

LEXINGTON COUNTY
LAND DEVELOPMENT
MANUAL



LEXINGTON COUNTY

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Appendix G – Definitions



1 GENERAL

Requirements may differ for municipalities who have adopted this manual. Please consult with those municipalities for specific city and town requirements.

1.1 Purpose

The purpose of the Land Development Manual (LDM) is to establish minimum standards of site grading, land development, and re-development projects within the unincorporated areas of Lexington County and other municipalities as approved by the Lexington County Council. This document contains the policies and procedures used by the Lexington County Public Works Stormwater Division (PW/SWD) to interpret and implement the Lexington County Storm Water Management Ordinance. The Manual provides parameters and criteria for addressing some of the specific issues which must be resolved during the planning, designing, construction and permanent stormwater maintenance phases of land development. The minimum standards for site grading, soil protection, and land development are intended to protect and promote the general welfare of all citizens by accomplishing these goals:

1. Clearly document the land disturbance permit application requirements and approval process;
2. Require the design and construction of safe and durable streets, right-of-ways, and parking lots;
3. Require the design, construction and maintenance of stormwater drainage systems that maintain, to the maximum extent practicable, a site's pre-development drainage characteristics in terms of flow rates, runoff volume, velocities, and pollutant load/concentrations;
4. Require complete and accurate designs and construction documents to ensure grading and property issues are addressed;
5. Require land disturbance projects to contain the necessary measures to control erosion and sediment during construction;
6. Require land disturbance projects to contain the necessary measures to reduce stormwater pollution and protect water quality through good design features, maintenance requirements, and encouragement of the latest stormwater treatment technologies (engineered devices) and approaches (e.g. Low Impact Development, or LID);
7. Provide minimum standards for methods to improve water quality, prevent illicit discharges, and minimize stormwater runoff impacts due to increased flow volumes, velocities peak discharge rates, and pollutant loads from developed areas;
8. Prevent the alteration, diversion, or disturbance of watercourses that lie within a special flood hazard area without the prior approval from the Federal Emergency Management



Agency (FEMA) and the U.S. Army Corps of Engineers (USACE) through submittals of Letters of Map Revision (LOMRs), No-rise certifications, or other appropriate documentation. Development in the floodplain shall be discouraged until all other possible alternatives have been exhausted and a reasonable and necessary use exists to develop in the floodplain. The PW/SWD shall be notified of any and all plans to develop areas within a floodplain;

9. Protect wetlands. All wetlands within a new development shall be delineated and verified by the USACE and protected to the maximum extent possible or mitigated through other projects/mitigation banks. No disturbance of wetlands shall be allowed unless proper approval has been received from the USACE and Lexington County has been notified of such approval. Disturbance includes, but is not limited to, draining, grading, filling, discharging untreated and uncontrolled stormwater runoff, and removal of vegetation.

In the sections below, the minimum standards and submittal information required to obtain a land disturbance permit are provided. In developments where deviations/exceptions are required, the submitting developer/engineer shall include rationale/justification to support the desired changes. Proposed deviations from the standards will be considered on a case by case basis.

It must be recognized that some tracts of land are simply not economically feasible for certain types of development. In other cases, certain types of development may be economically feasible, but prohibited by ordinance measures such as restrictive zoning districts and road classification, or the 100-year floodway designations. Therefore, pre-submittal meetings with County staff are required during the initial concept and planning stages of a development, before significant resources are committed privately.

Every effort has been made to cover the common conditions and information needed by those involved in land development activities; however, the requirements in this Manual and the County Ordinances should be reviewed carefully to ensure that all requirements are being met. In the event of a conflict, the Stormwater Management Ordinance, Floodplain Damage Prevention Ordinance and Land Development Manual govern in protection of citizens from changes due to the impacts of development. The Subdivision Regulations shall govern over conflicts related to the subdivision of property. If the Stormwater Management Ordinance, Floodplain Damage Prevention Ordinance, Land Development Manual, or Subdivision Regulations fail to resolve all conflicts, the PW/SWD has the authority to settle any such issues related to stormwater management.

1.2 Scope

The scope of the Land Development Manual is limited to the requirements for submitting site plans and related projects to the PW/SWD. The PW/SWD is only one part of the Lexington County review process, as is explained further in Chapter 2. State and federal agencies may have additional requirements other than those listed. The Land Development Manual is not intended as a textbook or a comprehensive engineering design reference. Site plans, details, calculations, construction specifications, and other technical documents must be provided and sealed by a Professional Engineer, as appropriate, registered in the state of South Carolina, with sufficient



knowledge and experience to accomplish all design elements of the site plan. The Manual contains several references to some of the most common technical design manuals, such as the Natural Resources Conservation Service's (NRCS) TR-55, the South Carolina Department of Health and Environmental Control's (SCDHEC) Best Management Practices (BMPs) Manual, and the Georgia Stormwater Management Manual, where such information can be found.

In addition to technical design, submitted projects must also meet federal and state standards for health and safety (i.e. Occupational Safety and Health Administration-OSHA, Federal Highway Administration-FHWA and American Association of State and Highway and Transportation Officials-AASHTO requirements). Consideration for public safety must be emphasized throughout the design process.

1.3 Description and Use of the Manual

The Manual is developed under the assumption that the user possesses a basic understanding of stormwater control design, construction, or land development depending on the user's particular area of expertise. The Manual provides required information for and proper formatting of application packages on proposed land disturbance activities in Lexington County.

This Manual is not intended to be a systematic design methodology that addresses every land development situation that may occur in Lexington County nor is it a detailed reference for the various methods and procedures used in the design process. The application of engineering principles and judgment combined with the information contained within this and other referenced material are necessary to successfully complete the planning, design, and preparation of documents for acquiring a land disturbance permit. References to guidance documents from federal, state, and local agencies are given throughout the Manual to provide additional information to users.

This Manual is not intended to restrain or inhibit engineering creativity, freedom of design, or the need for engineering judgment. When shown to be applicable, it is encouraged that new procedures, techniques, and innovative stormwater BMPs be submitted with supporting documentation. However the use of such approaches should be substantiated with submitted documentation by design professionals showing that the proposed design is equal to, or exceeds the traditional procedures in terms of performance and economic feasibility.

1.4 Manual Organization

The Manual contains eleven chapters, organized to present recommended technical and engineering procedures along with the criteria needed to comply with the State of South Carolina's Stormwater Management and Sediment Reduction Act (SC Code Ann. §§ 48-14-10 et seq R.72-300), the Construction General Permit (SCR10000) the Small Municipal Separate Stormwater System permit (SCS030000), and Lexington County's Stormwater Management and Flood Damage Prevention Ordinances.

This chapter provides information on Lexington County's authority to develop and enforce design requirements along with several legal matters, and some background information on stormwater management and its importance.



1.5 Authorization

This Manual has been prepared by the PW/SWD, which has been granted the authority to develop engineering design standards and enact programs and policies to ensure compliance with State and Federal laws for the purposes described above. A detailed description of the law, regulations, and assigned authorizations to Lexington County is provided below.

1.5.1 Stormwater Related Regulations and Permits

1.5.1.1 Clean Water Act

The Clean Water Act (CWA) requires the reduction of water pollution and gave the United States Environmental Protection Agency (EPA) the congressional authority to develop programs to improve the health of navigable waters. EPA in response developed regulations that created a program of discharge permits as part of the National Pollutant Discharge Elimination System (NPDES) to regulate point source discharges. The 1987 amendments to the CWA extended NPDES permits to industrial discharges, including stormwater runoff associated with land disturbing activity. The 1987 CWA Amendments also require NPDES permitting for stormwater runoff from urbanized areas. A municipal separate storm sewer system (MS4) NPDES permit is required based on population. Authority to administer the NPDES permit program was delegated to state agencies, such as SCDHEC, by the EPA.

1.5.1.2 South Carolina Pollution Control Act

The South Carolina Pollution Control Act (PCA) (S.C. Code Ann. §§ 48-1-10) was originally enacted in 1950 and was last amended in 2012. It is applicable to any activity that could negatively impact the environment by requiring attainment of a permit and implementation of measures to mitigate potential impacts.

1.5.1.3 South Carolina Stormwater Management and Sediment Reduction Act

The South Carolina Stormwater Management and Sediment Reduction Act of 1991 (SMSRA) S.C. Code Ann. §§ 48-14-10 et seq. was enacted to address the increase in stormwater runoff rate and quantity, the decrease of rainwater infiltration, and the increase in erosion associated with urban development throughout the state. The Act gave legislative authority to SCDHEC to enact programs to meet its purpose. Lexington County was authorized to implement the requirements of this Act and its associated regulations through development and implementation of a Stormwater Management Program (SWMP) and other measures deemed necessary.

1.5.1.4 NPDES Permit for Stormwater Discharges Associated with Industrial Activity (Permit No. SCR000000)

All untreated stormwater runoff from “industrial activities” is considered an illegal discharge without an NPDES Stormwater Permit (SCR000000). These permits require certain industries to develop and implement a Stormwater Pollution Prevention Plan (SWPPP), which must include appropriate BMPs to minimize pollution to the receiving natural waterbodies.



1.5.1.5 NPDES Construction General Permit (Permit No. SCR100000)

All construction activities disturbing one or more acre of land must first have coverage under the Construction General Permit (CGP). Lexington County has delegated authority to issue coverage under the CGP. The requirements for obtaining and complying with the Construction General Permit are part of the focus of this Manual.

1.5.1.6 NPDES General Permit for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems (Permit No. SCR030000)

Lexington County is required to have coverage under the NPDES permit to discharge stormwater from the County's municipal separate storm sewer system (MS4). Because development activities contribute to the discharge of pollutants, the NPDES permit requires that Lexington County encourage, promote, and implement certain practices, programs, and procedures for the purpose of reducing or limiting discharge of pollutants to Waters of the State. Permit coverage was granted by SCDHEC in accordance with the NPDES Small Municipal Separate Storm Sewer System general permit. The permit requires that Lexington County develop and implement a Stormwater Management Program to control the discharge of pollutants from its MS4 to the maximum extent practicable (MEP). The Stormwater Management Program has several components that must be met, and this Manual provides partial compliance with several, including construction site runoff control, post-construction runoff control, and illicit discharge elimination and detection.

1.5.1.7 Lexington County Ordinances, Regulations, and Standards

Lexington County has developed and adopted ordinances and standards based upon State and Federal regulations, to address concerns associated with uncontrolled stormwater runoff. The principal ordinances and standards for the County that affect the selection of stormwater control measures are:

1. **Stormwater Management and Flood Damage Prevention Ordinances:** Establish the engineering design standards and land disturbance criteria for obtaining a land disturbance permit within Lexington County. The PW/SWD is authorized by this ordinance to develop all necessary regulations, as detailed in this Land Development Manual for properly controlling stormwater runoff and mitigating existing and future impacts;
2. **Zoning Ordinance:** Issues that may be impacted by this Ordinance when designing stormwater management systems include but are not limited to: limits on building density, buffer and setback requirements, parking lot islands and required spaces. Applicants should specifically check to make sure a desired development type is allowed in the planned location;
3. **Landscape and Open Space Ordinance:** The Landscape and Open Space Ordinance may affect stormwater management system designs through tree protection requirements, planting species selection, and screening requirements for ponds and other BMPs. This will typically be more crucial for commercial developments, however, all applicants are



encouraged to contact the Landscape Administrator for more information and specific requirements;

- a. **Lexington County Comprehensive Plan:** This document is a compilation of the County's land use planning goals and objectives. The plan covers all the previous policies adopted for the various planning areas of the County as well as the inclusion of new needs and issues which have arisen in recent years. These goals are changed by County Council through amendment of the ordinance at any regularly scheduled meeting with the Department of Planning and GIS responsible for maintaining the current status of these strategies. The goals and objectives cover protection from flooding, protection of water quality, safe and efficient transportation facilities, airport investments, and many land use planning issues.
- b. **Subdivision Regulations:** These regulations authored by the Planning Commission describe the process and procedures for the subdivision of property in Lexington County. These regulations are available at the Community Development Department website here:

<http://www.lex-co.sc.gov/departments/DeptAH/communitydevelopment/Pages/CDOrdinances.aspx>

Lexington County has been delegated the authority to administer the stormwater management and sediment control plan review and approval/disapproval, and the inspections during construction and maintenance inspection components of the South Carolina Stormwater Management and Sediment Reduction Program to handle the following responsibilities:

1. Comply with all Federal and State regulatory requirements imposed by the NPDES Permit in accordance with the Clean Water Act to manage stormwater discharges from systems within Lexington County to waters of the state;
2. Conduct all activities necessary to carry out the stormwater management programs and other requirements included in the NPDES General Permit, SCR030000, adopted on January 1, 2014;
3. Maintain the stormwater system consistent with provisions of NPDES General Permit, and pursue the necessary means and resources required to fulfill this responsibility;
4. Direct and oversee the continuous implementation and ensure compliance with the NPDES General Permit.

1.6 Updates to the Design Manual

This Manual is intended to be a working document. As design technology and criteria evolve or change or it becomes evident that additional measures are needed to ensure the public general welfare, the Manual will be updated. Updates will always include oversight by process that involves a stakeholders group.



1.7 Stormwater Management

Development has the potential to alter the natural drainage patterns, flow rates, and volumes of water in the environment. Development can directly or indirectly change the physical, chemical, and biological conditions of natural waterways. When land is developed, the natural hydrology of the watershed is disrupted. Grading removes the benefits of topsoil, compacts the subsoil, and fills in depressions that provide natural storage. As a result of land development, infiltration is decreased and rainfall that once seeped into the ground runs off the surface at an accelerated rate.

In the following sections, further descriptions are provided on the impact of land development projects, and the measures that can be employed to mitigate such impacts.

1.7.1 Effects of Development on Watershed Hydrology

Development and urbanization have the following impacts on receiving waterbodies:

1. Changes to Stream Flow;
 - a. Increased runoff volumes;
 - b. Increased peak runoff discharges;
 - c. Greater runoff velocities;
 - d. Increased flooding frequency;
 - e. Lower dry weather flows (base flow);
2. Changes to Stream Geometry;
 - a. Stream channel enlargement and erosion;
 - b. Stream down cutting;
 - c. Changes in channel bed due to sedimentation;
 - d. Increase in floodplain elevation;
3. Degradation of Aquatic Habitat;
 - a. Degradation of habitat structure;
 - b. Decline in stream biological functions;
4. Water Quality Impacts;
 - a. Increased pollutant loading;
 - b. Reduced oxygen in streams;
 - c. Microbial contamination;
 - d. Hydrocarbons and toxic materials;
 - e. Sedimentation;
5. Property Damage and Safety Concerns;
6. Unsightly Aesthetic Stream Channel Conditions and Restricted Use of Recreational Waters.

1.7.2 Steps to Successful Stormwater Management Plans



Proper planning is necessary to ensure that stormwater management is considered and fully integrated at the various stages of the site-development process. This involves a comprehensive approach to site planning and a thorough understanding of the physical characteristics and resources associated with the project site. This planning includes addressing each of the categories in the following graphic:

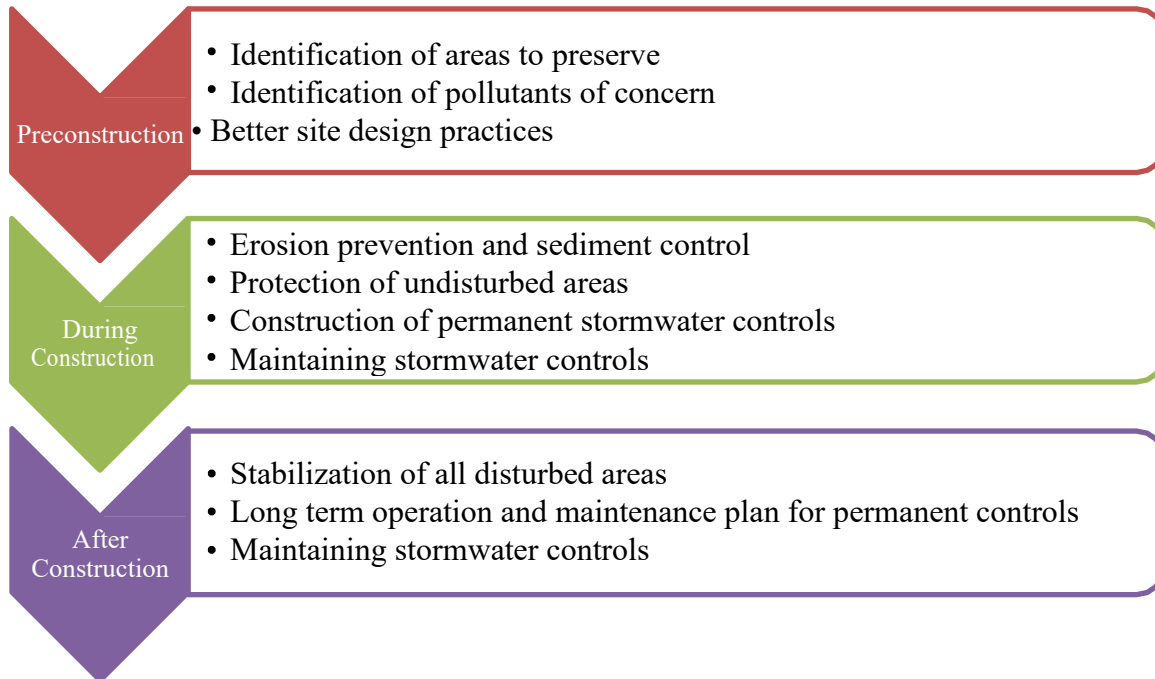


Figure 1-1. Steps to Successful Stormwater Management Plans.

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

1. Site visit;
2. Pre-submittal site meeting;
3. Review of site development requirements;
4. Detailed site analysis and supporting calculations;
5. Creation of a Stormwater Concept Plan;
6. Design aspects of the stormwater management plans;
7. Approval and completion of the land disturbance permit application.

In Chapter 2, the procedure for submitting a complete land disturbance permit application is provided.



1.7.3 Innovative Design Approach

When designing for land disturbance activities, the design must address the following four categories of control: water quantity (flood control), design storm control for each identified design storm (rate and volume), erosion prevention and sediment control, and pollution control (water quality standards, long-term).

Innovative approaches to site design are more of a source control for stormwater runoff – the site design practices limit the amount of runoff generated as well as incorporate BMPs within the design for quantity and quality control. These types of design concepts are described in detail in several sources including: Georgia Stormwater Manual, Volume 1: Policy Guidebook, First Edition, Atlanta Regional Commission, August 2001; and Low-Impact Development Design Manual, Prince George’s County Maryland (1999). Some general concepts from these sources are provided in the following sections.

1.7.4 Best Management Practices and Site Planning Process

The first step in addressing stormwater management begins in the site planning and design stage of the development project. Minimizing adverse stormwater runoff impacts by the use of BMPs and site planning should be a primary consideration for a design professional. BMPs that reduce the amount of total post-development impervious area and maintain natural characteristics of the pre-development site conditions reduce the overall hydrologic and hydraulic impact of the development.

Examples of this include:

1. Maintaining site resources and natural undisturbed areas
2. Using lower impact site layout techniques
3. Minimizing impervious cover
4. Using natural features for stormwater management
5. Incorporating pre-approved BMPs into the site plan
6. Using engineered/proprietary devices

Lexington County is aware of the potential benefit of using manufactured devices available on the market, such as baffle boxes, cartridge filters, catch basin inserts, and advanced vegetation producing methodologies. The PW/SWD will evaluate all devices for appropriate drawings, specifications, and the applicability of the product, expected performance, and required maintenance. The PW/SWD reserves the right to disapprove BMPs that have a poor performance history or high failure rate. Where non-standard or non-pre-approved BMPs are to be used on projects, the designer and developer should meet with PW/SWD prior to submitting a plan.



1.8 Engineering Design Accountability

The Land Development Manual will assist engineers, plan reviewers, inspectors, and contractors in the design, layout and oversight of most land disturbance projects. However, this Manual does not replace or otherwise excuse the need for professional engineering judgment and knowledge. The user of this Manual is hereby cautioned that many aspects of engineering design must be considered, including but not limited to:

1. Public health and safety;
2. Site-specific conditions or unusual features of project site that warrant special designs;
3. Current versions of design texts, manuals, technical documents and research.

The design engineer is expected to thoroughly investigate field conditions and coordinate all design efforts with Lexington County.

Construction plans must be stamped and signed by a Professional Engineer actively licensed in the state of South Carolina, unless otherwise stated in this Manual. The design professional must have sufficient education and experience to perform a complete and thorough design of each element shown on the construction plans, and must also have complete control to change or alter plans during the design phase. Stormwater design criteria are based upon current scientific knowledge and engineering judgment.

1.9 Legal Aspects

If any portion of the Land Development Manual is ruled to be invalid or unconstitutional by any court with adequate jurisdiction over Lexington County, then such portion shall be considered to have been selectively removed from this Manual without affecting the Manual's overall applicability and legal standing to the land disturbance process. The Land Development Manual will be revised on a periodic basis to reflect known changes to laws and regulations. All local, state and federal laws and regulations shall be considered when interpreting provisions within the Land Development Manual. In each instance, the more restrictive requirement shall govern unless sound engineering judgment can determine and prove that the more restrictive requirement would be otherwise unnecessary. In most instances, laws and regulations that are phrased more explicitly shall apply over those items that are not phrased as precisely.

1.10 Language and Interpretation of Text

The following language rules are applicable to the Land Development Manual:

1. The imperative case is always mandatory. The words "shall" and "must" are always mandatory. These actions must be performed unless sufficient engineering justification is submitted to County officials within the Public Works Stormwater Division (PW/SWD) and written approval has been specifically granted. The word "should" indicates an action that is highly recommended under most conditions. The word "may" indicates an allowable action or choice that is usually beneficial in meeting the minimum county requirements;



2. Use of the singular or plural case of a noun will not affect the applicability of this Manual, or any other law, regulation, or ordinance, unless the context of the sentence specifically indicates that the singular/plural case affects the intended use or function on a scientific or engineering basis. The use of a singular or plural noun does not necessarily indicate whether to design or construct a single unit or multiple units;
3. Any reference to the PW/SWD shall mean the duly authorized representatives, sections or employees under the Director’s supervision who have delegated responsibility. Areas of delegated responsibility may include, but are not limited to: review and approval of plans, review and approval of survey plats, definition of standards or requirements, approval of special conditions, review and issuance of permits, inspections and field investigations, enforcement actions, conducting public meetings, etc.
4. The use of “and” shall imply conjunction of items in lists of required elements, in which all items must be complied with. The use of “or” shall imply the disconnection of items in lists of required elements, in which either of the items in the list must be complied with.

1.11 Contact Information

The following Lexington County personnel should be contacted for any questions, clarifications, or other information not found within this Manual.

Primary contact for stormwater issues:

Public Works Director
440 Ballpark Road
Lexington, South Carolina 29072
(803) 785-8201

Stormwater Manager
440 Ballpark Road
Lexington, South Carolina 29072
(803) 785-8201

Environmental Coordinator
440 Ballpark Road
Lexington, South Carolina 29072
(803) 785-8201

Flood Plain Manager
212 South Lake Drive
Lexington, South Carolina 29072
(803) 785-8121

Submittal address:

Lexington County Community Development Department



Lexington County, South Carolina
Lexington County Community Development

Land Development Manual
2026

212 South Lake Drive
Lexington, South Carolina 29072
(803) 785-8121
(803) 785-8188 (fax)
CDCustomerService@lex-co.com



2 LAND DISTURBANCE PERMITTING PROCEDURES

This chapter provides developers, owners, engineers, contractors, and others with the minimum requirements to obtain a Land Disturbance Permit (LDP). Figure 2-1 below outlines the requirements for more common land-disturbing permits required by the Public Works, Stormwater Division (PW/SWD). For more information on each type of permit, see the corresponding section in this Chapter.

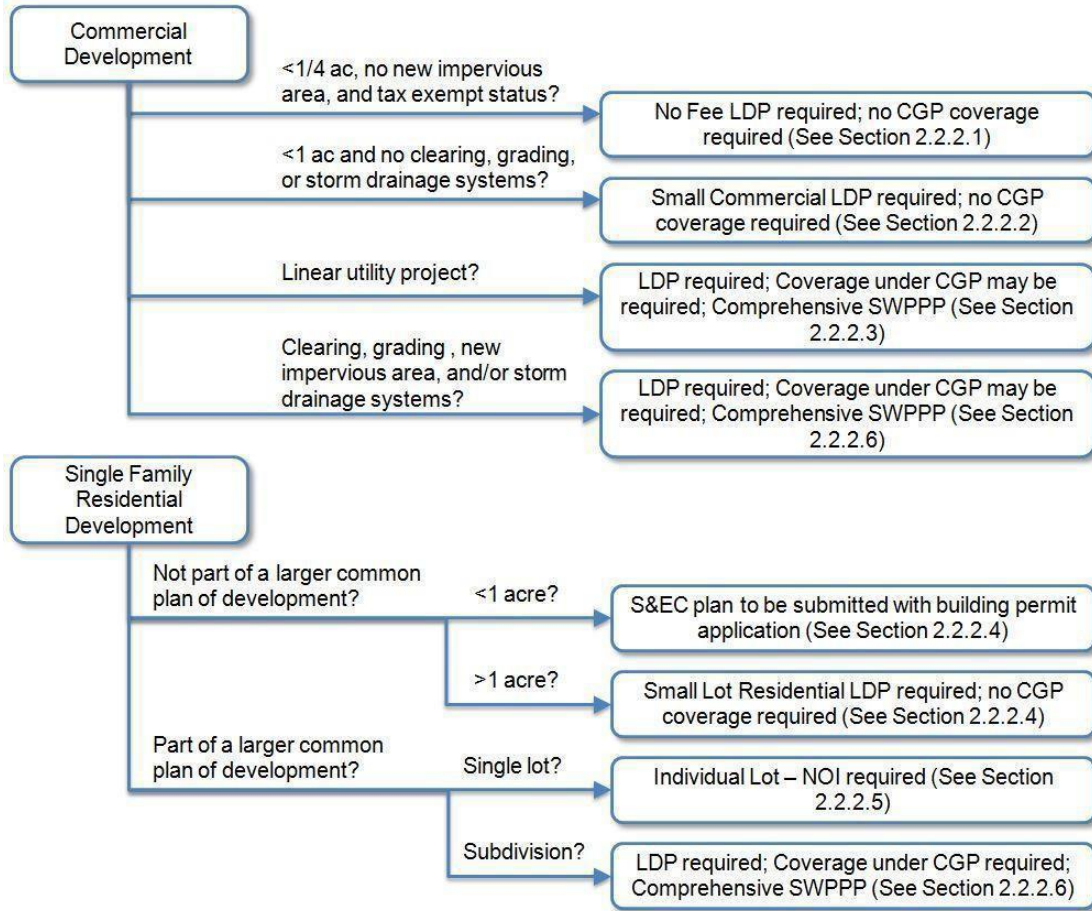


Figure 2-1. Permitting Flow Chart.

The following information describes conditions when a LDP is needed, the type of permit needed, application submittal requirements, and the use of variances. The PW/SWD has been granted authority to enforce such requirements, issue permits, and can penalize those who fail to comply. PW/SWD has the authority to clarify any situation not adequately covered by these regulations. PW/SWD may impose further restrictions to ensure the health, safety, and general welfare of the citizens of Lexington County, the economic viability of the community, and the prevention of environmental degradation.

Unless otherwise provided within the Stormwater Management Ordinance or this Manual, the surface of land in Lexington County shall not be disturbed or altered without a LDP or other



approval by the PW/SWD. No major drainage channel shall be impeded or encroached upon, nor any alteration or encroachment of a flood area, except in accordance with a LDP approved by the PW/SWD.

2.1 Pre-Submittal Process

A pre-submittal meeting with PW/SWD shall take place at the proposed project location or in the PW/SWD office. The purpose of the pre-submittal meeting is for all of the entities involved to discuss the design and stormwater management requirements for the site before final plans are submitted to the PW/SWD. The intent of the meeting is to reduce the need for revisions due to lack of knowledge of specific design requirements.

The applicant shall have a concept plan and discuss items on the Residential and/or Commercial Review Checklist found in Appendix D.

When a pre-submittal meeting is held, a concept plan should be developed for discussion purposes. Small Commercial and Single Family Residential Applications may skip this step unless requested by the PW/SWD.

The concept plan shall contain the following items:

1. A preliminary sketch of the site showing the layout;
2. Vicinity map;
3. Pre- and post-development runoff patterns and discharge points;
4. Location(s)/distances to Waters of the State (WoS) and all other existing natural features such as wetlands, ponds, lakes, floodway/floodplains, and buffers;
5. Location(s)/distances to 303d listed and TMDL (total maximum daily load) waters;
6. Location(s) of existing and proposed roads, buildings, utilities, parking areas and other impervious surfaces;
7. Lexington County's GIS topography, existing land use for the site and area immediately adjacent to it; and
8. Any downstream stormwater flow or volume restrictions, which may include the identification of undersized downstream stormwater systems and points at which the downstream analysis will be performed.



2.2 Land Disturbance Permits

2.2.1 Application Process

Initial permit application submittals for the Small Commercial Land Disturbance Permit and General Land Disturbance Permit shall be made to the Lexington County Community Development Department. The Community Development Department distributes the submittal to PW/SWD and other County departments. The Community Development Department can provide a complete list of requirements from all departments upon request. All other permit application submittals shall be made to Lexington County Public Works Department.

Submittals for projects located within a municipality are initially submitted to the municipality. The municipality will forward submittals to the Lexington County Community Development Department upon approval by municipal officials.

The PW/SWD will require applicants who need permit coverage from other agencies to have such documents in hand prior to LDP issuance, such as:

1. 401/404 certifications or permits,
2. Department of the Army permit from the US Army Corps of Engineers (USACE),
3. Right-of-way acquisition and all applicable easements, etc.,
4. Other documents as requested by PW/SWD

2.2.2 Submittal Requirements

It shall be the responsibility of the applicant and/or engineer to contact the PW/SWD before submitting an application to determine the appropriate permit and process to use. PW/SWD has the authority to require a specific permit as necessary to protect the citizens of Lexington County, surrounding property, the County's existing drainage system, and WoS. The following are types of LDPs issued by Lexington County:

2.2.2.1 No Fee Land Disturbance Permit

Where $\frac{1}{4}$ of an acre or less is disturbed and the disturbance creates no significant increase in impervious area, an applicant may apply for a No Fee Land Disturbance Permit. The applicant must have a tax exempt status.

The No Fee Land Disturbance Permit submittal shall contain the following items:

1. Small Commercial Land Disturbance Permit Application shall be used for the No Fee Land Disturbance Permit. This application form is located in Appendix A. All information requested shall be complete. The original application and signature shall be submitted in the permit application.



2. Project Sketch: Location(s) of all proposed disturbances; location of existing and proposed stormwater management control devices; location of 100-year floodplain and floodway; property lines; location of all sediment and erosion control measures (silt fence, riprap, inlet protection, etc.).

The PW/SWD will conduct a site visit to determine if the project can be permitted as a No Fee Land Disturbance Permit or if it requires a different land disturbance permit. Once a determination has been made, the PW/SWD will notify the applicant.

2.2.2.2 Small Commercial Land Disturbance Permit

A Small Commercial Land Disturbance Permit is required for new development and redevelopment activities that disturb less than one acre and do not involve clearing, grading, or the installation of storm drainage systems. The PW/SWD reserves the right to require a General LDP for any of these projects. In certain situations engineering site plans may be required.

The Small Commercial Land Disturbance Permit submittal shall contain the following items:

1. Application Form for Small Commercial Land Disturbance Permit: This application form can be found in Appendix A. The original application and signature shall be submitted in the permit application package.
2. Site Narrative: The narrative should describe the site in general prior to land disturbance, the proposed land disturbance activity, known or potential problems with adjacent properties, and receiving water bodies. Any access, easement, and/or agreements shall be adequately defined.
3. Project Sketch:
 - a. Location(s) of all proposed disturbed and undisturbed areas;
 - b. Location of existing and proposed stormwater management control devices;
 - c. Location of 100-year floodplain and floodway;
 - d. Property lines;
 - e. Location of all sediment and erosion control measures (silt fence, riprap, inlet protection, etc.) for each phase of grading; and
 - f. Location of any new driveways or parking areas (grass, gravel, pavement, etc.).

For a Small Commercial Land Disturbance Permit, the applicant submits a Small Commercial Land Disturbance Permit Application to the Community Development Department. The Community Development Department will forward the submittal to the PW/SWD. Upon receipt of the submittal the PW/SWD will conduct a site visit to determine if the project can be permitted as a small commercial project or if it needs full engineering plans submitted. Once it has been determined that the project can be permitted under a Small Commercial Permit, the PW/SWD will notify the applicant.

The Small Commercial Land Disturbance Permit is issued by PW/SWD. The Permit will outline the activities that are allowed onsite along with any sediment and erosion control requirements.



The applicant will be required to sign for and comply with the requirements of the Small Commercial Land Disturbance Permit.

2.2.2.3 Linear Utility Projects

When disturbing land in Lexington County, applicants must show coverage under the South Carolina Department of Health and Environmental Control (SCDHEC) Utility General Permit and obtain a General Land Disturbance Permit. Linear Utility Projects follow the same requirements as listed under the General Land Disturbance Permit; however the fee for this type of project would be the same as a Small Commercial Permit. See section 2.2.2.6 for General Land Disturbance Permit requirements.

2.2.2.4 Single Family Residential Development Not Part of a Larger Common Development

There are two types of single family residential sites:

1. Those that disturb less than an acre or
2. Those that disturb more than an acre.

Development requirements are different for each. The following section describes the PW/SWD requirements for each. These requirements only apply to lots that are not a part of a larger common plan of development.

1. When a single family residential development disturbs less than one acre and is not part of a larger common plan of development, no land disturbance permit is required. The building permit application shall include a completed Residential Building Erosion Protection & Sediment Control Application. This document can be found in Appendix A or can be obtained at the Lexington County Community Development Department. This form must be completed and signed by the permit applicant.
2. When a single family residential development disturbs one acre or more and is not part of a larger common plan of development, a Single Family Residential Land Disturbance Permit (SFRLDP) is required. In certain situations site plans may be required. This type of site requires a General LDP and coverage under the Construction General Permit.

The SFRLDP submittal shall contain the following items:

1. Completed Residential Building Erosion Protection & Sediment Control Application (see Appendix A) and certification.
2. Site Narrative: General description of topographic and soil conditions of the property. A description of the stormwater management and sediment control plan to be used during land disturbing activities. A general description of adjacent property and existing structures, buildings, and other fixed improvements located on surrounding properties.



Define adequate locations to control sediment and erosion in order to ensure no offsite impacts into WoS, adjacent properties, and public right-of-ways/conveyances.

3. Project Sketch: One copy of sketch plan of the site to include:
 - a. A site location drawing of the proposed project, including the location of the proposed residential structure in relation to roadways, jurisdictional boundaries, wetlands, streams and rivers;
 - b. The boundary lines of the site on which the work is to be performed;
 - c. A topographic map of the site; AND
 - d. Location of adequate sediment and erosion controls in order to reduce offsite impacts into WoS, adjacent properties, and public rights-of-way/conveyances.

If needed the PW/SWD staff may request a meeting with the applicant to review sediment and erosion control measures and stormwater management concerns on the property.

The PW/SWD will complete its review of the SFRLDP package submitted within 20 business days. Once the review is complete the applicant will be issued a SFRLDP. The SFRLDP shall be displayed onsite during the entire time of home construction. A final inspection may be required before the issuance of a Certificate of Occupancy.

2.2.2.5 Individual Lot Notice of Intent

The Primary Permittee is typically the owner or developer of a subdivision and is typically the person or entity under whose permit the infrastructure of the subdivision was installed. An individual lot owner or residential builder that conducts land-disturbing activity on an individual lot or group of lots that are part of a Larger Common Plan (LCP) (subdivision) previously permitted by the PW/SWD is a Secondary Permittee.

The Residential Building Erosion Protection & Sediment Control Application found in Appendix A must be completed and submitted to the PW/SWD for approval. If a Primary Permittee will be developing within their own subdivision and will be following the lot grading plan as approved in the original submittal, the Primary Permittee shall sign this form acknowledging that they will be following the approved lot grading plan. If the Primary Permittee chooses to not follow the approved plan or if the original approved submittal did not provide a lot grading plan, they must submit a completed Individual Lot Notice of Intent (IL-NOI) as well as a lot grading plan to the PW/SWD for approval. Once Lexington County has approved the submittal, the IL-NOI will be sent to SCDHEC to receive NPDES coverage. Once SCDHEC approval has been received, this approval letter is to be supplied to the Lexington County Building Department to obtain a building permit.

If a Secondary Permittee will be developing inside of a subdivision, they must get their own land disturbance coverage by submitting a completed IL-NOI to the PW/SWD for approval. If the Secondary Permittee will be following the Primary Permittee's lot grading plan as approved in the original submittal, a copy of this plan must be submitted with the IL-NOI to the PW/SWD. If the Secondary Permittee chooses to not follow the approved plan or if the original approved submittal did not provide a lot grading plan, they must submit a lot grading plan with the IL-NOI to the PW/SWD for approval. If the Primary Permittee is willing to allow the individual lot



owner/residential homebuilder to work under his permit and is willing to take responsibility for the work on the site, the Secondary Permittee must submit a letter stating this intention on the developer's letterhead to the PW/SWD in place of the IL-NOI in the scenarios above.

If there is an existing co-permittee agreement enacted prior to January 1, 2013, a copy of the co-permittee agreement on the developer's letterhead shall be submitted to the Lexington County Building Department. If the applicant will be following the permittee's lot grading plan as approved in the original submittal, a copy of the grading plan being used must be supplied with the agreement. If the applicant chooses to not follow the approved plan or if the original approved submittal did not provide a lot grading plan, a lot grading plan must be submitted to the PW/SWD for approval.

For projects permitted before 1998, no secondary permittee coverage is required.

2.2.2.6 General Land Disturbance Permit

A General Land Disturbance Permit is required for activities consisting of clearing, grading, and installation of storm drainage/system whether commercial or residential, where the type of development does not meet the requirements for other permits as outlined in Sections 2.2.2.1 through 2.2.2.5 of this Manual.

The General Land Disturbance Permit submittal shall contain the following components:

1. Application Form for General Land Disturbance Activities. The SCDHEC Notice of Intent (NOI), that can be found on SCDHEC's website, serves as the permit application for Lexington County. All information requested shall be complete. The signatures submitted on the original NOI shall be the same as the applicant on the engineering plans.
2. Site Narrative: A narrative shall be submitted with the permit application describing the site in general, purposes of the land disturbance, topographic and soil information, adjacent properties and owners, waterbodies receiving stormwater runoff (existing and proposed), existing water quality and flooding issues, and anticipated impacts and benefits. Wetland and/or WoS disturbance issues should be discussed along with details on the status of necessary permit application to the USACE and/or SCDHEC. A summation of pre and post storm flows, volumes and velocities shall be provided in the Comprehensive Stormwater Design Summary Tables found in Appendix D. Upstream and downstream conditions shall also be included. If applicable, the narrative should also contain justification for variances, waivers, or other special conditions of the site.
3. Technical Report: The technical report shall include all the proper stormwater calculations. See Chapter 3 for design requirements.
4. Draft Operation and Maintenance Plan (O&M Plan) for all permanent stormwater components on the site, including a draft (not recorded) maintenance agreement. See Appendix D for more information on the O&M Plan requirements.



5. Engineering/Construction Plans. One complete set of certified and signed construction plans; specifications and calculations are to be submitted with the LDP application/NOI. See Appendix D for the residential and/or commercial checklist for engineering plan requirements. Design requirements can be found in Chapters 3 and 4. When the review is complete, additional sets of certified and signed construction plans and specifications will be requested by the PW/SWD as follows:
 - a. Five sets will be required for projects located in Lexington County.
 - b. Six sets will be required for projects located in municipalities in Lexington County.
 - c. Seven sets will be required for projects located in municipalities whose boundaries are within Lexington County and a neighboring County.

