville County has specified watersheds where a fee-in-lieu of stormwater detention requirements is preferred. On sites with impervious areas of one acre and less, this is the preferred method. To encourage this application, developers are subject to a fee waiver if appropriate LID practices are used to reduce runoff volumes and control peaks. Certain practices are required such as enhanced infiltration with use of permeable pavements, bio-swales and bio-retention cells, rain gardens, stormwater harvesting and reuse, green roofs, etc. to most likely meet the criteria.

Sites with larger impervious areas must be able to prove no downstream impact and be in a location where the county intends to construct stormwater conveyance upgrades or regional controls.

### **3.1.3.3 Criteria**







The following criteria must be considered and determined to be favorable for applying the fee-in-lieu of stormwater detention:

1. Modeling shows that the installation of site specific detention controls results in unfavorable increases in downstream peak discharges, flooding depths, erosion (channel degradation), and water quality impacts;
2. Runoff from the area is controlled via a regional, county maintained system of conveyance, storage and water quality enhancements;
3. Development of a site with one acre or less impervious area, or with a flow increase more than 1 cfs for the critical storm (The fee-in-lieu of detention is determined by a cost of \$1.00 per square foot per impervious area up to 43,560 square feet. This fee can be waived with the use of LID practices that reduce runoff rates and volumes. The fee-in-lieu for sites with developed impervious areas of 43,561 square feet and greater is based on the construction, design, and maintenance of the structure that would otherwise be required for the site. The fee-in-lieu does not include the cost of the land.).

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4. The MS4 conveyance system and the natural system provides adequate capacity such that in full build out conditions in the watershed it can be demonstrated that there are no adverse effects due to flooding or water quality or other detrimental effect to all upstream, adjacent and downstream properties.
  5. The development adds a minimum of 5,000 square feet of impervious area. This does not apply to individual residential home construction that is separately built. It may apply to a residential subdivision that is part of a larger common plan of development. In the case of a subdivision the impervious area includes the roads, sidewalks, and individual homes.
  6. The proposed development is located in a watershed where a model and master plan exists to evaluate the impact of fee in lieu of stormwater detention and water quality impacts. Currently these areas are Horsepen creek (i.e., Gilder), Brushy Creek, Rocky Creek, and Reedy River watersheds. Others will be included as plans are completed.

### 3.1.4 Steps for Successful Stormwater Management Plans

The design of successful stormwater management plans involves adhering to the following requirements where applicable:

-  Pre-design meeting.
-  Review of site development requirements.
-  Detailed site analysis.
-  Creation of a Stormwater Concept Plan (for innovative techniques).
-  Creation of a Preliminary Site Development Plan.
-  Completion of Final Site Development Plan.



#### Pre-Design Meeting

One of the most important actions that happens at the beginning of the land-development process is a pre-design meeting between the Greenville County Land Development Division, developer/owner and design professional. This meeting allows all the entities involved in the land development process to understand the stormwater management requirements and identify the areas on the site that will require the most attention to meet the requirements of the regulations. Major incentives for the pre-submittal site meeting are establishing a partnership between all the entities involved through the entire development process, and increasing the chances of faster Greenville County Stormwater Management Permit approval through an early understanding of the permitting and plan requirements. It shall be left to the discretion of the Greenville County Land Development Division and the Director if this meeting shall or shall not be required for a specific project.

#### Review of Site Development Requirements

The Stormwater Management Plan design professional should be familiar with the Greenville County Stormwater Management Permit requirements that are given in this Design Manual. Most of this guidance can be obtained at the pre-design meeting.

The plan design professional must also be familiar with other local requirements and ordinances such as, but not limited to the following:

-  Zoning ordinances.
-  Subdivision regulations.

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- Road, SCDOT and utility requirements.
  - Land development regulations.
  - Floodplain management ordinances.
  - Other Local, State, and Federal regulatory requirements and ordinances.

### **Detailed Site Analysis**

To better understand the existing topography, hydrology and hydraulics of the proposed development, the design professional should personally make a field site visit. During this visit, the design professional should collect as much information as necessary to create an accurate existing condition map of the proposed site. If the design professional has a good understanding of the existing site conditions, it should be easier to implement a stormwater management plan that will effectively protect downstream water quantity and quality impacts. An actual site visit also gives the design professional an initial vision of how the potential stormwater management system can fit with the natural surroundings.

Items to be recorded during the site visit shall include, but are not to be limited to the following:

- Topography of the site especially very steep sloped areas.
- Natural drainage patterns, swales, and detention areas.
- Natural perennial flowing streams and intermittent streams.
- Existing floodplain locations and elevations.
- Soil types and evidence of eroded and/or non-eroded soils.
- Existing vegetation including the corresponding density of each type of vegetation:
  - ◆ Trees
  - ◆ Grasslands
  - ◆ Various ground covers
  
- Existing development including roads, buildings, utility easements, parking areas, and ponds.
- Existing stormwater facilities including ditches, storm sewer systems, and detention ponds.
- Adjacent property characteristics and stormwater outfall points.
- Wetlands.
- Critical habitat areas.
- Boundaries of existing wooded areas.
- Existing buffer areas along natural drainage ways and channels.

### **Creation of a Stormwater Concept Plan for Innovative Practices**

The Stormwater Concept Plan involves the overall layout of the site including the stormwater management system layout. This Concept Plan is an optional step which gives the design professional the opportunity to propose several potential site layout possibilities to the developer/owner and the Greenville County Land Development Division. A concept plan may be needed if the design professional is proposing innovative design approaches not currently outlined in the design manual or if deviations from the design manual are proposed. Deviations will require a written request for exemptions or waivers. Innovative methods and technologies are encouraged and shall be accepted providing there is sufficient documentation to prove the effectiveness and reliability of the proposed approach.

This step is not required as part of the ordinance. However, it is encouraged for designs that are innovative and require some discussion and thought and may propose different challenges from a permitting perspective. This concept plan should focus on the proposed layout and BMPs for during and post construction applications that are unique and require a nonstandard approach. When LDD has

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agreed to the concept presented then the applicant can proceed to develop a preliminary set of plans that incorporates the concepts agreed upon.

Upon concurrence of the Concept Plan, the applicant shall create and submit a Final Site Development Plan. However, concurrence in the concept stage will not prevent the Director from rejecting the Site Development Plan during the formal review process if it is determined that the plan does not comply with federal, state, or local laws and regulations including Greenville County ordinances. A Concept Plan may be submitted for review after the pre-design meeting if all the documentation required on the concept plan check list is included in the submittal.

The following steps should be followed when developing the Stormwater Concept Plan:

- Based on the review of the existing site conditions, utilize the appropriate best site design approaches. This will minimize the size and number of water quantity and water quality controls needed to comply with the Greenville County Stormwater Management Permit requirements.
- Perform preliminary selections and potential locations of all water quantity and water quality controls including stormwater conveyance systems and erosion and sediment control structures. Suggested uses for temporary EPSC BMPs are summarized in Appendix D and permanent stormwater quality BMPs are summarized in Appendix F.

It is very important that a Stormwater Concept Plan is integrated into the overall site design process and not procrastinated to be the last topic covered before submittal of the permit package. The application of a Concept Plan should expedite the final design process and review process to obtain a Greenville County Stormwater Management Permit.

To achieve maximum benefits, the Stormwater Concept Plan should include at a minimum the following elements when applicable:

- Site address and description of the site (owner and tax map number).
- Vicinity map of the project location.
- Existing conditions and proposed development plan having at least the following items:
  - ◆ Existing and proposed contours.
  - ◆ Perennial and intermittent streams.
  - ◆ Watershed delineation maps.
  - ◆ Existing vegetation boundaries and proposed clearing limits.
  - ◆ Location of all existing natural features such as wetlands, ponds, lakes, floodplains, and stream buffers. If wetlands are delineated, they must be delineated by a qualified professional.
  - ◆ Location of existing and proposed roads, buildings, parking areas and other impervious surfaces.
  - ◆ Existing and proposed utility easements.
  - ◆ Preliminary selection and location of all stormwater management control facilities including erosion and sediment control structures.
  - ◆ Location of existing and proposed conveyance systems such as grass channels, swales, and storm sewer systems.
  - ◆ Preliminary location and dimensions of all culvert and bridge crossings.