6. Comprehensive Stormwater Pollution Prevention Plan (SWPPP). A Comprehensive SWPPP (C-SWPPP) is a site specific document that identifies sources of stormwater pollution on a construction site, describes practices that will be used to reduce pollutants in stormwater discharges, and identifies procedures the applicant will implement in order to comply with the conditions of the LDP. The C-SWPPP shall also include descriptions of the site and of each major phase of planned activity, the roles and responsibilities of contractors and subcontractors, and the inspection schedule and logs. Modifications to the construction plans and associated stormwater prevention activities should also be documented in the SWPPP. Once construction begins, the Onsite Stormwater Pollution Prevention Plan (OS-SWPPP) must be kept current and reflect conditions and Best Management Practices (BMPs) in the field.

Once the General Land Disturbance Permit submittal is received by the PW/SWD, the Division shall have 20 working days to approve, deny, or issue comments to the applicant. The 20 day review period begins when a complete submittal is received by the PW/SWD and a pre-submittal meeting has taken place. If notice is not given to the applicant or if action is not taken by the end of the 20th working day, the application submittal will be considered approved by Lexington County without review. The NPDES Construction General Permit will not be considered approved without review. For projects considered approved without review, the roads and storm drainage system shall not be taken into the Lexington County maintenance system and will be considered privately maintained. The residential and/or commercial review checklists used by the PW/SWD is provided in Appendix D.

If review comments require further information, or a denial is issued, a response detailing these issues will be sent to the applicant. A meeting between the PW/SWD, engineer and developer is required. This meeting is to address the issues listed in the correspondence sent to the applicant. This meeting is not to serve as a re-submittal review. PW/SWD staff will not begin subsequent reviews until after this meeting has taken place.

Revisions are submitted directly to the PW/SWD. Once received the PW/SWD has 20 working days to review, approve or deny. If notice is not given to the applicant, or if action is not taken by the end of the respective time period, the application submittal will be considered approved without review.



If the revisions did not initially contain all necessary information, correspondence will be made by the PW/SWD to the applicant/engineer. This constitutes a second revision and requires an additional review fee. If an additional comment is offered by PW/SWD based on an exclusion from previous reviews, then an additional review fee shall not be required. See fee schedule on Lexington County's website for additional review fees. This process will continue until all information needed by the PW/SWD has been received.

Once requirements have been met for approval, the PW/SWD will request the applicant/engineer to submit the additional full sets of construction drawings and the NPDES permit coverage fee. The County's approval letter, the NOI and permit coverage fee will then be forwarded to SCDHEC for coverage under the NPDES General Permit for Stormwater Discharges from Large and Small Construction Activities. SCDHEC may request additional information from the applicant. Any such requests will be submitted directly to SCHDEC. The applicant shall copy Lexington County on any such submittals. Review time is dictated by SCHDEC. Once all information requested by SCDHEC has been satisfied, a letter will be sent to the applicant granting coverage under the NPDES Construction General Permit. The applicant must then notify the PW/SWD that NPDES permit coverage has been granted by SCDHEC. Once the PW/SWD is notified, the General LDP can be issued by the PW/SWD. If the project is located in a municipality which has adopted the Lexington County Stormwater Ordinance, a copy of the County and SCDHEC approval will be forwarded to the municipality. At the end of this process, the owner will have two permits; one from SCDHEC (NPDES) and one from Lexington County (General LDP). If the project is located within a municipality, the permit will be forwarded directly to the municipality, and they will distribute the permit to the applicant.

The PW/SWD reserves the right to deny a permit if an application fails to conform to the provisions of the Stormwater Management Ordinance and/or this Manual.

2.2.2.7 Animal Feeding Operation Permit

A general LDP (Section 2.2.2.6) shall be obtained for all Animal Feeding Operations that disturb one acre or more.

2.3 Fees

All required fees, except the Small Commercial Land Disturbance Permit and NPDES fee, shall be submitted with the permit application submittal. Land Disturbance Permit fees may be updated annually as approved by Lexington County Council. The fee schedule can be found on the PW/SWD website.

NPDES: For all land disturbing activities involving one (1) or more acres, or part of a larger common development, a NPDES General Permit coverage fee applies in addition to the Lexington County review/inspection fees. This fee will be forwarded on to SCDHEC by Lexington County after the project has been approved to obtain the applicant's NPDES permit coverage. The NPDES fee is listed on the SCDHEC NOI.



2.4 Deadlines for Re-Submittal

If a project has been reviewed by the PW/SWD and revisions are requested the revisions must be submitted within six months of the date of the review letter. After five months have elapsed the applicant will be notified that the project review timeline will expire in 30 days. The applicant will have 30 days to re-submit the plans. If submittals have not been received by the sixth month the project will be considered closed. Inspection fees may be refunded to the project applicant. Future reviews will require the applicant to resubmit the project in accordance with the most current regulations and fee requirements.

2.5 Maintenance Schedules, Agreements, and Easements

When stormwater management facilities and system components are to be maintained by an owner, lessee, or other designated party, Lexington County must be given assurance that such activities will be conducted. This is to be established using legally binding agreements that require maintenance during and after construction, creation of maintenance schedules for all stormwater system components, and designation of the responsible parties in perpetuity. A copy of all maintenance agreements are listed in the Appendix D.

The process for developing and finalizing an Operation and Maintenance Plan (O&M Plan) for the permanent stormwater system on a project is generally described in Figure 2-2. Since the full stormwater system and all BMPs are proposed during the plan submittal process, the O&M plan cannot be completed and finalized until after the site has been built, the components have been constructed and verified in the field with an as-built certification, and the maintenance agreement (if required) has been finalized and recorded. A Certificate of Occupancy cannot be issued until the O&M Plan has been finalized.

For residential development, the County may choose to accept maintenance responsibility for sites designed using Option B: Unified Sizing Criteria after the stormwater system has been constructed and an as-built certification verifies that the structure(s) was built according to plan. However, a developer may elect to have ponds and other permanent stormwater system components privately maintained.

Commercial developments are responsible for the long term operation and maintenance of all stormwater system components, regardless of the stormwater design option.

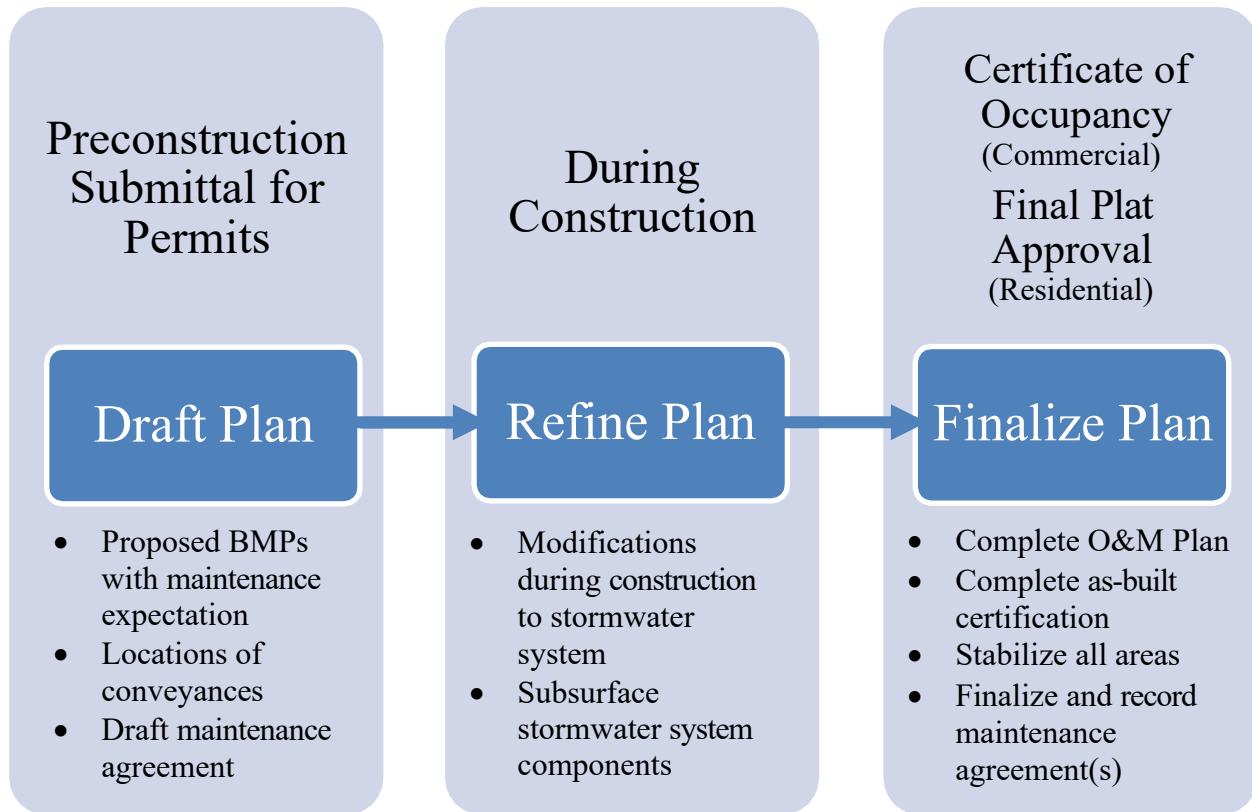


Figure 2-2. Operation and Maintenance Plan Development Process.

In an effort to help designers and developers understand the long term operation and maintenance of permanent stormwater controls such as ponds, bioretention areas, and water quality credit areas, PW/SWD has developed standard operation and maintenance plans for each control, which are located in Appendix D. These standard O&M Plans should be used in developing the overall site operation and maintenance plan, including the maintenance agreement found in Appendix D. Where new permanent control practices have been incorporated into the overall site plan, the designer or developer must prepare a separate O&M Plan for that control and have the O&M Plan approved by PW/SWD before the final as-builts are submitted to PW/SWD.

2.6 Project Construction

The applicant shall notify the PW/SWD 48 hours before construction begins. A pre-construction conference shall be required on-site for all sites obtaining a General LDP. Construction activities must adhere to the provisions agreed to in the approved LDP and SWPPP. Any substantial revisions to the approved General LDP or SWPPP shall be submitted in writing to PW/SWD along with any subsequent fees. Such changes shall not be implemented until written approval is given.

The owner is required to maintain at least one copy of all approved permits, technical reports, construction documents and the up-to-date OS-SWPPP onsite at all times until a Notice of Termination (NOT) has been obtained. The LDP shall be posted in a visible location on the site. A qualified individual must perform site inspections consistent with the SCDHEC Construction General Permit (CGP) at least once every calendar week.



2.6.1 Transfer of Land Disturbance Permit and/or NPDES Permit Coverage

When a developer wishes to transfer LDP coverage, a completed Transfer of Ownership Application must be submitted to the PW/SWD. The engineer of record, or a new engineer of record, must submit plans with certifications signed by the new LDP holder. If a performance bond has been executed for the project, a new bond and supplemental surety from the new LDP holder must be received and approved by the Community Development Department before the LDP can be transferred. The Transfer of Ownership Application can be found in Appendix A.

When a permit holder transfers the County permits, the developer must also transfer the SCDHEC Construction General Permit coverage to relieve him of his NPDES responsibilities. These transfer requirements shall be obtained from SCDHEC.

2.7 As-Built Certifications

Stormwater controls and conveyance components must be installed per the approved plans and maintained perpetually. In an effort to ensure that controls are built per the approved plans, PW/SWD requires that as-built certifications be completed for all stormwater controls and conveyance components, including any water quality treatment credit areas. As-built information may be required for temporary controls if deemed necessary by the PW/SWD. For specific requirements of residential and commercial as-builts, a checklist is provided in Appendix E. Note that the checklists are to be used as guidelines for as-built submittals and additional information may be required if deemed necessary by the PW/SWD. A Professional Engineer (PE) is required to certify the as-built drawings. The developer/owner may be required to modify the stormwater infrastructure to meet the approved design criteria. The calculations shall address any water quality and/or quantity goals of the approved plans.

Appendix E contains required as-built certification language to be included on as-built drawings.

2.8 To Terminate Land Disturbance Permit (TLDP) Coverage

To terminate a commercial land disturbance permit, the as-builts (and any other documents if required) must be approved and all final site inspections are completed by the PW/SWD. Once these have been completed, PW/SWD will issue a termination letter and notify the Lexington County Building Department or the municipality to release any stormwater holds on the Certificate of Occupancy (CO). If the permit was required to have NPDES coverage a signed Notice of Termination (NOT) shall be submitted to Lexington County for approvals. The NOT will be forwarded to SCDHEC for NPDES termination.

To terminate a residential land disturbance permit, the as-builts must be approved and final site inspections completed by the PW/SWD. The final plat redlining process shall be completed and final plats must be recorded with Lexington County. After the final plat has been recorded, the Community Development Department may release all remaining bonds. A signed Notice of Termination (NOT) shall be submitted to Lexington County for approvals. The NOT will be forwarded to SCDHEC for NPDES termination.



2.9 Exemptions

The provisions of this section shall not apply to those items that are exempt in the Lexington County Stormwater Ordinance.

Construction activities of the S. C. Department of Transportation (SCDOT) conforming to the requirements of 1976 SC Code of Laws Section 48-18-10 and corresponding Regulation 72-400 are exempt from this section.

If a developer or landowner believes other exemptions to the requirements of this Manual or the Stormwater Ordinance may apply, the exemption must be provided in writing to PW/SWD to verify.

2.10 Other Authorizations or Requirements

Where any authorizations, requirements, or other securities are required by applicable laws, regulations or ordinances for any part of the proposed work to be done under the LDP, the applicant shall furnish PW/SWD with evidence that such requirements have been met before the LDP will be approved. The list below contains examples of additional authorizations or requirements that may be necessary when disturbing land within Lexington County. It shall be the responsibility of the applicant to determine if other authorizations or requirements are applicable; however the pre-submittal meeting will be helpful in determining if such additional necessities exist.

Some of the potential requirements or authorizations that may be required are listed below. Note: this is not a comprehensive list.

1. Planning Commission, Stormwater Advisory Board and/or County Council approval, and Special Protection Areas Regulations (these are typically for areas with known flooding or water quality problems – see Chapter 3);
2. USACE or SCDHEC permits and/or certifications, if required, for disturbance of wetlands/Waters of the State. USACE Jurisdictional Determination of onsite wetlands if there are any onsite;
3. Applicants shall have obtained written documentation of all necessary offsite easements and/ or agreements;
4. A copy of the encroachment permit application or approved permit;
5. All necessary stormwater discharge agreements shall be recorded;
6. Road closures

2.11 Expiration of Permit

A LDP will remain valid for up to five (5) years from the date of approval. A project will be considered expired after five (5) years have elapsed from the approval date. The project will also



expire if a project has not started, or is inactive for a period of 24 consecutive months. Once a permit has expired it must be re-submitted in accordance with the most recent development guidelines and fee schedule. Requests for an extension of the LDP must be submitted to the PW/SWD. Extensions will be reviewed on a case-by-case basis. Projects that were approved before the current revision of this Manual are not eligible for a permit extension.

2.12 Responsibility of Permit Holder

During any land disturbance operation, the LDP holder shall be responsible for carrying out the proposed work in accordance with the permit, approved plans, specifications, time schedules, SWPPP, and in compliance with all requirements of the Stormwater Management Ordinance and this Manual.

2.13 Cases Requiring Planning Commission Approval

Certain subdivisions of land must be reviewed and approved by the Lexington County Planning Commission before a LDP or waiver can be issued. Such projects include Private Road Subdivisions, Innovative Developments, and Floodplain Management. The specific requirements for subdividing land can be found in a separate document titled Subdivision Regulations.

2.14 Non-floodplain Variances

The Stormwater Advisory Board may, upon request, provide recommendations for variances or exceptions to any of the provisions of this Manual, provided such variances or exceptions are in harmony with the general purpose and intent of the Stormwater Management Ordinance and this Manual. A written request for a variance shall be provided to the Stormwater Advisory Board and shall state the specific variance(s) sought and the reason(s) with supporting data for the request. The applicant will be scheduled to present the request to the Stormwater Advisory Board within four weeks of submitting the variance request to PW/SWD. After the presentation the Stormwater Advisory Board will review the variance request and provide its recommendation to the Director of Public Works, who will make the final decision. Any request for variance shall be clearly stated in the LDP application. Procedures for variances related to floodplain issues are covered in Chapter 11.



3 STORMWATER DESIGN REQUIREMENTS

3.1 Preface

This chapter provides engineers, designers, developers, and others with the necessary information to assist with the development of systems that will control the rate, volume, and pollutants released from a new or re-development project. The Public Works Stormwater Division (PW/SWD) has been authorized by law or agreement to enforce design requirements for water quality and quantity. These design requirements are based on Best Management Practices (BMPs) and reference State and Federal regulations, engineering publications, and other municipal and academic guidance.

It is an overall goal of this Chapter to provide a set of design standards that will result in effective stormwater management. The goal is to mitigate the impact of land development on existing/natural hydrologic and hydraulic processes, as well as attempt to prevent further degradation of the water resources in Lexington County through proper planning and design. The design professional is required to use all means necessary to develop land in a manner consistent with County Ordinances and this Manual and to ensure the safety of the general public. Specific methods and applications not covered in this section must be discussed with the PW/SWD for applicability.

Note: In addition to the content included in this manual, the Georgia Stormwater Management Manual (GSMM, Volume 2 First Edition August 2001) will also be utilized.

The following process (Figure 3-1) will be described in detail throughout this Chapter, and will be the basis for compliance with the County stormwater requirements.

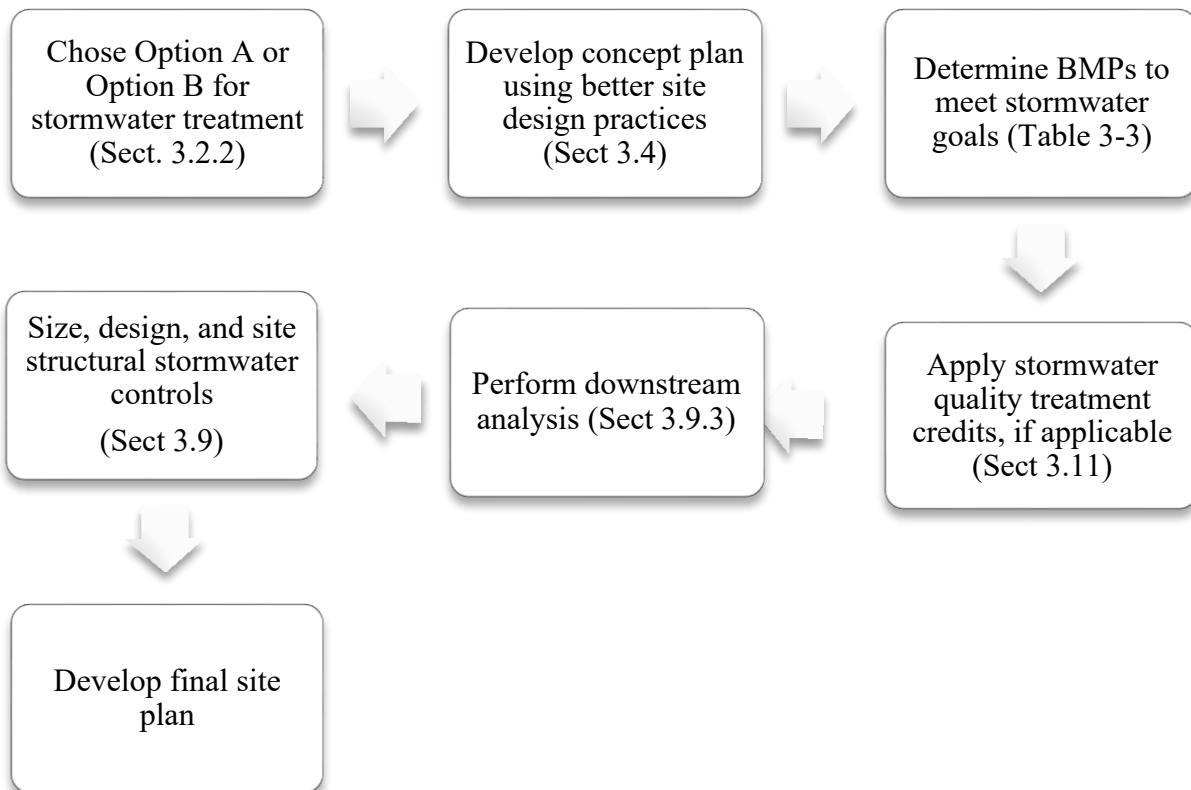


Figure 3-1. Stormwater plan compliance process.

3.2 Stormwater Program Goals and Rationale

On January 2, 2014, Lexington County was authorized to discharge stormwater from the small municipal separate storm sewer system (SMS4) as outlined by the NPDES General Permit for the second permit cycle. This updated permit places a greater emphasis on post-construction BMPs, long-term maintenance and operation of BMPs, and further addresses water quality issues. At the local level, PW/SWD receives multiple complaints and is tasked with addressing issues regarding increased runoff, in-stream velocities, stream degradation and runoff volumes due to development. Past development guidance resulted in unsightly and oversized detention ponds that rarely held water. In addition, the County is taking a proactive approach in an effort to address water pollution to prevent the addition of streams to the impaired waters list and the development of new Total Maximum Daily Loads (TMDLs). These state and local factors led the County to pursue and discover a stormwater design approach that addresses all of these issues and has been implemented by many other local governments similar to Lexington County. The design approach is called the Unified Sizing Criteria (USC) and is outlined in this chapter. To allow flexibility in stormwater design, the County will accept an alternative stormwater design under certain conditions. This section describes the foundation and options for the County’s program addressing water quality and quantity.



3.2.1 Stormwater Program Goals

Lexington County has established the following goals for the County's stormwater program:

1. Prevent damage to property from large and small storm events. The mechanisms through which the County meets this goal are:
 - a. Floodplain management program. The County's floodplain management program establishes criteria for new development in flood-prone areas along large streams and rivers. See Chapter 11 of this manual for more information on the requirements of the floodplain program.
 - b. Unified Sizing Criteria and downstream property protection. The Unified Sizing Criteria (USC) applies to new development and requires that post-development flows are equal or are less than the pre-development flows for the 2-, 10- and 25-yr storm events. In addition, the 100-yr storm event is safely conveyed through structural BMPs and impacts to downstream properties and receiving systems are minimized. More information on these design requirements can be found later in this Chapter.
 - c. Downstream analysis. Both stormwater design options require a downstream analysis on receiving systems down gradient from a new development site. The goal of this analysis is to mitigate any potential negative impact on the receiving system.

2. Identify areas of small and large system flooding and identify potential solutions. The mechanisms through which the County meets this goal are:
 - a. Special Protection Areas. The County has identified known areas with existing stormwater system capacity issues, where small system flooding occurs. In these areas, new development is held to more restrictive design criteria to mitigate some of the stormwater capacity issues.
 - b. Ongoing Capital Improvement Planning (CIP). The County continues to seek funding to address small and large system flooding issues through their CIP program, including seeking grants or cost share opportunities to offset the often significant costs associated with system capacity and large system flooding problems.

3. Comply with the County's Small Municipal Separate Stormwater System (SMS4) Phase 2 NPDES Permit. The County's Phase 2 permit contains 6 minimum control measures as well as significant water quality monitoring and improvement requirements. The County is required by permit to ensure compliance with the SCDHEC Construction General Permit as well. The general goals of the Phase 2 permit are to reduce the water quality impacts from new development and municipal operations, and to develop strategies to improve streams that do not have acceptable water quality. The mechanisms through which the County meets this goal are:
 - a. Interlocal agreements. The County works cooperatively with the municipalities located within the County to administer the permit consistently.
 - b. Stormwater Management Program. The County has a stormwater management program that outlines steps the County is taking to meet the requirements in the Phase 2 permit, which includes regulating new development stormwater quality to



standards outlined in the Phase 2 permit, extensive stream and stormwater monitoring, and undisturbed buffers.

- c. Stormwater Ordinance and Land Development Manual. The County is required by the permit to develop regulations and technical guidance criteria for new development such that the development does not cause or contribute to water quality problems in receiving streams. More information the County's rationale for the new development stormwater treatment goals can be found in the next section. In addition, the County must ensure the perpetual operation and maintenance of stormwater controls installed for water quality and quantity management.
4. Encourage development that is in support of the goals identified above. The Land Development Manual contains simplified methods for new development sites to prevent degradation to streams.

3.2.2 Stormwater Program Rationale

As noted above, Lexington County is required to maintain coverage under the Phase 2 NPDES SMS4 General Permit, SCR030000. The Phase 2 permit requires all new development and redevelopment sites that disturb one acre or more (or less than an acre if part of a larger common plan of development) to develop and implement stormwater quality management plans. The Phase 2 permit provides general guidance to SMS4s on the requirements for stormwater quality treatment control plans by providing written site performance standards as follows:

From Section 4.2.5.2 of SCR030000:

1. Permittees must establish, implement and enforce a requirement that owners or operators of new development and redeveloped sites discharging to the SMS4, which disturb greater than or equal to one acre (including projects that disturb less than one acre that are part of a LCP), design, install, implement, and maintain stormwater control measures that approximate pre-development conditions to the MEP (maximum extent practicable) and protect water quality (emphasis added).
2. New Development Standards to be used can be either one, combination, or equivalent combination of design strategies, control measures, practices or provisions such as infiltration, evapotranspiration, rain harvesting, and stormwater reuse and recharge that demonstrate the runoff reduction and pollutant removal necessary to approximate pre-development conditions to the MEP and to protect water quality. The first inch of runoff must be addressed.

The Phase 2 general permit left permittees with significant flexibility in developing standards for stormwater management in new development, though the emphasis was placed on water quality treatment and mimicking predevelopment conditions. In developing the post construction stormwater quality program, the County considered numerous factors related to the environment and the type of development common to the County. The County's standards for stormwater management in new development have been built on the following premises:

1. Develop effective post construction stormwater quality treatment criteria: pollutant loading is directly tied to impervious surfaces; therefore, the County's stormwater quality program



treatment goals are also directly tied to impervious surfaces. (Note: Some stormwater pollutants, such as pathogens and nutrients, are not as directly tied to impervious surfaces. Land management practices may be the cause of higher loadings of pathogens and nutrients, such as landscape area management or septic system or wastewater treatment system maintenance.)

2. Encourage low impact development and green infrastructure: Low impact development principles are encouraged through stream buffers and water quality treatment credits described more fully in section 3.10.
3. Encourage multi-purpose BMPs: For example, bioretention facilities can serve landscaping and stormwater quality treatment requirements, and stormwater detention facilities can be included in a treatment train to meet both stormwater quantity and quality requirements.
4. Encourage redevelopment: For already developed sites that are being redeveloped, stormwater quantity treatment criteria are less restrictive.
5. Long-term operation and maintenance of BMPs: The County has historically taken perpetual maintenance responsibility of most ponds in residential developments, except where a developer chooses otherwise. Going forward, the County will continue to maintain stormwater ponds in residential areas (unless the developer request otherwise) and may assume maintenance responsibilities of other types of structural BMPs in residential developments based upon the BMP type and the design. All BMPs, whether privately or publicly maintained, must be located in appropriate easements and allow easy access for maintenance. In addition, all privately owned BMPs must be inspected by the owner annually, and documentation of that inspection must be submitted to the County.
6. Provide options for post-construction stormwater management. Two options are available to meet the post-construction stormwater management requirements:
 - a. Option A – Use the method outlined in Section 3.5 of this manual. (Note that this design method was adopted in the 2007 version of the Land Development Manual). This methodology requires that post-development peak flow rates not exceed pre-development peak flow rates for the 2-year, 10-year, and 25-year, 24-hour storm events. Additionally, all permanent stormwater management facilities shall be designed to detain the pre-development runoff volume for the 2-year and 10-year storms for a period of 24 hours. This option is only allowed where ponds and other BMPs installed on the project are to be privately maintained perpetually.
 - b. Option B – Use the Unified Sizing Criteria Method outlined Section 3.6 of this manual. In summary, this method includes specific requirements to treat the Water Quality Volume (WQV), the Channel Protection Volume (CPV), Overbank Flood Protection (QOF), and Extreme Flood Protection (Q100). All BMPs that are to be maintained by the County shall be designed using this design methodology.



3.3 General Requirements

General requirements for all new development plans will include, but are not limited to the following:

1. For all commercial LDPs (land disturbance permits) and residential LDPs, an assessment of the presence/absence of wetlands/Waters of the State shall be performed on all sites and certified by a qualified professional. If wetlands/Waters of the State are found to exist on a property, they shall be investigated and delineated by a qualified consultant. If wetlands are present, Lexington County will not issue a Land Disturbance Permit without a confirmation or denial letter from the US Army Corps of Engineers (USACE).
2. SCDHEC has approved several TMDLs within the County. Where a new development site drains to streams that have approved TMDLs or impaired streams, additional pollutant reduction criteria may be required.
3. Better site design principles may be applied to all new development sites to fit the design to the property and limit impacts to natural features such as streams and wetlands.
4. The stormwater design criteria addressed in this chapter includes two options:
 - a. Option A: Traditional Method (from 2007 Land Development Manual), which includes
 - i. Post-development peak flow rates not to exceed pre-development peak flow rates for the 2-year, 10-year, and 25-year, 24-hour storm events;
 - i. All permanent stormwater management facilities shall be designed to detain the pre-development runoff volume for the 2-year and 10-year storms for a period of 24 hours;
 - ii. Permanent water quality ponds and water quality structures having a permanent pool elevation shall be designed to store the first ½-inch of runoff from the contributing area of the site and release the accumulated water quality volume (WQ_V) over a minimum period of 24-hours, and;
 - iv. Downstream analysis
 - b. Option B: Unified Sizing Criteria (USC), which includes
 - i. The Water Quality Volume (WQ_V)
 - i. The Channel Protection Volume (CP_V)
 - ii. Overbank Flood Protection (Q_{OF})
 - iv. Extreme Flood Protection (Q₁₀₀)
 - v. Downstream analysis
5. Specific design and performance requirements for each allowable BMP: The County is required through its SMS4 permit to ensure the long term operation and maintenance of all permanent stormwater BMPs. One component of the County's stormwater BMP maintenance program is the requirement for all new developments with privately owned stormwater facilities to have a comprehensive operation and maintenance plan. This plan



includes a notarized covenant that is to be recorded with the Register of Deeds in Lexington County (See Chapter 2).

6. To encourage development of previously developed sites (i.e., redevelopment), stormwater controls for water quality and quantity are required only when the impervious surface area of the proposed redevelopment is greater than the development's existing impervious area. If the impervious area of the proposed redevelopment is equal to or less than the impervious area of the existing development, then no additional stormwater quality or quantity treatment is required. When required, stormwater quality and quantity treatment shall be designed based on the difference between the total impervious area of the proposed redevelopment and the total impervious area of the existing development.
7. All stormwater management and sediment control practices shall be designed, constructed, and maintained with consideration for the proper control of mosquitoes and other vectors.

3.4 Better Site Design

Through stormwater better site design practices and techniques, it is possible to reduce the amount of runoff and pollutants generated. Better site design concepts can be viewed as both water quantity and water quality management tools, and can reduce the size and cost of required structural stormwater controls. The site design approach can be used to better mimic the natural hydrologic conditions of the site, include management techniques that have a lower maintenance burden, and provide for more long-term and sustainable stormwater management. Better site design includes:

1. Conserving natural features and resources
2. Using lower impact site design techniques
3. Reducing impervious cover
4. Utilizing natural features for stormwater management

For each of the above categories, there are a number of practices and techniques that reduce the impact of urban development and stormwater runoff from the site. These better site design practices are described in detail in Section 3.9.

For several of the better site design practices, there is a direct economic benefit to their implementation for both stormwater quality and quantity. For both design types, the incorporation of better site design practices can reduce the size of a BMP and reduce the downstream impact. In addition, the Unified Sizing Criteria allows for treatment offsets for some specific nonstructural site design practices called water quality volume treatment credits.



Table 3-1. Benefits of using better site design practices.

	Potential Benefits of the Use of Better Site Design Practices
Reduced BMP sizes	<ul style="list-style-type: none"> • Better site design practices that reduce the total amount of runoff will also reduce pond sizes and WQ_v by a proportional amount. • Better site design preserves naturally beneficial stormwater areas, which reduces total runoff volume. • Better site design practices focus on reducing the impervious surfaces on a site, which inherently reduces the stormwater volume to be treated.
Reduced downstream impacts	<ul style="list-style-type: none"> • The use of better site design practices that reduce the total amount of runoff will also reduce the sizing of water quantity BMPs by a proportional amount.

3.4.1 List of Stormwater Better Site Design Practices and Techniques

The stormwater better site design practices and techniques allowed for in this Manual are grouped into four categories and are listed below:

1. Conservation of Natural Features and Resources
 - a. Preserve undisturbed natural areas
 - b. Preserve riparian buffers
 - c. Avoid floodplains
 - d. Avoid steep slopes
 - e. Minimize locating impervious areas on porous soils
2. Lower Impact Site Design Techniques
 - a. Fit design to the terrain
 - b. Locate development in less sensitive areas
 - c. Reduce limits of clearing and grading
 - d. Utilize open space development
 - e. Consider creative development design
3. Reduction of Impervious Cover
 - a. Reduce roadway lengths and widths
 - b. Reduce building footprints
 - c. Reduce the parking footprint
 - d. Reduce setbacks and frontages
 - e. Use fewer or alternative cul-de-sacs
 - f. Create parking lot stormwater "islands"
4. Utilization of Natural Features for Stormwater Management
 - a. Use buffers and undisturbed areas
 - b. Use natural drainage ways instead of storm sewers
 - c. Use vegetated swale instead of curb and gutter
 - d. Drain rooftop runoff to pervious areas



More detail on each site design practice is provided in the "Stormwater Better Site Design Practice Summary Sheets" in subsection 1.4.2 of the GSMM. These summaries provide the key benefits of each practice, as well as examples and details on how to apply them in site design. Site design should be done in unison with the design and layout of stormwater infrastructure in attaining stormwater management goals. Figure 3-2 illustrates the stormwater better site design process that utilizes the four better site design categories.

Note that the County has identified five better site design practices as water quality treatment credits that can be used to further decrease the sizes of structural BMPs. These water quality treatment credits can be found in Section 3.10 of this Chapter. All criteria for a water quality treatment credit must be met in order to be considered as a treatment credit.

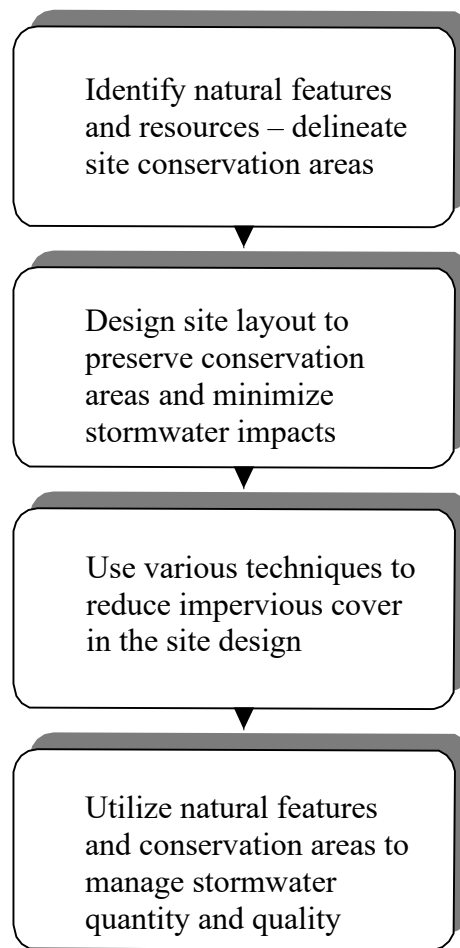


Figure 3-2. Stormwater better site design process.



3.5 Option A: Traditional Method

The traditional stormwater design method from the 2007 Land Development Manual may be used for stormwater design. However, this option is only allowed where the ponds and other BMPs installed on the project are to be privately maintained perpetually.

3.5.1 Water Quantity Control Requirements

Water quantity control is an integral component of overall stormwater management. Its purpose is to negate the effects of stormwater runoff associated with land use changes due to development during storm events. The following design criteria are established for water quantity control.

1. All permanent stormwater management facilities associated with new and redevelopments shall be designed and constructed to detain the pre-developed runoff volume for the 2 and 10-year 24-hour storm events for a period of 24-hours. To assist with design constraints, a tolerance may be given for peak flow rate matching for all storm events.
2. Post-development discharge rates shall not exceed pre-development discharge rates for the 2, 5, 10, and 25-year frequency 24-hour duration storm events. The same hydrologic procedures shall be used in determining both the pre-development and post-development peak flow rates.
3. Post-development discharge velocities shall be reduced to provide non-erosive flow velocities from structures, channels or other control measures, or equal the pre-development 10-year 24-hour storm event flow velocities, whichever is less. These should be considered onsite in addition to 600 ft downstream from the proposed project.
4. For post construction the detention volume from all controls shall be drained from the structure within 72 hours. During construction detention volumes can be temporarily stored to allow settling of particles. During construction, basins cannot be temporarily undercut to handle sediment storage. Upon project finalization pond elevations must be per the approved plans.
5. No discharge basins shall be required on those sites which do not currently discharge stormwater runoff or have no existing outlet. Appendix D contains information on that design.

3.5.2 Water Quality Control Requirements

The following design criteria are established for water quality control and shall be incorporated by the use of BMPs for a given project area. Incorporation of these requirements shall constitute adequate control of the discharge of pollutants.

1. All permanent stormwater management facilities associated with new and redevelopments shall be designed and constructed to detain the pre-developed runoff volume for the 2 and 10-year 24-hour storm events for a period of 24-hours. To assist with design constraints, a



tolerance may be given for peak flow rate matching for all storm events.

2. All sites which disturb one (1) acre or more shall have permanent BMPs installed. Stormwater discharges to special protection areas with sensitive resources are subject to additional performance.
3. Permanent water quality ponds and water quality structures having a permanent pool elevation shall be designed to store the first ½-inch of runoff from the contributing area of the site and release the accumulated WQV over a minimum period of 24-hours.
4. Permanent water quality structures not having a permanent pool elevation shall be designed to store the first 1-inch of runoff from the contributing area of the site and release the WQV over a minimum period of 24-hours.
5. Engineered devices that are designed to treat the runoff volume from a project area may be substituted for a permanent water quality pond, if appropriate and if the design meets the criteria set forth in this manual.
6. BMPs used strictly for water quality that will be capturing five (5) or more acres shall have a pretreatment device as part of the BMP or treatment system. This may include forebays, vaults, or other devices that remove debris and coarser sediments from the drainage system.

3.6 Option B: Unified Sizing Criteria

This section presents an integrated approach for meeting the stormwater runoff quality and quantity management requirements by addressing the key adverse stormwater runoff impacts from site development and redevelopment in a design methodology called the Unified Sizing Criteria. All sites with BMPs that are to be maintained by the County must use this design method. The purpose of the Unified Sizing Criteria is to provide a universal design framework, which will:

1. Reduce pollutant loading from stormwater runoff and improve water quality
2. Prevent downstream streambank and channel erosion
3. Reduce downstream overbank flooding
4. Safely pass or reduce the runoff from extreme storm events

More detailed discussions on the Unified Sizing Criteria can be found in Section 1.3 of the GSMM. Table 3-2 below briefly summarizes the criteria.



Table 3-2. Summary of the unified sizing criteria for stormwater design.

Sizing Criteria	Description
Water Quality Volume, WQ _V	Treat the volume of runoff from the majority of the storms that occur in an average year. For Lexington County, this equates to providing water quality treatment for the runoff from a site's impervious surfaces from 1.2 inches of rainfall. Treat that volume of runoff through infiltration, filtration, or extended detention to maximum pollutant removal.
Channel Protection Volume, CP _V	Provide extended detention of the 1-year, 24-hour SCS Type II storm event released over a period of 24 hours to reduce bank-full flows and protect downstream channels from erosive velocities and unstable conditions.
Overbank Flood Protection, Q _{OF}	Provide peak rate discharge control of the 2-year, 10-year, and 25-year, 24-hour SCS Type II storm events such that the post-development peak discharge rates do not exceed the pre-development peak discharge rates to reduce overbank flooding.
Extreme Flood Protection, Q ₁₀₀	Evaluate the effects of the 100-year, 24-hour SCS Type II storm event on downstream systems, adjacent property, and downstream property. Manage the impacts of the extreme storm event through detention controls and/or floodplain management.