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## Preliminary Site Development Plan

The Preliminary Site Development Plan shall consist of maps, narratives, and supporting design calculations for the proposed stormwater system and should include the following sections when applicable:

- Pre-development hydrologic analysis and calculations that determines the existing stormwater runoff volumes, peak flow rates and flow velocities.
- Post-development hydrologic analysis and calculations that determines the stormwater runoff volumes, peak flow rates and flow velocities.
- A 360-degree map showing:
  - ◆ Data to support the hydrology model
  - ◆ Drainage areas delineated, curve numbers (CNs), slopes, contours, flow path segments (this includes individual lots)
  - ◆ Photography
  - ◆ Network diagram for the hydrology model
- Stormwater management control facility design:
  - ◆ Narrative describing the stormwater management control facilities selected.
  - ◆ Location of all stormwater management control facilities.
  - ◆ Supporting calculations that justify that the facilities meets the Greenville County Stormwater Management Permit requirements. Includes hydrographs, stage storage volumes, and stage discharge values for water quantity and water quality control facilities and design calculations and elevations for all stormwater conveyance systems.
  - ◆ A permanent maintenance plan for each permanent stormwater management facility.
- Erosion and sediment control plan:
  - ◆ Narrative describing the erosion and sediment control facilities selected.
  - ◆ Location of all erosion and sediment control facilities.
  - ◆ Resulting design calculations and trapping efficiencies for all sediment control facilities.
- Downstream analysis calculations showing the effect of post-development design flows on downstream stormwater conveyance systems and channels.

### Minimum Preliminary Site Development Plan Requirements

All Preliminary Site Development Plans shall include as a minimum the following:

- A vicinity map indicating a north arrow, scale, boundary lines of the site and other information necessary to locate the development site.
- The existing and proposed topography of the development site.
- Physical improvements on the site, including present development and proposed development.

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- Location, dimensions, elevations, and characteristics of all stormwater management facilities. As a minimum, easements shall have the following characteristics.
    - ◆ Provide adequate access to all portions of the drainage system and structures.
    - ◆ Provide sufficient land area for maintenance equipment and personnel to adequately and efficiently maintain the drainage system and all stormwater facilities.
    - ◆ Restriction on easements shall include prohibiting all fences and structures which would interfere with access to the easement areas and/or the maintenance function of the drainage system.
  - All areas within the site which will be included in the land disturbing activities shall be identified and the total disturbed area calculated.
  - The location of temporary and permanent vegetative and structural storm- water management control measures.
  - An anticipated starting and completion date of the various stages of land disturbing activities and the expected date the final stabilization will be completed.
  - A determination that the development is in compliance with the County Flood Control Ordinance.
  - At the discretion of the Director, for all portions of the drainage system which are expected to carry over 50 cubic feet per second (cfs) for the 100-year storm, the 100-year plus one-foot flood elevation analysis shall be required if one of the following criteria apply:
    - ◆ The estimated runoff would create a hazard for adjacent property or residents
    - ◆ The flood limits would be of such magnitude that adjacent residents should be informed of these limits.
  - For all portions of the drainage system which are expected to carry 150 cfs or more for the 100-year storm, the 100-year plus one-foot flood elevation analysis shall be done and flood limits shall be shown on the drainage plans. Such data shall be submitted in digital form, as well as in print, in a format specified by the Director.
  - Plans must meet all other applicable plan requirements in effect at the time of submittal.
  - A Tree saving and planting plan consistent with the requirements in the Greenville County Tree Ordinance and the Landscape Plan requirements of this Design Manual.
  - To prevent water quality degradation and to improve the water quality aspects of the drainage system, the plan shall include best management practices to control the water quality of the runoff during the land disturbing activities and during the life of the development. The plan shall include all engineering calculations needed to design the system and associated structures including pre- and post-development velocities, peak rates of discharge, inflow and outflow hydrographs of stormwater runoff at all existing and proposed points of discharge from the site.
  - Description of site conditions around points of all surface water discharge including vegetation and method of flow conveyance from the land disturbing activity.
  - Construction and design details for structural controls.

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- The expected timing of flood peaks through the downstream drainage system shall be assessed when planning the use of detention facilities.
  - All stormwater management facilities and all major portions of the conveyance system through the proposed development (i.e., channels, culverts) shall be analyzed, using the 100-year design storm, for design conditions and operating conditions which can reasonably be expected during the life of the facility. The results of the analysis shall be included in the hydrologic-hydraulic study.
  - If the site development plan and/or design report indicates that there may be a drainage or flooding problem at the exit to the proposed development or at any point downstream as determined by the Director, the Director may require:
    - ◆ water surface profiles plotted for the conditions of pre- and post- development for the 2-year through 100-year design storm;
    - ◆ water surface profiles plotted for the conditions of pre- and post- development for the 100-year design storm;
    - ◆ elevations of all structures potentially damaged by the 2-year through 100-year flows.
  - All plans submitted for approval shall comply with the applicable requirements in Divisions 3, 5, 6, and 7 of the Greenville County Stormwater Management Ordinance.
  - All plans submitted for approval shall contain certification by the person responsible for the land disturbing activity that the land disturbing activity will be accomplished pursuant to the approved plan and that responsible personnel will be assigned to the project.
  - The site development plan shall contain certification by the applicant that all land clearing, construction, development and drainage will be done according to the site development plan or previously approved revisions. Any and all site development permits may be revoked at any time if the construction of stormwater management facilities is not in strict accordance with approved plans.
  - All plans shall contain certification by the person responsible for the land disturbing activity of the right of the Director to conduct on-site inspections.
  - The plan shall not be considered approved without the inclusion of an approval stamp with a signature and date on the plans by the Land Development Division. The stamp of approval on the plans is solely an acknowledgement of satisfactory compliance with the requirements of these regulations. 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, or omission from the site development plan.

### **Completion of Final Site Development Plan**

The Final Site Development Plan shall include, and add further detail to the Preliminary Stormwater Management Plan if needed. This plan shall reflect any changes or modifications requested or required by the Land Development Division. The Final Site Development Plan shall include all the revised elements from the Preliminary Site Development Plan and shall contain all of the Technical Report Submission Requirements. The completed Final Site Development Plan shall be submitted to the Greenville County Land Development Division for final review and approval prior to initiating any construction activities on the proposed development site.



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## 3.2 Submittal Requirements for Sites with Less Than 10,000 Square Feet of Disturbed Area

The person or entity responsible for any land disturbing activity, including commercial and industrial sites, that disturbs more than 5,000 square feet but less than 10,000 square feet of land, and is not part of a larger common plan development, shall submit a Simplified Stormwater Management Control Plan. This plan does not require approval by the Public Works Department or the Land Development Division, and does not require preparation or certification by a professional designer.

For all land disturbing activities that will result in more than one cubic foot per second increase in peak runoff rate for the critical storm<sup>1</sup>, require a storm drain pipe conveyance system (one or more pipes) or alterations to existing storm drain systems, or cause downstream impact requiring preparation by an engineer or design professional, the requirements for sites with one or more acres of land disturbed (see Section 3.3) including all requirements of a Site Development Plan (see Section 3.1.4) shall apply.

### Simplified Stormwater Management Control Plan

The Simplified Stormwater Management Control Plan shall contain the following items:

1. Narrative description of the stormwater management facilities to be used.
2. General description of topographic and soil conditions at the development site.
3. General description of the adjacent property and description of existing structures, buildings, and other fixed improvements located on surrounding properties.
4. A sketch to accompany the narrative containing the following when applicable:
  - ◆ Site location drawing of the proposed project showing project location in relation to roadways, jurisdictional boundaries, streams, rivers and the boundary lines of the site to be developed.
  - ◆ All areas within the site that will be included in the land disturbing activities shall be identified and the total disturbed area shall be calculated.
  - ◆ Topographic map of the site.
  - ◆ Anticipated starting and completion dates of the various stages of the land disturbing activities and the expected date of final stabilization shall be noted.
  - ◆ Location of temporary and permanent vegetative and structural sediment control and stormwater management control measures.
5. Simplified Stormwater Management Control Plans shall contain certification by the persons responsible for the land disturbing activities that the activities will be accomplished pursuant to the plan.
6. Simplified Stormwater Management Control Plans shall contain certification by the person responsible for the land disturbing activities of the right of the Director to conduct on-site inspections.

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<sup>1</sup> The critical storm is defined in Section 2.2 of this Manual.

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## 3.3 Submittal Requirements for Sites with Greater Than 10,000 Square Feet Disturbed Area

The person or entity responsible for any land disturbing activity that disturbs 10,000 square feet or more or will result in more than one cubic foot per second increase in peak runoff rate for the critical storm, requires a storm drain pipe conveyance system (one or more pipes) or alterations to existing storm drain systems, or causes downstream impact requiring preparation by an engineer or design professional, will be subject to all of the requirements of a Site Development Plan (see Section 3.1.4). Professionally certified site development plans, erosion and sediment control plans, specifications, and supporting calculations and computations shall be submitted and stamped/sealed by professionally licensed engineers, landscape architects or Tier B land surveyors.