Each of the Unified Sizing Criteria are intended to be used in conjunction with the others to address the overall stormwater impacts from a development site, for the entire range of critical hydrologic events.

Figure 3-3 graphically illustrates that the criteria are "nested" within one another. For example, the extreme flood protection volume requirement also contains the channel protection volume and the water quality treatment volume. Figures 3-4, 3-5, and 3-6 show how these volumes would be nested in a typical stormwater wet or dry pond designed to handle all four criteria.

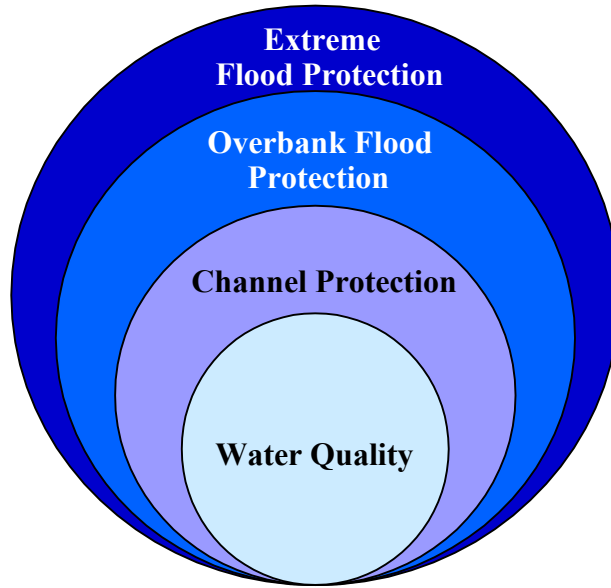


Figure 3-3. Representation of the Unified Sizing Criteria.

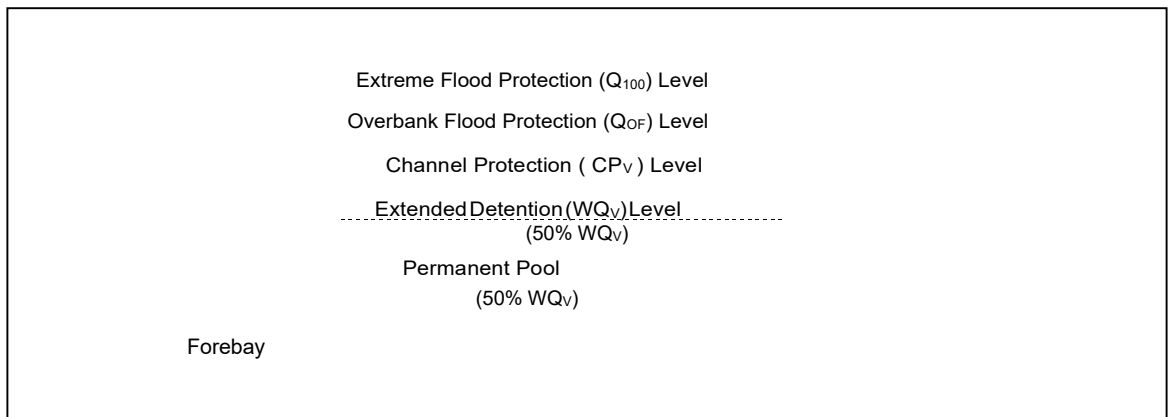


Figure 3-4. Unified Sizing Criteria water surface elevations in a wet extended detention pond.

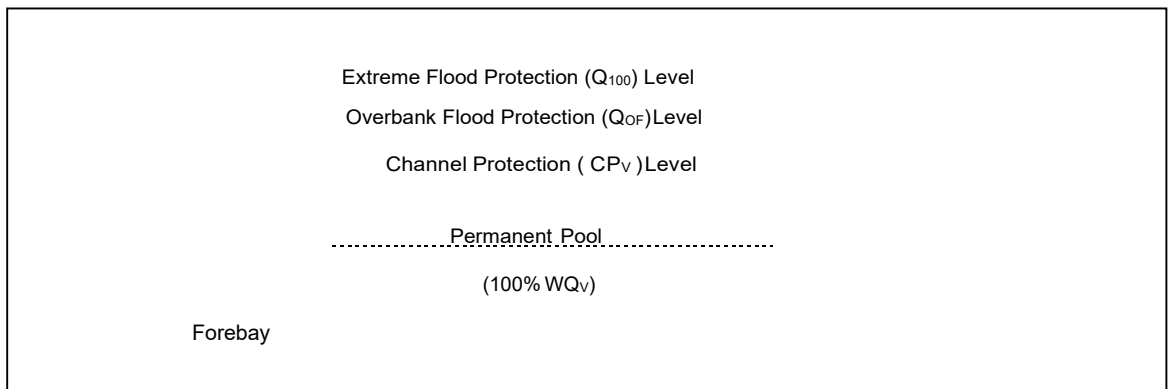


Figure 3-5. Unified Sizing Criteria water surface elevations in a wet pond.

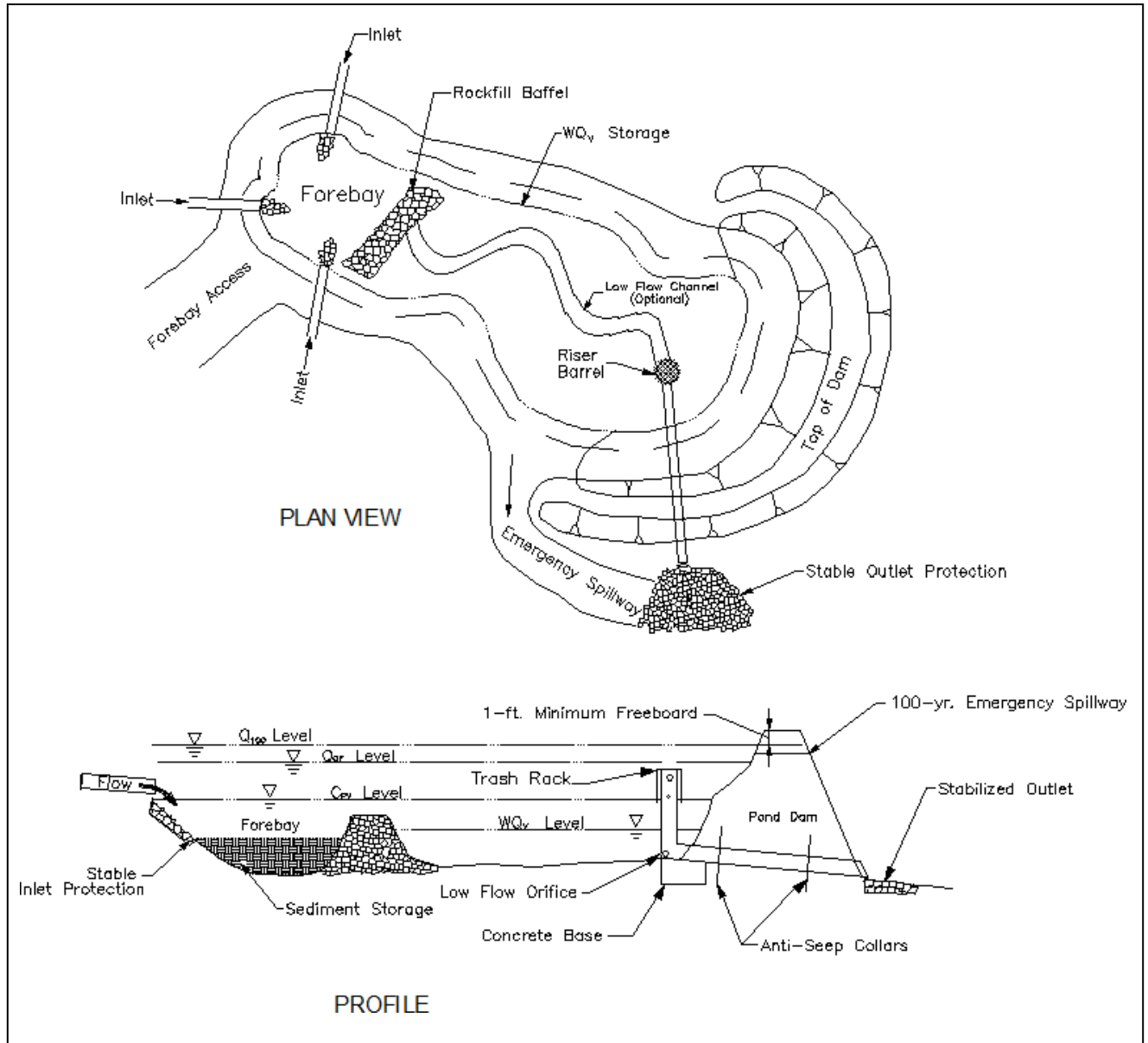


Figure 3-6. Unified Sizing Criteria water surface elevations in a dry extended detention pond.

The following sections describe the four sizing criteria in detail and present guidance on how to properly compute and apply the required storage volumes.

3.6.1 Water Quality Volume (WQ_v)

The Water Quality Volume sizing criterion, denoted as WQ_v, specifies a volume of runoff that must be treated to reduce pollutant loading. The County’s goal is to treat the 85th percentile storm event, which equates to 1.2 inches on an average annual basis. WQ_v is calculated based upon impervious surfaces at the site. Hence, the water quality treatment volume is directly related to the amount of impervious cover at a site. Therefore, if a site designer reduces the imperviousness at a site, the required treatment volume is also reduced.



The volumetric runoff coefficient (R_V) and the site area are the key factors in the WQ_V calculation, as shown in the formula below:

$$WQ_V = \frac{1.2 \times R_V \times A}{12} \quad \text{where:}$$

WQ_V = water quality volume based upon 1.2-inches of rainfall, acre-feet

A = site area (acres)

$R_V = 0.05 + 0.009(I)$ where:

I = impervious cover expressed as a percent (i.e. I = 30 for 30% impervious cover)

Determining the Water Quality Volume (WQ_V):

1. Measuring impervious area: The area of impervious cover can be taken directly off a set of plans or appropriate mapping. For residential subdivisions, the impervious cover for the infrastructure (roadways, sidewalks, etc.) on the set of plans should be measured from the plans. For each residential lot, the designer must estimate the maximum expected imperviousness. For commercial subdivisions where regional water quality and quantity BMPs will be designed and installed, each commercial lot must have an estimate of the maximum amount of imperviousness and then this maximum imperviousness must be conveyed to any future developer of the commercial lot through a restrictive covenant or contract document.
2. Multiple drainage areas: When a development project contains or is divided into multiple drainage areas, the Unified Sizing Criteria components must be calculated and addressed separately for each drainage area.
3. Off-site drainage areas: Off-site existing impervious areas may be excluded from the calculation of the WQ_V . However, offsite impervious surfaces must be included in the other components of USC.
4. Better site design practices: The use of certain better site design practices may allow the WQ_V to be reduced by reducing the imperviousness and laying out the site to take advantage of soils with good infiltration.
5. WQ_V treatment credits: To encourage the use of non-structural BMPs, PW/SWD has developed WQ_V treatment credits. These credits have design criteria that must be met. For more information on these credits, see Section 3.11.
6. For off-line BMPs – determining the peak discharge for the water quality storm: When designing the off-line structural control facilities, the peak discharge of the Water Quality Storm (Q_{WQ}) can be determined using the method described in Section.
7. WQ_V can be expressed in cubic feet by multiplying by 43,560 ft³/acre-foot.



8. Treatment of the water quality volume with structural BMPs: The water quality treatment requirement can be met by using a variety of stormwater BMPs, including but not limited to:
 - a. Stormwater ponds
 - b. Stormwater wetlands
 - c. Bioretention areas
 - d. Infiltration trenches
 - e. Enhanced swales
 - f. Sand filters

See Section 3.9 for additional information on structural BMP design.

3.6.2 Channel Protection (CP_V)

The CP_V sizing criterion specifies that 24 hours of extended detention be provided for runoff generated by the 1-year, 24-hour rainfall event to protect downstream channels.

1. To meet the extended detention requirement, the CP_V must be released over a period of at least 24 hours.
2. CP_V control is not required for sites with minimal areas or imperviousness that results in post-development discharges less than 2.0 cfs.
3. The use of nonstructural site design practices that reduce the total amount of runoff will also reduce the channel protection volume by a proportional amount.
4. CP_V treatment may not be required for sites that discharge directly into larger streams, rivers, wetlands, or lakes where the reduction in the smaller flows will not have an impact on streambank or channel integrity. Acceptance of this design must be obtained from PW/SWD prior to submitting plans.

The increase in the frequency and duration of bank-full flow conditions in stream channels due to urban development is the primary cause of streambank erosion and the widening and down-cutting of stream channels. Therefore, channel erosion downstream of a development site can be significantly reduced by storing and releasing stormwater runoff from the channel-forming runoff events (which correspond approximately to the 1-year storm event) in a gradual manner to ensure that critical erosive velocities and flow volumes are not exceeded.

Determining the Channel Protection Volume (CP_V):

1. Rainfall depths: The rainfall depth of the 1-year, 24-hour storm is 3.1 inches.
2. Multiple drainage areas: When a development project contains or is divided into multiple drainage areas, CP_V must be calculated and addressed separately for each drainage area.
3. Off-site drainage areas: Off-site drainage areas must be modeled as “existing condition” for the 1-year storm event. If there are adequate upstream channel protection controls, then the off-site area can be modeled as “forested” or “natural” condition. A structural stormwater control located “on-line” will need to safely bypass any off-site flows.



4. Routing/storage requirements: The required storage volume for the CPV may be provided above the WQV storage in stormwater ponds and wetlands with appropriate hydraulic control structures for each storage requirement.
5. Control orifices: Orifice diameters for CPV control of less than 3 inches are not allowed without adequate clogging protection.

3.6.3 Overbank Flood Protection (Q_{OF})

The Overbank Flood Protection criterion specifies that the post-development 2-year, 10-year, and 25-year, 24-hour storm peak discharge rates, denoted as Q_{OF} , not exceed the pre-development (existing conditions) discharge rates. This is achieved through detention of runoff from the 2-year, 10-year, and 25-year events.

1. Larger storms (> 25 -year) are partially attenuated through the control of Q_{OF} .
2. The use of nonstructural site design practices that reduce the total amount of runoff will also reduce Q_{OF} by a proportional amount.
3. When the County has designated a watershed to have existing flooding problems that require increased detention and flood control requirements (See Section 0), the Q_{OF} flows must be reduced to one-half (50%) of the existing flows.

If the channel protection criterion is not used (e.g. post-development discharges less than 2.0cfs), then for overbank flood protection, peak flow attenuation of the 2-year through the 25-year return frequency storm events must be provided.

Determining the Overbank Flood Protection Volume (Q_{OF}):

1. Peak-discharge and hydrograph generation: The SCS TR-55 hydrograph method shall be used to compute the peak discharge rates and runoff volumes for all analyzed storm events. Apply the methodology for estimating the required storage volume provided below.
2. Rainfall depths: The rainfall depth of the 2-year, 24-hour storm event is 3.6 inches. The rainfall depth of the 10-year, 24-hour storm event is 5.3 inches. The rainfall depth of the 25-year, 24-hour storm event is 6.4 inches.
3. Off-site drainage areas: Off-site drainage areas must be modeled as existing condition for the design storm events and do not need to be included in the estimates, but maybe routed through a structural stormwater control.
4. Downstream analysis: Downstream areas must be checked to ensure that there is no negative impact from the Q_{OF} under post-development conditions to the point downstream where the site area is 10% or less of the total drainage to that point.



3.6.4 Extreme Flood Protection (Q₁₀₀)

The Extreme Flood Protection criterion is provided to support the planning of stormwater management facilities and associated grading plans and site layouts that need to be designed to protect buildings, ponds, roads, and other permanent structures from the 100-year, 24-hour return frequency storm event, denoted Q₁₀₀. This is accomplished either by:

1. Controlling Q₁₀₀ through on-site or regional structural stormwater controls to maintain the existing 100-year floodplain. This is done where residences or other structures have already been constructed within the 100-year floodplain fringe area and would be expected to incur greater or more frequent flooding as a result of the proposed development; or
2. By designing the on-site conveyance system, site grading, and building layout to safely pass Q₁₀₀ without impacting downstream buildings, ponds, roads, or other permanent structures and allowing it to discharge into a receiving system.

Note: Flows can be conveyed without retention or detention to a receiving floodplain if it can be shown that the floodplain is sufficiently sized to account for extreme flow increases from the site without causing damage. Where the designer believes that detention is not necessary on the site, the downstream analysis must show that there will be no negative downstream impact from the Q₁₀₀. Section 3.9.3 details the requirements of the downstream analysis.

Local flood protection (levees, floodwalls, flood proofing, etc.) and/or channel enlargements may be offered as a substitution on site to address the conveyance of the Q₁₀₀ as appropriate, as long as adequate conveyance and structural safety is ensured through the measure used.

Determining the Exterme Flood Protection Criteria (Q₁₀₀):

1. Peak-discharge and hydrograph generation: The SCS TR-55 hydrograph method will be used to compute the peak discharge rate and runoff for the 100-year, 24-hour storm.
2. Rainfall depths: The rainfall depth of the 100-year, 24-hour storm will be 8.3 inches.
3. Off-site drainage areas: Off-site drainage areas that drain through the site must be modeled as existing condition for the 100-year storm event to ensure safe passage of future flows. Consult PW/SWD to determine full built out conditions for adjoining properties based upon either development plans that are in process or land use designations.

3.7 Special Protection Areas

In an effort to address some of the most critical water resource problems that exist in the County, Special Protection Areas have been established. Those wishing to develop or redevelop lands within these protected areas will be required to comply with the minimum standards listed in the following sections (i.e. The Unified Sizing Criteria) as well as a more stringent set of design criteria detailed in sections 3.7.1 – 3.7.3. Special Protection Areas generally focus on either a water quantity or a water quality problem.



3.7.1 Flooding Problem Areas

Flooding problem areas exist in locations around the County where development densities have increased to the point that stormwater controls are overwhelmed, or where controls were never adequately designed or installed to control runoff (see Lexington County's GIS). In an effort to relieve existing flooding problems, the following list of design criteria will be required in areas with known flooding problem. These areas may change with time, and it is the developer's responsibility to review the most current map/data to ensure compliance. The requirements listed below, in conjunction with the enforcement of other design criteria listed in the sections above, are expected to assist in reducing these problem areas.

1. The post-development, peak discharge rates are restricted to $\frac{1}{2}$ the pre-development rates for the 2-, 10-, and 25-year storm events.
2. Where an unstudied stream exists within the site boundaries of a new development, the PW/SWD may require that the limits of the 100-year flood be established, regardless of drainage area. When PW/SWD requires a study, a hydraulic modeling methodology consistent with FEMA studies must be used.
3. When deemed appropriate, the PW/SWD can require that a downstream hydrologic (and/or hydraulic) analysis be performed to assess potential impacts to receiving properties and stormwater systems under a 100-year event, due to altered timing of released stormwater discharges (See Section 0). If such a requirement is enacted by the PW/SWD, a hydrologic (and/or hydraulic) modeling methodology consistent with FEMA studies shall be used. A more detailed discussion of this analysis is provided in Section 2.1.9 of the GSMM.

Additional site-specific requirements may be necessary and will be reviewed on a case-by-case basis.

3.7.2 Design Procedures for Impaired Waters and TMDL Watersheds

In conjunction with the NPDES permitting program, SCDHEC, through delegated responsibility from EPA, must identify and mitigate impaired waterbodies. Impaired waterbodies are identified through a monitoring program, the results of which are compared against water quality standards developed to protect designated uses of individual waterbodies. Waterbodies that are not meeting water quality standards cannot be designated as fishing, swimming, recreation, and/or aquatic life areas. In accordance with Section 303 of the Clean Water Act, States must release a bi-annual report of impaired waterbodies. Waters listed on the 303(d) list will eventually have a TMDL developed, which represents the daily amount of a particular pollutant that a waterbody can receive and still meet the water quality standard for its designated use(s).

If a site drains to an impaired (303(d) listed) stream or to a stream that has an adopted TMDL for a pollutant of concern other than sediment or total suspended solids (TSS), the design must also provide pollutant reduction for the pollutant of concern.

The appropriate steps include:



1. Determine if the site is located in the watershed of a receiving water that is impaired (303(d) list) or has an approved TMDL. The 303(d) list will note the pollutant causing the impairment, which is the pollutant of concern. A list of the County's 303(d) listed waters and TMDLs can be found on SCDHEC's website.
2. Determine which structural BMPs are applicable to the land use and address the pollutant(s) of concern. BMPs should be selected based upon the pollutant impairment in the receiving stream. Table 3-3 outlines BMPs and their assumed pollutant reduction capabilities. Below are the pollutant reduction goals for several other pollutants of concern.
 - a. Total suspended solids (TSS) : 80% reduction
 - b. Nitrogen (TK or TN): 30% reduction
 - c. Phosphorus: 50% reduction
 - d. Metals: 40% reduction

Many of the County's streams are impaired due to bacteria. Since the bacteria pollutant reduction capabilities for most structural BMPs are variable, additional pollutant reduction beyond the standard requirement is not required.

When designing BMPs to meet multiple pollutants, the design outlined in Section 0 should be followed with the following additional steps:

1. Revise chosen BMPs until required percent reductions are achieved for all pollutants of concern.
2. Provide all calculations in submittal package in a cohesive, easy to follow organization. Appendix D contains a designer's checklist (commercial and/or residential) outlining the information that must be provided.

3.7.3 Lake Murray

Lake Murray is a vital water resource for Lexington County, providing a drinking source for much of the midlands of South Carolina, as well as a vast habitat for aquatic life. Criteria listed below, in addition to the requirements detailed in this Manual, will be enforced for all new development and re-development projects on or near Lake Murray. These design requirements shall specifically apply to stormwater runoff from all new development and re-development projects that is discharged directly into the lake or is discharged within 50 feet of the 360-foot elevation contour and inside the SCE&G Project Boundary Line (PBL).

The specific design requirements are as follows:

1. Water Quality: Developments with a commercial land use or a parking lot which exceeds 2,000 ft² of impervious surfaces must include BMPs designed to capture hydrocarbons either as pretreatment BMPs or in the main BMP(s).
2. Erosion Prevention: All discharge points shall include energy dissipation features that reduce velocity to a non-erosive state of 5 fps for clay and 2.5 fps for sand unless site conditions warrant further evaluation. The use of level spreaders to dissipate energy and create a sheet flow discharge pattern is preferred over a single, large discharge



pipe/channel. All energy dissipation measures shall be installed above the 360-foot elevation contour.

3. BMP Location: All structural and non-structural BMPs must be located above the 360-foot elevation contour and outside the SCE&G PBL.

3.8 Additional Stormwater Control Requirements

3.8.1 Water Quality Control

Water quality control is an integral and required component of overall stormwater management systems to preserve the water resources of Lexington County. New development and re-development projects must include controls that treat or otherwise limit the discharge of pollutants. These requirements are due to State and Federal requirements. Because this is a requirement of stormwater design, this section provides background information, references, and design standards addressing water quality. This section will utilize the better site design methods described in Section 3.4, as well as the credits described in Section 3.11, to reduce the volumes that must be treated.

Note: The designer must also comply with the buffer requirements described in Chapter 7.

The following design criteria are established for water quality control and shall be incorporated by the use of BMPs for a given project area. Incorporation of these requirements shall constitute adequate control of the discharge of the pollutant(s) of concern.

1. All projects requiring a land disturbance permit as defined in Chapter 2 (excluding Linear Utility and Single Family Residential Not Part of a Larger Common Plan projects) shall have permanent water quality BMPs installed. Stormwater discharges to special protection areas with sensitive resources are subject to additional performance criteria.
2. BMPs used for water quality shall have a pretreatment component as part of the BMP or treatment system. Options include forebays, vaults, or other devices that remove debris and coarser sediments from the drainage system.
 - a. Forebays shall be placed inside the main pond area or upstream of the main storage pond area.
 - b. Unless a separate vault is to be used for the forebay, the forebay shall be separated from the larger detention area by barriers or baffles that may be constructed of earth, stones, riprap, gabions, or geotextiles. The barrier and/or baffles act as a trap for coarse sediments and minimize their movement into the main pond.
 - c. Forebays shall be sized to provide a volume for 0.1-inches of runoff from impervious surfaces. This volume can be included in the BMP design to meet the overall WQ_v .
3. Projects that are located within the watershed of an impaired waterbody (as identified by SCDHEC) or a waterbody with an approved TMDL shall be required to reduce pollutant loading for the pollutant of concern.



4. All BMPs must have a long term Operation and Maintenance Plan. General operation and maintenance templates are provided in Appendix D of this Manual.
5. Stormwater treatment volume credits are available. These treatment credits offer alternatives for how a site meets water quality requirements. Each credit has specific design criteria that must be met in order to receive the credit. However, SCDHEC minimum stormwater design criteria must also be met.
6. The PW/SWD reserves the right to require specific effluent limits for any pollutant from a site, if necessary, to ensure the water quality standards and other local, State, and Federal water quality regulations are met. The PW/SWD also reserves the right to not allow credits at certain sites.
7. Annual groundwater recharge rates must be maintained to the maximum extent practical by promoting infiltration through the use of structural and non-structural methods.

3.8.2 Water Quantity Control

The following additional stormwater quantity control design requirements must be met:

1. Post-development discharge velocities shall be reduced to provide non-erosive flow velocities from structures, channels or other control measures, or equal the pre-development 10-year, 24-hour storm event flow velocities, whichever is less. These must be considered onsite, in addition to 600 ft downstream from the proposed project.
2. For post construction, the detention volume from all controls shall be drained from the structure within 72 hours. Prior to project finalization, detention ponds must be cleaned out and elevations established per the approved plans.
3. Where detention structures are initially installed as sediment basins, the conversion from sediment basin to detention structure cannot occur before the contributing watershed has been built out to 80% and stabilized. Once the area has been stabilized and the structure has been converted, an as-built certification is required prior to the County's final inspection.



3.9 Design Procedures

3.9.1 General Design Procedures for Structural BMPs

The following design procedures are intended to meet the County’s water quality requirements. In the event that a site’s downstream receiving water has a TMDL or impairment for another pollutant of concern, additional design procedures may be required.

The design of all structural BMPs must follow the process described below:

1. Site the development based upon the better site design practices in Section 3.4.
2. Calculate the stormwater treatment volumes form Option A or Option B using equations in Sections 3.5 and 3.6.
3. Identify crediting opportunities for reduced volumes identified in Step 2 (See Section 3.11)
4. Select BMPs from Table 3-3.
5. Compute stage-storage and stage-discharge relationships of the outlet control structure(s), as needed.

Specific Methodology:

1. Compute Initial Abstraction divided by rainfall, (I_a/P) for given hydrologic parameters:
 - P = rainfall depth (inches)
 - $I_a = 0.2 * ((1000/CN) - 10)$
 - T_c = as per TR-55
2. From Figure 3-7, read Unit Peak Discharge (q_u) for given post developed time of concentration (t_c) and computed I_a/P (in csm/inch).
3. From Figure 3-8, read ratio of Outflow to Inflow (q_o/q_i) for 24-hr detention or calculate from the equation:

$$q_o/q_i = 12.03 q_u - 0.9406$$

4. Compute the ratio of the volume of storage divided by the volume of runoff (v_s/v_r) from Figure 3-9 or by equation where:

$$v_s/v_r = 0.683 - 1.43(q_o/q_i) + 1.64 (q_o/q_i)^2 - 0.804(q_o/q_i)^3$$

5. Estimate required storage volumes

$$V = v_r(v_s/v_r)(A)/12 \text{ in acre-feet.}$$

Where: v_r = the post-developed volume of runoff depth for the design storm in inches
 A = the drainage area in acres, and
 12 = a conversion factor

Or
 $V = v_r(v_s/v_r)$ in acre-feet.



Where: v_r = the post-developed volume of runoff volume for the design storm in
acre-feet

6. Repeat Steps 2-5 until initial design criteria are met.
7. Complete the downstream analysis (See Section 3.9.3), and revise the design as needed or obtain written agreements and design downstream improvements. Note that any proposed offsite easements or modifications must have written approval by the downstream landowners prior to submitting the plan to PW/SWD.

Note: For engineered devices, detailed calculations must be submitted for review and acceptance by PW/SWD.

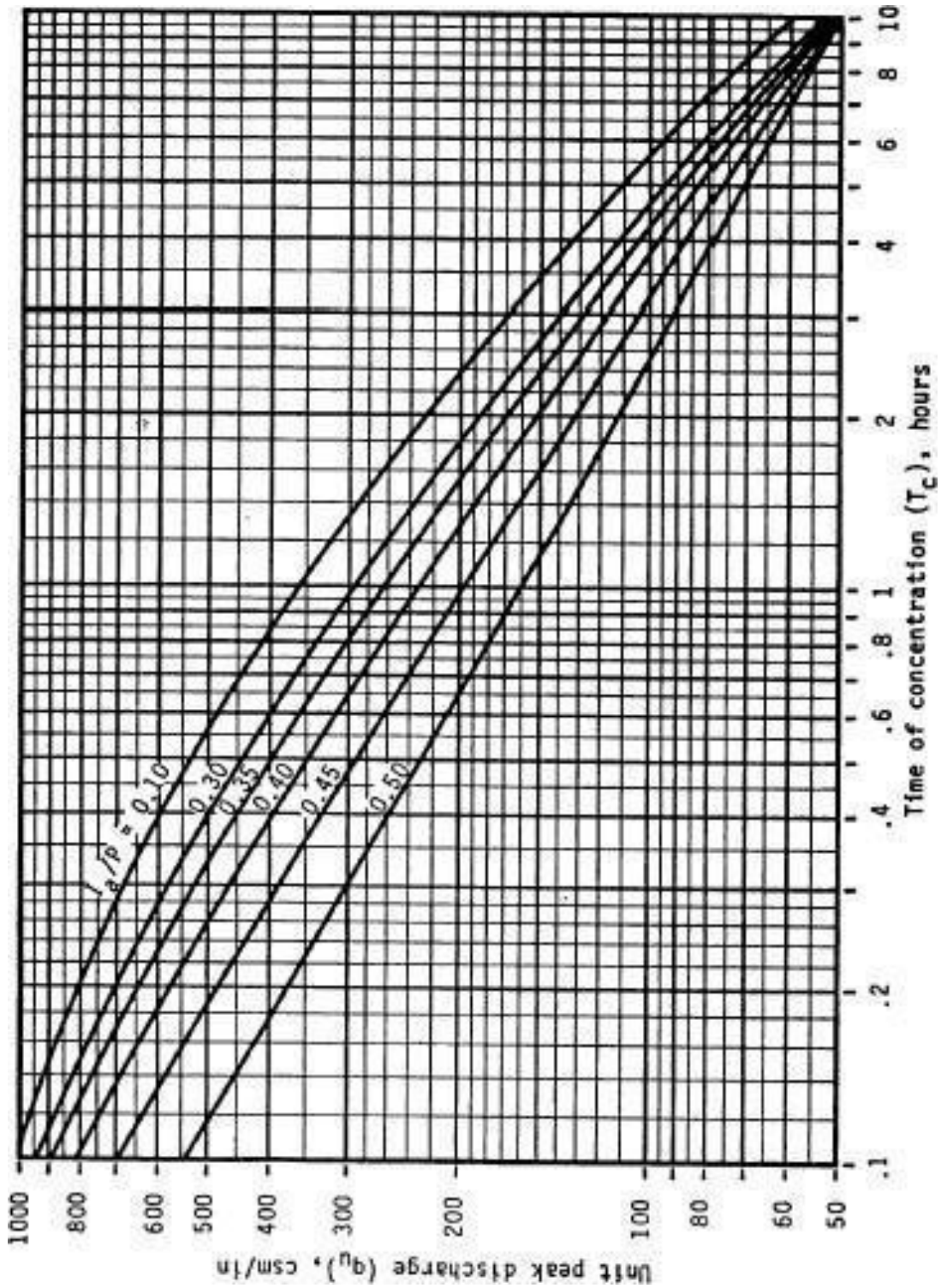


Figure 3-7. SCS Type II Unit Peak Discharge Graph.
(Source: SCS, TR-55, Second Edition, Jun 1986)

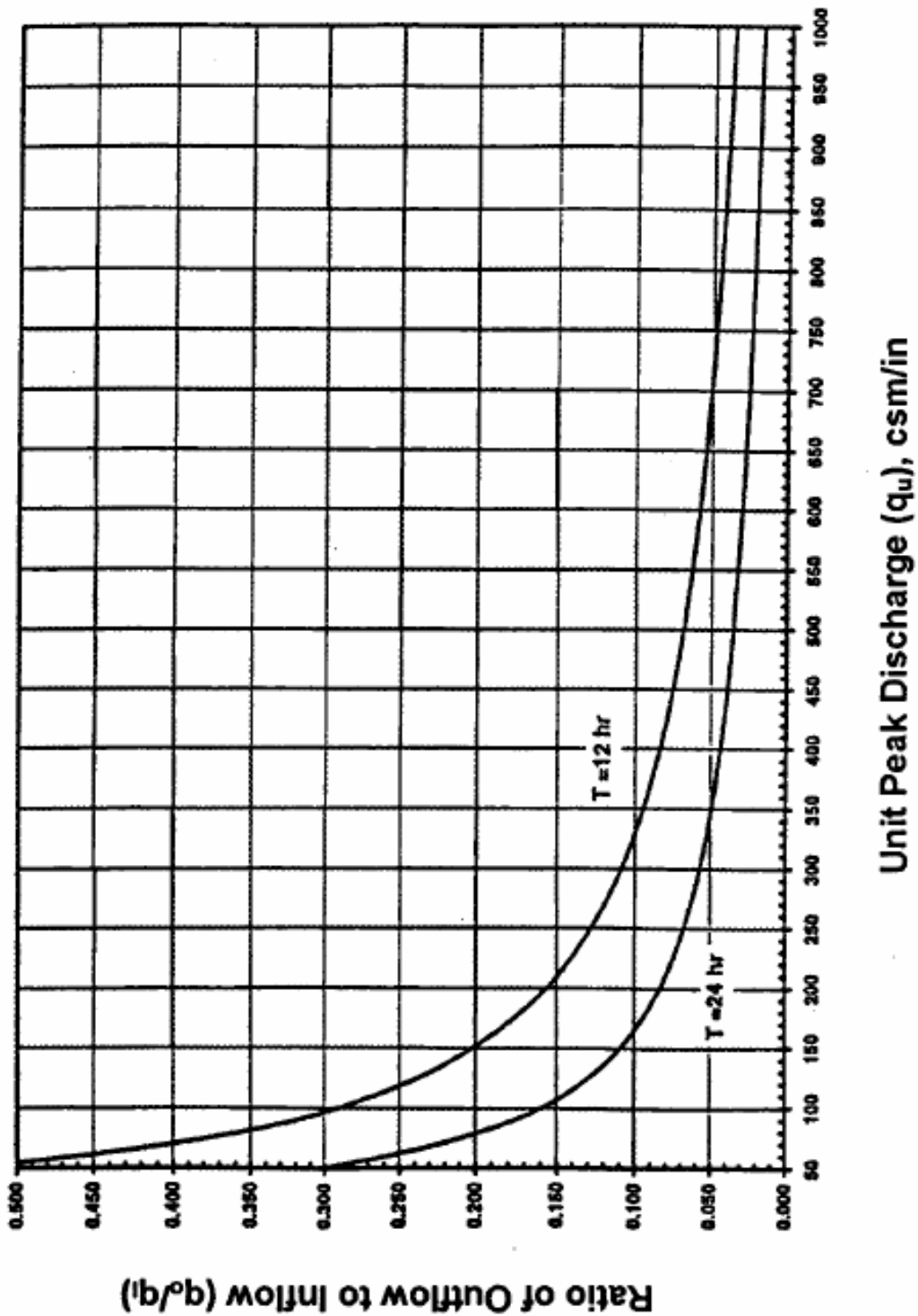


Figure 3-8. Detention Time vs. Discharge Ratios.
(Source: MDE, 1998)

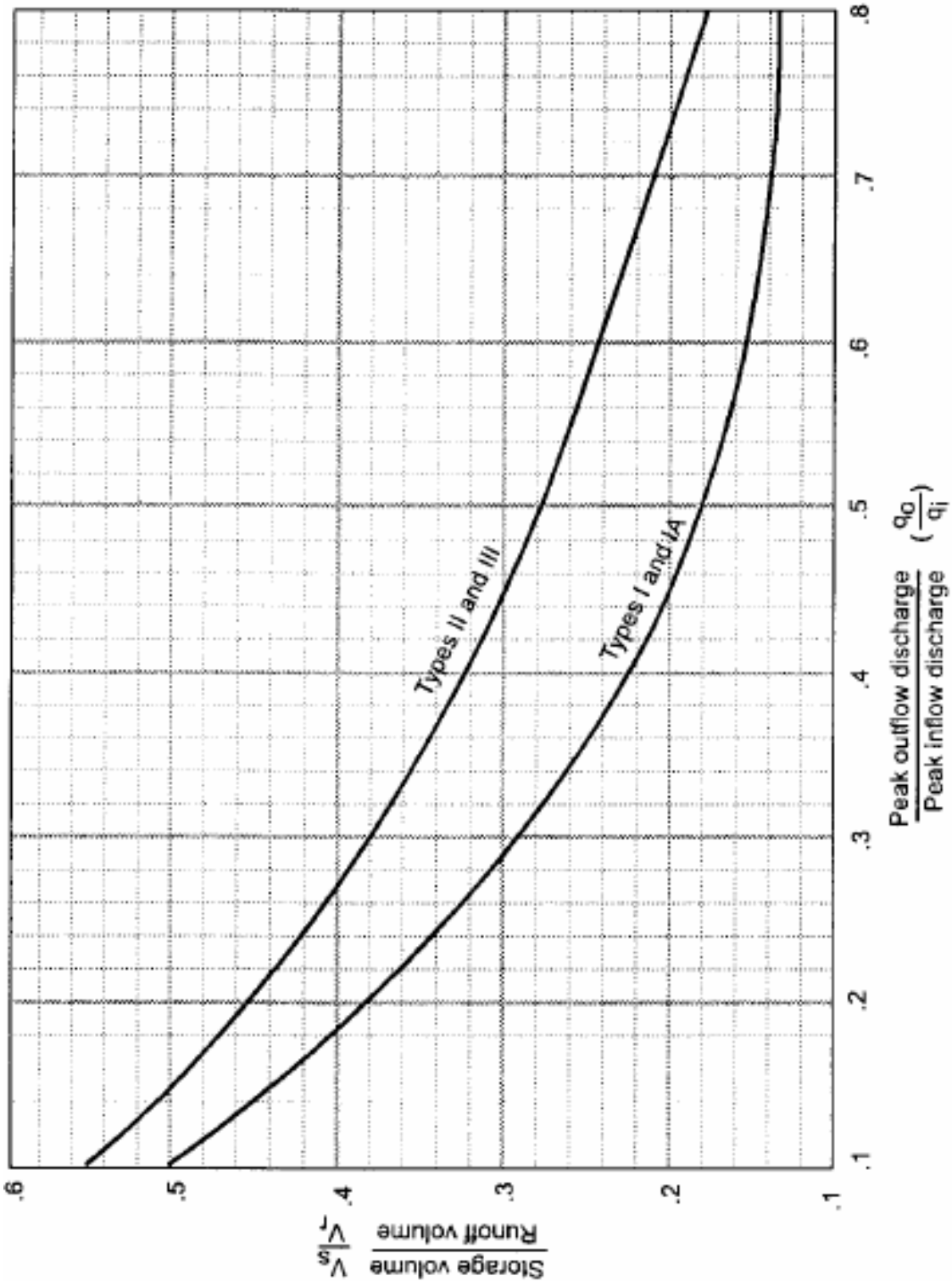


Figure 3-9. Approximate Detention Basin Routing for Rainfall Types I, IA, II, and III.
(Source: TR-55, 1986)



3.9.2 Water Quality Volume Peak Flow Calculation for Offline BMPs

Off-line structural BMPs provide stormwater treatment (or other control) away from the flowpath of the runoff, and therefore, are typically designed only to receive a specified discharge rate or volume. After the design runoff flow has been treated and/or controlled it is returned to the conveyance system. In contrast, on-line facilities, such as a stormwater treatment channel, typically provide stormwater control within the flowpath of the runoff. The peak rate of discharge for the water quality design storm (Q_{WQ}) is needed for the sizing of off-line diversion structures, such as for sand filters, bioretention, grass filter strips, grassed swales, and infiltration trenches.

The following procedure can be used to estimate peak discharges for small storm events. It relies on the WQ_v and the simplified peak flow estimating method above. A brief description of the calculation procedure is presented below.

1. Using WQ_v , a corresponding Curve Number (CN) is computed using the following equation:

$$CN = 1000/[10 + 5P + 10Q_{wv} - 10(Q_{wv}^2 + 1.25 Q_{wv}P)^{1/2}]$$

Where, P = rainfall, in inches (use 1.2 inches for the Water Quality Storm)

Q_{wv} = Depth of Water Quality Volume is expressed in inches
($1.2R_v$)

2. Once a CN is computed, the time of concentration (t_c) is computed (based on the methods described in this section). Note that the minimum t_c 5 minutes.
3. Using the: computed CN; time of concentration (t_c); and drainage area (A), in acres, the peak discharge (Q_{WQ}) for the water quality storm event is computed using a slight modification of the Simplified SCS Peak Runoff Rate Estimation technique, using Type II rainfall distribution:

- Read initial abstraction (I_a), compute I_a/P
- Read the unit peak discharge (q_u) for appropriate t_c
- Using WQ_v , compute the peak discharge (Q_{WQ})

$$Q_{WQ} = q_u * A * Q_{wv}$$

Where: Q_{WQ} = the water quality peak discharge (cfs)

q_u = the unit peak discharge (cfs/mi²/inch)

A = drainage area (mi²)

Q_{wv} = Depth of Water Quality Volume, in inches ($1.2R_v$)

3.9.3 Downstream Analysis

Water quantity control is an integral component of overall stormwater management. Its purpose is to mitigate the negative effects of increased stormwater runoff associated with land use changes due to development. This section provides guidance to determine the potential impact to downstream properties from increased flows. This section is to be applied in conjunction with all



of the design storm criteria in both Option A and Option B stormwater design methodologies. Negative impacts are defined as the following:

1. Increasing peak flow for the 2-year, 10-year, and 25-year, 24-hour storm peak discharge rates.
2. For the 100-year storm:
 - a. Causing or increasing flooding to structures that are or were subject to building permits;
 - b. Causing overtopping of roadway; OR
 - c. Increasing overtopping of roadways by more than 10%.

In addition, due to a site's location within a watershed, there may be very little reason for requiring overbank flood control or extreme flood control at a particular site. This section outlines the required procedure, as part of a developer's stormwater management site plan, which is also summarized in Section 2.1.9 of the GSMM.

3.9.4 Requirements

A downstream analysis shall be required for development sites that are required to obtain a Land Development Permit (but not for Small Commercial LDPs or Small Lot Residential LDPs) to determine the impacts on downstream systems based on the 2-, 10-, 25- and 100-year, 24-hour storm events. A downstream analysis shall determine whether the design storm events of interest have a negative impact to downstream properties, road crossings, and other areas as directed by the PW/SWD. Applications for permit coverage must discuss this impact, the degree of the impact, and potential solutions.

3.9.5 The Ten-Percent Rule

Based on studies and results for a large number of sites, a site's zone of influence is considered to be the point where the drainage area controlled by the detention or storage facility comprises 10% of the total drainage area. For example, if the structural control drains 10 acres, the zone of influence ends at the point where the total drainage area down gradient is 100 acres or greater. However, some sites may require that the "zone of influence" be extended further downstream. Each evaluation is to be applied at ditches, pipes, culverts, road crossings, and streams.

Typical steps in the application of the ten-percent rule are:

1. Determine the target peak flow for the site for predevelopment conditions.
2. Using a topographic map determine the lower limit of the zone of influence (aka "10% point").
3. Using a hydrologic model determine the pre-development peak flows and timing of those peaks at each stormwater or tributary junction beginning at the pond outlet and ending at the next stormwater or tributary junction beyond the 10% point. Analysis must be performed on culverts and channels and must include the 100 year floodplain for streams.



All areas shall be modeled as existing condition.

4. Change the land use on the site to post-development and rerun the model. Offsite areas are modeled as existing condition.
 - a. If the post-development peak flow rates and 100-yr elevations are unchanged at the “10% point”, when compared the pre-development model, the lower limit of the zone of influence has been affirmed.
 - b. If the post-development peak flow rates and/or 100-yr floodplain elevations have increased at the “10% point” when compared to the pre-development model, additional steps must be taken to detain or otherwise mitigate the increased flow rates and floodplain elevations.
5. Design the structural control facility such that the 2-, 10-, and 25-year post-development flows do not exceed the predevelopment peak flows, and that the 100 year storm post-development flows do not negatively impact downstream structures or the 100-yr floodplain elevations at the outlet and the determined tributary junctions.
 - a. Flows must be routed using an accepted hydrologic and hydraulic method.
 - b. Hydraulic step-backwater calculations (USACE’s HEC-2 or HEC-RAS models or equivalent) may be required by the PW/SWD based on several factors, such as the severity of potential impact and location of project.
 - c. The analysis must also address the severity of impact on any upstream and proposed stormwater quantity structure.
6. If the downstream analysis determines that the development of a particular site will have a negative impact on downstream properties, then appropriate controls shall be designed and implemented, which may include any or all of the following:
 - a. Providing additional detention on the new development site;
 - b. Modifying the receiving system below the new development site to account for the increased flow;
 - c. Obtaining drainage easements from affected properties;
7. Where downstream properties are to be modified to accommodate increased flows or where drainage easements are needed, downstream property owners must agree to the modifications or easements, and all modifications shall be included in a drainage easement and recorded on the affected property deed. Written agreements from downstream property owners shall be submitted with the engineering plans for review. Once the plans have been approved, the downstream properties that have been modified to accommodate increased flows or where flow easements are needed must have recorded drainage easements encompassing the affected area(s) prior to the final inspection performed by the County.

3.9.6 Accepted Quantity Controls

Detention structural controls are used for providing water quantity control and are typically used downstream of other minor structural controls. These structures are designed to provide channel protection, overbank flood protection, and protection against adverse downstream impacts that are related to the increase in peak flow rates from development. In addition, these controls can be



designed as multi-functional controls that meet water quality and quantity requirements. Detention structural stormwater controls accepted by PW/SWD are shown in Table 3-3.

3.9.7 Quantity Control Design Procedures

This section provides the general procedures for the design of stormwater quantity control structures. The following items shall be required for the design of these structures and routing flows through them:

1. Compute the inflow hydrograph for the structure for the 2-, 10-, 25-, and 100-year, 24-hour storm events for both the pre-development and post-development conditions. From this, determine peak flow rates for each storm.
2. Compute a stage-storage relationship for the proposed structure. A stage storage-curve defines the relationship between the depth of water and storage volume within the detention facility. Stage-storage and stage-discharge calculations must be included in the engineering calculations.
3. Compute stage-discharge relationship of the outlet control structure(s). A stage-discharge curve defines the flow capacity of a structure at a given stage or elevation. Also compute outlet barrel capacity and discharge velocity for energy dissipation design.
4. Perform routing calculations for the 2-, 10-, 25-, and 100-year storm events.
5. Size the outlet structure configuration to meet the required design criteria.
6. Check to make sure the discharge hydrograph from the 100-year storm event provides a minimum of 1-foot of freeboard within the banks of the facility.
7. Evaluate the control structure outlet flow velocity and provide velocity control and channel stabilization. Drawings and details must be provided for outlet structures and basin.
8. Where the structure doesn't discharge into a defined channel, ditch, or stream, concentrated flow shall be returned to the overland flow condition.

3.9.8 Routing with WQ_v Removed

When off-line structural controls that provide infiltration (i.e. bioretention areas, sand filters, infiltration trenches, etc.) are used, downstream structural controls do not have to account for this volume during design. That is, the WQ_v may be subtracted from the total volume that would otherwise need to be routed through the downstream structural controls.

From a calculation standpoint this would amount to removing the initial WQ_v from the beginning of the runoff hydrograph – thus creating a “notch” in the runoff hydrograph. Since most commercially available hydrologic modeling packages cannot handle this type of action, the following method has been created to facilitate removal from the runoff hydrograph of approximately the WQ_v :



1. Enter the horizontal axis on Figure 3-10 with the impervious percentage of the watershed and read upward to the predominant soil type (interpolation between curves is permitted).
2. Read left to the factor.
3. Multiply the curve number for the sub-watershed that includes the water quality feature by this factor – this provides a smaller curve number.

The difference in curve numbers will generate a runoff hydrograph that has a volume less than the original volume by an amount approximately equal to the WQ_v . This method shall be used only for controls that infiltrate the WQ_v , such as bioretention areas without an underdrain, some sand filters and infiltration trenches.

A design tool for this calculation can be found in Appendix D.

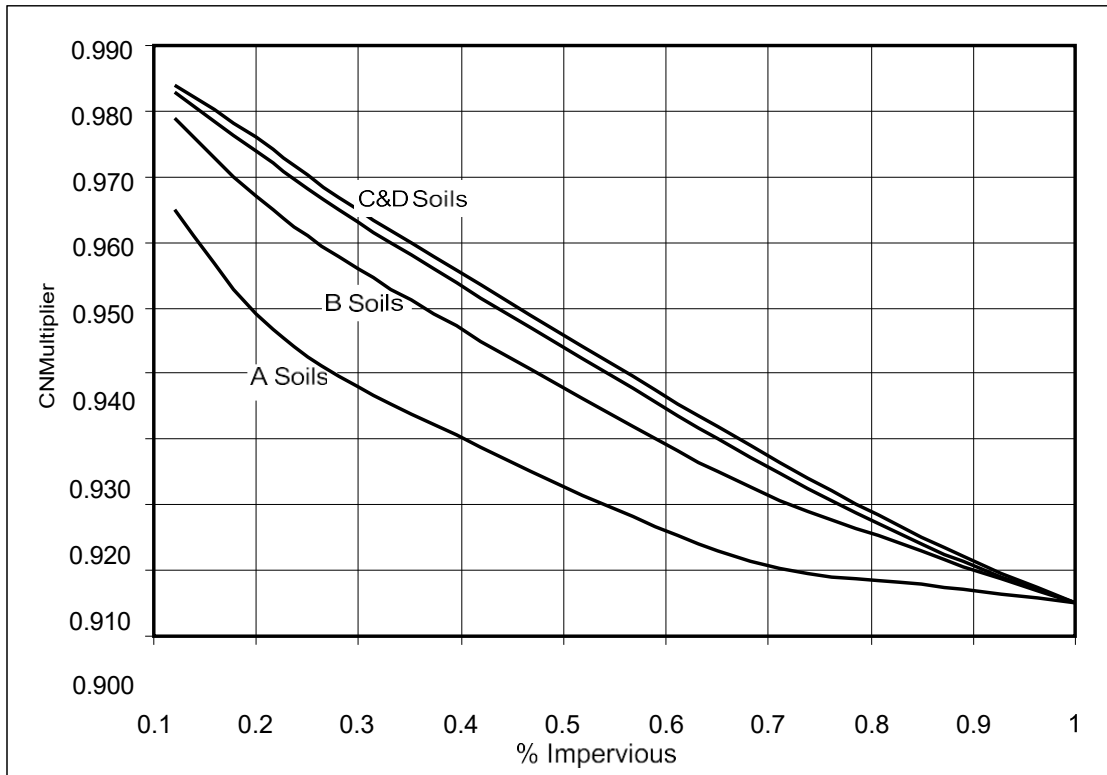


Figure 3-10. Curve Number Adjustment Factor.

Example:

A site design employs an infiltration trench for the WQ_v and has a curve number of 72, is B type soil, and has an impervious percentage of 60%, the factor from Figure 3.11 is 0.92. The curve number to be used in calculation of a runoff hydrograph for the quantity controls would be:

$$(72 * 0.92) = 66$$



3.9.9 No Discharge Infiltration Basins

Some sites within Lexington County do not have a clear outlet point for discharging stormwater runoff. Where such conditions occur, a “no discharge” infiltration basin is required. The design criteria for No Discharge Infiltration Basins are as follows:

1. All No Discharge Infiltration Basins are to be designed to infiltration the 100-year storm event.
2. When designing the basin’s drawdown rate, only the side slopes of the basin can be used for infiltration; the bottom of the basin cannot be used.
3. Side slopes are to be 3:1 (preferred) or 2:1 to 5:1 (range).
4. Bottom width of the pond must be at least 20 feet or 4 times the depth of the pond, whichever is larger.
5. Infiltration rates may be obtained from the Soil Survey Book of Lexington County, SC. The permeability rates of subject soils are given as range. Determine the lowest number for the range and take half of the lowest number for the infiltration rate. A second option is to have an acceptable infiltration test (i.e. double ring infiltrometer) performed by a soils testing lab. The borings for the proposed infiltration basin shall be excavated to the determined depth of the bottom of the basin prior to infiltration testing. Use one-half (1/2) of the results determined by the soils testing lab as a factor of safety.
6. Provide calculations to show dewatering within a 72-hour period.

3.9.10 On-Line Versus Off-Line Structural Controls

Structural stormwater controls are designed to be either “on-line” or “off-line.” On-line facilities are designed to receive, but not necessarily control or treat, the entire runoff volume up to the extreme flood protection or Q_{100} event. On-line structural controls must be able to handle the entire range of storm flows without scouring or resuspending any settled solids.

Off-line facilities on the other hand are designed to receive only a specified flow rate through the use of a flow regulator (i.e. diversion structure, flow splitter, etc.). Flow regulators are typically used to divert the water quality volume (WQ_V) to an off-line structural control sized and designed to treat and control the WQ_V . After the design runoff flow has been treated and/or controlled it is returned to the conveyance system.

3.10 Structural BMPs

3.10.1 Pre-Approved BMPs

In an effort to streamline design and permitting of new development sites, the County has pre-approved structural BMPs to treat stormwater quality and to manage stormwater quantity. Table 3-3 provides an at-a-glance view of pre-approved BMPs. These BMPs have varying abilities to address downstream CP_V , Q_{OF} and/or Q_{100} . In Special Protection Areas with water quality



impairments, the County may require the use of certain BMPs to provide a specific level of treatment for the pollutant of concern.

More information on the design for requirements for each BMP can be found in the subsections of this chapter. Note: should a designer choose to use BMPs that are not included in the following table, the permitting process may be lengthier as designs and treatment criteria must be verified by the County prior to permitting.

In reviewing the BMP matrix below, note that some BMPs are not well suited for residential sites. In designing the concept plan, consider the long-term operation and maintenance of the BMPs included, as well as the general acceptance of a BMP in the type of development. For example, a hydrodynamic separator may work very well for a commercial development where the majority of the runoff is from paved surfaces but may not work well over time located in a residential subdivision where a significant portion of the drainage area is pervious or managed pervious area.

The pre-approved BMPs in Table 3-3 have supporting design and maintenance information referenced through the GSMM. Where the design criteria for Lexington County for any BMP differs from the GSMM section, the difference will be called out in the following subsections.



Table 3-3. Structural BMP Matrix.

Structural BMP	Variation	Pollutant Removal Efficiencies (%)				Drainage Area (ac)	Implementation Considerations			
		TSS	Total P ¹	Total N ²	Metals		Residential	Commercial / Industrial	Relative Unit Cost	Relative Maintenance Burden
Stormwater Ponds	Wet Pond	80	55	30	50	>25	✓	✓	Low	Low
	Wet ED Pond					>25	✓	✓	Low	Low
	Micro Pool ED Pond					>10	✓	✓	Low	Low
	Multiple Pond Systems					>25	✓	✓	Moderate	Low
Dry Extended Detention Pond		60	35	25	25	≤75	✓	✓	Low	Low
Stormwater Wetlands	Shallow Wetland	80	45	30	50	>25		✓	Moderate	Moderate to High
	ED Wetland					>25		✓	Moderate	Moderate to High
	Pond / Wetland System					>25		✓	Moderate	Moderate to High
	Pocket Wetland					>5		✓	Moderate	Moderate to High
Bioretention Areas		85	60	50	80	≤5	✓	✓	Moderate	Low
Infiltration Trench / Basin		90	60	60	90	≤5	✓	✓	Moderate to High	Moderate
Enhanced Swale	Dry Swale	80	50	50	40	≤5	✓	✓	Moderate	Low
	Wet Swale / Wetland	80	25	40	20	≤5		✓	Moderate	Low
Sand Filter	Perimeter Sand Filter	80	50	25	50	<2		✓	High	High
	Surface Sand Filter	80	50	25	50	<10		✓	High	High
Gravity Oil Separator		40	5	5	---	<1		✓	Moderate	Moderate
Porous Surfaces (Porous Concrete, Modular Porous Paver Systems)		**	**	**	**			✓	Moderate to High	Low
Proprietary Systems (Commercial Stormwater Controls)		***	***	***	***			✓	Moderate to High	Moderate to High

1 Total Phosphorous

2 Total Nitrogen

** These practices are source controls and are not designed as pollutant removal devices; considered as pervious in WQv Calculations

*** The performance of specific proprietary commercial devices and systems must be provided by the manufacturer and should be verified by independent third-party sources and data

--- Insufficient data to provide design removal efficiency



A description of the allowable types of pre-approved BMPs are listed below. Detailed descriptions of each structural control along with design criteria and procedures are provided in Section 3.2 of the GSMM. Where the Lexington County requirements differ from the GSMM design, differences or additional design criteria are noted below. The most notable difference between Lexington County and the GSMM is the requirement to control the 2- and 10-yr storm events in addition to the 25-yr storm event for the overbank flood protection criteria, as required by SCDHEC's 72-300 regulations regarding stormwater management.

3.10.1.1 Stormwater Ponds

Stormwater ponds (also referred to as detention ponds, wet ponds, or wet extended detention ponds) are constructed stormwater detention basins that have a permanent (dead storage) pool of water throughout the year. They can be created by excavating an already existing natural depression or through the construction of embankments. There are several different variants of stormwater pond design:

1. **Wet Ponds:** Wet ponds are stormwater basins constructed with a permanent (dead storage) pool of water equal to the water quality volume. Stormwater runoff displaces the water already present in the pool. Temporary storage (live storage) can be provided above the permanent pool elevation for larger flows.
2. **Wet Extended Detention (ED) Ponds:** A wet extended detention pond is a wet pond where the water quality volume is split evenly between the permanent pool and extended detention (ED) storage provided above the permanent pool. During storm events, water is detained above the permanent pool and released over 24 hours. This design has a similar pollutant removal to a traditional wet pond, but consumes less space.
3. **Micropool Extended Detention (ED) Ponds:** The micropool extended detention pond is a variation of the wet ED pond where only a small "micropool" is maintained at the outlet to the pond. The outlet structure is sized to detain the water quality volume for 24 hours. The micropool prevents resuspension of previously settled sediments and also prevents clogging of the flow orifice.
4. **Multiple Pond Systems:** Multiple pond systems consist of constructed facilities that provide water quality and quantity storage in two or more cells. The additional cells can create longer pollutant removal pathways and improved downstream protection.
5. **Dry Extended Detention Ponds:** Dry extended detention ponds consist of a dry storage basin designed to hold back the design storm events to pre-development peak flow rates. The water quality volume is held and released over a period of 24-hours to allow pollutants to settle out before discharging.

Refer to Section 3.2.1 of the GSMM. Unless other BMPs are included with these controls, the design must include 2- and 10-yr peak control such that post-development runoff is the same as or less than the pre-development runoff rates.



3.10.1.2 Stormwater Wetlands

Stormwater wetlands (also referred to as constructed wetlands) are constructed shallow marsh systems that are designed to treat urban stormwater and control runoff volumes. As stormwater runoff flows through the wetland facility, pollutant removal is achieved through settling and uptake by marsh vegetation. There are several design variations of the stormwater wetland, each design differing in the relative amounts of shallow and deep water, and dry storage above the wetland.

1. **Shallow Wetlands:** In the shallow wetland design, most of the water quality treatment volume is in the relatively shallow high marsh or low marsh depths. The only deep portions of the shallow wetland design are the forebay at the inlet to the wetland and the micropool at the outlet. One disadvantage of this design is that, since the pool is relatively shallow, a relatively large amount of land is typically needed to store the water quality volume.
2. **Extended Detention Shallow Wetlands:** The extended detention (ED) shallow wetland design is the same as the shallow wetland; however, part of the water quality treatment volume is provided as extended detention above the surface of the marsh and released over a period of 24 hours. This design can treat a greater volume of stormwater in a smaller space than the shallow wetland design. In the extended detention wetland option, plants that can tolerate both wet and dry periods need to be specified in the ED zone.
3. **Pond/Wetland Systems:** The pond/wetland system has two separate cells: a wet pond and a shallow marsh. The wet pond traps sediments and reduces runoff velocities prior to entry in the wetland, where the stormwater flows receive additional treatment. Less land is required for a pond/wetland system than for the shallow wetland or the ED shallow wetland systems.
4. **Pocket Wetlands:** A pocket wetland is intended for smaller drainage areas of 5 to 10 acres and typically requires excavation down to the water table for a reliable source to support the wetland system.

Note that natural wetlands CANNOT be used as water quality or water quantity treatment BMPs.

Refer to Section 3.2.2 of the GSMM. Unless other BMPs are included with these controls, the design must include 2- and 10-year peak control such that post-development runoff is the same as or less than the pre-development runoff rates.

3.10.1.3 Bioretention Areas

Bioretention areas (also referred to as bioretention filters or rain gardens) are structural stormwater controls that capture and temporarily store the water quality volume (WQ_v) using soils and vegetation in shallow basins or landscaped areas to remove pollutants from stormwater runoff.

Bioretention areas are engineered facilities in which runoff is conveyed as sheet flow to the “treatment area,” which consists of a grass buffer strip, ponding area, organic or mulch layer, planting soil, and vegetation. An optional sand bed can also be included in the design to provide aeration and drainage of the planting soil. The filtered runoff is typically collected and returned to



the conveyance system, though it can also be exfiltrated into the surrounding soil in areas with porous soils. There are numerous design applications, both on- and off-line, for bioretention areas. These include use as off-line facilities adjacent to parking lots, along highway and road drainage swales, within larger landscaped pervious areas, and as landscaped islands in impervious or high-density environments.

Refer to Section 3.2.3 of the GSMM. Bioretention areas are typically designed to treat the WQ_V in the Unified Sizing Criteria. However, some components of the CP_V can be included in bioretention design. The full spectrum of design must be provided by the BMP treatment train, including channel protection, overbank flood protection, and extreme flood protection.

3.10.1.4 Infiltration Trenches

Infiltration trenches are excavations typically filled with stone to create an underground reservoir for stormwater runoff. This runoff volume gradually exfiltrates through the bottom and sides of the trench into the subsoil over a 2-day period and eventually reaches the water table. By diverting runoff into the soil, an infiltration trench not only treats the water quality volume, but also helps preserve the natural water balance on a site and can recharge groundwater and preserve baseflow. Due to this fact, infiltration systems are limited to areas with highly porous soils where the water table and/or bedrock are located well below the bottom of the trench. In addition, infiltration trenches must carefully be sited to avoid the potential for groundwater contamination.

Refer to Section 3.2.5 of the GSMM. Infiltration trenches are only designed to treat the WQ_V and possibly some of the CP_V storms. Therefore, channel protection (including the 2- and 10-year events), overbank flood protection, and extreme flood protection must be provided by other BMPs.

3.10.1.5 Enhanced Swales

Enhanced swales (also referred to as vegetated open channels or water quality swales) are conveyance channels engineered to capture and treat the water quality volume (WQ_V) for a drainage area. They differ from a normal drainage channel or swale through the incorporation of specific features that enhance stormwater pollutant removal efficiencies. There are two primary enhanced swale designs:

1. **Dry Swales:** The dry swale is a vegetated conveyance channel designed to include a filter bed of prepared soil that overlays an underdrain system. Dry swales are sized to allow the entire WQ_V to be filtered or infiltrated through the bottom of the swale. Because they are dry most of the time, they are often the preferred option in residential settings.
2. **Wet Swales:** The wet swale is a vegetated channel designed to retain water or marshy conditions that support wetland vegetation. A high water table or poorly drained soils are necessary to retain water. The wet swale essentially acts a linear shallow wetland treatment system, where the WQ_V is retained.

Refer to Section 3.2.6 of the GSMM. Enhanced swales typically only treat the WQ_V . However, some components of the CP_V can be included in the enhanced swale design. The full spectrum of



design must be provided by the BMP treatment train, including channel protection (including the 2- and 10-year events), overbank flood protection, and extreme flood protection.

3.10.1.6 Sand Filters

Sand filters (also referred to as filtration basins) are structural stormwater controls that capture and temporarily store stormwater runoff and pass it through a filter bed of sand. Most sand filter systems consist of two-chamber structures. The first chamber is a sediment forebay or sedimentation chamber, which removes floatables and heavy sediments. The second is the filtration chamber, which remove additional pollutants by filtering the runoff through a sand bed. The filtered runoff is typically collected and returned to the conveyance system, though it can also be partially or fully exfiltrated into the surrounding soil in areas with porous soils.

Because they have few site constraints beside head requirements, sand filters can be used on development sites where the use of other structural controls may be precluded. However, sand filter systems can be relatively expensive to construct and install. There are two primary sand filter system designs:

1. **Surface Sand Filters:** The surface sand filter is a ground-level open air structure that consists of a pretreatment forebay and a filter bed chamber. This system can treat drainage areas of up to 10 acres in size and is typically located off-line. Surface sand filters can be designed as an excavation within earthen embankments or as a concrete or block structure.
2. **Perimeter Sand Filters:** The perimeter sand filter is an enclosed filter system typically constructed just below grade in a vault along the edge of an impervious area such as a parking lot. The system consists of a sedimentation chamber and a sand bed filter. Runoff flows in the structure through a series of inlet grates located along the top of the control.

Refer to Section 3.2.4 of the GSMM. Sand filters are typically designed to only treat the WQ_v. However, some components of the CP_v can be included in sand filter design. The full spectrum of design must be provided by the BMP treatment train, including channel protection (including the 2- and 10-year events), overbank flood protection, and extreme flood protection. This applies to both variations of sand filter designs.

3.10.1.7 Gravity separator

Refer to Section 3.3.6 of the GSMM. This structural control works well as a pre-treatment BMP. It is only designed to address a portion of the WQ_v and must be used in a treatment train. The full spectrum of design must be provided by the BMP treatment train, including channel protection (including the 2- and 10-year events), overbank flood protection, and extreme flood protection.



3.10.1.8 Porous surfaces

Refer to Sections 3.3.7 and 3.3.8 of the GSMM. Poorly installed or maintained porous surfaces have a high failure rate. In addition, porous surfaces have unique installation methods and low load requirements. Therefore, this category of BMPs is considered limited. However, wherever porous surfaces are installed, the WQ_v is directly impacted by lowering the imperviousness of a site. Porous surfaces typically only treat WQ_v but may also manage some storm events for CP_v. This BMP must be used in a treatment train. The full spectrum of design must be provided by the BMP treatment train, including channel protection (including the 2- and 10-year events), overbank flood protection, and extreme flood protection.

3.10.1.9 Proprietary systems

Most manufactured and proprietary treatment systems provide excellent pre-treatment, removing gross solids. Proprietary systems can typically treat other more industrial pollutants such as oil and petroleum. In terms of WQ_v treatment, these BMPs are assigned a 50% TSS reduction capacity and must be used in a treatment train to meet the full spectrum of design, including channel protection (including the 2- and 10-year events), overbank flood protection, and extreme flood protection.

3.10.2 Prohibited Structural Controls

The following structural controls in Table 3.4 are not allowed for use in Lexington County to meet stormwater management objectives, as they have high failure rates or high maintenance needs. Under very limited circumstances, PW/SWDMay approve the use of these BMPs.

Table 3-4. Prohibited Structural Controls.

Structural Control	Rationale for Lack of Recommendation
Porous Asphalt	Porous asphalt surfaces are easily clogged by clays, silts and oils resulting in a potentially high maintenance burden to maintain the effectiveness of this structural control. Further, summer heat in South Carolina can cause the asphalt to melt, destroying the porous properties of the surface.
Media Filter Inserts	Media filter inserts, such as catch basin inserts and filter systems, are easily clogged and require a high degree of regular maintenance and replacement to achieve the intended water quality treatment performance and should not be used for areas of new development or redevelopment.

3.11 Water Quality Volume Treatment Credits for use with Option B: Unified Sizing Criteria

A set of stormwater “credits” has been developed to provide developers and site designers an incentive to implement better site design practices that can reduce the volume of stormwater runoff



and minimize the pollutant loads from a site. The credit system directly translates into cost savings to the developer by allowing for a reduction in the water quality treatment volume (WQ_v). This also reduces the size of structural stormwater control and conveyance facilities for events greater than the water quality treatment (WQ_v) event. Please note that Water Quality Volume Treatment Credits are only allowed for use with the Unified Sizing Criteria. Developments designed using the Traditional Method (from 2007 Land Development Manual) are not eligible for Water Quality Treatment Credits.

The better site design practices that provide stormwater credits are listed in Table 3-5. Site-specific conditions will determine the applicability of each credit.

Note: better site design practices and techniques that reduce the overall impervious area on a site already implicitly reduce the total amount of stormwater runoff generated by a site (and thus reduce WQ_v) and are not further credited under this system.

Table 3-5. Summary of Water Quality Volume Treatment Credits.

Practice	Description
Credit #1: Natural area conservation	Undisturbed natural areas are conserved on a site, thereby retaining their pre-development hydrologic and water quality characteristics.
Credit #2: Permanent Stream buffers	Stormwater runoff is treated by directing sheet flow runoff through a naturally vegetated or forested permanent buffer as overland flow.
Credit #3: Use of vegetated channels	Vegetated channels are used to provide stormwater treatment.
Credit #4: Overland flow filtration/infiltration zones	Overland flow filtration/infiltration zones are incorporated into the site design to receive runoff from rooftops and other small impervious areas.
Credit #5: Environmentally sensitive large lot subdivisions	A group of site design techniques are applied to low and very low density residential development.

For each potential credit, there are a minimum set of criteria and requirements (e.g., flow length, contributing area, etc.) that identify the conditions or circumstances under which the credit may be applied. Site designers are encouraged to utilize as many credits as they can on a site. Greater reductions in stormwater storage volumes can be achieved when many credits are combined (e.g., disconnecting rooftops and protecting natural conservation areas). However, credits cannot be claimed twice for an identical area of the site (e.g. claiming credit for stream buffers and disconnecting rooftops over the same site area).

Note: Due to local safety codes, soil conditions, and topography, some of these site design credits may be restricted. Designers are encouraged to consult with the County to ensure if and when a credit is applicable and to determine restrictions on non-structural strategies.



The water quality volume treatment credits approved by PW/SWD are outlined below. General requirements and policies applicable to all credits are as follows:

1. Water quality volume treatment credits can only be claimed if the area or practice for which credit is requested conforms to all of the minimum criteria and conditions stated below. Partial credits are not allowed.
2. Water quality volume treatment credits cannot be claimed twice for the same area of the site (e.g. claiming credit for stream buffers and disconnected rooftops over the same site area).

General better site design practices and techniques performed without regard to the criteria and conditions stated herein will not be awarded site design credits. It should be noted, however, that these practices may reduce the overall imperviousness, thereby reducing the required WQ_v treatment and BMP size.

3.11.1 Credit #1: Natural Area Conservation

A water quality volume treatment credit can be taken when undisturbed natural areas are conserved on a site, thereby retaining their pre-development hydrologic and water quality characteristics. Under this credit, a designer can subtract conservation areas from total site area when computing water quality volume requirements and adhering to the criteria listed below. An added benefit is that the post-development peak discharges will be smaller, and hence water quantity control volumes (CP_v, Q_{OF}, and Q₁₀₀) will be reduced due to lower post-development curve (CN) numbers.

Rule: Subtract conservation areas from total site area when computing water quality volume requirements.

Criteria:

1. Conservation area cannot be disturbed during project construction.
2. Area shall be protected by limits of disturbance clearly shown on all construction drawings and in the field.
3. Area shall be located within an acceptable conservation easement instrument that ensures perpetual protection of the proposed area.
4. The easement must clearly specify how the natural area vegetation shall be managed and boundaries will be marked.
5. Managed turf (e.g., playgrounds, regularly maintained open areas) is not an acceptable form of vegetation management.
6. Conservation areas shall have a minimum contiguous area requirement of 10,000 square feet.



7. R_v is kept constant when calculating WQV.
8. Natural Conservation Area must be located within the drainage area for which water quality volume credits are given.

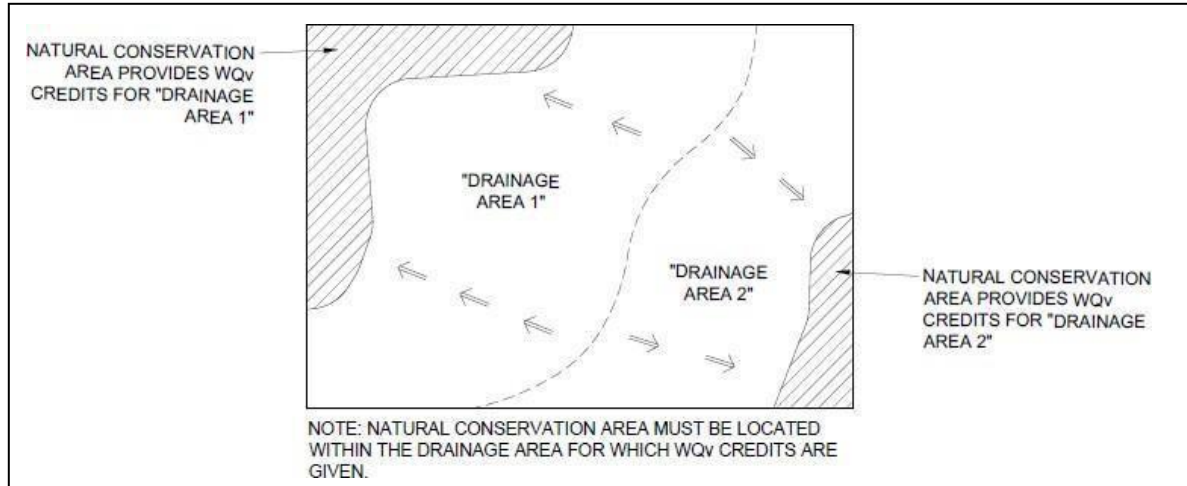


Figure 3-11. Natural Conservation Area Example.

Example: Residential Subdivision
 Development area = 38 acres
 Natural Conservation Area = 7 acres
 Impervious Area = 13.8 acres

$$R_v = 0.05 + 0.009 (I) = 0.05 + 0.009 (36.3) = 0.37$$

Credit calculation:

7.0 acres in natural conservation area
 New drainage area = 38 – 7 = 31 acres

Before credit:

$$WQ_v = (1.2)(0.37)(38)/12 = 1.40 \text{ ac-ft}$$

With credit:

$$WQ_v = (1.2)(0.37)(31)/12 = 1.15 \text{ ac-ft}$$

(18% reduction in water quality volume)

3.11.2 Credit #2: Permanent Stream Buffers

This credit can be taken when stormwater runoff is effectively treated by a permanent stream buffer. Effective treatment constitutes treating runoff through overland flow in a naturally vegetated or forested buffer. Under the proposed credit, a designer can subtract buffer area and areas draining via overland flow to the buffer from total site area when computing water quality volume requirements. In addition, the volume of runoff draining to the buffer can be subtracted



from the channel protection volume. The design of the stream buffer treatment system must use appropriate methods for conveying flows above the annual recurrence (1-yr storm) event, and adhere to the criteria listed below.

Rule: Subtract buffer area and areas draining via overland flow to the buffer from total site area when computing water quality volume requirements.

Criteria:

1. This credit only applies when the County's permanent water quality buffers are applied along streams and wetlands as outlined in Chapter 7. Simply applying construction buffers will not meet the criteria for this credit.
2. For 50' wide permanent buffers: A 50' wide stream buffer can be used to treat up to 150' of pervious area draining to it or 75' of impervious area draining to it.
3. For 100' wide permanent buffers: A 100' wide stream buffer can be used to treat up to 250' of pervious area draining to it or 100' of impervious area draining to it.
4. For all buffers regardless of width:
 - a. The average contributing slope shall be 3% maximum unless a flow spreader is used.
 - b. Runoff shall enter the buffer as overland sheet flow. A flow spreader can be included to ensure this, or if average contributing slope criteria cannot be met.
 - c. Not applicable if overland flow filtration/groundwater recharge credit is already being taken.
 - d. Buffers shall remain unmanaged other than routine debris removal.
5. R_v is kept constant when calculating WQV.

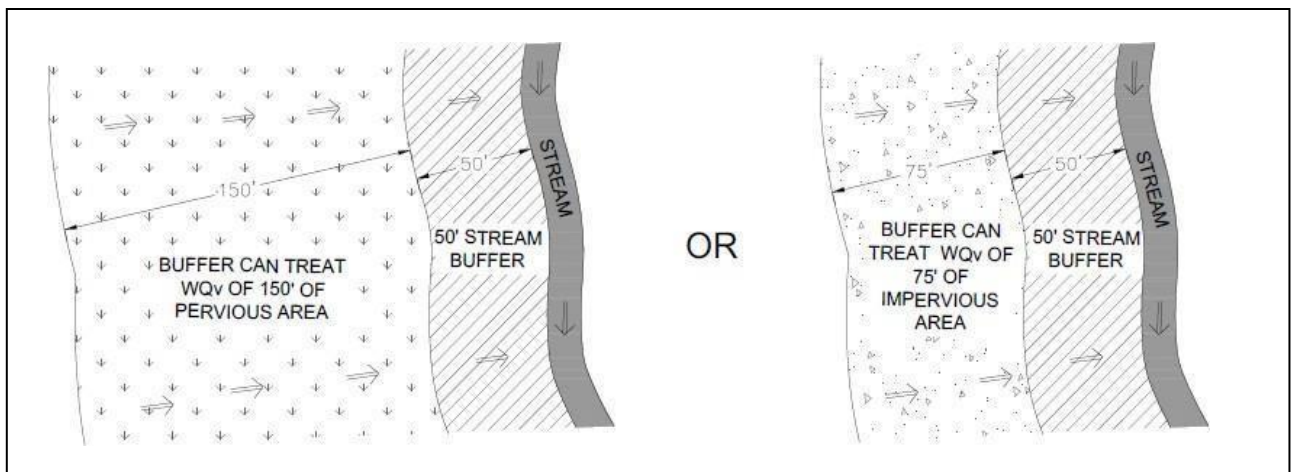


Figure 3-12. Example application of Permanent Stream Buffer Credit with 50' stream buffer.



Example: Residential Subdivision
 Area = 38 acres
 Impervious Area = 13.8 acres
 50' wide Buffer Area = 2 acres
 Area Draining to Buffer = 5 acres

$$R_v = 0.05 + 0.009 (I) = 0.05 + 0.009 (36.3) = 0.37$$

Credit:

5.0 acres draining to buffer
 2 acres of buffer area
 New drainage area = 38 – 5 – 2 = 31 acres

Before credit:

$$WQ_v = (1.2)(0.37)(38)/12 = 1.40 \text{ ac-ft}$$

With credit:

$$WQ_v = (1.2)(0.37)(31)/12 = 1.15 \text{ ac-ft}$$

(18% reduction in water quality volume)

3.11.3 Credit #3: Vegetated Channels

This credit may be taken when vegetated (grass) channels are used for water quality treatment. Under the proposed credit, a designer can subtract the areas draining to a grass channel from total site area when computing water quality volume requirements. A vegetated channel can fully meet the water quality volume requirements for certain kinds of low-density residential development (see environmentally sensitive large lot development credit). An added benefit will be that the post-development peak discharges will likely be lower due to a longer time of concentration for the site.