The Greenville County Stormwater Management Permit Application (Non-Simplified Stormwater Application) can be processed efficiently if all necessary information is included with the permit application. This section of the Design Manual explains the information required in order to obtain the desired permit. With proper planning and coordination, the permit processing time requirements can be kept to a minimum. The items discussed in this section of the Design Manual should be used as a checklist prior to the submittal of the permit application. The initial submittal package shall contain:

- A completed Greenville County Stormwater Management Permit Application (Non-Simplified Stormwater Application) Form,
- Completed first two pages of the SCDHEC NOI Application Form;
- One copy of the Final Site Development Plan including the Sediment Control Plan.
- One copy of the Technical Report and supporting calculations, and
- A completed checklist based on the Technical Report requirements.

### 3.3.1 Applications

All necessary application forms and checklists to use in the Non-Simplified Stormwater Application submittal package can be obtained from Greenville County. The Non-Simplified Stormwater Application must be completed accurately and submitted by the applicant to the Greenville County Land Development Division digitally.

The general submission requirements include the following:

- All required application forms completed neatly, legibly and accurately and signed by the owner or authorized agent.
- All required checklists completed neatly, legibly and accurately.
- The final Stormwater Management and Sediment Control Plans completed neatly, legibly and accurately.
- The Technical Report providing a summarization of existing and proposed site conditions and the supporting calculations for all stormwater management design procedures (See Section 3.3.8).

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### 3.3.2 Permits

Unless specifically exempted, a Stormwater Management Permit as required by this Design Manual, shall be obtained prior to the commencement of any development, redevelopment, building, excavating, grading, re-grading, paving, landfilling, berming or diking of any property located within Greenville County.

Other applicable permits such as Federal, State or other local agency may be required for specific project sites. It is the applicant's responsibility to recognize the need to obtain all necessary permits before submitting for a Stormwater Management Permit.

### 3.3.3 Stormwater Management Design Standards

It is an overall goal of this Design Manual to address stormwater management to provide effective water quantity and water quality solutions due to the impact of runoff from land development. The following set of criteria shall be followed in the absence of designated specific watershed master plan criteria.

#### Hydrologic Computations

All hydrologic computations shall be completed using acceptable volume based hydrograph methods. The design storm duration for these computations shall be the 24-hour storm event with an SCS Type II distribution or the appropriate new NRCS distribution (based on NOAA Atlas-14 data) with a 0.1-hour duration time increment. Typical hydrologic input includes but is not limited to the following:

- Storm frequency and duration
- Rainfall depth or intensity
- United States Geological Survey (USGS) soil classification and hydrologic soil group
- Land use
- Time of concentration
- Abstractions

#### Water Quantity Control

Water quantity control is an integral component of overall stormwater management. The following design criteria are established for water quantity control unless a waiver is granted on a case-by-case basis.

- May be controlled with above ground wet or dry detention basins, underground detention facilities, or infiltration facilities.
- Post-development peak discharge rates shall not exceed pre-development peak discharge rates for the 2-, 10-, and 25-year frequency 24-hour duration storm events, plus the critical storm for areas where the critical storm is not the 25-year frequency.
- Post-development discharge velocities for the critical storm shall be reduced to provide non-erosive flow velocities from structures, channels or other control measures, or be equal to the pre-development storm event flow velocities for the critical storm, whichever is greater.
- Emergency spillways shall be designed to safely pass the post-development 100-year 24-hour storm event without overtopping any dam structures.

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- Downstream analysis shall be required for the 2-, 10-, 25-, and 100-year frequency 24-hour duration storm events for all development sites unless a waiver or variance is granted from this analysis. When water quantity controls are implemented, an off-site analysis waiver may not be required, provided that all required design criteria of the Design Manual are met.
  - A downstream peak flow 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 and every point or area along the project site's boundaries at which runoff will exit the property. The analysis shall focus on the portion of the drainage channel or watercourse immediately downstream from the project. This area shall extend downstream from the project to a point in the drainage basin where the total area of the development comprises ten percent (10%) of the total basin area. In calculating runoff volumes and discharge rates, consideration may need to be given to any planned future upstream land use changes. The analysis shall be performed in accordance with the requirements of this Design Manual
  - Watersheds that have well documented water quantity problems may have more stringent or modified design criteria determined from master plan studies by Greenville County.
  - All stormwater systems shall be designed to have no increase in velocity, peak flow, water surface elevation in relationship to upstream, adjacent, and downstream property in the 100-year storm, unless an adequate permanent drainage easement is obtained.

### **Water Quality Control**

All development and redevelopment projects and portions of redevelopment projects disturbing 10,000 square feet or more or that will result in more than one cubic foot per second increase in peak runoff rate for the critical storm shall meet the requirements of this section even if there is not a change in land use.

Water quality control is an integral component of overall stormwater management. All stormwater runoff generated from a site shall be adequately treated before discharge. It will be presumed that a stormwater management system complies with this requirement if the following minimum design criteria are met unless a waiver is granted on a case-by-case basis:

1. The water quality requirement listed in Table 9-1 (and subsequent clarifications and additions) appropriate for the project size and location.
2. The Director has discretion to require more stringent controls for water quality where the Director determines the minimum standards of this section are not adequate. Areas where more stringent controls may apply include outstanding resource waters, trout waters, wetlands, steep slopes, TMDLs or other sensitive areas.
3. Appropriate structural stormwater controls or non-structural practices are selected, designed, constructed or preserved, and maintained according to the specific criteria in this Manual.

### **General Stormwater Management Permit Submittal Items**

The following items are required to be included in the submittal package for a Stormwater Management Permit.

- Watershed delineation maps.
- Location of all stormwater management structures.

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- Pre- and post-development peak flow volumes, peak flow rates, peak flow velocities and inflow and outflow hydrographs of stormwater runoff at all existing and proposed points of discharge from the site for the 2-, 10-, 25-, and 100-year 24-hour storm events (and/or other storm events as dictated for special locations or situations during the predesign meeting).
  - Site conditions around points of all surface discharge including vegetation and method of conveyance from the land disturbing activity.
  - Design details and computation for all stormwater management controls, including the following:
    - ◆ Drainage area calculations.
    - ◆ Weighted curve number or runoff coefficient calculations.
    - ◆ Time of concentration calculations.
    - ◆ Pipe size capacity and velocity calculations.
    - ◆ Open channel capacity and velocity calculations.

### 3.3.4 Erosion and Sediment Control Design Standards

It is an overall goal of this Design Manual to address erosion and sediment control to provide effective water quality solutions due to the impact of runoff from land development. The following set of criteria shall be followed in the design of erosion and sediment control solutions.

#### Design Removal Efficiency Goal

All sediment control structures shall be designed and installed to accommodate the anticipated sediment loading from all land disturbing activities and meet a minimum design removal efficiency of 80% total suspended solids (TSS) or 0.5 mg/L settleable solids effluent standard, whichever is less, for disturbed conditions for the 10-year, 24-hour storm event.

#### Design Requirements

A sediment detention basin is required when ten or more acres of disturbed land area drain to a single outlet point. Such basins shall be designed to have a minimum design removal efficiency of 80% TSS or 0.5 ml/L settleable solids effluent standard using a 10-year, 24-hour design storm, whichever is less, and control the 10-year, 24-hour storm event to pre-development conditions and successfully pass the 100-year 24-hour storm event. The person responsible for the activity shall submit a full Non-Simplified Stormwater Application which shall be prepared or certified by a registered engineer, landscape architect, or Tier B land surveyor.

Land disturbing activities that create between one and ten acres of land area that do not drain to a single outlet point may incorporate other practices other than a sediment basin to achieve the equivalent removal efficiency of 80 percent TSS or 0.5 ml/L settleable solids effluent standard, whichever is less, using a 10-year, 24-hour design storm.

Land disturbing activities that create less than one acre of disturbed area are **not** required to receive approval for a Stormwater Management Permit from the Land Development Division unless the project meets one of the additional criteria listed in Section 2.2.

Sediment storage volumes shall be calculated for all sediment controls to determine the required clean-out frequencies and maintenance schedules. The Universal Soil Loss Equation (USLE) or other

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acceptable methods that determine sediment yield may be used to predict the required sediment storage volumes for specific sediment control structures.