This credit cannot be taken if grass channels are being used as a limited application structural stormwater control (i.e. not designed to fully meet the design methodology and criteria) towards meeting the pollutant reduction goal for WQ_v treatment.

Rule: Subtract the areas draining to a grass channel from total site area when computing water quality volume requirements.

Criteria:

1. The credit shall only be applied to moderate or low density residential land uses (3 dwelling units per acre maximum).
2. The maximum flow velocity for water quality design storm shall be less than or equal to 1.0 feet per second.
3. The minimum residence time for the water quality storm shall be 5 minutes, meaning vegetated channels must be designed to hold the water quality storm event for a minimum



of 5 minutes.

4. The bottom width shall be a maximum of 6 feet. If a larger channel is needed, use of a compound cross section is required.
5. The side slopes shall be 3:1 (horizontal:vertical) or flatter.
6. The channel slope shall be 3 percent or less.
7. R_v is kept constant when calculating WQ_v .

Example: Residential Subdivision
 Area = 38 acres
 Impervious Area = 13.8 acres

$$R_v = 0.05 + 0.009 (I) = 0.05 + 0.009 (36.3) = 0.37$$

Credit:

12.5 acres meet grass channel criteria
 New drainage area = $38 - 12.5 = 25.5$ acres

Before credit:

$$WQ_v = (1.2)(0.37)(38)/12 = 1.40 \text{ ac-ft}$$

With credit:

$$WQ_v = (1.2)(0.37)(25.5)/12 = 0.94 \text{ ac-ft}$$

(33% reduction in water quality volume)

3.11.4 Credit #4: Overland Flow Filtration/Groundwater Recharge Zones

This credit can be taken when “overland flow filtration/infiltration zones” are incorporated into the site design to receive runoff from small impervious areas (e.g., driveways, small parking lots, etc). This can be achieved by grading the site to promote overland vegetative filtering or infiltration areas (i.e. rain gardens). If impervious areas are adequately disconnected, they can be deducted from total site area when computing the WQ_v requirements. An added benefit will be that the post-development peak discharges will likely be lower due to a longer time of concentration for the site.

Rule: If impervious areas are adequately disconnected (i.e. the receiving area has the appropriate soils, surface area, length and slope to filter and/or infiltrate the calculated runoff volume for the water quality event), they can be deducted from total site area when computing the water quality volume requirements.

Criteria:

1. Relatively permeable soils (hydrologic soil groups A and B) must be present in the overland flow areas.



2. Runoff shall not come from a designated or known areas where land use or activities generate highly contaminated runoff, with concentrations of pollutants in excess of those typically found in stormwater, a "hotspot".
3. The maximum contributing impervious flow path length shall be 75 feet.
4. Downspouts shall be 10 feet or more away from impervious surface to discourage "re-connections".
5. The disconnection shall drain continuously through a vegetated channel, swale, or filter strip to the property line or structural stormwater control.
6. The length of the "disconnection" shall be equal to or greater than the contributing length.
7. The entire vegetative "disconnection" shall be on a slope less than or equal to 3 percent.
8. The imperviousness area to a discharge location is 5,000 square feet or less.
9. If draining directly to a buffer, the stream buffer credit cannot also be used.
10. R_v is kept constant when calculating WQV.

Example: Site Area = 3.0
 Impervious Area = 1.9 acres (or 63.3% impervious cover)
 "Disconnected" Impervious Area = 0.5 acres

$$R_v = 0.05 + 0.009 (I) = 0.05 + 0.009 (63.3) = 0.62$$

Credit:
 0.5 acres of surface imperviousness hydrologically disconnected
 New drainage area = 3 – 0.5 = 2.5 acres

Before credit:
 $WQ_v = (1.2)(0.62)(3)/12 = 0.19 \text{ ac-ft}$

With credit:
 $WQ_v = (1.2)(0.62)(2.5)/12 = 0.15 \text{ ac-ft}$

(21% reduction in water quality volume)

3.11.5 Credit #5: Environmentally Sensitive Large Lot Subdivisions

This credit can be taken when a group of environmental site design techniques are applied to low and very low density residential development (1 dwelling per 2 acres [du/ac] or lower density). The credit can eliminate the need for structural stormwater controls to treat water quality volume requirements. This credit is targeted towards large lot subdivisions and will likely have limited application. Note that stormwater quantity requirements must still be met.



Rule: Targeted towards large lot subdivisions (2 acre lots and greater). The requirements for structural practices to treat the water quality volume treatments shall be waived.

Criteria For Single Lot Development:

1. Total site impervious cover is less than 15%.
2. Lot size shall be at least two acres.
3. Rooftop runoff is disconnected in accordance with the criteria in Credit #4.
4. Grass channels are used to convey runoff versus curb and gutter (see Credit #3).

For Multiple Lots:

1. Total impervious cover footprint shall be less than 15% of the area.
2. Lot areas should be at least 2 acres, unless clustering is implemented. Open space developments should have a minimum of 25% of the site protected as natural conservation areas and shall be at least half-acres average individual lot size.
3. Grass channels must be used to convey runoff versus curb and gutter (see Credit #3).
4. Overland flow filtration/infiltration zones should be established (see Credit #4).



4 STORMWATER DRAINAGE

4.1 Hydrologic Computation Requirements

All hydrologic computations shall be completed using volume-based hydrograph methods acceptable to the PW/SWD. The design storm duration for these computations shall be the 24-hour storm event and a SCS Type II distribution with a 0.1-hour duration time increment. Typical hydrologic inputs include, but are not limited to the following:

1. Precipitation depth or intensity
2. NRCS soil classification and hydrologic soil group (Lexington County soils information can be found at <http://maps.lex-co.com/lexcogeo/>)
3. Land use and appropriate curve numbers
4. Time of concentration
5. Hydrographs

All hydrologic computations shall be presented in an easily reviewable format, which will minimize PW/SWD review time through consistent submittals. This format shall include pre- and post-development runoff rates, velocities, and volumes. The County reserves the right to reject or revise the format of a submittal, or to require a specific format be used, in order to provide efficient and consistent reviews. A standard format is provided in Appendix D.

The remainder of this section will provide basic information for hydrologic calculations. It is assumed that the designer has a solid understanding of hydrology and hydraulics. Therefore, the intent of the Manual is not to provide detail on every aspect of hydrologic computations, limitations, assumptions, appropriateness of use, but rather general guidance on generally accepted standards. This Manual does, however, reference suggested materials as necessary for detailed discussion of related topics.

4.1.1 Precipitation Depths/Intensities

The precipitation depths/intensities corresponding to various return periods to be used for projects in Lexington County are shown in Table 4-1.

Table 4-1. Design storm precipitation data for Lexington County, South Carolina.

Design Storm	Water Quality	1-yr (Channel Protection)	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
24-hr rainfall (in.)	1.2	3.1	3.6	4.5	5.3	6.4	7.3	8.3



4.1.2 Recommended Methodologies

The PW/SWD recommended methods and corresponding design circumstances are listed in Tables 4-2 and 4-3. If other methods are used, approval must first be given by PW/SWD. Complete source documentation must be submitted for approval.

Table 4-2. Recommended methodologies based on land disturbance area.

Method	Size Limitations*	Comments
(Modified) Rational Method	0 – 2 Acres	Acceptable for sizing individual culverts or storm drains that are not part of a pipe network or system. Not to be used for storage design.
“SCS Method” (TR-55)	0 – 2000 Acres	Used for estimating peak flows from urban areas.
USGS Regression Equation	> 2000 Acres	Used for estimating peak flows for all design applications for areas between 2,000 and 16,000 acres and estimating hydrographs for all design applications for areas between 2,000 and 16,000 acres.

*Size limitations refer to the subwatershed size to the point where a stormwater system component (i.e., culvert, inlet, BMP) is located.

Table 4-3. Recommended methods for designing various stormwater management systems and controls.

Method	Rational Method	SCS Method	USGS Equations	Simple Method
Stormwater Quality				+
Stormwater Quantity		+	+	
Storage/Sedimentation Facilities		+	+	
Outlet Structures		+	+	
Gutter Flow and Inlets	+	+		
Storm Drain Pipes	+	+	+	
Culverts	+	+	+	
Small Ditches	+	+	+	
Open Channels		+	+	
Energy Dissipation		+	+	

Soil types in Lexington County range from sands and sandy clays to clays. Existing land use and corresponding runoff potential factors should be obtained from the site visit and other appropriate sources.

Methods for calculating the time of concentration and abstraction are numerous. However, a minimum time of concentration of six (6) minutes shall be used for all hydrologic calculations.



The time of concentration shall be developed using the SCS methodology, with the following limitations for sheet flow calculations:

1. Maximum flow length of 50 feet for paved or bare surfaces
2. Maximum flow length of 150 feet for vegetated surfaces

See references given above for the suggested methodologies for information on these calculations.

Hydrographs should be used to evaluate entire systems by routing storm events through pipe or storage systems. The use of a hydrograph will provide better insight into system performance than simply using the peak discharge. Lexington County will accept commonly used computer models. New models may be accepted with appropriate documentation.

4.2 Stormwater Drainage System Design

This section provides the design requirements for various storm drainage/collection system components.

4.2.1 Storm Drainage Pipes

1. The entire watershed that drains to a particular design point shall be included in determining the appropriate design storm. All drainage systems regardless of size or classification shall be analyzed and designed to safely pass the 100-year storm event to avoid the likelihood of dwelling flooding, property damage, public access, and/or utility interruption.

Example 1: A residential stormwater drainage system is required to collect and convey flows from a 10-year event. However, the designer estimated the depth of flow across roadways and other surfaces during a 100-year event, which were in excess of those that the catch basins and inlets could collect and convey, but would ultimately be directed to the receiving stormwater pond (or waterway). Those depths of flow, for the entire site, were determined to be below those that would cause flooding (or other damages) to neighboring/adjacent properties or cause an impediment to public access and/or utility interruption. Therefore, this system safely passes the 100-year storm event.

All computations shall be based on the existing conditions of the contributing watershed, not just the project area or disturbed area. Classification of stormwater systems are as follows:

- a. **Minor Drainage Systems: 0 - <40 Acres**
All drainage systems, excluding ponds, shall be designed to carry flows resulting from a 10-year storm event. Ditches and channels must be designed for the 25-year storm event.



- b. **Collector Systems: 40 - <100 Acres**
All drainage systems, excluding ponds, that carry at least 40 acres but less than 100 acres shall be designed to carry flows resulting from a twenty-five (25) - year storm event.
 - c. **Major Drainage Systems: 100 - <300 Acres**
All drainage systems, excluding ponds, that carry at least 100 acres but less than 300 acres, shall be designed to carry a flow resulting from a 50-year storm event. Encroachment upon Major Drainage Channels and the adjacent overflow land shall be avoided to the maximum extent possible.
 - d. **County or FEMA Floodplains: 300 and more Acres**
Bridges and culverts being constructed in natural channels, creeks, or rivers draining more than 300 acres, shall be designed to carry a flow resulting from a 100-year storm event. Bridge clearance (from low chord to 100-year water surface elevation) and culvert freeboard (from top of roadway to 100-year water surface elevation) will be determined by the PW/SWD, on a case-by-case basis. Encroachment upon these channels shall be avoided to the maximum extent practicable, and new encroachments into an established floodway (excluding bridge piers) shall be avoided. The floodplain provisions in Chapter 10 shall apply, where applicable, to drainage systems which drain 300 or more acres.
2. The minimum size storm drainage pipe allowable shall be fifteen (15) inches in diameter.
 3. The minimum allowable slope for storm drainage pipe shall be one-half of one (1) percent (0.005 ft/ft) or a minimum flow velocity of three (3) feet per second at all flow levels. Maximum allowable slope for storm drainage pipe is twenty (20) percent (0.20 ft/ft).
 4. Side property line drainage shall be conveyed non-erosively via engineered drainage swales or pipes. Where practical, drainage swales are preferred over pipes. At pipe outfalls, this normally requires the use of a rip-rap apron, placed on filter fabric, for a minimum distance equal to or greater than six (6) pipe diameters.
 5. Type and class of storm drainage pipe, as well as the construction of pipe culverts, shall be in accordance with South Carolina Department of Transportation's (SCDOT) Supplemental Technical Specifications, Sections 714. The proposed use of any type of storm drainage pipes other than RCP shall be considered on a case by case basis.
 6. A minimum of one (1) foot of cover shall be provided for reinforced concrete pipe (RCP) storm drainage pipe; for residential collector (RC) and light commercial/industrial (LC/I) roads, pipe shall be placed at least six (6) inches below the base course. See Chapter 10 – Road Design for specific information on road classes and other related information.
 7. Storm drainage pipe shall be placed to minimize the length running under pavement. Where it is necessary for a pipe to cross the roadway, the preferred placement shall be at a ninety (90) degree angle, and in no case at less than forty-five (45) degrees. All cross lines



in the roadway shall be compacted in 12" lifts to 95% Standard Proctor maximum density and to 100% Standard on the last 12".

8. Any "open" storm drainage cross line pipe shall extend out to the toe of the roadway embankment; in no case will the end of the pipe be within five (5) feet of the roadway shoulder.
9. Storm drainage pipe discharging into a drainage channel shall intersect the channel in a manner such that the interior angle measured from its centerline of flow, is at least ninety (90) degrees. Rip-rap, or other suitable protection, is required from the outlet point to the bottom of the channel and on the opposite channel bank to prevent scour and erosion.
10. Storm drainage pipes discharging into a wet pond below the permanent pool shall be analyzed to ensure that tailwater conditions do not adversely impact storm drainage capacity or increase the potential for flooding. Where storm drainage pipes discharge above the permanent pool, rip-rap or other energy dissipation structures shall be designed and installed to ensure non-erosive velocities and discourage resuspension of solids in the pond.
11. An access point to allow maintenance shall be available within every 300 feet for 15" to 18" diameter pipe, every 400 feet for 24" pipe, and every 500 feet for larger storm drainage pipes.
12. The 100-year, 24-hour storm event shall be used to check all drainage designs for local flooding and, most notably, potential flood hazards to adjacent structures and/or property.
13. Hydraulic grade line and head loss calculations for determining water surface elevations shall be performed for connections to existing systems.
14. Calculations should be performed for the appropriate design storm event.
15. For storm drainage systems with less than 10 connections, Manning's Equation shall be acceptable for sizing the capacity of drain pipes for non-submerged conditions where the free water surface elevation is below the crown of the pipes.
16. Storm drain profile plots should be included in the set of construction plans.
17. Storm drainage systems shall be designed to convey stormwater runoff by gravity flow unless otherwise approved.
18. For very flat flow lines, flow velocities shall increase progressively throughout the system to reduce the potential for the accumulation of debris within the pipe. Upper reaches of the pipe system may have flatter slopes than the lower end of the system. In addition, all pipe outfalls will have appropriate erosion prevention and/or energy dissipation features.

4.2.2 Culverts

1. Proper consideration of inlet and outlet control shall be given in the design of culverts and outlets.



2. The pipe, appurtenant entrance and outlet structure should properly account for water, bed-load, and floating debris at all stages of flow.
3. The outlet should be designed to resist undermining and washout. Rip-rap aprons, flared end sections, wing walls, or other means shall be sized and specified, as necessary.
4. Culvert selection techniques can range from solving empirical formulas, to using nomographs and charts, to comprehensive mathematical analysis for specific hydraulic conditions. Other widely accepted models may be used, but must be approved by the PW/SWD. Designs shall be based upon SCDOT requirements where applicable.
5. Additional hydraulic capacity shall be required as necessary to prevent backwater effects that may adversely impact upstream property or structures.

4.2.3 Headwalls and Outlets

All exposed ends of pipes shall be protected by a flared end section or one of the following type headwalls:

1. A concrete or brick headwall plastered with grout is preferred; it is required on culvert ends located in major drainage channels as previously defined. An acceptable design detail is provided in Appendix D.
2. A rip-rap headwall is acceptable for pipes 24" or less in a number of situations. If used, it should conform to the standard details provided in Appendix D. Note that this technique requires the use of both filter fabric and grout. For pipes greater than 24", a concrete headwall with wings is required.
3. Where feasible, outfalls that convey newly-concentrated runoff from new development and discharge to an area without an existing channel must discharge through a natural buffer area a minimum of fifty (50) feet in width from the property line. The discharge shall enter an energy dissipater to slow the velocity of water and convert the discharge back to sheet flow, or one that is below an erosive velocity for the site conditions before entering the buffer area. Where the concentrated runoff from the new development discharges into a channel, a stabilized outlet must be provided such that the discharge does not cause erosion of the receiving channel.
4. Outlets will not be allowed to discharge on fill slopes.

4.2.4 Energy Dissipation

1. All concentrated discharge points shall be sufficiently stabilized, or have energy dissipating devices added, to mitigate the potential for long-term erosion of the areas receiving the stormwater flows. Calculations shall be provided justifying the design and material used. The use of energy dissipating devices shall be considered in all applications, and an explanation shall be provided for all instances where they are excluded from the design (e.g. flows enters directly into a stable, natural swale/channel).



2. Where concentrated runoff does not discharge to a channel, level spreaders, riprap aprons, plunge pools, etc. shall be properly designed and installed to ensure that concentrated flows are converted into sheet flow. The use of level spreaders shall be considered in all applications, and an explanation shall be provided for all instances where they are excluded from the design (e.g. flows enters directly into a natural swale/channel).

4.2.5 Catch basins, yard inlets, manholes, and junction boxes:

1. Materials and construction shall be as specified in Appendix D.
2. Additional materials and construction, for items not provided in Appendix D, shall be as specified in Section 719 of the SCDOT Standard Drawings.
3. Side inlet catch basins or junction boxes (see details in Appendix D) with concrete covers shall have a metal ring and manhole lid cast within the top for easy access (e.g. pull holes in lid).
4. When the depth of a catch basin or junction box exceeds four (4) feet, rungs/steps shall be provided for ascent and descent (Steps are to be ASTM-C-478, or equivalent).
5. The box top shall be a minimum of three (3) feet by three (3) feet. Sides shall be plastered with grout.
6. All pipes entering or leaving shall not protrude more than four (4) inches into the box.
7. All roadway catch basins shall be Modified Florida Type Catch Basins, with details as shown in Appendix D.
8. Yard inlets shall be designed to accommodate a given flow such that ponded water is removed within 72 hours, and does not cause flooding to adjacent buildings or other interests. As long as these criterion are met, the depth of ponded water is allowed to exceed the top of the manhole lid by no more than 6 inches for the appropriate design storm.
9. It is desirable to locate catch basins outside curve radii. If this is not reasonably possible, the catch basin shall be set back an extra foot and the face of the catch basin shall be parallel to a chord joining the two points on the curve radius located by projecting lines from the sides of the catch basin box.
10. Catch basins shall contain a minimum drop of 0.2 feet from invert in to invert out.
11. Floors are to be of concrete with raised corners.
12. Within a catch basin, the elevation at the crown of any inlet pipe shall be equal to or greater than the crown of the outlet pipe.
13. Catch basins shall be field staked to ensure proper catch basin inlet alignment with the street gutter line.



14. Area around all catch basins shall be backfilled in 12" lifts, compacted to 95% Standard Proctor maximum density.
 15. Inlet protection shall be provided at all inlets into the stormwater system during construction and until project closure procedures have been completed or notification from the PW/SWD has been given stating that an acceptable level of stabilization has been achieved. Guidance on design, installation and maintenance of inlet protection can be found in the SCDHEC Storm Water Management BMP Field Manual (2005). PW/SWD does not allow inlet protection devices that are installed inside an inlet or pipe. All inlet protection devices must be located at the surface/entrance of the inlet.
 16. Inlet spacing shall be determined using a methodology similar to FHWA HEC-22, and according to the following criteria:
 - a. At least one full travel lane width must be available during the rain event for all residential collector (RC) and light commercial/industrial (LC/I) roads; 6-feet of spread, or half of a travel lane, whichever is greater is the maximum spread for residential/local (RL) road.
 - b. Inlets upgrade of a road intersection, sag inlets, or the last inlet for a given system must be designed with sufficient capacity to handle the entire flow, such that there is no flow through/bypass.
 - c. Calculations must show the spread, inlet capacity based upon inlet geometry and road geometry, and the amount of bypass flow to be accounted for as it travels downstream.
 17. Maximum depth in which the water may pond above or around an inlet must not threaten surrounding permanent structures or facilities and ponded water shall not extend into travel lanes.
 18. In depth design procedures for inlet and storm drainage design may be found in AASHTO's "Model Drainage Manual" (2014), USDOT "Urban Drainage Design Manual – Hydraulic Engineering Circular #22" (revised 2013), Mays, L., "Hydrology for Drainage Systems Design Handbook" (2001), and Yen "Hydraulics of Sewer Systems" (2001).
 19. All manhole lids, catch basins, and junction boxes shall have a water quality logo and "Lexington County" imprinted on them. Contact the PW/SWD for information on how to obtain lids.
 20. Catch basins, yard inlets, and junction boxes shall be constructed large enough to accept the pipes entering and exiting the box. Also, when necessary, an offset lid or other means shall be provided for safe access into the box for maintenance purposes. A detail shall be provided that clearly depicts these requirements.
- 4.2.6 Detention/Retention Structures:
1. If retaining walls or fill slopes are to be constructed at the downstream property line, the PW/SWD recommends a 10' setback to allow for construction and maintenance. If a 10' setback is not provided, then provide easements from the adjacent property owner.



2. A 50 foot minimum undisturbed buffer is required between the property line and drainage outfall. Where the pond discharges into a new or existing channel, the 50 foot setback applies, and the channel must be stabilized against erosion.
3. All ponds shall have an emergency spillway designed to safely pass the 100-year storm event. Earthen emergency spillways shall be designed so as not to overtop during the 25-year storm event. Larger ponds that fall under the purview of the Dams and Reservoirs Safety Act must comply with those regulations.
4. Corrugated metal pipe (CMP) is not allowed through pond dams; only RCP shall be allowed.
5. Lexington County maintained ponds shall have a six (6) foot tall security fence around the perimeter of the pond parcel.
6. Underground detention facilities shall be designed to account for periodic maintenance and in accordance with manufacturer recommendations.
7. Any development that uses a parking area or other feature for detention storage capacity shall clearly identify the limits and depths of the expected detention pool. Travel lanes cannot be used as detention storage.
8. Basin configurations which create stagnant water conditions shall be avoided.
9. Ponds with vegetated embankments shall be less than 15-feet in height and shall have side slopes no steeper than 3H:1V. Geotechnical slope stability analysis is required for slopes greater than 8-feet in height and embankments that have steeper slope than 3H:1V. Access inside a pond shall be provided with at least one side slope at 3H:1V or flatter.
10. A minimum freeboard of 1-foot above the 100-year, 24-hour design storm high water elevation shall be provided for all impoundments. The SC Dam Safety Act may impose other restrictions and requirements on dam owners. SCDHEC should be contacted for further information.
11. The bottom of detention structures shall be graded towards the outlet structure(s) to prevent standing water conditions. A minimum 0.5% bottom slope and 3:1 side slope are recommended. Ponds are not to be undercut for silt storage. Where permanent detention ponds are initially used as sediment basins, accumulated sediments shall be removed, outlets structures converted, and the pond shall be regraded to match the detention pond design contours.
12. The maximum depth of permanent storage facilities with a permanent pool shall be determined by site conditions, design constraints, and environmental needs. The facility should provide a permanent pool of water with a depth sufficient to discourage weed and mosquito growth without creating undue potential for anaerobic bottom conditions. A depth of 4 to 8 feet is reasonable unless Natural Resources Conservation Service (NRCS) requirements dictate otherwise. Aeration or other means shall be used as necessary to



prevent anaerobic conditions (unless used to remove nutrients). NRCS shall be contacted when aquatic habitat is required.

13. Where a site has no concentrated discharge point, a no discharge basin will be allowed. See Appendix D for more guidance on these structures.
14. Security and maintenance access features, such as fences, gates, and easements shall be included, and are subject to County approval. Such features will be selected based on the location (e.g. remote, commercial) and anticipated maintenance needs of the stormwater facility.

4.3 Open Channel Hydraulics

Open channels shall include all permanent storm drainage channels including swales and diversions. These storm drainage systems shall be designed based upon the following criteria.

1. Each swale design configuration (i.e. width, depth, side-slopes, and longitudinal slopes) used for a site must be provided – no “typical details” shall be allowed for sites that have multiple swale design configurations.
2. All open channels are to be uniform and shall be stabilized to prevent erosion in a manner approved by the PW/SWD. A number of acceptable techniques are shown in the current version of the SCDHEC Storm Water Management BMP Field Manual (2005).
3. The design of open channels shall be based on Manning’s Formula where backwater effects from obstructions and/or tailwater are not present. Flow velocities must be non-erosive to soils present or the channel surfaces must be adequately lined, e.g., rolled erosion control product, rip-rap, concrete. All channels in clayey soils shall be limited to a maximum flow velocity of five (5) feet per second. All channels in sandy soils shall be limited to a maximum flow velocity of 2.5 feet per second.
4. The minimum channel grade shall be 0.005 ft/ft, unless supporting calculations show that there will be no pools or standing water areas formed in the channels at smaller slopes.
5. Design conditions can be assumed to be steady, uniform flow.
6. Except for roadside ditches, the side slopes of grassed lined channels without rolled erosion control products or turf reinforcement matting shall be no steeper than 3H:1V.
7. Channels may be designed with multiple stage levels with a low flow section to carry the 2-year storm event and a high flow section to carry storms of larger frequencies.
8. Lexington County allows vegetated channels. Guidance on the design of these type channels can be found in Haan et. al. “Design Hydrology and Sedimentology for Small Catchments” (1994) or by using computer software that is capable of calculating channel stability and capacity.



9. Additional hydraulic capacity may be required to prevent adverse impacts on adjacent property or the existing drainage system(s).

General guidance on open channel design can be found in the following:

1. "Introduction to Highway Hydrology – Hydraulic Design Series # 4." Federal Highway Administration, Publication # FHWA NHI 01- 019. 2008.
2. "Hydraulic Design of Highway Culverts – Hydraulic Design Series # 5." Federal Highway Administration, Publication # FHWA-NHI-01- 020. 2012.
3. "Urban Drainage Design Manual – Hydraulic Engineering Circular # 22." Federal Highway Administration, Publication # FHWANHI-01-021. 2013.



5 DRAINAGE EASEMENTS AND BMP MAINTENANCE

The County owns or maintains a complex system of ditches, stormwater pipes, stormwater system connection components, and other structural and non-structural stormwater practices throughout the County. The County’s Small Municipal Storm Sewer System (SMS4) permit requires that the County “must ensure the long-term maintenance of structural stormwater control measures installed”. In addition, the County maintains stormwater system components beyond the requirements of the SMS4 permit to maintain the functionality of the system. The County’s system is interconnected with other privately and publicly owned systems. This Chapter outlines the requirements for operation and maintenance of both the private drainage system and the County’s drainage system.

5.1 Easements

All stormwater system components must be located in stormwater utility access and maintenance easements, in the road right-of-way or on land dedicated to the County. These easements must be noted on plats as “Stormwater Utility Access and Maintenance Easements”. Easements and properties dedicated to the County must include access from a public street that allows for public inspection and emergency repair of all components of the drainage system, including all conveyances and all water quantity and quality control facilities. Stormwater quantity and quality control facilities shall be located so that required easements can be effectively used and ownership and maintenance responsibility must be clearly defined in deeds and plats.

Not with standing any provisions set forth herein, Lexington County reserves the right to accept or deny maintenance of all or part of a storm drainage system.

The following section provides the required easement widths for various components of the stormwater system. In all cases, easements must be based upon the center of the stormwater system component.

5.1.1 Storm drain pipe easements

Stormwater utility access and maintenance easements shall provide adequate room for maintenance equipment to operate. Table 5-1 provides required minimum drainage easement widths for some of the more typical situations:



Maximum pipe size (in)	Maximum depth to invert (ft)	Width of drainage easement (ft)
18	3.5	15
24	5.0	20
36	6.0	24
54	7.0	30
72	9.0	36

Table 5-1. Stormwater Drain Pipe Easements.

Notes:

- (1) For depths greater than shown, add two (2) feet for each additional foot to the invert.
- (2) For larger pipe sizes and/or multiple lines of pipe easement width shall be determined by the PW/SWD.

5.1.2 Open channel easements

A minimum easement width for an open channel/ditch is 24 feet. For channels greater than 4 feet wide and/or 4 feet deep, the stormwater utility access and maintenance easements width shall be increased by two (2) feet for each additional foot of width and/or depth.

5.1.3 Ponds dedicated to Lexington County

A 20 foot all-weather access road shall be dedicated to Lexington County within the pond parcel. The pond parcel shall be accessed from a public facility (road, parcel, etc.) or some other access that is acceptable to the PW/SWD. The access road should be clear of any obstructions such as fire hydrants, manholes, storm drain boxes, etc. The pond parcel should be adjacent to the least amount of residential lots as possible. The pond parcel shall also include a minimum 10 foot wide strip around the perimeter of all detention and retention facilities extending from the outside toe of the pond berm, as well as a 10 foot all-weather riding surface on the top of the pond berm. The review by the PW/SWD will include a check to ensure this access for basin maintenance is sufficient for the pond and surrounding area (e.g. slopes not too steep).

5.1.4 Other stormwater facilities & BMP easements

All other structures used for the control of stormwater runoff (quantity or quality) not otherwise covered above, shall have an easement for access and maintenance that allows ease of access and maintenance. Easement widths shall be a minimum of 10 feet beyond the boundary of any such structure on all sides. PW/SWD may request or allow other easements widths on a case-by-case basis given site constraints or special conditions.

5.1.5 Off-site easements

Any required off-site easements shall be obtained prior to Land Disturbance Permit (LDP) approval. Any work done without proper and adequate easement(s) shall be at the Developer's own risk. Offsite easements must be executed and recorded prior to issuance of the LDP. Non-subdivision projects shall provide validation of necessary easements before a LDP will be issued.



5.2 Post Construction BMP Operation and Maintenance

Prior to final plan approval for any Land Disturbance Permit, the site plan must show all structural and non-structural (such as water quality treatment credits) stormwater controls located in easements, rights-of-way, or land dedicated to the County. In addition, an Operation and Maintenance Plan (O&M Plan) must be submitted and approved by the County. See Section 5.4 for a detailed description of the O&M Plan. Generally, there are three steps to finalizing the O&M Plan:

1. A draft O&M Plan must be submitted with the LDP application.
2. The final O&M Plan is submitted with the as-built certification.
3. The final O&M Plan is recorded prior to final platting and/or the Certificate of Occupancy issuance for both residential and commercial.

The final O&M Plan must reflect the actual stormwater system and BMPs on the site after the as-built certification and must be recorded. If the stormwater BMP sizes or locations change such that the criteria of the initial design cannot be met, the owner may be required to submit a revised stormwater management plan and modify site controls to meet the requirements of this manual.

When plans are initially submitted, a draft Operation and Maintenance Plan (O&M Plan) for the proposed site must be included with the submittal for the Land Disturbance Permit. Once the development has been constructed and all permanent stormwater controls have been installed, an as-built certification must be completed on all stormwater system components, included water quality treatment volume credit areas, water quality treatment best management practices (BMPs), and water quantity control BMPs. The as-built certification and final O&M Plan must then be submitted to the County for review and acceptance. Once accepted, the O&M Plan for privately owned and maintained stormwater systems must be recorded with the deed, and the County will perform the final inspection.

5.2.1 Maintenance Responsibilities

When plans are submitted to the County for review, maintenance responsibilities for each BMP or treatment credit must be clearly identified. This section describes the requirements for privately maintained and County maintained BMPs. The County will accept maintenance responsibilities for structural stormwater management controls on a case by case basis. Note that the County will not accept maintenance responsibilities for water quality treatment credits.

County Maintained BMPs:

1. The County may assume maintenance responsibilities for structural BMPs in residential developments. The developer must request that the County take primary responsibility for maintenance of post construction BMPs in the LDP application and must design stormwater controls using the Option B Unified Sizing Criteria (see Chapter 3).
2. The County may require that routine maintenance responsibilities such as mowing and



trash removal be assigned to the landowner, Home Owners Association, and/or landscaping company. However, for County-maintained BMPs, major maintenance items such as sediment removal or replacement of stormwater drainage systems are the responsibility of the County.

3. The County may accept maintenance responsibilities of stormwater systems designed using the Option B Unified Sizing Criteria in residential areas after the two year warranty/guarantee period. For systems dedicated or maintained by the County, periodic inspections shall be performed to determine maintenance needs.
4. All BMPs and water quality credit areas must be located in stormwater utility access and maintenance easements or Rights-of-Way. Ponds must be located on tracts of land that are dedicated to the County.

Privately Maintained BMPs:

1. Property owners and Lessees are responsible for maintaining stormwater quantity and quality facilities and all conveyance structures located on commercial property.
2. All stormwater quantity and quality facilities shall be located in stormwater utility access and maintenance easements.
3. Prior to the approval of the as-built certification, the responsible party shall execute a legal document to cover all necessary maintenance of the stormwater management system.
4. In residential areas where BMPs and the stormwater system are to be privately maintained, the Covenants shall specify minimum maintenance requirements to be performed at necessary intervals by the property owner or lessee and refer to the recorded Operation and Maintenance Plan.
5. Stormwater BMPs that are privately maintained must be inspected once every five years or when maintenance concerns have been identified and proof of the inspection must be provided to the County. Failure to submit an annual inspection report constitutes a violation of the stormwater ordinance.
6. If deficiencies are identified through the inspections, the BMP owner(s) must take corrective actions to ensure the functionality of the system is maintained or restored. If a privately maintained or owned facility or any portion of the stormwater system is not being maintained as required, the Director of Public Works or his designee will notify the property owner or lessee in writing of the needed maintenance. If the property owner or lessee fails to repair or maintain the facility within the allotted time, the Public Works Department is authorized to precede with corrective actions and/or applicable enforcement proceedings. The Public Works Department may authorize the work to be performed by the County or others. In such cases, the property owner or lessee shall reimburse the County for its direct and related expenses. If the property owner or lessee fails to reimburse the County, the County will proceed with applicable judicial proceedings.



7. A property owner or lessee may hire or contract others to perform necessary maintenance actions, but Lexington County will hold the person or organization responsible for maintenance as the responsible party should legal actions be necessary.

5.3 Operation and Maintenance Plan Contents for Privately Maintained Systems

All permanent stormwater system components must be maintained perpetually. For privately maintained stormwater systems and BMPs, the County requires the developer to prepare an Operation and Maintenance (O&M) Plan for each site and requires that the landowner perform inspections of each facility. A template for the inspection is included in Appendix D of this manual, as are examples of an O&M Agreement and O&M Plan. The final O&M Plan must be recorded with the deed.

The following components make up the comprehensive O&M Plan:

1. Completed and fully executed Operation and Maintenance Agreement.
2. Location map. The location map must show the locations of all permanent stormwater management components (including pipes and ditches), treatment practices (including structural BMPs and water quality treatment areas), and easements. This map must be specific and clear enough for a landowner to identify the drainage system components and any practices located throughout the development. All practices shall be located in stormwater utility access and maintenance easements or in Rights-of-Way.
3. Schematics for the practices. The BMP schematics must show the dimensions for each BMP (including depth, length, planting schematics, etc.) and location and sizes of inlets and outlets. For bioretention areas, the schematics must note that the mulch, planting media, and vegetation are all components of the BMP. Underdrains must be clearly noted as well. For measures with observation wells, locations of the observation wells must be identified. Dimensions and allowed management techniques (i.e., Natural Area Conservation treatment credit areas must be managed as meadows or other natural and low maintenance vegetation) must also be provided for water quality treatment areas.
4. Template inspection reports. Each structural treatment practice has a template inspection report contained in Appendix D. A template inspection report for each type of privately maintained BMP must be included in the O&M plan. If the BMP is a proprietary practice, the developer/designer is required to provide an inspection report that covers basic maintenance needs including maintenance frequency. The manufacturer of the practice can provide this information. An inspection report for each type of privately maintained BMP on the project must be included. These inspection reports are for the BMP owner's use in completing the BMP inspections at least once every five years.



6 EROSION PREVENTION AND SEDIMENT CONTROL

This Chapter provides a summary of the County’s Erosion Prevention and Sediment Control Program. The County’s program is based upon the South Carolina Department of Health and Environmental Control (SCDHEC) Construction General Permit (CGP), as well as specific requirements related to Lexington County.

Section 6.1.1 is provided as a summary of the sediment and erosion control requirements in the South Carolina NPDES General Permit for Stormwater Discharges from Construction Activities (CGP) and the South Carolina Standards for Stormwater Management and Sediment Reduction Regulation 72-300 thru 72-316. Please refer to these documents for the complete description of all applicable sediment and erosion control requirements.

6.1 Sediment and Erosion Control Requirements

PW/SWD requires that a Stormwater Pollution Prevention Plan (SWPPP) be submitted and approved prior to initiating construction on land disturbing activities as follows:

1. Development that disturbs greater than one acre or that disturbs less than one acre and is part of a larger common plan of development; or
2. As otherwise directed by PW/SWD.

SWPPP’s shall comply with the requirements of the current version of the South Carolina NPDES General Permit for Stormwater Discharges from Construction Activities (CGP) and the South Carolina Standards for Stormwater Management and Sediment Reduction Regulation 72-300 thru 72-316.

6.1.1 Stormwater Pollution Prevention Plans

The current South Carolina NPDES General Permit for Stormwater Discharges from Construction Activities requires the following sediment and erosion control related information for coverage of construction activities under the permit:

A Comprehensive SWPPP (C-SWPPP) must be developed for each construction site seeking coverage under the permit by a qualified individual in accordance with good engineering practices. In general, the C-SWPPP should include the following:

1. A project narrative that addresses the following:
 - a. Scope of the project
 - b. Pre- and post-development conditions
 - c. Existing and potential flooding problems at the site
 - d. Function of the project
 - e. Total area expected to be disturbed during construction
 - f. Information regarding the on-site support activities (e.g. concrete and asphalt batch plants, etc.)



- g. Identification of prior uses of the site or potential sources of pollution that may be expected to cause or contribute to a violation of any applicable water quality standard based on the existing condition of the site
2. A Stormwater Management and Sediment Control section that addresses the following:
 - a. Industrial stormwater discharges
 - b. Water quality best management practices (BMP's)
 - c. Erosion prevention BMP's
 - d. Structural controls and floodplain placement
 - e. Post-construction water quality BMP's
 - f. Construction debris management
 - g. Construction entrances and dust control
 - h. Stock pile management
 - i. Additional onsite and offsite pollution identification
3. Sequence of Construction that describes the following:
 - a. The nature of the construction activity
 - b. The intended sequence and timing of all planned major construction activities that disturb soils
 - c. When phased erosion prevention and sediment control plans are required, each phase must include a phase specific-specific sequence of construction
4. Site Features and Sensitive Areas
 - a. Identify all Waters of the State (WoS) located on or in the vicinity of the project site
 - b. If impacts to WoS are anticipated, an additional plan sheet that delineates impacted areas on the project site and includes appropriate measures and notes in accordance with U.S Army Corp of Engineers (USACE) permits and SCDHEC 401 certifications, if required. Copies of permits from those agencies must be provided to the County.
5. Buffer Zone identification and management for the protection of "surface waters" located on or immediately adjacent to the construction site. Buffer widths must meet or exceed the County's permanent buffer requirements (see Chapter 7).
6. Velocity Dissipation Requirements. Where concentrated stormwater discharges into a buffer zone previously receiving only sheet flow, velocity dissipation must be designed and installed to prevent erosion, and discharges must be first treated by the site's erosion prevention and sediment controls. Velocity dissipation measures may be implemented within a buffer zone. If the receiving waterway is a natural channel or swale, the discharges must not cause erosion to the channel.
7. Additional compliance options, exceptions, and exemptions (e.g. for linear projects) are described in further detail in Section 3.2.4.c of the CGP, and should be reviewed for their applicability to each project.



8. Sources of Pollution. The C-SWPPP must identify sources of pollution, including sediment and fertilizers, which are likely to affect the quality of stormwater discharges from the construction site. Litter, construction debris, oils, fuels, building products with significant potential for impacts, and construction chemicals that could be exposed to stormwater must be prevented from becoming a pollutant source.
9. Best Management Practices (BMPs). The C-SWPPP must include a BMP section that accurately and descriptively addresses the use, installation, maintenance, and inspection for each of the following types of pollution control measures:
 - a. Erosion Prevention BMPs
 - i. Stabilization
 - b. Sediment Control BMPs
 - i. Inlet protection
 - ii. Outlet protection
 - iii. Sediment basins
 - iv. Sediment traps
 - v. Water surface dewatering
 - c. Runoff Control and Conveyance Measures BMPs
 - i. Permanent conveyance measures
 - ii. Temporary conveyance channels
 - iii. Stabilization of conveyance channels
 - iv. Storm drainage systems
 - v. Velocity dissipation devices
 - d. Post Construction Water Quality Control BMPs
 - e. Structural BMPs
 - i. Permanent structural BMPs
 - ii. Temporary structural BMPs
 - iii. Detention/retention ponds
 - f. Non-structural BMPs
 - g. Low Impact Development BMPs
 - h. Additional BMPs
10. Phased Plan Requirement. For non-linear construction sites disturbing more than five (5) acres, the SWPPP must include a phased stormwater management plan. The phased plan identifies all BMPs and grading work implemented during a specific portion of a site's construction sequence (e.g. initial grading and perimeter controls, interim land disturbances through final grading, post-construction and final stabilization). Each phase must be addressed and identified on at least one separate plan sheet.
 - a. For site disturbances less than ten (10) acres, at least two (2) separate plan phases shall be developed: the Initial Land Disturbance Phase and the Stabilization Phase
 - b. For site disturbances greater than or equal to ten (10) acres, at least three (3) separate plan phases shall be developed: the Initial Land Disturbance Phase, the Construction Phase, and the Stabilization Phase.

Once approved, the C-SWPPP will be condensed into the On-Site SWPPP (OS-SWPPP) before undergoing implementation. The OS-SWPPP is a derivative of the C-SWPPP and is created after



the C-SWPPP has been approved by Lexington County and SCDHEC. The OS-SWPPP shall be kept at the construction site to act as the construction site's living documentation as the stormwater pollution prevention plan is implemented, updated as modifications or site changes are made, and used as a record log as stages of the approved OS-SWPPP are completed until the construction site has reached final stabilization and coverage under the permit has been terminated. In general, the OS-SWPPP should include the following:

1. SCDHEC Construction General Permit
2. Notice of Intent
3. NPDES Coverage Approval Letter
4. Lexington County Approval Letter
5. U.S. Army Corps of Engineers Approval (if applicable)
6. Contractor Certifications
7. Record Keeping

6.1.2 Lexington County Specific Vegetative Requirements

Lexington County emphasizes the importance of successful establishment of temporary and permanent vegetation of disturbed areas. Proper selection and implementation of vegetative stabilization can significantly reduce erosion and sediment loss during and after construction. In addition to the stabilization requirements of the CGP, Lexington County has additional planting requirements, which are listed in Appendix D.

6.1.3 Sediment and Erosion Control Design Requirements for Impaired Streams and Approved TMDLs

The County's Phase 2 SMS4 Permit includes design requirements specific to new development located in the watershed of either an impaired stream or a stream with an approved Total Maximum Daily Load (TMDL). To find the most recent lists of impaired streams and TMDLs, visit SCDHEC's website.

Receiving Waters with Approved TMDL's:

If a TMDL that is applicable to construction stormwater discharges has been established and is in effect for any receiving waters downstream from a construction site, then a careful evaluation of all selected BMPs and their performance is required to ensure that the construction site's stormwater discharges will not contribute to or cause a violation of water quality standards. For non-coastal counties, SCDHEC has determined that construction stormwater discharges are likely to contain pollutants causing the following impairments: turbidity, bio (Macroinvertebrate), TP (Total Phosphorous), TN (Total Nitrogen), and Chlorophyll-a. If a TMDL, that is applicable to stormwater construction discharges, has been established and is in effect for any receiving waters downstream of a construction site, then the C-SWPPP must address the following:



1. Include documentation supporting a determination of permit eligibility with regard to waters that have a TMDL that is effective and applicable to Stormwater construction discharges (See Section 1.3.3.D of SCDHEC's Construction General Permit for further information on determining permit eligibility related to TMDLs);
2. Include documentation of whether the construction site's Stormwater discharge is identified, either specifically or generally, in a TMDL and if there is any associated allocations, requirements, and assumptions identified for the construction site's discharge;
3. Identify if a specific Waste Load Allocation (WLA) has been established that would apply to the construction site's stormwater discharges, and incorporate that allocation into the stormwater management plan by implementing any necessary steps and/or BMPs to meet that allocation; and
4. Identify measures to be taken by the Operator so that the construction site's discharge of pollutants is consistent with the allocations, assumptions, and requirements contained in the TMDL, only the pollutants applicable to Stormwater discharges, including any specific WLA that has been established.

Receiving Waters with Impairments:

If the receiving water is listed on the most current South Carolina 303(d) List of Impaired Waters, the project must be designed such that construction stormwater discharges from the site do not have the reasonable potential to cause or contribute to an excursion above any state water quality standard. For receiving waters listed for a sediment or sediment-related parameter (i.e., TURBIDITY, BIO (Macroinvertebrate), TP (Total Phosphorous), TN (Total Nitrogen), and (Chlorophyll-a) the following must be addressed (as required by the SCDHEC Construction General Permit):

1. Using the guidance contained in the SCDHEC Construction General Permit, carefully select BMPs to best remove the pollutant(s) of concern. BMPs should be selected and designed to remove the pollutant(s) of concern to the maximum extent practicable.
2. Carefully evaluate the selected BMPs and their performance such that the construction site's stormwater discharges will not cause, have the reasonable potential to cause, or contribute to an excursion above any state water quality standard.

For construction sites that disturb 25 acres or more and have stormwater discharges draining directly to an impaired water body via structures or ditches, the design must contain a written quantitative and qualitative assessment that the selected BMPs will control the construction site's stormwater discharges so that they will not cause, have the reasonable potential to cause, or contribute to an excursion above any state water quality standard.



6.2 Additional Design Requirements

In addition to the design requirements in the South Carolina NPDES General Permit for Stormwater Discharges from Construction Activities and the South Carolina Standards for Stormwater Management and Sediment Reduction Regulation 72-300 thru 72-316, Lexington County requires the following:

6.2.1 Trapping Efficiency Calculations

SWPPPs shall be developed to achieve an eighty 80% sediment trapping efficiency for construction stormwater BMPs (such as sediment basins) located at each outlet/outfall of a development, and at any location that discharges concentrated flows. When a development is denuded of vegetation, the structural and nonstructural erosion prevention and sediment control measures must be designed to trap eighty (80) percent of the total suspended solids (TSS) or 0.5 mL/L peak settleable solids concentration (SSC), whichever is less, that are generated by the development. Trapping efficiency must be calculated for erosion prevention and control BMPs located at each outlet/outfall of the development. The design storm event associated with this level of control is the 10-year, 24-hour SCS Type II storm event. Calculations shall be provided to show adherence to this criteria.

6.2.2 Silt Fencing

Silt fencing or other appropriate BMPs shall be placed at the toe of all fill slopes and soil berms. Wire backing and steel posts are required on all perimeter silt fencing. When used on cleared and/or graded areas silt fence shall not have more than $\frac{1}{4}$ acre draining per 100 feet of silt fence length. The maximum slope length draining to the fence is 100 feet and the maximum gradient draining to the fence is 2H:1V.

6.2.3 Alternative BMPs

To encourage the development and testing of innovative alternative erosion prevention and sediment control BMPs, alternative management practices that are not included in this Manual may be allowed upon review and approval by the PW/SWD. To use an alternative BMP, the design professional shall submit substantial evidence that the proposed measure will perform at least equivalent to currently approved BMPs contained in the Manual. Evidence may include, but is not limited to:

1. Supporting hydraulic and trapping efficiency calculations
2. Peer-review by a panel of licensed professional engineers
3. Research results as reported in professional journals
4. Manufacturer literature
5. Maintenance requirements



6.2.4 Sediment Tracking Control

Sediment tracking control shall be implemented using stabilized construction exits that will be located and utilized at all points of egress on a construction site. The transfer of soil, mud, and dust onto roads shall be prevented. Construction exits may be shared between single family lots within a subdivision.

1. For lot exits, the minimum construction exit size shall be 10-foot wide by 20-foot long, have a minimum thickness of 6 inches using geotextile fabric under stone that has a diameter of 2 to 3 inches .
2. For main exits, the minimum construction exit size shall be 50 feet in length and a minimum of 20-feet in width, with a 6 inch depth of 2 to 3 inch diameter stone placed over geotextile fabric.
3. Crusher run or rock with fines are not acceptable as stone for construction exits, as the fine material is easily tracked off the project.
4. Where sediment is tracked off the project, the site operator or developer must clean the street at the end of the work day or before the next storm event, whichever is sooner.

6.2.5 Cleaning Permanent Structural Controls

All permanent structural controls, including drainage facilities such as channels, storm drainage inlets, and detention basins, shall be cleaned out as part of the project closeout/Notice of Termination (NOT) process. County staff will verify that this cleaning has occurred at final inspection

6.2.6 Cuts and Fills Adjacent to Property Lines

If retaining walls or fill slopes are to be constructed at the downstream property line, the PW/SWD recommends a 10' setback to allow for construction and maintenance. If a 10' setback is not provided, then provide permission from the adjacent property owner for possible land disturbing activities on his property.

6.2.7 Construction Site Waste

Construction sites shall remain free of litter. Construction waste must be placed in a dumpster. Dumpsters shall be covered with a rollback tarp. Perimeter controls around dumpsters must be provided if pollutants are leaking from the dumpster. Trash and other construction waste may not be placed on the ground outside of the dumpster. Trash and other construction waste must be disposed of following proper solid waste management disposal guidelines. Dumpsters must be placed away from streams, storm drain system components, and environmentally sensitive areas.

6.2.8 Floating Skimmers



Sediment basins must utilize outlet structures that only withdraw water from near the surface of the basin or impoundment, unless infeasible. This outlet structure should be capable of conveying the flow for the 10-year, 24 storm event. Surface skimmers are an acceptable method of dewatering. Design information for skimmers can be found on SCDHEC's website.

6.2.9 Allowable Disturbed Acres

A Master Project includes all proposed parent parcels, to include all phases, within a proposed development of those parent parcels.

- Projects disturbing between 0 to 25 acres shall be approved at staff level, by the Land Development Manager, or his/her designee, under the current regulations in the Land Development Manual.
- Projects greater than 25 acres, but less than 50 acres of disturbance shall be approved as an Expanded Master Project (EMP) and approved at staff level by the Land Development Manager, or his/her designee. An EMP shall require specific justification from the project engineer the need for the additional area of disturbance, enhanced Best Management Practices (BMPs) for sediment and erosion that include additional BMPs identified within this Section, and all components of the Disturbance/Stabilization Plan and Agreement. Forms for this agreement can be found in Appendix D. The Disturbance/Stabilization Plan shall provide site specific BMPs above the minimum requirements, to help further prevent and reduce off-site impacts and impacts to bodies of water. BMP design criteria can be found in the SC DHEC BMP Handbook. A Letter of Credit or cash surety is required and shall include the funds to install and maintain BMPs and stabilize all disturbed areas. The Letter of Credit or cash surety will be required prior to the beginning of any disturbance for an approved EMP along with required review fees. Additional required BMPs approved, as part of the Disturbance/Stabilization Plan are at the discretion of Lexington County.
- Should a portion of the initial approved disturbance area achieve 80% density stabilization as approved and verified by the engineer of record, then an area equal to the stabilized area can be disturbed upon approval by Lexington County. In all instances, the project engineer shall provide confirmation in writing to the Land Development Manager, or his/her designee, that stabilization has been provided prior to advancing site disturbance. The engineer of record shall also ensure the approved sequence of construction is being followed for the project to advance.

EMPs shall include at least five (5) additional BMPs, in addition to all minimum BMPs required for the project site, that focus on topography with greater than 15% slopes, soil type, proximity to bodies of water and/or streams, water quality protection, and off-site impacts. The protection of Lake Murray and its tributaries shall be taken into consideration when additional BMPs are identified and designed by the design engineer. The project engineer shall provide justifications for the reason each additional BMP was selected and the specific purpose of each BMP. The following are list of potential BMPs to consider for EMPs:

- Double the width of all required vegetated water-quality buffers during the construction



phase of the development along perennial streams, ponds, lakes, and wetlands. Buffer averaging may not be considered for this additional BMP standard.

- Increase all temporary sediment basins and retrofitted stormwater management basins to provide 3,600 cubic feet per acre, drained, of sediment storage.
- Provide baffles in all basins at double the conventional flow path length to the outlet structure.
- Provide stabilization for areas left undisturbed after seven (7) days using the appropriate hydraulic erosion control product (HECP) type, cover factor, and application rate as recommended in the most recent edition of the SC CEPSCI Certification Manual. All seeding specifications shall also comply with specifications found in the LDM.
- Provide 90% trapping efficiency using additional BMPs to further address water quality.
- Reduce the total master planned development to less than 50% impervious surfaces. The engineer of record shall identify the areas deemed impervious, as certain stormwater features may not be considered and/or calculated as pervious surfaces.
- Use burst modeling to determine additional BMPs necessary to address rain events not addressed with minimum standards and include those BMPs on the plan.
- Apply approved erosion control matting or bonded fiber matrix on all disturbed 3:1, or steeper, slopes.
- Apply approved erosion control matting or blankets, in lieu of concrete, in all construction stormwater ditches and storm drainages designed for a 25-year, 24-hour rainfall event.
- Use anionic polyacrylamide under a passive dosing method (ex. flocculent blocks) within all construction stormwater ditches and storm drainages feeding into temporary sediment basins and retrofitted management basins.
- Install sod at a minimum 20-foot width after final grade has been achieved along the site perimeter wherever construction stormwater is discharged. Sod must be maintained.
- Conduct soil tests and implement site specific treatments as recommended by the test results to further ensure adequate vegetative stabilization.
- Apply compost blankets at a minimum depth of one and one-half (1.5) inches to protect soil surfaces until vegetation is established during final stabilization.
- Include turbidity sampling after each rain event of one-half inch or greater in a 24-hour period to ensure trapping efficiency is obtained for projects that directly adjoin and discharge into bodies of water or Waters of the United States or State. Such data shall be included with all SWPPP documents and CEPSCI inspection reports.

In addition to all previously referenced design standards, each development site shall erect one sign, which must include the company, name of primary contact, and contact phone numbers for the developer and site contractor(s). The size of the sign must be the maximum sized allowed by the local zoning jurisdiction and placed on-site at the approved construction entrance of the development.



For developments that directly adjoin bodies of water and/or Waters of the United States or State, the following additional BMPs are required, regardless of disturbed acreage:

- Install mulch filter berms, in addition to silt fencing, along the site perimeter where stormwater may be discharged and where the silt fence directly adjoins water quality buffers. These filters cannot be placed in waterways or areas of concentrated flows.
- Turbidity curtains shall be deployed within adjoining and receiving bodies of water, where feasible, to further protect receiving areas from discoloration of turbid water.
- The engineer of record shall specifically identify these areas (ex. Waters of the United States or State, perennial/intermittent streams, tributaries of Lake Murray, special TMDL protection areas) in conjunction with the plan review checklist. Detailed measures and documentation are required to identify how specific BMPs or other measures will be utilized to ensure water quality protection, especially for any disturbance that may be within 50 feet of these areas.

Developments that need to disturb more than the 50-acre threshold shall be presented to the Stormwater Advisory Board (SWAB) and County Council for review and consideration. The final approval by CC, including all stipulations, shall be part of the project submittal for staff approval. The final approval for disturbance by CC shall include at a minimum the EMP criteria, plus additional criteria for each additional acre disturbed. In all instances, the engineer of record shall provide justification as to the need to expand beyond the threshold limits. No development shall advance past any land disturbance threshold, without achieving proper stabilization.

Violations of the disturbed area and/or inaccurate information provided will result in an automatic Stop Work Order (SWO) for the project and potential enforcement action by the Lexington County Sheriff's Department Code Enforcement Unit or other authorized code enforcement personnel. Disturbed areas determined to be above the approved threshold shall be stabilized with temporary and/or permanent BMPs immediately and a Corrective Actions Plan (CAP) shall be submitted, approved, implemented and verified by Lexington County prior to the release of the SWO.

The corrective actions for violations of this section of Land Development Manual shall be assessed as follows:

- A SWO will be issued and all work associated with the responsible permit holder(s) of the violation will cease. The SWO will remain in place until a CAP has been submitted, approved by Lexington County, and implemented. If the CAP has not been completely implemented and/or the violation area is not in full compliance within 45 days following notification of the violation then all permits, submittals, and inspections associated with the development may be placed on hold until compliance is obtained. The holds may include the issuance of building, zoning, landscaping, and/or land disturbance permits and requests for inspections. The Lexington County Sheriff's Department Code Enforcement Unit, or other authorized code enforcement personnel, will be notified of the violation and Community Development staff will request additional enforcement action



for the non-compliance issue.

- Developments that violate the approved limits of disturbance by 5 acres or more in area will require all work to cease immediately, to include, but not limited to building construction, until the CAP has been approved by Lexington County and implemented. In addition, all permits, submittals, and inspections associated with the development will be placed on hold until compliance is obtained. Future development within the area(s) not approved for clearing must be designed to address one-half predevelopment conditions for stormwater management.
- The current Land Development fee schedule shall identify fees assessed for the additional services provided to address violations of this Section by the County of Lexington. CAP fees shall be consistent with the current Sediment and Erosion Control plan review and inspection fees. In addition, Council shall impose a re-inspection fee for each inspection regarding the implementation of the CAP.
- The SWO does not prohibit corrective actions to be implemented prior to CAP approval, provided such work is agreed upon by the Land Development Manager, or his/her designee, and the engineer of record for the project.

SWOs will remain in place until the CAP has been implemented and verified by Lexington County. Once the SWO has been released, site work will be allowed to resume as originally permitted. If found guilty in Magistrate's Court, any penalty assessed by the local Magistrate will be in addition to the fees for the services provided by Lexington County. As consistent with other County development related ordinances, any person, firm, or corporation who violates or fails to comply with any of these requirements shall, upon conviction, be fined not more than the maximum allowed penalty jurisdiction of the Magistrate's Court. Each day such violation continues shall be considered a separate offense. Any person, firm, or corporation shall include, but not be limited to, the developer, site contractor, engineer, agent or private inspector and each person who commits, participates in, assists in, or maintains such violation may be found guilty of a separate offense and suffer the penalties herein provided. Unapproved clearing that results in the removal of trees will also be subject to penalties and corrective actions as regulated and enforced within the Lexington County Landscape and Open Space Ordinance or local municipalities, dependent upon jurisdiction.

Notice of Violations (NOV) shall be immediately issued for improperly installed, maintained, or implemented required BMPs. After 72 hours, if the items have not been corrected a SWO will be issued and shall not be lifted until the engineer of record confirms in writing to the Land Development Manager, or his/her designee, that compliance is met and following a satisfactory inspection from County officials. The Land Development Manager, or his/her designee, reserves the right in all cases to require the engineer of record certify that all BMPs have been installed correctly and per approved plans.



7 BUFFER REQUIREMENTS

A buffer is an area of undisturbed natural or re-established vegetation that borders streams, rivers, ponds, lakes, and wetlands. The benefits of buffers are numerous and include:

1. Stream corridor and shoreline protection. Deep rooted vegetation on stream banks and shorelines provides protection against channel and wave erosion.
2. Shade and temperature regulation. Development along streams typically includes impervious surfaces that increase the temperature of runoff flowing over it. Shade from trees and other woody vegetation helps offset some of the temperature changes in the corridor immediately adjacent to a stream.
3. Habitat creation. Buffers along streams, lakes and wetlands provide habitats for wildlife, and the woody detritus provides food for aquatic organisms.
4. Water quality. Buffers provide water quality “polishing” where runoff enters and flows through the buffer as sheet flow. However, buffers are easily overwhelmed by large flows, concentrated runoff and/or heavy sediment loads. Where concentrated flow is discharged into a buffer area, the design must incorporate level spreaders (to convert concentrated flow to sheet flow) or a stabilized channel (to convey larger concentrated flows).

7.1 Intent

It is the intent of the PW/SWD to ensure compliance with the Construction General Permit buffer requirements and to establish requirements for the design of permanent buffers to protect the streams and wetlands in the County of Lexington; to protect the water quality of watercourses, reservoirs, lakes, and other significant water resources; to protect riparian and aquatic ecosystems; and to provide for the environmentally sound use of the County of Lexington’s landresources.

7.2 Application

1. The following buffer criteria apply to new development and redevelopment in Lexington County:
 - a. Construction buffer: All sites that disturb from one up to five acres (or less than one acre if they are part of a larger common plan of development) must comply with the construction buffer requirements in the most current Construction General Permit (SCR100000).
 - b. Permanent water quality buffers: Sites that require a Land Development Permit and disturb 5 acres or more are required to maintain permanent water quality buffers along all perennial and intermittent streams, waterways, shorelines and wetlands as identified on a 7.5 United States Geological Survey (USGS) quadrangle map and/or United States Army Corps of Engineers (USACE). Water quality buffers are permanent corridors along streams that are not to be disturbed.
2. When specific site design criterion are met, water quality treatment design credits may be



applied for permanent stream buffers. See Section 3.11. of this Manual for more information about these credits.

3. This shall apply to all proposed development except for that development which meets exemptions in Section 7.3 and/or variance criteria in Section 7.12.
4. This shall apply to all surface mining operations except active surface mining operations that are operating in compliance with an approved South Carolina Department of Health and Environmental Control surface mining permit. A copy of the approved surface mining permit shall be provided to PW/SWD.
5. This shall apply to the construction of agricultural structures as stated in Section 3-2.b of the Stormwater Management Ordinance.
6. Except as provided in Section 7.3, this shall apply to all parcels of land, structures and activities which are causing or contributing to, or have the potential to cause/contribute to:
 - a. Pollution, including non-point pollution, to streams,
 - b. Erosion or sedimentation of stream channels,
 - c. Degradation of aquatic or riparian habitat,

7.3 Exemptions

The following are exempt from the application of construction or water quality buffers in Lexington County:

1. Any existing structure or structure under construction located within the buffer area that was present or under construction on or before the effective date of this Manual (LDM), provided the land owner can document prior existence of and for which the land owner will minimize disturbance to the buffer during construction.
2. The addition or expansion to an existing structure located outside of the buffer, provided it does not result in an increase in the total impervious area within or a disturbance of the buffer area.
3. Activities associated with emergency operations, such as hazardous materials removal, flood or fire control, evacuations, and storm damage clean up. However, efforts must be made to restore the disturbed portion of the buffer and obtain appropriate approvals/permits as soon as possible.
4. If any portion of a parcel proposed for development lies within an area designated as an area for special community use (e.g. officially adopted trail or greenway), the developer shall construct the designated improvements in accordance with County standards.
5. A single family parcel that is not part of a larger common development and does not disturb an acre or more.

7.4 Water Quality Buffers

Water quality buffers shall be considered a permanent “no disturb zone” along perennial and



intermittent streams as defined by USGS Quad Maps or as designated by the USACE. Vegetation cannot be disturbed, removed or replanted unless a buffer restoration plan has been approved by the PW/SWD. Section 7.8. outlines requirements to expand the buffer widths depending on slopes, water pollution hazards, or other uses that may contribute to water quality degradation. In defining the limits of stream buffers, top of bank is typically defined as the uppermost limit of the active channel of a stream during “bank full” conditions, typically marked by a break in slope. In some cases the top of the bank will be defined as the point separating the steep slope of the channel area from the flatter upland or floodplain (i.e. overbank) area.

The water quality buffer width shall be applied as follows:

1. Water quality buffers are only required along portions of a stream or wetland (as outlined below) that are on the development or redevelopment site.
2. Along perennial streams that are shown as a solid blue line on the USGS Quad Map not associated with a floodplain or wetlands the buffer shall be at least 100 feet perpendicular from the top of bank on each side of the waterway within the development or redevelopment site.
3. In areas where a floodway profile has been computed along a perennial stream (AE Zones) as part of an approved flood study, the buffer area shall be the width of the floodway if the floodway limit is greater than or equal to 100 feet from the top of bank. If the limit of the floodway is less than 100 feet from the top of bank, the distance to bring the buffer to 100 feet of the top of bank shall be added (i.e. If the floodway is 50 feet from the top of the bank then an additional 50 foot of buffer must be added for total distance of 100 feet from top of bank). If the limit of the floodway is greater than 100 feet from the top of bank, the required buffer width would be 100 feet or the width of the floodway, whichever is greater.
4. In areas where a floodway profile has not been computed along a perennial stream (A Zones) the developer shall perform a flood study, determine the floodway and follow the buffer requirements outlined above. As an alternative, the developer may use the A Zone width as the buffer.
5. Along intermittent streams, shown as a dashed blue line on the USGS Quad Map, the buffer shall be at least 50 feet perpendicular from the top of bank on each side of the waterway. If these streams have associated floodways as described above, the same requirements would apply to have a total width of 50 feet or the width of the floodway, whichever is greater.
6. For delineated wetland areas associated with perennial streams, if the entire boundary of the delineated wetland is located within the 100 foot buffer, no additional buffer is required. See Figure 1 below for an example.

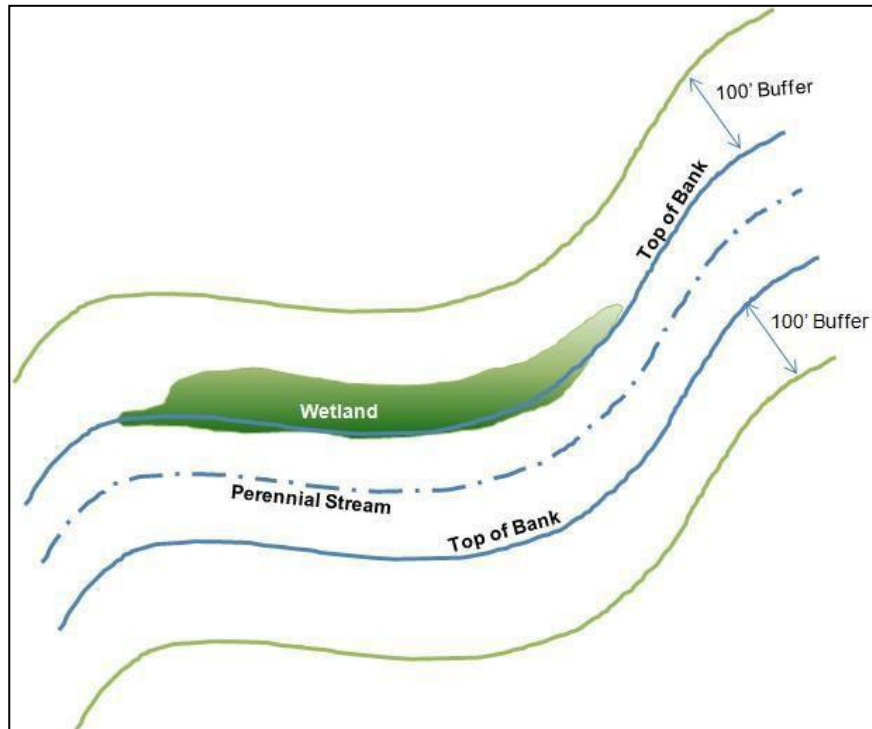


Figure 7-1. Example of Perennial Stream with Wetland Located Within 100' Buffer.

7. For delineated wetland areas associated with intermittent streams, if the delineated wetland is less than 50 feet from the top of bank, the buffer must be brought to a total of 50 feet (i.e. If the wetland area is 25 feet then an additional 25 foot of buffer must be added for a total distance of 50 feet from top of bank). This buffer width is independent of any wetland offset requirements of the USACE. Figure 7-1 depicts this example by changing perennial to intermittent and 100' to 50'.
8. For wetlands located fully or partially outside of water quality buffers applied to a stream the buffer width shall be 50 feet from the wetland delineation boundary. See Figure 7-2.

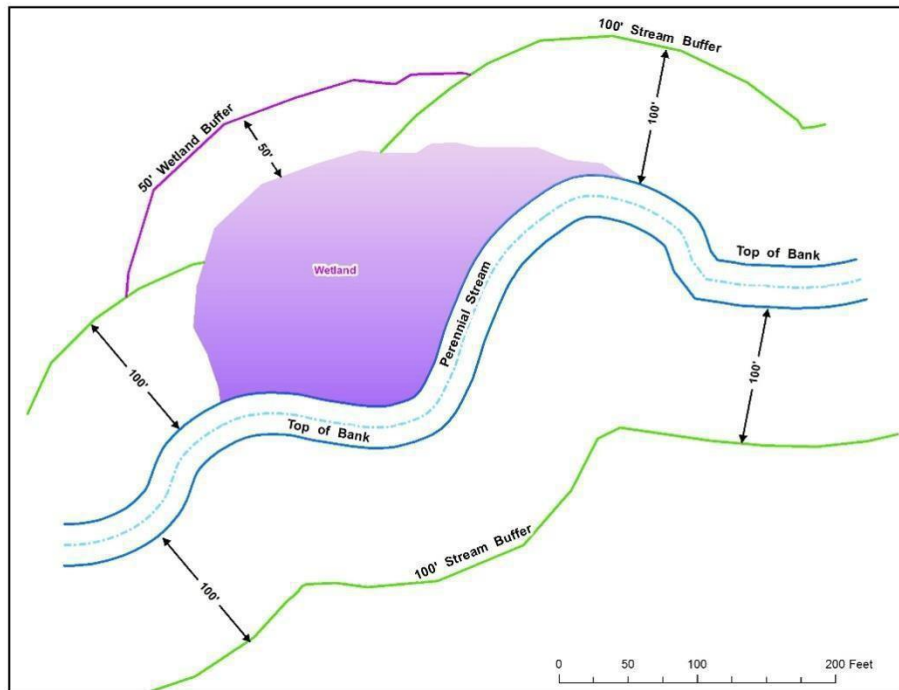


Figure 7-2. Example of a wetland located partially outside of a stream buffer

7.5 Water Quality Buffer Management and Maintenance

The function of the water quality buffer is to protect the physical and ecological integrity of the waterway, to reduce flooding potential, and to provide a final water quality “polishing” for runoff from development. The objective of a water quality buffer is to protect existing vegetation so that it is left undisturbed.

1. Management of the buffer includes specific limitations on alteration of the natural conditions. The following practices and activities are not allowed within the water quality buffer, except with prior approval by the PW/SWD:
 - a. Clearing or grubbing of existing vegetation,
 - b. Clear cutting of vegetation,
 - c. Soil disturbance by grading, stripping, or other practices,
 - d. Filling or dumping,
 - e. Use, storage, or application of pesticides, herbicides, and fertilizers,
 - f. Parking, storage of equipment, construction debris, or other construction related activities unless approved for utility work,
 - g. Conversion of vegetation from native to exotic species, and
 - h. Motor vehicles are not permitted in buffers other than during the installation of certain utilities permitted in the buffer zone.
2. The following structures, practices, and activities are permitted in the water quality buffer, subject to prior approval of the PW/SWD, and when specific design or maintenance features are adhered to:



3. Stream crossings and utilities:
4. Where an alternative analysis has been conducted, and approved by a Professional Engineer licensed in the State of South Carolina, that demonstrates (to the satisfaction of the County) that no economically feasible alternative is available;
5. The right-of-way at the stream crossing must be the minimum width needed to allow for maintenance access and installation;
6. The angle of a crossing shall be perpendicular to the stream and buffer in order to minimize clearing requirements;
7. The minimum number of crossings must be used within each development, and no more than one crossing is allowed for every 1,000 linear feet of buffer zone. Where possible, the design of roadways and lots within a development must be aligned such that all streams are either to the rear or the side of individual lots, not along the front.
8. Transportation right-of-ways, pedestrian crossings, public access, boat ramps, docks, fishing platforms, unpaved paths (i.e. trails and greenways), sidewalks, and stream bank stabilization efforts.
9. Utilities are allowed and shall be installed a minimum distance of 25 feet from the top of the stream bank or wetland, measured perpendicular from the top of bank within the buffer area.
10. In order to maintain the functional value of the buffer, vegetation may be removed as follows:
11. Dead, diseased, or dying trees that are in danger of falling and causing damage to dwellings or other structures may be removed with approval from the PW/SWD;
12. Debris in the buffer area that is caused by storm damage may be removed; and
13. Invasive plant species may be removed if they are replaced by native species that are effective in retarding runoff, preventing erosion and filtering non-point source pollution from runoff. A buffer restoration plan for removal of invasive species must be approved by the PW/SWD.

7.6 Shoreline and Wetland Buffers

Shoreline buffers shall be considered an area of managed vegetation adjacent to shorelines with hydrologic connectivity (stream leading into/out of the pond/lake or obvious spring input).

The shoreline buffer width shall be 50 feet perpendicular from the shoreline. For ponds and lakes, the shoreline shall be defined as the 100-yr event high water elevation. For Lake Murray the buffer shall be measured from the 360-foot elevation contour.

For wetland areas not associated with perennial or intermittent streams or a floodway, the water quality buffer shall be the extent of the wetland area plus an additional 50 feet perpendicular beyond the wetland edge.

If a wetland area is to be disturbed in accordance with an approved USACE permit, these wetland areas must be marked and remain undisturbed until after the pre-construction conference and a copy of the permit is submitted to PW/SWD.



Constructed ponds and wetlands designed and installed specifically for stormwater quality or quantity management are not subject to these buffer requirements. Existing, natural wetlands cannot be used for stormwater quality or quantity management. Existing ponds may be used if the spillway system and treatment provided by the existing pond meets the requirements of Chapter 3.

7.6.1 Shoreline and Wetland Buffer Management and Maintenance

The function of shoreline and wetland buffers is to protect the physical and ecological integrity of the water body by providing a functional distance to reduce flooding potential, reduce erosion, reduce sedimentation, and to filter runoff between development and the water body.

1. Management of shoreline and wetland buffers includes specific limitations on alteration of the natural conditions. The following structures, practices and activities are not allowed in shoreline and wetland buffers unless prior approval is granted by the PW/SWD:
 - a. Septic systems;
 - b. Permanent structures;
 - c. Impervious cover, with the exception of paths;
 - d. Soil disturbance by grading, stripping or other practice;
 - e. Filling or dumping;
 - f. Stormwater management facilities;
 - g. Use, application, or storage of pesticides or herbicides except for the spot spraying of noxious weeds or other non-native species consistent with approved agency recommendations (Lexington County, State Forestry Commission, SCE&G Land Management);
2. The following structures, practices, or activities are permitted in the shoreline buffer subject to the prior approval of the PW/SWD:
 - a. Biking or hiking paths;
 - b. Recreational uses as approved by the PW/SWD;
 - c. Limited tree or underbrush clearing with approval from the PW/SWD;

7.7 Water Quality Buffer Plat Requirements

All preliminary, bonded, and final plats prepared for recording as well as all right-of-way plats shall clearly:

1. Show the extent of any water quality buffers along streams, shorelines, and/or wetlands on the subject property by metes and bounds;
2. Label water quality buffers;
3. Provide a note to reference all water quality buffers stating: "There shall be no clearing, grading, construction or disturbance of vegetation except as permitted by the PW/SWD";
4. Provide a note to reference any protective covenants governing all water quality buffer areas stating: "Any water quality buffer shown on the plat is subject to protective covenants which may be found in the land records and which restrict disturbance and use of these areas";



5. Identify the responsible lot owner if the water quality buffer area will not be a part of an individual lot. The County will not accept ownership or maintenance responsibility for water quality buffers.
6. Provide location of permanent water quality buffer boundary marker signs.
7. Provide a statement that affirms that the water quality buffer has been placed in perpetuity.

7.8 Design Requirements

Water quality and construction buffers must be clearly labeled on plans submitted in conjunction with the erosion prevention and sediment control plan, SWPPP document, and all applicable calculations for a land disturbance permit.

Water quality and construction buffers shall be marked off with a high visibility barrier (such as orange safety fence) during construction activities to show that no disturbance is allowed in either buffer area. The high visibility barrier cannot be silt fence unless it is marked with brightly colored spray paint that says "Buffer Do Not Disturb."

The PW/SWD requires that the following steps be taken during the site plan development and site construction process to protect water quality and construction buffers during construction:

1. Water quality and construction buffers must be clearly identified on all stormwater management plans and construction drawings and marked with the appropriate statement: "Water Quality Buffer Do Not Disturb" or "Construction Buffer Do Not Disturb".
2. Water quality buffers cannot be encroached upon or disturbed during project construction, unless in accordance with Section 7.3 or 7.13 unless they are being established, restored, or enhanced in accordance with an approved by PW/SWD Buffer Enhancement Plan.
3. Construction buffers cannot be encroached upon or disturbed during project construction except as provided for in Section 3.2.4 of the Construction General Permit (SCR100000), and approved by PW/SWD.
4. Water quality and construction buffers must be clearly marked with a high visibility barrier before the pre-construction conference. The marking shall be maintained until completion of construction activities. All contractors and others working on the construction site must be made aware of the existence of the buffer(s) and the restrictions on disturbing the buffer(s).
5. All areas of the water quality and construction buffers, including stream banks, must be left in stabilized condition upon completion of construction activities. Should construction activities associated with development cause degradation to stream banks, all eroding, bare, or unstable stream banks shall be stabilized similar to the natural condition. This may require the replanting of (mature) native trees and reconditioning of the soil to address compaction that may have occurred from heavy equipment during construction and/or the inclusion of bioengineered solutions.
6. If any trees are allowed to be removed, show the tree location and provide a note stating



that the tree must be hand cleared.

7. The locations of all signage must be clearly shown on plans.
8. A narrative stating the type and extent of the buffer areas, including any allowed disturbance in the buffer areas (this should be in the narrative as well as in the SWPPP Document) must be included with the plans.
9. High visibility fencing or silt fence sprayed with “Buffer Do Not Disturb.” shall be shown on the upstream side of the applicable buffer area(s) on the plans and installed in the field before construction begins.
10. Water quality buffers and maintenance access points shall be shown and labeled on the engineering plans as well as the preliminary, bonded, and final plat.
11. Construction buffers must be shown on the erosion and sediment control plan and the SWPPP.
12. Water quality buffers are to be turned over to property owners, a Homeowners or Property Owners Association or placed in a conservation easement. Water quality buffers shall be maintained in accordance with the maintenance and inspection requirements for permanent stormwater management structures outlined in Chapter 9.
 - a. If placed in a conservation easement or if the easement is held by a viable third party, such as a land trust, land management company or utility, the organization shall:
 - i. Have the legal authority to accept and maintain such easements;
 - i. Be genuine and in perpetual existence;
 - ii. Have conveyance instruments that contain an appropriate provision for re-transfer in the event the organization becomes unable to carry-out functions;
 - b. If given to a Homeowners or Property Owners Association (HOA) the following criteria must be met:
 - i. Membership in the HOA is mandatory and automatic for all homeowners within the subdivision and their successors;
 - i. The HOA shall have lien authority to ensure the collection of dues from all members;
 - ii. The HOA assumes the responsibility for protecting, monitoring and maintaining the area as an undisturbed natural area, in perpetuity.

7.9 Water Quality Buffer Width Adjustments

Adjustments to the water quality buffer width shall be made for the following conditions:

1. If there are 15% to 24% slopes which are within the required buffer area, the buffer width must be adjusted to include an additional ten (10) feet, bringing the total water quality buffer widths to 110’ (along perennial streams) or 60’ (along intermittent streams).
2. If there are 25% or greater slopes which are within the required buffer area width, the buffer



width must be adjusted to include additional twenty-five (25) feet, bringing the total water quality buffer widths to 125' or 75'.