Additional design requirements for erosion and sediment control practices are as follows:

- Development shall be fitted to the topography and soils so as to create the least erosion potential;
- Natural vegetation shall be retained and protected wherever possible;
- Natural vegetation and non-structural methods shall be employed to the extent possible, for streambank stabilization and erosion control in place of structural methods wherever possible;
- Only the smallest practical area shall be exposed and then only for the shortest practical period of time;
- Erosion control practices such as interceptor ditches, berms, terraces, contour ripping, soil erosion checks, and sediment basins shall be installed to minimize soil and water losses;
- Temporary vegetation or mulching shall be used to protect areas exposed during the time of development;
- During and after development, stormwater management practices shall be utilized to effectively accommodate increased runoff caused by changes in soil and surface conditions, and to avoid siltation of receiving streams;
- Permanent vegetation and structures shall be installed in the development as soon as the weather permits;
- The design of outlet channels for the discharge of storm runoff shall be based on the runoff from predicted storm frequency and shall include the vegetative or structural measures required to protect the channel from scour and erosion;
- Waterway stabilization structures such as drop structures, grade stabilization structures, and channel liners shall be utilized to dissipate the energy of flowing water by holding the waterway slopes and velocities within non-erosive limits;
- Sediment basins and traps:
  - 1) Sediment shall be removed mechanically when the sediment basin behind the temporary barrier or the dam becomes filled, to an elevation shown on the plan or when the design capacity has been reduced by 50%. The structure may be removed once stability is reached in the development area;
  - 2) A sediment basin or sediment trap may be required to be enclosed, in the discretion of the Director, when necessary to ensure public safety;
- Cut and fill slopes and other exposed areas shall be planted or otherwise protected from erosion before the release of the permit obligations. The responsibility shall remain with the permittee or owner until the planting is well established;
- Fill may not be deposited beyond the mean high-water line unless the fill is used for marsh creation or shore restoration and does not extend beyond the mean low-water line or the fill is placed behind a structural shoreline erosion control device;

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- Calculations for design of all BMPs for sediment control must be included as part of the permit application. Locations and timing of installation of sediment control BMPs must be shown on the Sediment and Erosion Control Plan and included as part of the SWPPP;
  - Description of measures to prevent the discharge of solid materials, including building materials, to waters of the State and the United States, except as authorized by a permit issued under section 404 of the Clean Water Act;
  - Description of measures to minimize, to the extent practicable, off-site tracking of sediments onto paved surfaces and the generation of dust;
  - Description of construction and waste materials expected to be stored on-site, updated as appropriate, and controls, including storage practices, to minimize the exposure of the materials to stormwater;
  - Description of spill prevention and response practices;
  - All sediment laden diversion channels and ditches shall be designed such that applicable shear stress and velocities are non-erosive. The design storm event that should be used is the 10-year, 24-hour event; and,
  - The surface of stripped or disturbed areas shall be permanently or temporarily stabilized within 14 days after final grade is reached or when left idle for more than 14 days. Temporary erosion and sediment control measures shall be maintained continuously until permanent soil erosion control measures have reached final stabilization.

### **General Erosion and Sediment Control Plan Submittal Items**

The following items shall be included in the submittal package for a Stormwater Management Permit:

- Location of all erosion and sediment control structures.
- Provisions to preserve topsoil and limit the amount of total disturbed area.
- Details of site grading.
- Design details and computation for all erosion and sediment control structures.
- List of the trapping efficiency of each sediment control structure.
- Calculation of required sediment storage volumes.
- Explanation of any computer models or software used with highlights of the output data.
- Description of required clean-out frequencies and maintenance schedules.

### **3.3.5 Single- and Multi-Family Development Requirements**

A stormwater management plan must be submitted for single- and multi-family developments to obtain a Stormwater Management Permit. In addition to the requirements of the submittal package highlighted in this Section of the Design Manual, the following is a list of the minimum requirements for the submittal package for single- and multi-family developments where applicable:

- Legal description of all properties located on the plans including tax map numbers.
- The exact legal street names and addresses for the properties.
- The dimensions and border of the lot parcels.
- The name address of the owners of the parcels.

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- The minimum finished floor elevations in flood areas.
  - Maintenance responsibilities shall be defined in a maintenance agreement with the County for permanent water quality and quantity features such as ponds, easement, and buffers.
  - Digital files compatible with the County's geographic information system (GIS) must be submitted.
  - Calculations and narratives must be submitted documenting compliance with total maximum daily load (TMDL) requirements as appropriate.

In developing plans for residential subdivisions, individual lots shall be required to obtain and comply with a general permit and the residential subdivision development, as a whole, shall be considered a single land disturbing activity requiring a permit. Hydrologic parameters that reflect the ultimate subdivision development shall be used in all engineering calculations.

If individual lots or sections of a subdivision are being developed by different property owners, all land disturbing activities related to the subdivision shall be covered by the approved drainage plan for the entire subdivision. Individual lot owners or developers shall sign a certificate of compliance that all activities on that lot will be carried out in accordance with the approved drainage plan for the residential subdivision.

When the subdivision development reaches the condition where it is fifty (50) percent built the following actions must be taken.

- Where a detention pond is installed as-built certification and drawings are due to the Director
- The detention pond shall be cleaned and stabilized
- Homeowners association documents must be filed with the Director defining the responsible party for maintaining the detention pond and any water quality devices or features installed in the subdivision.
- When the subdivision development is developed to a point between fifty and eighty percent built; individual lot controls as well as other erosion and sediment control BMPs in addition to the sediment/detention pond shall provide the sediment control to meet 80 percent trapping efficiency rather than only the detention pond. Once the subdivision is eighty percent or greater built and the disturbed areas are stabilized according to the requirements of SCR100000 and 72-300 (SC Code of Regulations) then the permittee may file a request for a Notice of Termination of the permit coverage for the subdivision.

### **3.3.6 100-Year Floodplain**

The goal of this section of the Design Manual is to provide an overview of the requirements and procedures for proposed land development occurring in the 100-year floodplain. Development is defined as any manmade change to improved or unimproved real estate including, but not limited to, buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations. Ordinance No. 4631 is administered by the County Building Official or his/her designee (County Floodplain Administrator) and provides a comprehensive set of requirements for developing in the floodplain. This section is not intended to replace or supersede the requirements of that ordinance.

#### **Floodplain Policy**

The provisions in this section apply to all development in areas of special flood hazard identified by the Department of Homeland Security - Federal Emergency Management Agency (DHS-FEMA) in its



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Flood Insurance Rate Maps, dated August 18, 2014 and any revisions thereto, and areas that have base flood elevations determined due to ordinances enforced by the Greenville County.

It is the purpose of the Flood Control Ordinance # 4631 and this section to promote the public health, safety and general welfare and to minimize public and private losses due to flood conditions in specific areas by provisions designed to:

1. Restrict or prohibit uses that are dangerous to health, safety and property due to water or erosion caused by flood depths or velocities.
2. Require that uses vulnerable to flood damages, including facilities which serve such uses, be protected against flood damage at the time of initial construction;
3. Control the alteration of natural floodplains, stream channels and natural protective barriers, which are involved in the accommodation of floodwaters.
4. Control filling, grading, dredging and other development which may increase erosion or flood damage; and,
5. Prevent or regulate the construction of flood barriers which will unnaturally divert floodwaters or which may increase flood hazards to other lands.

### **Floodplain Standards**

The following is a general summary of the provisions contained within the “Flood Control, Drainage, Stormwater Management – Floods and Flood Control” Ordinance. This section is not intended to be comprehensive and complete but rather an overview of the general provisions. Ordinance No. 4631 should be reviewed to determine the specific requirements related to development in the floodplain.

- A permit must be obtained from Greenville County for all development in the floodplain. (Section 8-32)
- Development within the limits of a floodplain is not allowed where alternative locations exist. The applicant must demonstrate that new structures cannot be located out of the floodplain. (Section 8-32)
- No encroachment, including fill, shall be permitted within the floodplain without supporting documentation from a SC Registered Engineer demonstrating that the encroachment will not adversely impact the floodplain. If an adverse impact is anticipated, then the applicant must submit an application for a Conditional Letter of Map Revision (CLOMR) to the County and DHS-FEMA. Within thirty (30) calendar days of completion of construction activities, the applicant shall apply for a Letter of Map Revision (LOMR). (Section 8-38.6)
- If an adverse effect is determined, engineering justification by the use of hydraulic computer models and compensatory storage at hydraulically equivalent sites for the proposed development shall be required. (Section 8-38.6)
- There is a minimum 4-foot freeboard requirement on all new construction and substantial improvements. (Section 8-33)

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- All new construction or substantial improvements on fill shall be constructed on properly designed and compacted fill (ASTM D-698, as amended) that extends beyond the building walls before dropping below the base flood elevation and has appropriate protection from erosion and scour. The design of the fill or the fill standard must be approved by a registered engineer. (Section 8-38)
  - All new and replacement water supply and sanitary sewer systems must be designed to minimize or eliminate infiltration into the system. (Section 8-32.5)
  - All roadways within or adjacent to a floodplain shall be constructed so that the centerline elevation of the finished road surface is no less than two (2) feet above the base flood elevation. (Section 8-35)

### **Floodplain Study General Criteria**

All floodplain studies shall follow the guidelines and procedures as set forth by DHS-FEMA and the County. The following general criteria and requirements have been established to help clarify the procedures related to performing a floodplain study in Greenville County.

- The project must be consistent with applicable State and Federal regulations.
- A professional engineer registered in the State of South Carolina shall prepare all studies.
- The following hydraulic computer models for floodplain development in Greenville County are recommended, but is not limited to:
  - ◆ HEC-RAS
  - ◆ SWMM
- The floodplain analysis shall include the 10-, 50-, 100-, and 500-year, 24-hour storm events.
- Hydrologic analyses should utilize the current land use conditions based on the most updated data within the desired watershed. DHS-FEMA only allows for consideration of existing conditions in the watershed. The County can require particular models to be based on built out conditions for its own purposes, but DHS-FEMA will not accept these future conditions in the FEMA submittal.
- Limits of the 100-year floodplain for the pre-development and post-development conditions shall be shown on the site plan.
- Backwater conditions, local obstructions, bridges, culverts, and stormwater conveyance systems shall be considered.
- Digital data shall have the following characteristics:
  - ◆ Horizontal Datum: NAD83 (1994)
  - ◆ Coordinate System: SPC Lambert Zone 3900
  - ◆ Vertical datum: NAD88
  - ◆ Units: International Feet
- There are areas of special flood hazard within the County where no base flood data has been provided or where no floodway has been established. In these instances, special provisions apply to development and the required supporting documentation. (Section 8-39)

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- Calculated flood boundaries shall be submitted in a digital format that is compatible with Greenville County's GIS.

### Floodplain Study Submittal Criteria

Each permit application must include:

- Applicants Name
- Address where the work will be done
- Correct tax map I.D. number
- Subdivision name if applicable

A type of development must be chosen. If the work being done falls into "other", please elaborate in the comments section.

Under "Flood Zone" all properties that have floodplains must check either "No. A or A Zone". The No. A zones are floodplain areas that have had a detailed study performed and a base flood elevation is known. The base flood elevation in A Zones have been approximated.

Under "Location in relation to Floodway/Floodplain", all properties that have floodplains must chose "inside adopted floodplain". In the comments section, if the work to be done includes a structure, make a note as to whether the structure is located within the floodplain.

The application must be signed and stamped by a South Carolina Registered Engineer or Surveyor and the applicant must sign the application.

Hydrologic and hydraulic analyses must be contained in a report describing the study methodology, a listing of all assumptions (e.g., rationale for Manning's 'n' values, reasons for revising hydrology, source of topographic information and land use), bridge and cross section data, and a brief description of the project.

All projects being submitted to FEMA must have a completed FEMA MT-1 or MT-2 form as appropriate. These forms can be obtained from the following.

**FEMA website:** [www.fema.gov](http://www.fema.gov)

**FEMA Region IV**

3003 Chamblee Tucker Road  
Atlanta, Georgia 30341  
(770.220.5400)

**The South Carolina Department of Natural Resources**

Flood Mitigation Program  
1000 Assembly Street  
Columbia, South Carolina 29201  
(803.734.4307)

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### 3.3.7 Stormwater Facility Ownership and Maintenance

#### Ownership

All permanent stormwater management facilities shall be privately owned and maintained unless Greenville County accepts the facility for County ownership and maintenance. The owner of all private facilities shall grant the County a perpetual, non-exclusive easement that makes the facility accessible for public inspection and emergency repair.

#### On-Going Inspection and Maintenance

A permanent maintenance plan for each permanent stormwater management facility shall be included in the Final Site Development Plan. Requirements for on-going inspection and maintenance of permanent stormwater management facilities are as follows:

- Stormwater management facilities and practices, included in a site development plan, which are subject to an inspection and maintenance agreement, must undergo ongoing inspections to document maintenance and repair needs and ensure that maintenance is completed in compliance with the SWPPP, any agreements and the County's Stormwater Management Ordinance. For developments, which establish a POA or HOA, provisions for long term maintenance, as outlined in SWPPP, must be defined in a maintenance agreement. The provisions of this agreement must also identify a source of funding to support future required maintenance and upkeep activities, and a responsible party. The maintenance agreement shall be recorded in the Greenville County Register of Deed's Office and shall constitute a covenant running with the land to all heirs, successors, and assigns. The Director must be notified of changes in status and personnel or contract information for record keeping and inventory purposes in accordance with its MS4 permit requirements.
- Subdivision site runoff storage areas, and stormwater facilities not located in dedicated rights-of-way or easement, shall be granted or dedicated to and accepted by a public entity, or shall be conveyed by plat as undivided equal interests to each lot in the subdivision or to dedicated entities approved by the Director. Included in the dedication shall be a plan for continued management, operation, and maintenance of the stormwater facility, including designation of the person or persons responsible for long-term operational management and dedicated funding sources. If title to the land underlying site runoff storage areas and stormwater facilities is conveyed by agreement to each of the lots in the subdivision, then:
  - A covenant on the face of the plat shall be provided; and
    - ◆ Subdivision property owners shall establish a property owner's association to provide for the maintenance of site runoff storage areas and stormwater facilities. The association shall be duly incorporated and the property owners' association agreement shall be recorded for all the lots in that subdivision; and
    - ◆ The proposed property owners' association by-laws and declaration shall provide for a long term maintenance agreement.
- A stormwater management facility or practice shall be inspected on a periodic basis by the responsible person in accordance with the approved inspection and maintenance agreement. In the event that the stormwater management facility has not been maintained and/or becomes a danger to public safety or public health, the County shall notify the person responsible for carrying out the maintenance plan by registered or certified mail to the person specified in the inspection and

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maintenance agreement. The notice shall specify the measures needed to comply with the agreement and the plan and shall specify the time within which such measures shall be completed.










- Inspection programs by the County may be established on any reasonable basis, including but not limited to: routine inspections; random inspections; inspections based upon complaints or other notice of possible violations; and joint inspections with other agencies inspecting under environmental or safety laws. Inspections may include, but are not limited to: reviewing maintenance and repair records; sampling discharges, surface water, groundwater, and material or water in stormwater management facilities; and evaluating the condition of stormwater management facilities and practices.
- Parties responsible for the operation and maintenance of a stormwater management facility shall provide records of all maintenance and repairs to the County.

### 3.3.8 Technical Report Submission Requirements

Failure of an applicant to provide all of the information detailed in this section may result in the denial of receiving a Stormwater Management Permit from the Greenville County Stormwater Management Director. The items listed as the technical report submission requirements shall be used as a checklist to verify that all required items are properly submitted.

The general submission requirements for all projects requiring a Stormwater Management Permit approval shall include the following information when applicable:

1. Standard completed application form.
2. Evidence of acquisition of all applicable local, state, and federal permits.
3. Anticipated starting and completion dates of the various stages of land disturbing activities and the expected date of final stabilization.
4. A vicinity map indicating north arrow, scale, boundary lines of the site, and other useful information to successfully locate the property where than land development is to take place. It shall include at least one major roadway intersection for reference.
5. A plan with an appropriate written and graphical scale (not less than 1-inch = 50-ft.) accompanied by a design technical report indicating at least:
  - a) The location of the property where the land development is to take place shown on a Greenville County GIS map or a United States Geological Survey (USGS) 7.5-minute topographic map.
  - b) The location of the soils shown on a Greenville County GIS map or United States Department of Agriculture (USDA) soils map, with the major USDA soil types and Hydrologic Soil Groups identified.
  - c) Existing and proposed contour lines. Limits of disturbed area should be shown for each lot.
  - d) Existing and proposed physical structures on site including buildings, roads, easements, and parking areas.
  - e) Proposed grading and land disturbance information including:
    - 1) Surface area of entire project in acres.
    - 2) Surface area of planned land disturbance project area in acres.
    - 3) Limits of grading and land disturbance.