3. If the adjacent land use involves drain fields from on-site sewage disposal and treatment system (i.e., septic systems), subsurface discharges from a wastewater treatment plant, or land application of bio-solids or animal waste, the buffer area width must be adjusted to include an additional twenty-five (25) feet, bringing the total water quality buffer widths to 125' or 75'.
4. If the land use or activity involves the storage of hazardous substances or petroleum facilities, the buffer area width must be adjusted to include an additional fifty (50) feet, bringing the total buffer widths to 150' or 100'.
5. If the land use or activity involves raised septic systems or animal feedlot operations, the buffer area width must be adjusted to include an additional one-hundred (100) feet, bringing the buffer totals to 200' or 150'.
6. If the land use or activity involves solid waste landfills or junkyards, the buffer area width must be adjusted to include an additional two-hundred (200) feet, bringing the buffer totals to 300' or 250'.

The PW/SWD has the ability to allow water quality buffer width adjustments on a case-by-case basis.

7.10 Water Quality Buffer Averaging

This section outlines the criteria for water quality buffer averaging on new and redevelopment sites. Buffer averaging can be utilized to adjust the required buffer width, allowing some flexibility for site development. Using buffer averaging, the width of the buffer can be varied with the criteria stated in this Manual, as long as a minimum average width of 100' for perennial streams and 50' for intermittent streams, wetlands and shorelines are maintained.

7.10.1 Requirements and Policies

The following criteria must be met in order to utilize buffer averaging on a development site:

1. Buffer averaging must be applied to the portion of the stream that is not part of a stream crossing approved by PW/SWD.
2. An overall average water quality buffer width of 50 to 100', depending on the water buffer requirement, must be achieved within the boundaries of the property to be developed.
3. The average width must be calculated based upon the entire length of stream bank, wetland or shoreline that is located within the boundaries of the property to be developed. When calculating the buffer length, the natural stream channel must be followed.
4. Stream buffer averaging shall be applied to each side of a stream independently. If the



property being developed includes both sides of a stream, buffer averaging can be applied to both sides of the stream, but must be applied to each side of the stream independently.

5. Concentrated stormwater discharges cannot be conveyed through the section of the buffer with the minimal width.
6. Buffer averaging may be applied such that no section of the buffer has a width less than 50% of the required buffer (i.e. 50' from top of bank for perennial streams, 25' for intermittent streams, wetlands and shorelines) unless one of the following applies:
 - a. The floodway is greater than the reduced buffer width. In such a case, the minimum buffer width is the floodway width.
 - b. The developer has approval for a stream crossing, to alter a wetland, or to alter a shoreline. In such cases, these areas of impact will be minimized and not considered in the buffer averaging.

7.10.2 Areas Where Water Quality Buffer Averaging is Prohibited

Buffer width averaging is prohibited in developments that have, or will have after development, the land uses listed below:

1. Developments or facilities that include on-site sewage disposal and treatment systems (i.e., septic systems), raised septic systems, subsurface discharges from a wastewater treatment plant, or land application of bio-solids or animal waste;
2. Landfills (demolition landfills, permitted landfills, closed-in-place landfills);
3. Junkyards;
4. Commercial or industrial facilities that store and/or service motor vehicles;
5. Commercial greenhouses or landscape supply facilities;
6. Facilities that have commercial or public pools (this may be waived on a case-by-case basis)
7. Animal care facilities, kennels, and commercial/business developments or facilities that provide short-term or long-term care of animals;
8. Other land uses deemed by the PW/SWD to have the potential to generate higher than normal pollutant loadings.

7.10.3 Example Calculation

This section provides an example calculation of water quality buffer averaging. A development site is bounded by 800 linear feet of an intermittent stream, measured following the stream channel. Only one side of the stream is located within the boundaries of the site to be developed.

Step 1: Calculate the total required area of the buffer.



The total linear length of the buffer is 800 feet (ft).

The required width of the buffer (without averaging) is 50 ft.

$$\begin{aligned} \text{Total required area of buffer} &= \text{length of buffer} \times \text{width of buffer} \\ &= 800 \text{ ft} \times 50 \text{ ft} \\ &= 40,000 \text{ ft}^2 \end{aligned}$$

Step 2: Calculate maximum allowed length of buffer that has the minimum allowed buffer width:

Lexington County allows a maximum of 50% of the total length of the buffer to have a width of 25 feet. Step 2 will determine the maximum length of buffer that can have the minimum allowed buffer width of 25 feet.

$$\begin{aligned} \text{Maximum length of 25 ft buffer} &= \text{length of buffer} \times 50\% \\ &= 800 \text{ ft} \times 50\% \\ &= 400 \text{ linear feet} \end{aligned}$$

Therefore, 400 linear feet of the buffer can have a minimum width of 25 feet.

Step 3: Calculate total area of buffer that has the minimum allowed buffer width and determine remaining buffer area required.

$$\begin{aligned} \text{Total buffer area provided} &= \text{Length of buffer @ 25 ft} \times 25 \text{ ft width} \\ &= 400 \text{ ft} \times 25 \text{ ft} \\ &= 10,000 \text{ ft}^2 \end{aligned}$$

$$\begin{aligned} \text{Available buffer area remaining} &= \text{Total required area of buffer} - 10,000 \text{ ft}^2 \\ &= 40,000 \text{ ft}^2 - 10,000 \text{ ft}^2 \\ &= 30,000 \text{ ft}^2 \end{aligned}$$

Step 4: Determine the width of remaining buffer.

$$\begin{aligned} \text{Length of remaining buffer} &= \text{Total length} - \text{Length of buffer @ 25 ft width} \\ &= 800 \text{ ft} - 400 \text{ ft} \\ &= 400 \text{ ft} \end{aligned}$$

$$\begin{aligned} \text{Width of remaining buffer} &= \frac{\text{Available buffer area remaining}}{\text{Length of remaining buffer}} \\ &= \frac{30,000 \text{ ft}^2}{400 \text{ ft}} \\ &= 75 \text{ ft} \end{aligned}$$

Therefore, 400 linear feet of buffer will have a minimum 25 ft width and an additional 400 linear feet of buffer will have a minimum width of 75 ft, with an overall buffer width average of 50 ft.



If more variation in the buffer width is desired, steps 3 and 4 can be repeated using variable buffer widths until an average standard width of 50 feet is achieved keeping the total required area of the buffer constant.

7.11 Signage

For subdivisions, permanent boundary marker signs are required for water quality buffers prior to bonding of the subdivision and/or finalizing the subdivision with the intent to transfer property. For commercial property, permanent boundary marker signs are required prior to the issuance of a Certificate of Occupancy (CO). Permanent boundary markers are required to ensure that property owners are aware of the buffer. The PW/SWD has the authority to require the person or entity responsible for permanent maintenance of the buffer to replace boundary markers that have been removed or destroyed.

The following general requirements shall apply to buffer boundary markers:

1. Generally, buffer boundary markers shall be located on the landward edge of the buffer, and at other locations which will approximately delineate the buffer boundary. For commercial developments, markers shall be posted every 100 feet along the buffer boundary. Wetland buffer signs must be placed every 100 feet along the buffer boundary. For subdivisions where multiple lots are located along the buffer, it is recommended that a buffer boundary marker be located at the intersection of every other lot line with the landward edge of the buffer.
2. Buffer boundary markers shall include the statement "Water Quality Buffer Do Not Disturb".
3. Where possible, the markers should be mounted to a tree larger than three (3) inches in diameter. Where it is not possible to mount the marker to a tree, or when the lifespan of a tree may be shortened due to the use of nails or screws, a treated wood or metal signpost must be used. The post must extend below the ground surface at least twenty-four (24) inches. No bands, which may restrict the growth of a tree and shorten the lifespan, shall be used on a tree.
4. The boundary markers must be mounted between four (4) and six (6) feet above the ground surface.
5. The boundary markers must be at least twelve by eighteen inches (12"x 18").
6. Buffer and wetland boundary markers may be purchased from the PW/SWD or from another vendor.
7. Buffer boundary marker details must be shown on the engineering plans.



7.12 Buffer Restoration and Enhancement Plans

Buffer restoration is required when a buffer is disturbed without prior approval from the PW/SWD. A developer or property owner may also wish to enhance a buffer to bring it closer to an optimal, undisturbed native forest condition. Prior to reestablishing or planting the buffer, a restoration or enhancement plan must be submitted to and approved by the PW/SWD.

Buffer restoration and/or enhancement plans must include the following:

1. A drawing or plan that shows the location of the buffer in relation to the existing or planned development and to the buffered waterway; the disturbance limits for the planned buffer restoration; the direction of flow of runoff from the site and flow within the water feature; erosion prevention and sediment control measures to be installed to protect the waterway; any existing or proposed stream crossings; existing or proposed stream bank stabilization measures; access to a water source for the purposes of watering vegetation; and other pertinent information. For large scale restoration and enhancement projects the plan(s) must be stamped by a registered professional and may require additional approval from other agencies.
2. A visual and a narrative plan that describes the vegetation plan for the buffer; stream buffers must be planted with native trees, shrubs, and grasses that will not be mowed. Suitable native plants may be found in Appendix D of this Manual.
3. The schedule for when plantings will occur and a two-year survival guarantee provided by the responsible party. All items replaced during the two-year guarantee period will have an additional two-year guarantee period from the date of replacement.

7.13 Variances

No variance shall be granted to the undisturbed buffer unless the Stormwater Advisory Board and the Director of Public Works determines that a hardship exists and relief meets the general purpose and intent of this Manual. No relief of the undisturbed buffer area requirements shall be allowed on any USGS blue line stream within a water quality Special Protection Area as defined in Section

3.7 of this Manual.

In granting a request for a variance, the Stormwater Advisory Board and the Director of Public Works may require site design, landscape planting, fencing, the placement of signs, and the establishment of water quality best management practices in order to reduce adverse impacts on water quality, streams, wetlands, and floodplains.

Variance requests shall only be considered if a request meets any of the criteria listed below.

7.13.1 Buffer Variance Criteria

1. The project involves construction of:
 - a. One single family home for residential use by the owner of the property;



- b. The property has an unusual shape or topography, and there is no opportunity to develop under any reasonable design configuration;
 2. The project involves the construction or repair of a structure which, by its nature, must be located within the buffer:
 - a. Dams;
 - b. Public water supply intakes;
 - c. Waste water discharges;
 - d. Docks and boat launches;
 - e. Stabilization areas of public access to water;
 - f. Buffer intrusion is necessary to provide access to property.
 - g. Project will:
 - i. Require a Wetland Permit from the USACE for impacts to jurisdictional wetlands, and;
 - ii. The USACE has approved a mitigation plan.

7.13.2 Buffer Variance Submittal Requirements

The applicant shall submit a written request for a variance to the PW/SWD. The request shall include specific reasons justifying the variance and any other information necessary to evaluate the proposed variance request. The PW/SWD may require an alternative analysis that clearly demonstrates that no other feasible alternative exists, and that minimal impact will occur as a result of the project or development. The PW/SWD shall make a determination and decision concerning the variance request. An appeal may be made to the Stormwater Advisory Board. An appeal of the PW/SWD decision shall be filed in writing within 30 days after the final decision. The Stormwater Advisory Board and the Public Works Director shall make all final determinations and decisions.

7.14 Inspections, Violations, Enforcement and Penalties

Inspections shall be carried out as outlined in Chapter 9 of this Manual. Violations of the water quality buffer requirements will follow the enforcement and penalty procedures outlined in Chapter 9 of this Manual. Violations of the construction buffer will follow the enforcement and penalty procedures outlined in Chapter 9 of this Manual and as outlined in the Construction General Permit, SCR100000.



8 BONDS, WARRANTIES AND AGREEMENTS

This chapter provides information on the various agreements, bonds and warranties required by the County of Lexington. If a development is located within a municipal boundary, requirements may vary. Lexington County may assist the municipality but the developer or his representative is responsible for contacting the municipality to verify requirements.

8.1 Subdivision Bonding Process

A developer may, at the discretion of County Council, provide a “Subdivision Agreement and Surety Bond” and a supplemental surety to guarantee completion of the infrastructure of a development and obtain a Bonded Plat approval. The recording of a Bonded Plat allows developers to sell parcels prior to Final Plat approval. The bonded infrastructure shall include, but is not limited to: roads, storm drainage conveyance systems, sediment and erosion control measures/maintenance, water quality best management practices (BMPs), water/sewer systems, and associated engineering/surveying costs necessary to obtain Final Plat approval. A Bonded Plat shall be recorded with the Register of Deeds for Lexington County, thus allowing subdivision parcels to be conveyed.

Lexington County Council and/or the County Administrator reserves the right to deny the bonding process to a developer or any person, entity, corporation, LLC, or association in partnership with the developer. If a developer fails to uphold his responsibilities for the completion of the required infrastructure within a specified time, the supplemental surety shall be collected by Lexington County to complete the development. Should the developer complete the development within an approved schedule for completion after the supplemental surety has been collected, the monies shall be returned to the issuer of the supplemental surety.

The requirements and policies of the subdivision bonding process are described in more detail in Sections 8.1.1 through 8.2.1.

8.1.1 Subdivision Agreement and Surety Bond and Supplemental Surety

The “Subdivision Agreement and Surety Bond” is executed by the developer for approval by Lexington County. This document can be obtained from the Community Development Department or on the Lexington County website. The Subdivision Agreement and Surety Bond shall be executed to allow up to 24 months for the initial coverage period for completion of the infrastructure. The Surety Bond portion of this document is required to be 125% of the cost estimate to complete the development.

The supplemental surety is an additional instrument readily convertible to cash in an amount equal to 125% of the cost to complete the development. A developer must provide the supplemental surety from an insured financial institution, with Lexington County as the beneficiary in the form of an irrevocable letter of credit (LOC) or cash deposit in the amount of 125% of the cost estimate as approved by Lexington County Public Works Stormwater Division (PW/SWD). Lexington County will not accept a supplemental surety which allows draw downs for monthly expenditures.



Payment of monthly expenditures is the sole responsibility of the developer and does not affect the amount of money held in the supplemental surety.

To expedite the review process of the bonding documents, Lexington County will accept communication via email, but the final hardcopy shall be delivered prior to final signature approval by County Council and County Administrator.

8.1.2 Bond Estimate

The supplemental surety bond estimate is 125% of the associated construction cost for completing the roads, stormwater conveyance system, sediment and erosion control measures/maintenance, water quality practices, water/sewer systems as well as associated engineering/surveying costs necessary to obtain As-Builts and Final Plat approval. If the developer is bonding a phase within a larger development, the bond estimate shall include all necessary improvements required for the phase to function as a stand-alone project. The PW/SWD will review the bond estimate submittal to verify the amount adequately covers associated costs should Lexington County be required to complete the infrastructure. Regardless of the remaining work to be completed, the supplemental surety shall not be less than 25% of the total construction costs of the infrastructure that will be maintained by Lexington County. The project engineer shall provide an itemized total construction cost for the development along with the initial bond estimate.

The Project Engineer's bond estimate submittal shall be reviewed for approval by the PW/SWD using current cost factors. Unit cost prices are evaluated periodically by PW/SWD and are subject to change. The cost estimate shall bear the live signature and seal of the Licensed Professional Engineer of Record.

8.1.3 Bonded Plats

Four copies of a Bonded Plat shall be submitted for redlining along with or prior to the cost estimate submittal. If the developer is bonding a phase within a larger development, the bonded plat shall include all necessary improvements required for the phase to function as a stand-alone project. For the purpose of a Bonded Plat, a stand-alone project is defined as a phase that can function by itself if no future development occurs, such as: offsite storm drainage to include detention areas/water quality features, permanent turn-arounds, water and sewer etc. Upon completion of the review process and required documents, a Bonded Plat will be considered for approval.

8.1.4 Floodplain development bond

When work in the floodplain is necessary for a development and floodway encroachment is anticipated, the developer must either submit a No Rise Certification or a Conditional Letter of Map Revision (CLOMR) to PW/SWD. After construction in the floodway has been completed, a Letter of Map Revision (LOMR) must be developed and submitted to PW/SWD and to FEMA. The costs associated with the completion of the LOMR shall be added to the Subdivision Agreement and Surety Bond.



8.1.5 Additional Requirements

Sign installation shall be required once a resident inhabits the development. Sign fees shall be collected by the PW/SWD prior to Final Plat approval. The PW/SWD will place a work order and the signs can be picked up by the developer or installed by Lexington County once the infrastructure of the subdivision has been substantially completed. Signs can be obtained from a private vendor if a sample is provided to County sign shop and meets all specifications.

Subdivision lots containing temporary sediment traps shall be excluded from platting and shown as future development until 80% of the lots in the area draining to the trap have been built-out and permanently vegetated. These lots may be platted once this requirement has been met and the trap(s) has been removed and installed as a permanent feature according to the approved engineering plans or at the approval of the PW/SWD.

8.1.6 Reductions.....

A bond reduction will be allowed one time within the initial coverage period (24 months). This reduction will account for the infrastructure that has been installed. As-builts must be approved for the infrastructure to justify the requested reduction. The surety bond shall not be reduced below 25% of the total construction costs of the infrastructure that will be maintained by Lexington County.

8.1.7 Extensions

After the initial coverage period (24 months), a one year extension of the Subdivision Agreement and Surety Bond may be requested. To obtain an extension of the Subdivision Agreement and Surety Bond, the developer shall provide amendment documents for the extension of the surety bond two weeks prior to its expiration date for review and approval.

If the infrastructure work is not completed, or an extension is not obtained prior to the surety expiration date on the third year, the surety will be collected by the County. Should the developer complete the infrastructure after the collection of the surety bond, the monies may be returned to the financial institute upon approval by PW/SWD. If the collected surety bond is insufficient to finance the required improvements and the developer reneges his obligation to complete the development, Lexington County reserves the right to pursue additional costs to complete the infrastructure of the improvements above the original surety bond amount.

8.2 Warranty Period

Roads and stormwater management systems that are to be dedicated to Lexington County for maintenance shall be under warranty by the developer for a period of two (2) years. The warranty period shall begin after final plats have been recorded at the Register of Deeds office.

The County Engineer or designee shall maintain surveillance over the infrastructure with a semiannual inspection to provide written notification to the developer if repair work is required during the warranty period. The developer shall provide the County Engineer with a timeline for the completion of the required repairs. If not completed within the approved timeline, Lexington County may correct the repairs and pursue the developer for associated cost of repairs.



Emergency road and/or stormwater conveyance defects that directly affect public health and safety shall be addressed immediately. The Land Disturbance Permit shall not be closed prior to the start of the warranty period.

8.2.1 Financial Assurance

Prior to recording a final plat, the engineer of record must provide a cost estimate for failure of curbing, asphalt (pavement), and storm drainage (pipe and boxes). This cost estimate will be approved by Lexington County to secure funds for the warranty period. See examples as follows:

Curbing: Determine the average linear foot (LF) of curbing per lot. Determine how many lots remain to be completed. For a lot to be considered complete, the structure and permanent vegetation of the lot must be final. Assume 50% of the curbing will fail.

Asphalt: Determine the total number of utility crossings to include stormwater and sewer (include all main and service line crossings). Assume asphalt failures at 50% of the total crossings. The length and width of asphalt repair may vary depending on pipe size and depth. The asphalt repair shall be at least five (5) feet, centered on the utility crossing.

Storm Drainage: Option 1, All storm drainage systems shall be videoed, provided, and approved by Lexington County prior to the installation of any roadway components (such as curb, subgrade, stone base/soil cement or asphalt). The cost associated for videoing the system may vary depending on the complexity and size of system. The developer is responsible for all costs associated with videoing the drainage system.

Option 2, Assume 5% LF of the storm drainage pipe and 5% of the number of storm drainage boxes will fail. The cost shall include all labor and materials necessary to complete the repairs including associated backfill, base course, asphalt, and curb in the area of repair. The developer/permit applicant may obtain the Financial Assurance Agreement by contacting the Community Development Land Development Division or see Appendix E.



8.3 Grassing Agreement

The Construction Site Grassing Agreement is an option which allows a construction site to obtain a Certificate of Occupancy (CO) or start a warranty period or final plat approval before the final stabilization of a site has been achieved. The developer/permit applicant can obtain a Construction Grassing Agreement by securing monies with the PW/SWD. The Grassing Agreement can be obtained by contacting the PW/SWD office or see Appendix E.

Final stabilization is 70% density of permanent vegetative coverage across 100% of the construction site for all previously disturbed areas not covered by buildings or pavement. Seeding with temporary grass is not considered final stabilization. Once permanent vegetation is complete developer/permit applicant can request via email or mail to the PW/SWD at 440 Ball Park Road, Lexington, SC 29072 for reimbursement of the Grassing Agreement.

8.3.1 Eligibility

To be eligible for a Construction Site Grassing Agreement, the developer/permit applicant must meet the following criteria:

1. The site shall be graded so that permanent grass and/or other methods of final stabilization can be achieved.
2. The developer/permit applicant shall attempt to establish permanent grass or apply permanent grass seed prior to Lexington County's acceptance of the Construction Site Grassing Agreement.
3. All off site areas disturbed during the construction process shall be completely stabilized (e.g. any off site utility lines).
4. An as-built plan and certification must be submitted and approved by the PW/SWD.
5. All recorded covenants for permanent maintenance for stormwater controls (detention/retention ponds, amenity, water quality treatment credit areas, etc.) as applicable, must be approved by the PW/SWD.
6. The developer or permit applicant shall complete the Construction Site Grassing Agreement.
7. All sites greater than 1 acre shall continue with weekly inspections until the site has been permanently stabilized and the agreement has been released by PW/SWD.



8.3.2 Application

If the developer/permit applicant meets all eligibility criteria, they may apply for a Construction Site Grassing Agreement. By signing the Construction Site Grassing Agreement the developer/permit applicant is obligated to have the site completely stabilized by the end of the agreement period set by the PW/SWD.

The PW/SWD will evaluate the non-stabilized acreage to secure the agreement using \$5,000 per disturbed acre or any portion of a non-stabilized acre. The PW/SWD reserves the right to adjust this amount depending on site conditions.

If the site has been completely stabilized before the end of the agreement period, the developer/permit applicant will be refunded the entire amount of the agreement. Any interest accrued by the County while the monies are in its account will remain as the property of Lexington County.

8.3.3 Extensions

A developer/permit applicant can request a one-time agreement extension. In the event that unforeseen circumstances do not allow final stabilization to occur, an additional extension may be granted. The request must be written and submitted via email or mailed to the PW/SWD at 440 Ball Park Road, Lexington, SC 29072, 10 days prior to the expiration of the agreement. This request will be evaluated by the PW/SWD, and an extension will be considered. The PW/SWD reserves all rights to deny an extension request.

8.3.4 Failure to Meet Grassing Agreement Requirements

If the site has not been completely stabilized by the end of the grassing agreement period, or an extension has not been approved, then the developer/permit applicant is in violation of the Lexington County Stormwater Ordinance. The PW/SWD may issue a criminal citation subject to the penalty jurisdiction of the magistrate's court, and the developer/applicant will forfeit all monies secured for the agreement.



9 INSPECTIONS & ENFORCEMENT

This chapter establishes inspection and enforcement procedures.

9.1 Stormwater Management Staff Authority

Public Works Stormwater Division (PW/SWD) Staff is authorized by the Lexington County Stormwater Management Ordinance to inspect construction sites and enforce the requirements of this Manual. The staff shall be:

1. Authorized to enter and inspect all properties for regular inspections, periodic investigations, monitoring, observation, measurement, enforcement, sampling, and any other duties necessary to carry out the provisions of the Stormwater Management Ordinance.
2. Authorized to conduct inspections and file reports for periodic inspections as necessary during land disturbing activities to assure compliance with the approved Stormwater Pollution Prevention Plan (SWPPP), Land Disturbance Permit (LDP), construction plans, and/or Lexington County Stormwater Management Ordinance.
3. Authorized to furnish the permit holder or other authorized agent the results of inspection in a timely manner after the completion of each inspection.
4. Authorized to issue a Notice of Violations (NOV) to the permit holder or other authorized agent when any portion of the site work does not comply with the approved SWPPP, LDP, construction plans and/or Lexington County Stormwater Management Ordinance.
5. Authorized to issue a Stop Work Order (SWO) as the result of unsafe conditions, working without a permit, unsatisfactory work or other non-compliance without any prior notice. A SWO may be issued when previous requests by PW/SWD to remedy any non-compliance(s) (NOVs, holding building permits /inspections/finals, citations, etc.) that have not been followed with appropriate and prompt corrective action.
6. Authorized to hold building permits, inspections, and finals in order to gain compliance with approved plans. These actions may be in conjunction with NOVs, SWOs, etc. These actions shall only be asserted to the entity or his subcontractors that have initiated the noncompliance.
7. Authorized to issue a civil citation(s) as a result of failure to comply with all previous enforcement measures.
8. Authorized to perform a final inspection upon the completion of the stormwater system to determine if the completed work is constructed in accordance with the approved SWPPP, LDP, construction plans, and/or Lexington County Stormwater Management Ordinance.



9. Authorized to conduct post-construction inspections and file reports for inspections as necessary to assure all permanent post-construction stormwater management facilities are operating according to the SWPPP, LDP, construction plans, and/or Lexington County Stormwater Management Ordinance.

9.2 Stormwater Management Staff Responsibility

PW/SWD staff shall conduct site inspections on all land disturbing activities and sites that have permanent post-construction stormwater management facilities. The permit holder or other authorized agent shall notify the PW/SWD staff at least 48 hours before the initiation of construction. Failure to notify the PW/SWD before a project begins may result in the issuance of a SWO. The permit holder must also notify the PW/SWD staff upon project completion when a final inspection shall be conducted to ensure compliance with the approved LDP, SWPPP, construction plans, and/or Lexington County Stormwater Management Ordinance. PW/SWD staff shall be responsible for:

1. Inspecting the project site at a minimum of once a month.
2. Verifying that the approved SWPPP, LDP and construction plans are on the project site or are available through other approved means.
3. Verifying that active construction sites are inspected for compliance with the approved SWPPP, LDP, construction plans, and/or Lexington County Stormwater Management Ordinance.
4. Verifying that maintenance is being performed in accordance with the maintenance schedules as approved with the LDP.
5. Providing the permit holder or other authorized agent an inspection report when a deficiency is noted. The following items will be noted in the inspection report:
 - a. Inspector name, project name, date, and location of the site inspection,
 - b. Whether the approved SWPPP, LDP, and construction plans are on site and have been properly implemented and maintained,
 - c. If the deficiency is in relation to the approved SWPPP, LDP, construction plans, and/or Lexington County Stormwater Management Ordinance, and
 - d. Corrective action to be taken and corresponding date for the action to be completed.
6. Conducting a post-construction inspection of permanent stormwater management facilities. All maintenance inspections shall be conducted at reasonable times. If the owner cannot be contacted, the inspection shall be performed and a report shall be sent to the owner.



7. Providing the owner or other authorized agent of a permanent stormwater management facility with a written permanent maintenance inspection report when a deficiency is noted. The following items will be noted in the inspection report:
 - a. Inspector name, project name, date, and location of the site inspection,
 - b. Whether the maintenance activities have been properly implemented and completed,
 - c. Maintenance deficiencies, and
 - d. Corrective action to be taken and corresponding date for the action to be completed.
8. Upon refusal by any property owner to allow County staff to enter or continue an inspection, the staff shall terminate the inspection. The PW/SWD Staff shall immediately report the refusal and grounds to the PW/SWD. The PW/SWD shall promptly seek the appropriate compulsory process.
9. Upon completion of a land disturbance or post construction inspection the PW/SWD staff shall notify the person financially responsible for the land disturbing activities or for permanent maintenance in writing within three working days when a violation(s) is observed. NOVs will include the following information:
 - a. Nature of the violations,
 - b. Proposed penalty,
 - c. Required corrective actions, and
 - d. The time period for adequately correcting the violations.

In the case of an immediate threat to life and/or property or any other emergency as deemed necessary by Lexington County Public Safety, the PW/SWD may employ the necessary labor and materials to perform the required work as expeditiously as possible. The owner shall reimburse all costs, including administrative costs, to Lexington County to address the immediate threat.

9.3 Inspections by Other Responsible Parties

In accordance with National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Large and Small Construction Activities, Lexington County Stormwater Management Ordinance and this Manual, permittees are responsible for conducting inspections during and after construction. In addition, permanent stormwater control owners are required to conduct inspections on those controls. Specific requirements for these inspections are provided in the following sections.



9.3.1 Construction Inspection by Permittee

Inspections shall be conducted for each stormwater management best management practice (BMP) shown on the construction plans in accordance with the NPDES Construction General Permit, as it relates to frequency, qualifications of the staff, and documentation. Copies of inspection reports must be inserted in the Onsite SWPPP (OS-SWPPP) and be made available to PW/SWD staff upon request.

9.3.2 Post-Construction Maintenance Inspection by Owner

The purpose of maintenance inspections is to ensure that stormwater management BMPs are working properly. All components of the stormwater system shall be maintained in accordance with the maintenance covenant and schedule. BMP owners must perform an inspection of BMPs once every five years or when maintenance concerns have been identified, complete inspection documentation and submit to the County. Where maintenance needs are identified, the BMP owner is responsible for completing the maintenance.

9.4 Working without a Permit

Any person that proceeds with land disturbing activities on a site that requires a SWPPP and/or LDP without first submitting a SWPPP and obtaining a permit shall automatically have a SWO placed on the development. If the SWO is issued for not obtaining a LDP, a penalty fee equal to two times the normal plan review fee will be charged. A Land Disturbance Permit (including payment of normal fees) must be approved prior to continuing work on site. Payment of fees and other penalties must be completed prior to lifting the SWO. The SWO shall require correction of violations. No other project activities other than correcting violations and deficiencies can resume until the SWO has been lifted by the PW/SWD.

9.5 Verbal Warnings

A Verbal Warning may be given for less severe violations or for first time offenders if it shall result in immediate compliance. Staff should document the verbal warning delivery in inspection reports, in an email, or in site notes.

9.6 Corrective Order (Written Warning)

A Corrective Order is a written warning intended for minor violations. The PW/SWD Staff may issue a Corrective Order to the responsible party and/or property owner where the violation has occurred. A Corrective Order shall be submitted in writing within three working days of the inspection.

9.7 Notice of Violation

The purpose of the Notice of Violation (NOV) is to formally notify the permit holder or other authorized agent of non-compliance noted during inspections. An NOV shall be submitted in writing within three working days of the inspection.



The PW/SWD may require the violator to submit, a written corrective action plan (CAP) by the deadline stated on the NOV. When required, the CAP must be submitted by the violator to the Director of Public Works. An inspection to ensure that corrective actions have been completed will be conducted by the PW/SWD staff. Submission of the CAP in no way relieves the violator of liability for any violations occurring before or after receipt of the NOV. See Section 9.13 for further information about the CAP.

9.8 Stop Work Order

The purpose of a Stop Work Order (SWO) is to give the violator an opportunity to gain compliance with an NOV or other violation with the approved SWPPP, LDP, construction plans and/or Lexington County Stormwater Management Ordinance. No further work other than correcting violations and deficiencies shall be allowed until the site is in compliance and the SWO is lifted.

The PW/SWD may require the violator to submit, a written corrective action plan (CAP) by the deadline stated on the SWO. When required, the CAP must be submitted by the violator to the Director of Public Works. An inspection to ensure that corrective actions have been completed will be conducted by the PW/SWD Staff. Submission of the CAP in no way relieves the violator of liability for any violations occurring before or after receipt of the SWO. See Section 9.13 for further information about the CAP.

9.9 Building Permits, Inspections, and Finals

The PW/SWD may place a hold on building permits, inspections, and final certificate of occupancy in order to give the violator an opportunity to gain compliance with the approved SWPPP, LDP, construction plans and/or Lexington County Stormwater Management Ordinance. These actions may be in conjunction with NOV's, SWOs, etc.

9.10 Civil Citations

The issuance of Civil Citations by the staff may be made for the following situations:

1. When a SWO has been issued, and work continues in defiance of the order.
2. On abandoned sites where no work has been taking place, and continued non-compliance with a NOV may result in the issuance of repeat citations.
3. When repeated, recurring violations take place at the same development site or when repeated recurring violations take place by the same responsible party.

Violations may subject the permit holder to Civil Penalties set forth by the magistrate for each violation. Each separate day that a violation remains uncorrected constitutes a new and separate violation.

Citations shall be hand delivered when possible. When it is not possible, the Citation shall be sent by Certified Mail. Permit Holders, owners, agents, permittees, lessees, builders, contractors,



developers, firms, corporations, or partnerships listed on permit application or tax record may be cited under this provision.

Along with the Civil Citation, the PW/SWD may require the violator to submit, a written corrective action plan (CAP) by the deadline stated on the Civil Citation. When required, the CAP must be submitted by the violator to the Director of Public Works. An inspection to ensure that corrective actions have been completed will be conducted by the PW/SWD Staff. Submission of the CAP in no way relieves the violator of liability for any violations occurring before or after receipt of the Civil Citation. See Section 9.13 for further information about the CAP.

9.11 Criminal Penalties

In addition to any applicable civil penalties, any person who negligently, willfully or intentionally violates any provision of the Stormwater Management Ordinance shall be guilty of a misdemeanor and shall be punished within the jurisdictional limits of the magistrate's court. Each day of a violation shall constitute a new and separate offense.

9.12 Issuing Violations

The PW/SWD staff shall issue an NOV to a permit holder, and/or other authorized agent upon findings of non-compliance of the SWPPP, LDP, construction plans and/or Lexington County Stormwater Management Ordinance. Subsequent non-compliance or failure to complete the items on the NOV may result in a SWO and/or citation. Repeat offenders may have accelerated compliance timelines.

For violations that do not involve the safety of life or an imminent threat of serious damage to the environment and public or private property, NOV's, SWOs, building holds, and/or citations may be issued for, but are not limited to, the following:

1. Failure to notify the PW/SWD before beginning work on any phase of a development project or failure to have work inspected.
 - a. Any work that has been placed without a required inspection approval shall be certified in writing by a registered design professional before the next phase of construction shall begin.
 - b. PW/SWD reserves the right to inspect all facilities that have not been viewed due to the permit holder's failure to notify the PW/SWD before work began. Any deficiencies that need to be corrected before work starts again shall be listed and given a compliance date. The permit holder shall be notified to call for future inspections.
2. Failure to have sediment and erosion controls in place, improper installation, and/or maintenance deficiencies.
3. Construction not in accordance with the approved plans.
4. Working without grading, building, or other applicable permits.



5. Encroachment upon buffer areas during construction.
6. Failure to properly maintain permanent post-construction stormwater management facilities, including water quality buffers.

Enforcement timelines are up to the discrepancy of the PW/SWD.

9.13 Corrective Action Plan

With any corrective action noted above, the PW/SWD has the authority to require a violator submit a written CAP. Some corrective actions needed at a site are straightforward, simple actions such as cleaning out sediment controls or vegetating an area. However, other actions may require more planning and thought. In those situations, the County may require a CAP. Depending on site conditions, the PW/SWD Staff may require that the CAP be prepared by a Qualified Person or prepared and certified by a Professional Engineer. A CAP must include:

1. Proposed corrective actions to resolve the violation, including immediate actions and final actions and
2. Proposed schedule for the corrective actions.

When requiring a CAP, the PW/SWD inspector will set a deadline for submittal of the CAP for review and acceptance. If immediate measures are needed to halt damages to the County's stormwater system, private property or a stream, those actions should be separately addressed in the enforcement action and required immediately as opposed to waiting for submittal of the CAP.



10 ROAD DESIGN STANDARDS

10.1 General

The PW/SWD will approve all plans for construction or upgrading of streets or roads in the County Road System to include:

1. New construction
2. Staged development of roadways (overlays)
3. Roadway widening
4. Appurtenant roadway improvements such as storm drains and curb and gutter
5. Encroachments

To be eligible for acceptance into the County Road System, a street or road must be designed and constructed in accordance with these standards and approved by the PW/SWD. Paving and proof rolling of roads are to be pre-scheduled with Lexington County inspectors or an independent laboratory approved by Lexington County.

In general, roadways should be designed for the anticipated traffic density 20 years from the proposed date of construction. Special conditions such as long range planning studies, proposed zoning, industrial parks, proposed interstate facilities, etc. should be considered in the design.

10.1.1 Roadway Plans

Complete construction plans and specifications together with all appropriate design calculations are to be submitted and approved prior to the commencement of construction. Plans are to be provided on 24" x 36" sheets.

1. Plan
2. Profile
3. Horizontal curve data
4. Vertical curve data
5. Grades
6. Stations of all PI's, PC's, PT's and intersections
7. Existing and proposed grades at half station
8. Typical cross section
9. Pavement design - to include supporting soil data (Grain Size, Atterberg limits, CBR's)
10. Drainage Structures
11. Utilities - all known or suspect (gas, phone, cable, electric, sewer and water)
12. Signage Plan
13. Pavement Marking Plan
14. Length of Proposed Roadways rounded to 0.01 Mile



10.2 Pavement Design Standards

10.2.1 General

In determining the required pavement strengths, the following factors shall be considered:

1. Road designation
2. Traffic Data. DHV, ADT, Percent Trucks (T)
3. Soil characteristics and strength
4. Traffic growth rates
5. Pavement
6. Structural number
7. Stage development
8. Parking
9. Drainage
10. Geometries

10.2.2 Road Classification

Roadways in the County Road System are classified as one of the following:

1. Residential (Minor/Local)
2. Collector
3. Arterial

The determination of the appropriate classification shall be made in consultation with the Community Development and Public Works.

10.2.3 Traffic Data

1. ADT, Average Daily Traffic, the daily traffic flow in both directions of travel, for a 24-hour period. ADT for residential roads can be estimated using the projected generation rates per dwelling unit shown in the table below.

Dwelling Unit	ADT Rate
Single-family detached	10.0
Duplex (twin), Multiplex, Townhouse, etc.	8.1
Planned Unit Development	7.8
Apartment, Mobile Home	5.4
Retirement Village	3.3

2. DHV, Design Hour Volume, the 30th highest hourly volume of the year is designated the DHV. If this information is not readily available DHV may be calculated as 12% of the ADT.
3. T, Percentage of Trucks, the quantity of trucks during the ADT or DHV, expressed as a



percent of that total traffic. For the purpose here, light delivery trucks, such as panels and pickups, are considered as passenger cars. In lieu of the actual field data, T can be considered 10% on Arterials, 5% on Collector and minor Residential. Special conditions must be discussed with the PW/SWD for the Industrial Road Designations.

- a. Trucks shall be further identified as follows, during the traffic counting.
 - 2DT - Unit truck, two axles
 - 3SU - Unit truck, three axles
 - 2S1 - Semi truck, two axles on cab, one axle on tailer 2S2 - Semi truck, two axles on cab, two axles on tailer 2AX - Truck with five axles or more
 - b. In lieu of the actual traffic count to determine T, and utilizing the percentages provided in Section 10.2.3.C the following road designations shall contain the respective road groups as follows:
 - i. Residential (or Local) - Road Group B
 - ii. Collector - Road Group DRoad group loads and their effect on pavement design as related to these road groups is as shown on Data Sheet 1 of the design sheets.
4. Lane Factor: In two lane roads the total one-way traffic is obvious. In four lane roads the most heavily traveled lane will be the right most lane and a factor of 0.8 will be applied to the total one-way traffic. In six lane roads, the most heavily traveled lane will be the right lane also, and a factor of 0.7 will be applied to the total one-way traffic.

10.2.4 Sugrade Soil Support Value

In the case of proposed new construction, the soil support value of the subgrade will be provided by the tri-axial shear test; modulus of deformation may be developed by laboratory testing and correlated with the accompanying soil support scale to provide these data. This value is requested also for staged road work (overlays) and road widening work. In lieu of an actual soils evaluation, a value of 1.50, 2.5 or 3.5 (as determined by the PW/SWD) may be used for the value of S. Data Sheet 4 gives the estimated Soil Support Value and other related data for those soils occurring in Lexington County as identified by the Soil Conservation Service.

The designer shall be aware that the maximum soil support value that will be accepted without a laboratory analysis of the subgrade soil is 3.5.