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- f) Drainage area maps including:
    - 1) Existing off site- and on-site drainage areas including flow paths.
    - 2) Proposed off site- and on-site drainage areas including flow paths.
  - g) Stormwater management facilities water quantity and water quality (temporary and permanent) including:
    - 1) Location
    - 2) Dimensions
    - 3) Elevations
    - 4) Maintenance Plan
    - 5) Calculations:
      -  Pre- and post-development flow rates,
      -  Pre- and post-development velocities,
      -  Hydrographs,
      -  Stage storage volume information,
      -  Stage discharge information.
  - h) Erosion and sediment control plans including:
    - 1) Location
    - 2) Dimensions
    - 3) Elevations
    - 4) Calculations:
      -  hydrographs,
      -  stage storage volume information,
      -  stage discharge information
      -  trapping efficiencies
6. Compliance with County Flood Control Ordinance and FEMA flood maps and Floodplain study material where applicable.
7. Right-of-ways and easements.
- a) Location of easements
  - b) Designation of easements that require inspection and maintenance
8. Landscape plan.
- a) Tree saving and planting plan consistent with the requirements of the Greenville County Tree Ordinance
  - b) Vegetation to be used for streambank stabilization, erosion control, sediment control, aesthetics, and water quality
  - c) Special requirements to preserve the natural aspects of the drainage system
9. Description of conditions around points of all surface water discharge.
10. Construction details for all stormwater management controls.
11. Downstream impact analysis.
12. Federal and State wetland maps, where appropriate. If wetlands delineation is performed for the project, it must be performed by a qualified professional.
13. Appropriate fees for the project.
14. The Plan Review Agency shall require the following:

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- a) All plans and design reports are to be sealed by a qualified design professional.
  - b) All plans are to be designed in accordance with all ordinances, programs, regulations, standards and criteria.

15. The Land Development Division may require additional information as deemed necessary for complete project review.

## 3.4 Digital Submittal Requirements

All submittals to Land Development Division should be delivered digitally through the current procedure posted on the Land Development Division's website.

## 3.5 Plan Submittal, Review and Approval Process

### 3.5.1 Plan Submittal

When the Greenville County Land Development Division receives the initial submittal package it shall be reviewed by a certified plan reviewer for compliance. After the plans have been reviewed to determine compliance with the regulations set forth by this Design Manual the plan reviewer will contact the applicant/design professional and request any necessary changes or notify the applicant/design professional that the plans are in compliance. A copy of all correspondence shall be sent to the owner.

### 3.5.2 Plan Review Period

Upon receipt of a completed application for a Stormwater Management Permit and submittal of the Final Site Development Plans, the Greenville County Land Development Division shall accomplish its review and have either the approval or review comments transmitted to the applicant within twenty (20) working days.

The Greenville County Land Development Division shall conduct its review of a waiver or variance submitted by the applicant within ten working days of the submittal. Failure of the Review Agency to act on the waiver by the end of ten (10) working days will result in the automatic approval of the waiver.

### 3.5.3 Incomplete Stormwater Management Permit Applications

Engineering design plans, permit applications, specifications, and submittal packages submitted to the Land Development Division that do not meet the minimum requirements of Chapter 3 of the Design Manual shall be handled in the following manner:

- If the original Stormwater Management Permit application submittal package has all of the major components in accordance with Chapter 3 but is missing some information, a written notice will be sent to the applicant with a copy to the owner.
- The written notice from the Land Development Division shall state the following:
  - ◆ The specific information that must be re-submitted to the Land Development Division in order for the permit application to be considered complete for review and processing.
  - ◆ The Stormwater Management Permit application has been removed from the review process.

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- ◆ Re-submittal of the application with all of the required modifications shall return the application to the review process.
  - ◆ The Land Development Division shall hold the incomplete plan for a period of 60 working days from the date of the written notice.
  - ◆ If an adequate response is not received within 60 working days, the submittal shall be rejected, and the entire submittal process must be initiated again.
- If the original Stormwater Management Permit application submittal does not contain the major required components, it shall be returned to the applicant for re-submittal without review.

### 3.5.4 Plan Approval and Final Submittal

When the plans have been determined to be in compliance, LDD will electronically stamp the approved plans and PDFs will be made available to the engineer. One stamped paper copy must be available on site at all times.

Approved plans remain valid for two (2) calendar years or five (5) calendar years, at the discretion of the applicant, from the date of approval. Extensions or renewals of the approved plans shall be granted by the Director upon written request by the person responsible for the land disturbing activity.

The Final Stormwater Drainage Plan shall not be considered approved without an approval stamp with a signature and date on the plans by the Land Development Division (LDD). The stamp of approval on the plans is solely an acknowledgement of satisfactory compliance with the requirements of the Stormwater Management Ordinance. The approval stamp does not constitute a warranty to the applicant or any other person concerning safety, appropriateness or effectiveness of any provision, or omission from the Drainage Plan.

Approvals of land disturbing activities that were approved prior to the effective date of this Design Manual shall remain in effect for the original term of the approval. For land disturbing activities which were not initiated during the original term of approval, the person responsible for the land disturbing activity shall re-submit the Site Development Plan including the Sediment Control Plan to the appropriate Land Development Division for review and approval subject to the requirements of this Design Manual.

#### Notification of Work

A Stop Work Order shall be issued on all projects proceeding without the required pre construction meeting and issuance of a grading permit.

## 3.6 Construction Requirements

### 3.6.1 Deviations from Approved Plans

Substantial deviations from the approved site development plans and specifications shall not be made on-site without written approval from the Land Development Division. Realistically and practically, there are always minor variations to the proposed plan during land development activities. These minor variations will be allowable without the need for approval from the Land Development Division, though sound engineering judgment should be exercised in assessing the impacts of these minor changes.



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Examples of substantial deviations that would require written approval from the Land Development Division include, but are not limited to the following:

- Pipe size changes.
- Pipe grade changes that will affect the hydraulic capacity of the stormwater facilities.
- The movement of stormwater facility that would put them outside of specific easements and right-of-ways.
- Changes in grade on the site which would affect the direction of stormwater flows, flow velocities, flow volumes, or other hydrologic impacts that would cause the existing plans to fail in protecting water quantity and water quality impacts.

### 3.6.2 Phase Sequence Verification

Phase sequence verification is required to be completed throughout the project. Prior to commencing construction on future phases of sediment and erosion control, the engineer must follow the current Phase Sequence Verification process. See the Land Development Division website for current form and criteria.

Constructors should also arrange for a County site inspector to be present for the installation of underground detention structures, manufactured treatment devices, pond liners, or other buried structures to be used for water quality treatment. Alternatively, if the Land Development Division grants prior approval, photographs of the installation(s) that clearly show the location on site of each structure may also be acceptable in lieu of an inspector. Additionally, the location of each should be clearly marked on as-built plans.

### 3.6.3 As-Built Requirements

The permittee shall submit an as-built plan certified by a registered professional upon the completion of the construction of the stormwater management control structures submitted in the Final Stormwater Management Site Plan. The registered professional shall certify the following:

- The facilities have been constructed as shown on the As-Built plans.
- The facilities meet the approved site plan and specifications and achieve the function they were designed to perform as stated in the Pond Certification Letter. An example of a Pond Certification Letter may be obtained on the Land Development Division website.

Acceptable as-built plans shall be submitted prior to the following:

- The use or occupancy of any commercial or industrial site.
- Final acceptance of any road into the Official County road inventory.
- Release of any bond held by Greenville County.

The Director may perform a final inspection upon completion of the installation of stormwater management structures to determine if the work is completed and constructed in accordance with the Final Stormwater Management Site Plan.

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## 3.7 Performance Security

A monetary performance guarantee for every new development is required. This guarantee will provide assurance that all exposed soil surfaces will be stabilized and any other areas of stormwater management and sediment control deficiency addressed, in the event a development discontinues or proper control measures are not installed and/or maintained.

Prior to the issuance of any building and/or land disturbance permit for a development or phase of development, every applicant must pay Greenville County a non-refundable Resource Remediation Fee. The non-refundable Resource Remediation Fee is set at \$100.00 per disturbed acre. These Fees will be held in a separate, use restricted, interest bearing account known collectively as the Resource Remediation Fund (the "RRF"). Monies deposited into the RRF may be used by the County to remediate sites that have been abandoned, sites left in an unstable condition, or sites with stormwater management or sediment control deficiencies, as determined by the Director.






By submitting an application for land disturbing activity, each applicant gives the County express authority to enter upon the subject property during and after development activities for the purpose of performing inspections and/or needed remediation, as determined by the Director.

For all new development and all redevelopment of sites, an applicant must provide to the County a notarized certification that the applicant has no known direct or indirect contractual, business, financial, or familial relationship ("Relationship") to a RRF site where fund money is outstanding or Person Responsible for Land Disturbing Activity at such site. Based on this statement, the County has the right to request, and the applicant must supply, additional specific information concerning any such affiliations.

For sites at which monies from the RRF are spent, an applicant with a Relationship to any Person Responsible for the Land Disturbing Activity on such RRF site(s) or a Relationship with a person who in the past has significantly failed to comply with any provision of this ordinance or previously issued permit, will not be allowed to further participate in this program and no further review of a permit for land disturbing activity will be conducted by the County or permit issued, until such time that all RRF monies are repaid to the County in full by the applicant or other such related person. This is in addition to any other penalty or injunctive relief authorized under this ordinance.

Staff will review funding on an annual basis and recommend any needed changes.

RRF fund monies can be used to complete proposed site improvements including but not limited to the following:

-  Storm drain pipe, culverts, manholes, and box inlet installation.
-  Site filling and grading, including the construction of open drainage swales and detention facilities.
-  Establishment of erosion and sediment control.
-  Re-grading of the site to minimize the erosive effects of stormwater runoff.
-  Temporary or permanent seeding and stabilization of disturbed areas to minimize the erosive effects of stormwater runoff.

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- Maintenance and cleaning of sediment control structures.

## 3.8 Application Fees

Permits authorized by the provisions of this Design Manual shall be effective only upon the payment of the appropriate fees. The current fees required can be found on the Greenville County Webpage.

Any land development project disturbing one or more acres or must obtain either NPDES general permit coverage or an NPDES permit. There is an additional NPDES fee for these projects. There are no exemptions from this fee, therefore local, State and Federal entities must submit the NPDES fee as part of their Stormwater Management Permit submittal package.

## 3.9 Stormwater Service Coordination

A Stormwater Service fee may be assessed on all land properties within the unincorporated, non-SCDOT regulated areas of Greenville County and within any Municipality that chooses to participate as a co permittee with Greenville County in its NPDES permit. The financing of the Stormwater Service is based on the principle that each user of the stormwater system pays to the extent to which the user contributes to the need for the stormwater system, and the charges reflect a substantial relationship to the cost of the service. The main objective of the Greenville County Stormwater Utility is to reduce the amount of pollutants that are discharged to the natural waterbodies of the County. Therefore, the County offers credit on the Stormwater Service Fee to those who implement approved structural and nonstructural stormwater quality BMPs on site.

## 3.10 Stormwater Service Fee Credit Policy

### 3.10.1 Purpose

Greenville County (County) has established a policy and procedure for providing credits (i.e. reductions) against the Stormwater Service Fee for Classification 2 properties (developed nonresidential properties) in an effort to provide equity and consistency in the application of the Stormwater Service Fee to individual properties. It is the County's intent to encourage sound technical design practices and the use of applicable BMPs to reduce the impact of development on the drainage system and reduce water quality impairment on the environment through a simple but effective crediting system. Credits will be granted for water quantity and/or water quality impact reductions.

### 3.10.2 Applicability

Any Classification 2 property on which an approved, on-site post-construction stormwater control facility or an approved water quality facility or BMP was installed may be eligible for a reduction of the Stormwater Service Fee billed to that specific parcel. The County will evaluate each case individually in determining the appropriate level of credit. Credit for facilities or BMPs, will remain in effect as long as:

1. The post-construction stormwater control facility or BMP is contained within a recorded sanitary sewer easement, drainage easement, or equivalent restrictions to future changes in use. See Appendix I for exceptions.

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2. The owner has obtained applicable permits and the facility or BMP has been constructed in compliance with approved plans.
  3. The property owner and/or applicant remain(s) responsible for all cost of operation and maintenance of the facility or BMP.
  4. The facility or BMP is maintained in compliance with County standards.
  5. The County is permitted access to the facility or BMP for purposes of inspecting the facility's or BMPs compliance with design, maintenance and operating standards.
  6. There are no significant changes in land use or impervious surface within the watershed that is serviced by the facility or BMP. If significant land use changes occur, the owner and/or applicant may be required to re-evaluate the performance of the facility or BMP in order to continue receiving a reduction in their Stormwater Service Fee.

### **3.10.3 Credit Schedule**

A total maximum of up to a 25% credit against the Stormwater Service Fee may be granted. The following criteria shall apply:

1. The credit will be applied by reducing the number of billable equivalent residential units (ERUs).
2. The property can qualify for both water quantity and water quality credits.
3. The maximum allowable water quantity credit percentage = 25%.
4. The maximum allowable water quality credit percentage = 25%.
5. The adjusted ERU includes the credit for both water quantity and water quality.
6. The minimum adjusted ERU is one.

### **3.10.4 Inspections**

The County may perform periodic evaluations of facilities or BMPs. These evaluations will ensure that the facilities and BMPs are being maintained and functioning as intended. If a facility or BMP fails an evaluation a notice of violation will be sent to the property owner stating that improvements and/or corrections need to be made. If adequate improvements and/or corrections to the facility or BMP in question are not completed or addressed within the time frame specified in the notice of violation the credit shall be rescinded. In order to reinstate the credit the owner must reapply using the procedures required by the County. The owner will not be eligible for reinstatement of credits for a period of one year.

### **3.10.5 Facility and BMP Maintenance**

The post construction stormwater control facilities and BMPs shall be constructed in compliance with approved plans, functioning as intended, and properly maintained prior to the submittal of a Credit Application. The property owner's engineer shall inspect the facility or BMP using forms provided by the County. Most nuisance and maintenance deficiencies can be corrected within a short period of time. A longer period of time for corrections may be granted if any structural and/or construction related deficiencies are found during inspection. All facility or BMP deficiencies shall be corrected or addressed prior to the approval of any credit to be applied against the Stormwater Service Fee. An

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annual report and certification of proper operation and maintenance is required to maintain the credit annually.

### 3.10.6 Maintenance Agreement

Applicants may request a credit for post construction stormwater control facilities or BMPs located on upstream and/or downstream properties. To be eligible for a credit, the facility or BMP must be designed to mitigate the impacts of stormwater runoff from the property in question. Both the applicant and the facility or BMP owner must agree on the contents of the Credit Application and ensure that the facility or BMP is maintained in accordance with County guidelines. Requests for credits for stormwater facilities or BMPs located on adjacent upstream and/or downstream properties must include a maintenance agreement between the applicant and the facility or BMP owner.

### 3.10.7 BMP Not Located in a Dedicated Easement

An applicant may request a credit for a post construction stormwater control facility or BMP not located in a recorded sanitary sewer easement, drainage easement, or equivalent restriction to future changes in use. Although the County prefers that post construction stormwater control facilities or BMPs be located in a recorded sanitary sewer easement, drainage easement, or equivalent restrictions to future changes in use, credit may be allowed in situations where the applicant enters into an agreement with the County to maintain the facility or BMP as designed in lieu of establishing a recorded sanitary sewer easement, drainage easement, or equivalent restrictions to future changes in use. Acceptance of this alternative will be determined at the discretion of the County. The applicant should contact the County for the viability of using this option prior to requesting the Credit Application.

### 3.10.8 Stormwater Service Fee Credit Percentage Calculation Procedure

All credits must be rounded to the nearest whole number.

#### Water Quantity Credit

**The maximum allowable water quantity credit percentage = 25%**

1. *Tree Preservation Credit* – up to a 10% credit will be available for property owners that go above the requirements of the Greenville County Tree Ordinance.

Credit will be considered for the preservation of natural undisturbed areas within a parcel of at least 1 contiguous acre that are preserved and maintained as a natural and undisturbed area. Natural undisturbed land areas must meet the standards necessary to qualify for a conservation use as outlined in the South Carolina guidelines on Nature Conservancy and recorded as such in the restrictive covenants. The fee credit allowance for such areas will be 1 percent for each acre of contiguous area up to a maximum of 10 percent.

A credit will also be considered for parcels for which stormwater runoff from impervious surfaces is effectively treated by a stream buffer. Stream buffers must meet the minimum current standards stipulated by the Stormwater Design Manual. The fee credit allowance for such areas will be 1 percent for each acre of impervious surface that drains to the stream buffer up to a maximum of 10 percent.

2. *Upgrade of Existing Detention or Retention Facilities Credit* – up to a 15% credit will be available for property owners who re-construct existing detention or retention facilities that comply with the current stormwater regulations. To be eligible for this credit, the property owner shall submit a certification from a licensed engineer verifying that the facility meets the requirements of current County stormwater regulations for both water quantity and water quality.
3. *Over Detention/Retention Credit* – up to a 25% credit will be available for property owners that construct detention or retention facilities designed to detain/retain stormwater runoff from the property in excess of the values required under the current stormwater regulations. To be eligible for this credit, the property owner shall submit a certification from a licensed engineer verifying that the facility detains/retains stormwater runoff from the property in excess of the values required in the current County stormwater regulations

The Over Detention/Retention credit shall be determined using the following formula:

$$C_{100} + C_{50} + C_{25} + C_{10} + C_2 = \text{Over Detention/Retention Credit (Not to exceed 25\%)}$$

With maximum credit per storm event to total 25% as follows:

Maximum credit for control of 100-year runoff =	1%
Maximum credit for control of 50-year runoff =	2%
Maximum credit for control of 25-year runoff =	11%
Maximum credit for control of 10-year runoff =	6%
Maximum credit for control of 2-year runoff =	5%

Where:

$$\text{Credit}_{100} = \left[ \frac{(Q_{\text{post } 100} - Q_{\text{w/control } s_{100}})}{(Q_{\text{post } 100})} \right] \times 0.01 \times 100$$

$$\text{Credit}_{50} = \left[ \frac{(Q_{\text{post } 50} - Q_{\text{w/control } s_{50}})}{(Q_{\text{post } 50})} \right] \times 0.02 \times 100$$

$$\text{Credit}_{25} = \left[ \frac{(Q_{\text{post } 25} - Q_{\text{w/control } s_{25}})}{(Q_{\text{post } 25})} \right] \times 0.11 \times 100$$

$$\text{Credit}_{10} = \left[ \frac{(Q_{\text{post } 10} - Q_{\text{w/control } s_{10}})}{(Q_{\text{post } 10} - Q_{\text{predevelop ed}_{10}})} - 1 \right] \times 0.06 \times 100$$

$$\text{Credit}_2 = \left[ \frac{(Q_{\text{post } 2} - Q_{\text{w/control } s_2})}{(Q_{\text{post } 2} - Q_{\text{predevelop ed}_2})} - 1 \right] \times 0.05 \times 100$$

$Q_{\text{pre-developed}}$  = the peak discharge without development (cfs)

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$Q_{\text{post}}$  = the post-developed peak discharge without controls (cfs).

$Q_{\text{w/controls}}$  = the post-development peak discharge from the developed site with stormwater controls (i.e. detention/retention facility) in place (cfs).

To be eligible for the over detention/retention credit, the ratio must be *greater* than one (1.0). Over detention/retention credit percentage calculations shall reflect a pre-development land use without development and/or prior to any land disturbing activities (i.e., clearing, grading, existing development, addition of impervious surfaces, etc.).

4. *Discharge Elimination* – up to 25% will be available for property owners that do not discharge runoff to the county stormwater management system. These areas treat, store, dispose, transpire, evaporate, infiltrate or otherwise manage all rainfall events up to and including the 100 year reoccurrence event with no discharge or releases of water or pollutants to the county stormwater management system. To be eligible for this credit, the property owner shall submit a certification from a licensed engineer verifying that the facility retains stormwater runoff from the property.


### Water Quality Credit

**The maximum allowable water quality credit percentage = 25%**

1. *New Development, New BMP Facilities* – Up to a 10% credit will be available for property owners that install water quality facilities and best management practices (BMPs) on their properties. All stormwater quality BMP structural controls must be designed in accordance with the Greenville County Stormwater Manual. All other water quality protection structural control systems will be considered on a case-by-case basis. Innovative solutions addressing stormwater quality issues are encouraged by Greenville County.

The water quality facilities and BMPs shall be designed to effectively reduce pollutants associated with post-construction stormwater runoff. To be eligible for this credit, the property owner shall submit a certification from a licensed engineer verifying that the flow from the percentage of the property indicated is routed through the water quality facility or BMP.

A Water Quality Factor is also provided in Appendix I. This Water Quality Factor shall be used along with the percent impervious drainage area of the property draining to the BMP to determine the Water Quality Credit for new water quality BMPs as follows:

 ***New Stormwater Quality Control BMP Credit = Percentage of the impervious area of the property that is routed through the BMP X Water Quality Factor % (from Appendix I) X 10%***

Before the approval of structural stormwater quality facilities or BMPs that are not included in the County Design Manual or BMP Manual, the County may require valid documentation from full-scale testing by an independent third party to verify that the pollutants of concern will be properly controlled.

2. *Retrofitting Existing Facilities* – The current design and development standards of the County have established the standards that all new developments must meet. The new standards were developed and adopted to control and minimize the negative impacts of development on flooding

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and water quality and to put measures into place that protect watershed resources. These new standards were not retro-active. A number of properties were designed and built prior to the new standards. In many cases, properties built to the previous standards can be altered or retro-fitted to meet the new standards. The following conditions and stipulations apply:

- a) Developments that intend to retro-fit their stormwater facilities and properties to the new standards must file the credit application and obtain a development permit from the County prior to making any changes.
- b) Only one credit application per parcel, the credit applies to the property served by the retro-fit and meeting the news standards. Calculations are to be provided to support the requested credit amount.
- c) A site map prepared and sealed by a licensed SC professional engineer or a licensed SC surveyor showing property boundaries, easements, topography, drainage features, natural conservation areas (and acreage), floodplain/floodway locations (and acreage), stream buffers (with width and length), overland flow and recharge areas (with acreage), and structures is to be submitted with the service fee credit application.
- d) A stormwater design analysis and a hydrologic/hydraulic report with calculations in accordance with the design manual prepared and sealed by a SC licensed PE is to be submitted with the service fee credit application.
- e) It is the responsibility of the property owner to provide all necessary documentation and certification that the property has been brought up to the current County standards. This will include as-built plans that are signed and sealed by a license SC professional engineer.
- f) The service free credit is for a term of up to 5 years beginning the billing period following acceptance of the application and as-built plans. An annual report and certification of proper operation and maintenance is required.
- g) Failure to properly maintain stormwater management facilities or property features that are the basis for the credit will nullify the credit and may disqualify the property from further service fee consideration.

A stormwater fee credit of **25%** for each applicable minimum standard, up to the maximum allowable, will be considered for property owners that retro-fit or otherwise modify and maintain their property to meet current minimum stands. Additional credits for qualifying properties may also be available in conjunction with any other credit defined by the policy up to the maximum allowable.

3. *Offsite Stormwater Quality Control Credit* – A Stormwater fee credit, up to 25% of the fee, may be granted if the property owner demonstrates to the satisfaction of the County (with supporting data and calculations) that the stormwater treatment facility provided on the property is adequate (designed in accordance with the Stormwater Design Manual) to treat offsite runoff from one or more developed properties (for which no stormwater controls exist at the time of the application for credit), in addition to the onsite runoff. No credit will be granted for non-point source pollution control for offsite undeveloped properties, since the provisions for this control have to be made onsite on the respective properties. To be eligible for offsite runoff quality control treatment credit, the offsite drainage area must be contiguous with the onsite drainage area. The credit will be allowed only if there is no contractual BMP maintenance agreement between the owners of the upstream offsite development and the credit applicant. A notarized signature statement to this fact must be submitted with the credit application from a Licensed SC Professional Engineer.

At such time that the offsite runoff is treated prior to draining onsite through BMP structure, or a maintenance agreement is executed between the appropriate parties, the offsite runoff quality



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control treatment credit may be re-evaluated for reduction or cancellation accordingly, based on the following formula:

● *Offsite Stormwater Quality Control Credit = Offsite Drainage Area / Onsite Drainage Area X Water Quality Factor % (from Appendix I) X 25%*

### Total Credit Percentage and Adjusted ERU Calculations

After the water quantity credit percentage and the water quality credit percentage are determined, the adjusted Stormwater Service Fee will be calculated as follows:

1. Total Base Credit Percentage = 100% - ((Water Quantity Credit Percentage + Water Quality Credit Percentage) --> not to exceed 25%)
2. Adjusted Stormwater Service Fee = Total Credit Base Percentage x Number of ERUs for the Property multiplied by the Stormwater Service Rate for the property
3. The minimum adjusted ERU is one.

### **3.10.9 Approved Best Management Practices**

A listing of the County-approved water quality facilities and BMPs for water quality credits are included in Appendix G of this Design Manual. These specifications include the design and maintenance requirements that must be followed, as well as the performance specifications that must be met in order to receive water quality credits for these water quality facilities and BMPs.

The County may consider other water quality facilities and BMPs for credits based on information submitted by the property owner. The credit values given by the County for these other water quality BMPs will be at the County's discretion.

### **3.10.10 Disqualifying Provisions**

The effectiveness of the various credits may be significantly diminished by certain conditions or practices. These conditions or practice include but are not limited to the following:

1. Development and construction in the floodplain
2. Development and construction on slopes, particularly in excess of 15 percent
3. Siting on porous or erodible soils
4. Excessive soil removal and excavation
5. Severe topography modifications
6. Channelization
7. Development in sensitive areas
8. Clear cutting
9. Excessive grading
10. Windborne dust and soils
11. Transfer of pollutions by vehicles and equipment

The County reserves the right to deny or reduce the amount of credit on the basis of any of the above considerations or others that may diminish or mitigate the effectiveness of various stormwater management measures and that have an unfavorable impact on water quality or the county's associated cost of stormwater management services. The County may disqualify egregious conditions that result in

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construction site stop work orders or citations related to excessive windborne dust and soils, transfer of pollution by vehicles and equipment, erosion control and illicit discharge violations.