10.2.5 Traffic Growth Rate

A figure of 4% per year has been identified as the growth rate characterizing traffic within the United States. This figure shall be used for forecasting anticipated ADT with the pavement design life. Other figures from local expertise are acceptable, when qualified as acceptable by the PW/SWD.

10.2.6 Coefficients of Relative Strength of Pavement Component Layers



The required thickness of a given layer or layers varies with their respective tensile strength. This strength is expressed in terms of relative coefficient. The estimated values of coefficients of the pavement components used in AASHO Interim Guide for the Design of Flexible Pavement Structures and ASHTO Road Test Equations applied to the Design of Bituminous Pavements in Illinois are utilized in this standard. It is to be understood that these coefficients may change if and when future studies are made to more accurately evaluate their respective tensile strength. At that time the PW/SWD will provide updated coefficients for incorporation with these standards.

10.2.7 Structural Number

An index number derived from an analysis of traffic and design features which may be converted to pavement thickness through the use of suitable factors related to the type of material being used in the pavement structure.

This dimensionless number reflects the product of the necessary thickness of the various road building components of pavement, i.e., sub-base, base-course, binder and/or leveling course, surface course and existing surface course, and their respective Coefficient of Relative Strength which when totaled together for the final pavement design must equal or exceed the Structural Number (SN).

The designer shall be aware that the minimum structural number for the particular road designations are as follows:

Residential and Rural	1.56
Collector	2.00

These minimum structural numbers are applicable to roads constructed on subgrade soils with soil support values equal to or greater than 5.5. When constructed on poorer soils, the pavement must have a structural number appropriate to the road designation and soil support value for the subgrade soil on the particular site.

10.2.8 Stage Construction

Various items of road construction such as pavement courses, lane requirements for future traffic density, or other sequential work must have the approval of the PW/SWD prior to consideration for acceptance by the County of Lexington.

Pavements on which the total asphalt thickness equals 2.5” or greater will be placed in two stages. The base and asphalt concrete binder course will be placed as the first stage.

The surety bond placed at the completion of the first stage will be in an amount equal to 125% of the estimated value of the remaining improvements. The estimated value will include, as a minimum, the cost of the surface course and repair of pavement failures on at least 25% of the pavement surface.



10.2.9 Flexible Pavement Design Method

The following explains the use of Data Sheets 1, 2 and 3 accompanying the Road Design Standards:

Data Sheet 1 is a summary of the traffic data, Data Sheet 2 is a nomograph relating the Soil Support Value and the Equivalent Daily 18 KIP Single Axle Load Application to the Structural Number and Data Sheet 3 provides the Coefficients of Relative Strength for Flexible Pavement Components.

Most of the first two lines of Data Sheet 1 are obvious. The truck %, (T), Designation, and number of lanes are derived from the traffic count (ADT) and the design standards. In the event that this is to be a new road, this information will be obtained from the PW/SWD. Section 10.2.3.C may be consulted for traffic information in lieu of an actual traffic count.

With the results of the traffic count (ADT), columns 1 and 2 and the percent trucks, T can be inserted. The 20-year figure is obtained from the design criteria or by the utilization of their growth rates acceptable to the PW/SWD.

The average one-way ADT is derived from the design criteria, Section 10.2.3 and is inserted in Column 3. Average one-way ADT factor is shown in Table IV. Average one-way trucks, are computed to be T multiplied by Column 3 with the result divided by 100 and then inserted in Column 4. The Truck weight, Column 5 represents either the design criteria road group equivalent 18 KIP applications per 100 trucks, or a computed equivalent 18 KIP applications per 100 trucks. The design criterion's road group is as shown in Table I. The computed value is calculated by utilizing the traffic count, and the percent trucks T, with the actual quantity of each respective truck designation as described in the design criteria. The number of trucks of each respective designation when multiplied by its equivalent 18 KIP per 100 vehicles of a type (Table II), and then divided by 100 will be the equivalent truck weight figure based on the traffic count (ADT).

Column 6 is obtained by multiplying Column 5 by Column 4. Column 7 is obtained by going to Table III and selecting the appropriate lane factor, based upon the number of lanes in the project. Column 8 is obtained by multiplying Column 7 by Column 6. Column 8 becomes one point on the nomograph on Data Sheet 2, and is plotted on the Equivalent Daily 18 KIP single axle load applications.

The Soil Support Value or the modulus of deformation is obtained through a soil test and is a measure of the bearing strength of the supporting subgrade under the pavement components. In lieu of a field test the values in the design criteria section 10.1.5 may be employed for S.

The tri-axial shear test is utilized for the field determination of the value of S or the modulus of deformation, and becomes the second point on the nomograph shown on Data Sheet 2, under its appropriate scale shown. It is also to be shown on Data Sheet 1 to provide all information to the designer in a concise package.



The two points described in the preceding paragraphs describe a straight line, which is extended to intersect with the line segment designated as a total pavement strength measure, which is to be equaled or exceeded by the total of the respective pavement section strengths. The formula employed is $SN = T_{1a1} + T_{2a2} + T_{3a3}$ where:

- T₁ = thickness of bituminous surface courses, in inches
- T₂ = thickness of base course, in inches
- T₃ = thickness of sub base course, in inches

10.2.10 Standard Design

In lieu of a pavement design as prescribed above, the engineer may elect to use a pavement as shown on Lexington County's Standard Street Cross Section, Alternate 1, 2, 3 or 4. The appropriate alternate is to be selected according to the estimated soils support value for the subgrade soil prevalent at the site as follows:

Soil Support Value	Alternate
1.5	1
2.5	2
3.5	3
5.5	4

Estimated soil support values for the various soil types identified on the Soil Survey of Lexington County are provided in Data Sheet 4.

The standard pavement design shall not be used in lieu of an individual pavement design based on subgrade or traffic conditions known or anticipated to be different from those on which the standard design is based.

10.2.11 Rigid Pavement Design

Rigid pavements are currently not approved for use on the County Road System.



DATA SHEET NO. 1

TRAFFIC DATA FOR PAVEMENT LOADING

ROAD _____ DESIGNATION _____ FROM _____ TO _____
 T% TRUCKS _____ PAVEMENT TYPE _____ # OF LANES _____ DATE _____

1	2	3	4	5	6	7	8
ADT	DESIGN PERIOD	ONE-WAY ADT	ONE-WAY TRUCKS	TRUCK WEIGHT	ADJUSTED TRUCKS	LANE FACTOR	ONE-WAY EQUIV. DAILY 18 KIP SINGLE AXLE LOAD APPLICATION

TABLE I

ROAD GROUP	DISTRIBUTION BY TYPE				EQUIV. 18 KIP APP PER 100 TRUCKS	
	2DT	3SU	2SI	5AX	FLEXIBLE	RIGID
B	92.9	1.6	1.4	1.4	23.14	25.71
D	86.5	0.6	3.1	4.6	28.92	34.44
G	71.7	6.5	2.4	6.8	39.97	52.11
J	54.0	6.8	3.5	15.5	55.70	77.30

TABLE II

EQUIV. 18 KIP APP PER 100 VEHICLES OF A TYPE	VEHICLE TYPE	
	FLEXIBLE	RIGID
2DT	17.83	17.75
3SU	62.69	101.52
2SI	76.91	76.84
2S2	109.88	145.54
	109.14	185.32

TABLE III

NO. OF LANES	LANE FACTOR
2	1
4	0.8
6	0.7

TABLE IV

AVERAGE ONE-WAY ADT FACTOR	
IN CITY	0.55
NEAR CITY (5~MI)	0.65

SOIL SUPPORT VALUE _____

Figure 10-1. Data Sheet No.1



DATA SHEET NO. 2

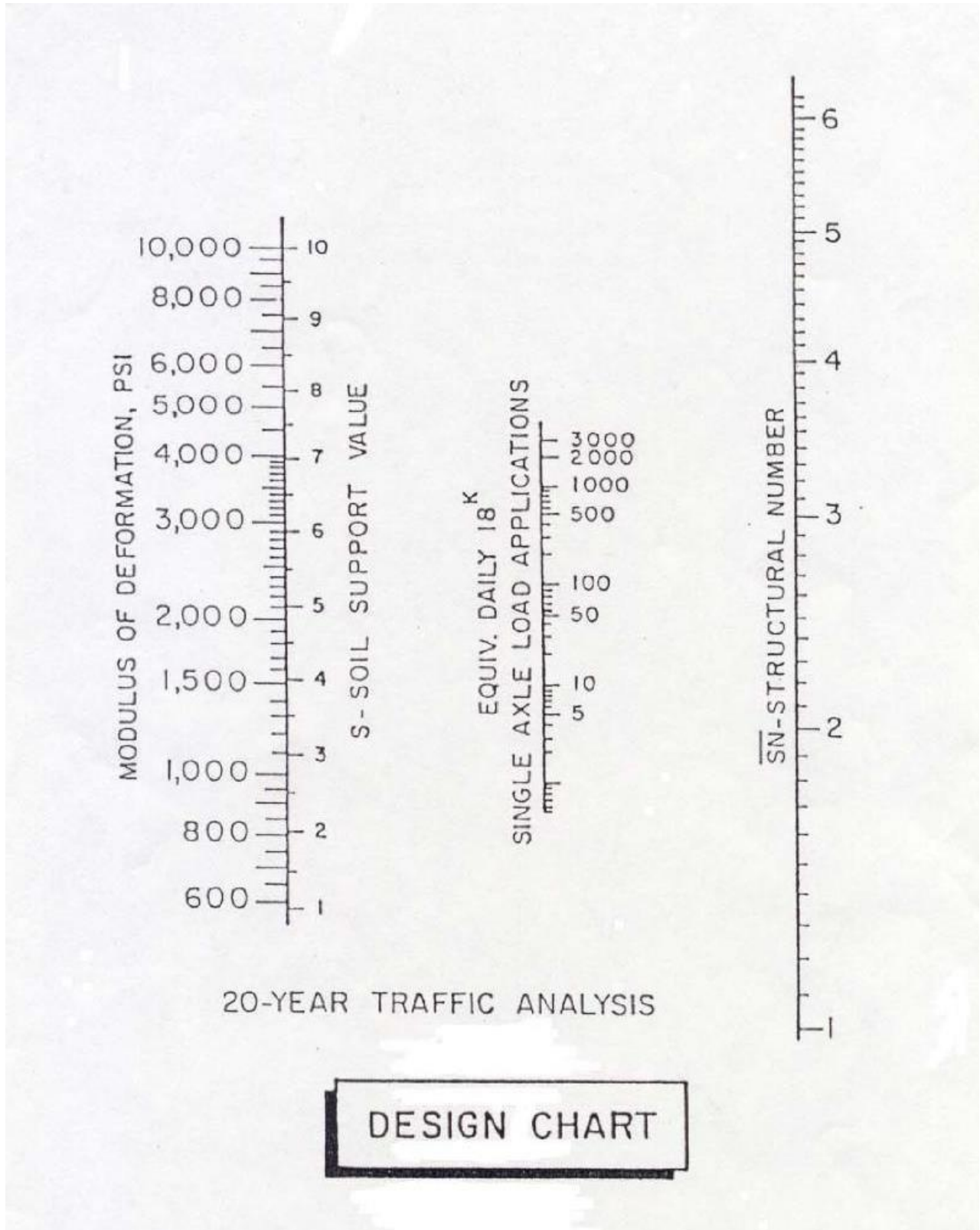


Figure 10-2. Data Sheet No. 2



DATA SHEET NO. 3
SC DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
COEFFICIENTS OF RELATIVE STRENGTH
FOR FLEXIBLE PAVEMENT COMPONENTS
July 1, 1979

Pavement Components	Coefficients		
	a ₁	a ₂	a ₃
<u>Surface Course</u>			
Hot Laid Asphalt Concrete Surface	0.44		
Hot Laid Asphalt Concrete Binder	0.44		
Bituminous Surfacing	0.35		
<u>Old Surface</u>			
Old Asphalt Concrete Surface Course	0.26		
Old Asphalt Concrete Binder Course	0.26		
Old Sand Asphalt	0.16		
Bituminous Surfacing	0.21		
<u>Base</u>			
Earth Type Base Course (Sand Clay)		0.12-0.20*	
Coquina Shell Base Course		0.12	
Macadam Base Course		0.15	
Cement Stabilized Earth Base Course		0.25	
Hot Laid Sand Asphalt Base Course		0.20-0.25*	
Stabilized Aggregate Base Course (Fossil/Limestone)		0.22	
Stabilized Aggregate Base Course (Non-Fossil/Limestone)		0.15	
Hot Laid Asphalt Concrete Binder Course		0.34	
Hot Laid Asphalt Aggregate Base Course		0.34	
Cement Stabilized Aggregate Base Course		0.34	
Old PCC Pavement		0.40	
<u>Sub-base</u>			
Soil Aggregate Sub base Course			0.10
Cement-Modified Subgrade			0.15

(*) Coefficient dependent on quality of material available.

Note: In general, it is recommended that, in computing SN for resurfaced flexible pavements, the coefficient for the former base be no greater than 0.7 of its original value, and that for the former sub base be no greater than 0.8 of its original value.

Figure 10-3. Data Sheet No. 3



DATA SHEET NO. 4

Soil Name & Map Symbol	% Passing 200 Sieve (F)	Liquid Limit (LL)	Plasticity Index (PI)	Group Index (GI)	Soil Support Value (S)
Ailey - AeC	40	40	16	2.5	3.5
Altavista - AtA	75	45	26	18.6	2.5
Blanton - BaB	12	--	--	0	3.5
Cantey - Ca	95	60	25	30.0	1.5
Chastain - Cd	98	75	40	48.5	1.5
Chewacla - Ce, CH	98	61	30	35.8	1.5
Clarendon - Cn	55	40	15	6.0	3.5
Congaree - Co	90	50	22	28.2	1.5
Coxville - Cx	80	55	35	28.6	1.5
Dorovan - Dn	NA	NA	NA	NA	NA
Dothan - DoA, DoB, DuB	45	40	25	3.5	3.5
Faceville - FaA, FaB	72	43	23	15.4	2.5
Fuguay - FuA, FuB	35	--	--	0	3.5
Georgeville - GeB,	98	75	35	44.4	1.5
Goldsboro - GoA	55	35	16	5.9	3.5
Herndon - HeB, HeC, HnB	98	70	30	38.6	1.5
Johnston - Jo	75	35	10	7.0	3.5
Kershaw - KeC	--	--	--	0	3.5
Kirksey - Krb	95	40	15	16.0	2.5
Lakeland - LaB, LaD, LkB	--	--	--	0	3.5
Lucy - LuB	30	30	15	0	3.5
Marlboro - MaA, MaB	70	48	20	13.9	3.5
Nason - NaB, NaC, NaE	95	66	36	40.6	1.5



Soil Name & Map Symbol	% Passing 200 Sieve (F)	Liquid Limit (LL)	Plasticity Index (PI)	Group Index (GI)	Soil Support Value (S)
Norfolk - NoA, NoB	55	40	20	8.0	3.5
Orange - OaB	90	99	70	72.2	1.5
Orangeburg, Oba, ObB, ObC, OgB, OgD	35	30	4	0	3.5
Pelion - PeB, PeD, PnC	55	40	18	7.2	3.5
Persanti - Ps	95	60	30	34.0	1.5
Rains - Ra	70	40	18	11.8	3.5
Smithboro - Sm	95	60	30	34.0	1.5
State - StA	70	41	15	9.9	3.5
Tawcaw - Tc	98	65	33	39.6	1.5
Toccoa - To	55	30	4	0.6	3.5
Trooup - TrB	35	--	--	0	3.5
Vaucluse - VaC, VaD	50	40	18	5.8	3.5
Wedowee - WeB	70	58	25	18.4	2.5

Figure 10-4. Data Sheet No. 4

10.3 Geometric Design Criteria

Unless specifically addressed in these regulations, all geometric elements of roadway design for streets and roads in the County Road System will be in accordance with the AASHTO Policy on Geometric Design of Highways and Streets.

10.3.1 Right-of-Way

The minimum right-of-way width acceptable under these standards is 50 feet. Required right-of-way widths for the several road classifications are shown in Table I. In all instances, the centerline of the road and the right-of-way are to be coincident.

No irrigation systems are to be installed in the right-of-way by the developer, builder, or homeowner.



10.3.1.1 Proposed Paved County/Private Roads

The minimum right-of-way for a Lexington County road is fifty (50) feet. This is sufficient for any RL and/or two-lane road with pavement width equal to or less than thirty (30) feet and one which is not reasonably expected to require subsequent widening. A uniform right-of-way width shall be maintained on the outside edge of pavement around islands and/or medians and at intersections. A minimum of a sixty-six (66) foot right-of-way is required for any wider or higher order road. Lesser R/W may be used with special criteria using the road design detail. If reduced right of way is proposed with additional requirements such as tree planting, sidewalks, and parking areas will be required as per reduced right of way detail.

10.3.1.2 Existing Paved County Roads

Any development encompassing existing County Roads which do not have the standard fifty (50) foot right-of-way shall dedicate this standard 50 foot width to Lexington County in order to proceed; for tracts lying only on one (1) side of such an existing County Road, a twenty-five (25) foot right-of-way, measured from the existing road centerline shall be dedicated to Lexington County. Proposed road cannot exceed classification of the existing County road.

10.3.1.3 Requirements for Subdividing Land and Paving Roads on an Existing Non-Paved County Maintained Dirt Road

When developing a commercial property off of a County maintained dirt road, the developer must pave the existing dirt road to Lexington County standards to the nearest paved intersection. The pavement must not stop on a upslope hill, but must continue to the top of the hill to prevent dirt washing on to the paved portion of the roadway.

When subdividing land on an existing County maintained dirt road, the developer must pave the existing dirt road to Lexington County standards when the total (existing and proposed) average daily traffic (ADT) is greater than 300 vehicles per day (vpd). This shall include the entire road frontage of the new subdivision to the nearest paved road intersection.

Additional subdividing on an existing privately maintained dirt road will need to be approved by the Planning Commission subject to Subdivision Regulations. If the existing private road accesses a County maintained dirt road the ADT requirements in Section 10.2.3.A shall be followed.

When proposing a new private road subdivision accessing a County maintained dirt road the ADT requirements in Section 10.2.3.A shall be followed.

The developer shall be responsible for obtaining all right-of-ways for the road improvements, acquiring off-site easements for storm drainage, and submitting an engineering plan for the road to the PW/SWD for approval. Every attempt must be made to acquire a 50 foot right-of-way. All right-of-way and/or easements shall be obtained prior to issuance of a Land Disturbance Permit.

At the request of the developer, Lexington County will provide the following assistance for a fee:



1. Provide the developer with a petition packet for the road in question. The developer is responsible for securing signatures of all affected property owners on the petition. The petition packet shall contain tax map numbers, property owners, and addresses.
2. Upon a positive response from the above petition, a letter will be sent to all property owners explaining the proposed project and the need for right-of-way and/or storm drainage easements. The letter will ask the recipient to reply to granting a right-of-way and/or storm drainage easements.
3. If an on-site meeting is required, Lexington County will be available to attend as a third party along with the developer and the associated property owners.
4. Evaluate alternative road design.
5. Lexington County will prepare all road right-of-way documents, and associated storm drainage easement documents for the developer to secure notarized signatures from all property owners.

10.3.1.4 Determination of ADT

Existing ADT shall be determined as follows:

1. If the existing dirt road is a dead end road and has no intersecting roads the existing residences shall be counted and multiplied by a factor of 10 (ie 20 homes x 10 = 200 vpd is the existing ADT).
2. If the existing dirt road is a dead end road and has intersecting roads that gain access exclusively by using the existing dirt road, residences on all intersecting roads shall be counted and multiplied by a factor of 10 (ie (20 homes on dirt road + 10 homes on intersecting road = 30 homes) 30 x 10 = 300 vpd is the existing ADT).
3. If the existing dirt road is a cut through road (a road that terminates at both ends to another road) a traffic study shall be conducted to determine the existing ADT for the dirt road.

The existing ADT on cut through roads shall be determined by a traffic study performed by the developer or the PW/SWD will perform the traffic count for a fee.

Total ADT shall be determined as follows:

1. Determine the existing ADT as shown above.
2. Determined proposed ADT from the proposed subdividing (ie number of lots being subdivided x 10 = proposed subdividing ADT).
3. Add existing ADT and proposed subdividing ADT for the total ADT. When an ADT of 300 vpd or greater is reached paving of the dirt road shall be required.



10.3.1.5 Exemptions to Road Paving Requirements based on density

These exemptions shall only apply if the Total ADT is less than 300 vpd.

1. The paving requirement may be exempt for a subdivision if the following density criteria are met:
 - a. On parent parcels of 25 acres or less, a maximum of 10 lots shall be subdivided.
 - b. On parent parcels between 25 and 50 acres "Item a" shall apply, plus one additional lot for every 5 full acres up to 5 lot for a total subdivision of 15 lots.
 - c. On parent parcels between 50 to 100 acres "Item a and b" shall apply, plus one additional lot per every 10 full acres up to 5 lots for a total subdivision of 20 lots.
 - d. On parent parcels greater than 100 acres "Items a, b, and c" shall apply, plus one additional lot for every 15 full acres.
2. Familial subdividing on any size parent parcels will be granted a division of 10 lots and be exempt from the paving requirement. Any further subdividing of these parcels are not exempt from the above requirements. Familial subdividing shall require right-of-way and/or storm drainage easements and all pertinent requirements for platting.

10.3.2 Pavement Width

Minimum pavement widths are to be as shown in Table I. The pavement widths shown are as measured from face to face of curbs except for the rural road and industrial service road on which the width is measured edge to edge of pavement.

10.3.3 Design Speed

Stopping distances, sight distances, minimum curve radii, vertical curve lengths and other design criteria are based on the design speeds for the different road classifications shown in Table I.

10.3.4 Catch Basins

Catch basins shall be located outside the intersection curve radii. Catch basins should generally be located on the uphill side of intersections to intercept runoff before it gets into the intersection. Catch basins shall be located so to not interfere with driveway and island locations.

10.3.5 Water and Sewer Lines

Where it is necessary for pipes to cross the roadway, the length of water and sewer lines running under pavement shall be minimized. Utility lines shall be placed at a ninety (90) degree angle with the roadway centerline, if possible, but in no case less than forty-five (45) degrees. Manholes and valves shall not be located in the pavement area.



10.3.6 Stopping Sight Distance

The distance that a vehicle travels during the time in which the driver perceives a hazard in the road, reacts and brings the vehicle to a halt is the stopping distance. Stopping distance can be calculated using the equation:

$$d = 1.47Vt + 1.075V^2/a \text{ where:}$$

- d = Stopping distance, Ft.
- t = brake reaction time, Sec.
- V = Design Speed, mph
- a = driver deceleration, Ft./Sec.²

When t = 2.5 Sec.
 and a = 11.2 Ft. /Sec², the above equation yields the following values for d at the design speeds shown:

V(mph)	d (Ft.)
10	46.3
20	111.9
25	151.9
30	196.6
35	246.2
40	300.6
45	359.7
50	423.7
55	492.5

The sight distance, measured along the road centerline from the eye at 3.75 feet above the road surface to an object, 0.5 feet high, is the stopping sight distance and at no point shall it be less than the stopping distance. Minimum requirements for stopping sight distances are shown in Table II.

10.3.7 Horizontal Curves

Horizontal curves are to be introduced at all changes of direction on collector, local commercial and industrial service streets and at changes of direction on residential streets where the deflection angle exceeds 10°. The minimum radii of curvature are to be in accordance with Table II. Speed limits on each street will be determined according to the shortest curve radius on the street. For streets with 2% cross slopes (1/4" per ft. crown) the maximum acceptable speed limits are:

Radius (ft.)	Speed Limit (MPH)
150 to 179	20
180 to 299	25



300 to 459	30
460 to 674	35
675 to 939	40

10.3.8 Vertical Curves

Crest vertical curves are to be of sufficient length to provide the minimum stopping sight distance at the design speed. The lengths required are as shown in Table III. The lengths are calculated using the formulas:

$$L = \frac{AS^2}{200(\sqrt{h_1} + \sqrt{h_2})^2} \quad S < L$$

And

$$L = 2S - \frac{200(\sqrt{h_1} + \sqrt{h_2})^2}{A} \quad S > L$$

in which:

- S = Stopping sight distance, in ft.
- L = Length of vertical curve, in ft.
- A = Algebraic difference, in grades
- h₁ = height of eye above roadway surface, in ft.
- h₂ = height of object above roadway surface, in ft.

10.3.9 Grades

A minimum grade of 0.5% is to be maintained on all streets to ensure proper drainage.

The maximum permissible grade on local and minor residential streets is 15%. Grades less than 12% are preferred.

The maximum permissible grade on collector, rural, local commercial and industrial service streets is 12%. Grades less than 8% are preferred.

10.3.10 Crown

All streets are to have a minimum cross slope of a 33:1 parabolic curve. Inverted crowns or center gutters are not acceptable.

10.3.11 Curb and Gutter

With the exception of rural and industrial service streets, all streets are to either have concrete curbs and gutters or asphalt valley gutters. Either rolled curb and gutter or barrier type curbs are acceptable except that the barrier type is required on some local commercial streets. Other types of curb and gutter may be approved by the PW/SWD.



10.3.11.1 Curb Cuts

Curb cuts are to be made at all points of access for traffic generators such as shopping centers, apartment buildings and complexes, restaurants, warehouses and other commercial developments. Curb cuts are to be a maximum length of 25 feet plus twice the corner radius and shall not begin closer than one foot from the extension of a side property line.

All curb cuts on existing County maintained streets require the submittal and approval of a Lexington County encroachment permit application before construction begins. The application form may be obtained from the PWD.

All construction is the responsibility of the applicant.

10.3.12 Traffic Impact Study

Developments on State roads shall be coordinated with SCDOT as per their requirements for traffic impact studies. Developments greater than 100 lots on a County road shall be required to submit a traffic impact study, and shall be coordinated with PW/SWD. Developments greater than 100 lots on Municipality roads shall be required to submit a traffic impact study, and shall be coordinated with that municipality.

10.3.13 Street Access

To enhance public safety and to meet the needs of the citizens of Lexington County, each residential development with 150 lots must have a minimum of two full unimpeded access points to roads of an equal or higher classification. Additional access points beyond this threshold may only be required upon recommendation from a Traffic Impact Study or through an encroachment permit review by the responsible maintenance entity.

Access points must be roads that are designed and constructed to County standards and must be connected to existing road systems not located within the boundaries of the subdivision. Multiple phased developments meeting the threshold for additional access points which are located within the parent parcel(s) must meet the provisions of this section. Residential subdivisions with 150 or more lots accessing an existing dead-end road must provide a full through access to a road of equal or higher classification. Commercial development access points shall be restricted per Lexington County Zoning and SCDOT. Interconnectivity for commercial design is regulated within the Lexington County Zoning Ordinance and interconnectivity between residential developments may be required, where feasible. To ensure public safety and the needs for the citizens of Lexington County are met, these provisions cannot be varied or modified by the Planning Commission without an independent review from applicable public safety and maintenance entities.

All access points must meet applicable SCDOT and/or Lexington County standards. In the event this design criteria is not met (ex. gated or controlled access), Lexington County will not accept the road system for public maintenance.



10.3.14 Left Turn Lanes

A residential development with 200 or greater lots shall provide a left turn lane in the existing subdivision. Development less than 200 lots that access an arterial or certain collector roads, a left turn lane must be provided. A smooth transition shall be provided for the turning lane; the turning lane shall have a minimum length of fifty (50) feet. Painted and stipping arrows shall meet SCDOT requirements.

On collector, local commercial and industrial service streets, left turn lanes are to be provided at all median openings and intersections. The length of the turn lane is to be such that adequate storage under the expected traffic loading is provided. The minimum length, however, is 100 feet.

10.3.15 Concrete Keys

A concrete key, twelve (12) inches wide and twelve (12) inches deep, shall be placed at the end of any pavement section expected to be extended by the Developer within seven (7) days or paving. Concrete keys are temporary and shall be removed prior to paving future roads

10.3.16 Alley Ways

Home Owner's Association (HOA) shall own/maintain alleyways and all pertinent storm drainage systems. Alleyways shall have a minimum twelve (12) foot width and shall ingress/egress onto a public road or shall terminate with an approved cul-de-sac, "Y", or "T". Alleyways shall not be named. Lots with alleyway access must also have a public or private road frontage. The common area for alleyways shall be equal to or greater than the riding surface.

10.3.17 Medians

Natural or planted medians separating opposing traffic lanes are acceptable. The minimum width of pavement on either side of the median is to be in accordance with the minimum lane widths contained in Table I. Barrier type curbs or adequate lateral clearance, however, must be provided on the median. Painted medians are required on collectors, local commercial and industrial service streets. Underdrains are to be installed within all medians and must tie into the storm drain system.

10.3.17.1 Median Openings

The minimum number of median openings required to serve abutting property are to be provided. Care shall be taken to locate openings only where there is adequate site distance.

10.3.17.2 Entrance Islands

1. The nose of the island shall be located at a distance of twelve (12) feet from the edge of the existing road pavement.
2. There shall be a normal fifteen (15) foot wide pavement section for one way traffic on each side of the entrance island, measured from back of curb BOC to BOC unless there is a turning lane.
3. Vegetation and structures in islands shall not interfere with intersection sight distance





requirements. Perpetual maintenance responsibility must be assumed by a private entity.

4. Expulsion type barrier curbing (see detail in Appendix I) is required around the entire circumference of the island. Pavement shall be sloped so runoff is directed away from the island and into the storm drainage system.
5. All islands are required to have French underdrain system. The underdrain is normally located behind the barrier curb for its entire circumference (although on narrow islands, a single drain running the length of the island in the center may suffice) and tied to a storm drainage system (see detail in Appendix I). A solid pipe shall be used under roadways at a depth of three (3) foot.
6. Traffic control signs, as specified by the South Carolina Manual on Uniform Traffic Control Devices shall be required. See Section 6 for additional guidance.
7. The island shall end before the location of the planned driveway for the first lot on each side of the island.
8. Gated community shall provide a minimum of 200' of staging road from access to gate.
9. An island is permitted only in a one-way "left offset" or "centered" design (see details in Appendix I). Note that the dimensions shown in the details are minimums.
10. A normal twenty (20) foot wide pavement section for one way traffic on each side of the island, measured from BOC to BOC, is required for a cul-de-sac.
11. Minimum inside curb radius shall be twenty-five (25) feet with a minimum radius of five (5) feet for the nose of the island; minimum outside curb radius shall be forty-five (45) feet with a return radius of fifty (50) feet for a cul-de-sac.
12. Horizontal and vertical alignment of the roadway shall provide the minimum stopping sight distance as determined by the design speed.

10.3.18 Cul-de-Sacs

All permanent dead-end streets are to terminate in a paved turnaround with a minimum radius of 40 feet. The right-of-way shall have a minimum radius of 50 feet. If a uniform right-of-way is not maintained around the cul-de-sac, there must be a smooth transition joining the different widths and the minimum right-of-way outside the edge of pavement at any point shall be ten (10) feet. Temporary cul-de-sacs shall not be designed/approved on engineered drawings. Dead end streets greater than 2,000 feet shall have an intermediate turnaround.

10.3.19 Islands

A natural or planted island may be used in the center of cul-de-sacs on residential and rural streets provided that a minimum pavement width of 18 feet is maintained around the island. Underdrains are to be installed within all medians and must tie into the storm drain system.



10.3.20 Sight Distance

Entrances onto County maintained streets are to be made only at points where adequate corner sight distance is provided in accordance with Table II.

10.3.20.1 Corner Sight Distance

All roadways are to be designed so that adequate corner sight distance is provided at all intersections. Corner sight distance at an intersection is measured from a point on the intersecting street 15 feet from the edge of pavement on the through street and 3.75 feet above the street surface to an object 4.5 feet high on the through street. The minimum corner sight distance is equal to the stopping distance shown in section 10.3.4 at the design speed, or posted speed limit, on the through street.



10.3.21 Intersections

The centerlines of no more than two streets shall intersect at any one point. Whenever possible, the centerlines of intersecting streets are to be perpendicular but in no case is the angle of intersection to be less than 60 degrees. All angles and distances are measured relative to the intersection of a street centerline.

10.3.21.1 Intersections in Curves

Intersections within a horizontal curve are permitted provided that the intersecting street has a 100-foot minimum tangent at the intersection and the required corner sight distance is maintained. Whenever possible, the tangent of the intersecting street is to be radial to the curve but in no case will it be more than 30 degrees from radial.

10.3.21.2 Curb Radius

The minimum acceptable curb radius at intersections is 25 feet. Larger radii must be provided in accordance with the AASHTO Policy on Geometric Design of Highways and Streets when significant tractor-trailer, or other large vehicle, traffic is expected.

10.3.21.3 Existing Streets

The profile of existing streets on either side of a proposed intersection shall be provided to ensure that adequate sight distances are available.

10.3.22 Reverse Curves

Reverse curves are permissible provided that applicable sight distances are maintained.

10.3.23 Lateral Clearance

A minimum lateral clearance as shown below shall be maintained from the edge of pavement or from the back of curb or valley gutter:

Rolled curb and gutter	6.0'
Barrier type curb	4.0'
Valley gutter	6.0'
Flat pavement	10.0'

No trees, entrance gates or other obstructions, with the exception of traffic control and street name signs and mailboxes, are to be placed within these distances from the edge of the street.

The above setbacks are minimums based on the obstruction being located on a tangent. When an obstruction is located within a horizontal curve, the setback must be calculated using the equation:

$$HS = R (1 - \cos^{28.65S/R})$$



R=The radius of curve in ft.
 S=Stopping sight distance in ft.
 HSO=Horizontals sightline offset in ft.

Provided the above setbacks and sight distance requirements are met, trees may be retained or planted within the right-of-way for aesthetic or environmental purposes.

10.3.24 Driveway Connections

Driveway aprons that do not involve a curb cut are to abut the back of curb or valley gutter for no more than 25 feet, including the corner radius.

For all new construction, the builder or developer is to be responsible for construction of paved driveway aprons in accordance with an approved plan.

10.3.25 Superelevation

In general, superelevation is not required on streets in the County Road System. In situations involving rural or arterial roads where design speeds will exceed 45 MPH, however, superelevation shall be required. In these cases, superelevation will be designed in accordance with the AASHTO Policy on Geometric Design of Highways and Streets.

Table II-1. Roadway Design Parameters

Street Classification	Min. R/W Width (Ft.)	Min. Pavement Width (Ft.)	Min. Lane Width (Ft.)	Design Speed (MPH)
Rural	66(3)	22(2)	11	(1)
Minor Residential	50	20	10	25
Local Residential	50	24	12	25
Local Commercial	66	36	12	40
Collector	66	36	12	40
Industrial Service	66	36	12	40
Industrial Service	80	36(2)	12	40
Arterial	100	52	24	

- (1) Determined in consultation with PW/SWD
- (2) Edge to Edge of Pavement
- (3) May be reduced to 50' at the discretion of the PW/SWD if the ground elevations at the 25' R/W line are no more than 0.85' above the proposed centerline elevation.



Table III-2. Roadway Design Parameters, continued

Street Classification	Stopping Site Dist. (Ft.)	Min. Curve Radius (Ft.)	Max. Grade (%)
Rural	*	*	12
Minor Residential	160	150	15
Local Residential	160	150	15
Local Commercial	275	350	12
Collector	275	350	12
Industrial Service	275	350	12
Industrial Service	275	350	12
Arterial	*	*	*

* Dependent on design speed selected



Table IV-3. Minimum Length of Crest Vertical Curves

Algebraic Difference In Grades	For Stopping Sight Distances of:			
	160'	275'	300'	350'
4.0	---	200.0	250.0	350.0
5.0	40.0	270.0	321.4	437.5
6.0	86.7	324.1	385.7	525.0
7.0	120.0	378.1	450.0	612.5
8.0	145.0	432.1	514.3	700.0
9.0	164.6	486.2	578.6	787.5
10.0	182.9	540.2	642.9	875.0
11.0	201.1	594.2	707.1	962.5
12.0	219.1	648.2	771.4	1050.0
13.0	237.7	702.2	835.7	1137.5
14.0	256.0	756.3	900.0	1225.0
15.0	274.3	810.3	964.3	1312.5
16.0	292.6	864.3	1028.6	1400.0
17.0	310.9	918.3	1092.9	1487.5
18.0	329.1	972.3	1157.1	1575.0
19.0	347.4	1026.3	1221.4	1662.5
20.0	365.7	1080.4	1285.7	1750.0



10.4 Dedication of Roads and Storm Drainage Systems

Notwithstanding any provisions set forth herein, Lexington County reserves the right to accept or deny maintenance of all or part of a road and/or storm drainage system. All Lexington County roads must be constructed in accordance to the South Carolina Department of Transportation (SCDOT) specifications. If a development is proposed for County maintenance, the roads and storm drainage systems must also meet standards specified in this Manual and/or other adopted Lexington County regulations and policies. Perpetual maintenance is accomplished through the submittal and acceptance of as-builts and final plats.

The County will not accept any road and/or storm drainage systems for commercial or non-residential developments, to include rental communities such as apartments, mobile home parks, and the like. In the event that the developer does not comply with public road and/or storm drainage design standards, or if a variance and/or modifications to these regulations are made, Lexington County will not accept the roads or storm drainage system for maintenance. At the developer's request, a subdivision may be privately maintained whereas all roads and storm drainage systems must meet the guidelines and regulations set forth within this Manual and other applicable County ordinance.

10.5 Testing and Inspections

All elements of roadway and storm drain system construction must be inspected and approved by the PW/SWD as a prerequisite for acceptance by Lexington County. This applies to all subdivision streets constructed under the jurisdiction of Lexington County Land Development Regulation whether they are to be dedicated to Lexington County or not. This will include:

1. Sub-grade Surface
2. Storm Drain System and all related structures
3. Detention/Retention Ponds
4. Embankments
5. Utilities within the structural zone
6. Utilities in Landscaped zones
7. Sub-grade for roads
8. Finished grade of road easements/ROW
9. Sub base
10. Base Course
11. Asphalt Paving

Instructions for coordination of the inspections with the contractor's activities are provided in Section 10.1.9 and 10.1.10. Requests for any inspection must be arranged with the PW/SWD's office 24 hours in advance.

The inspections conducted by the PW/SWD are for the protection of Lexington County only. They are not intended to certify the contractor's satisfactory discharge of his contractual obligation to the owner, nor do they relieve the project engineer from any of his responsibilities with regard to inspection and contract administration.

The contractor is responsible for providing all geotechnical and materials testing and the



accompanying documentation at no cost to the County. All testing is to be performed by a licensed certified agency and signed off on by the engineer. All testing is to be identified on forms as to the exact location (SD No.'s, Street name, Sta. No.'s, and elevation in regards to finished grade.) Unless otherwise stated herein, the proctor densities required under these procedures are standard proctor densities.

PW/SWD can withhold approval at any stage of construction, including final approval, for failure to comply with these regulations.



Mandatory Initial Sub-grade Surface Inspection: After clearing and rough grading of streets but prior to placement of any storm drain or fill for road way embankments, a mandatory sub-grade surface inspection is required.

A proof-roll must be conducted during this inspection by the PW/SWD. Underdrain requirements may also be identified at this point. All deficiencies identified during this inspection must be corrected by the contractor before the next inspection is requested. The consulting engineer or geotechnical engineer as well as the PW/SWD and contractor shall be represented. This inspection shall be set up by the contractor or the consulting engineer.

Sub-grade Proof-Roll: Prior to scheduling a sub-grade proof-roll, the PW/SWD's office must be in receipt of all density testing data (sub-grade shall have been tested every 250 ft., alternating lanes testing to be completed on cut or fill), required to be completed at this stage of construction. It is the responsibility of the contractor to provide independent density verification prior to proof-rolling and at no cost to Lexington County.

After fine grading of sub-grade, but prior to placing base material, the sub-grade must be proof-rolled with a loaded tri-axle dump truck with no less than eighteen (18) tons loading. A load ticket must provided showing date, time, and amount of weight from quarry.

The contractor shall schedule this inspection. The geotechnical engineer, PW/SWD office and contractor shall be represented. The PW/SWD's office reserves the right to conduct or require additional testing at any time. The minimum acceptable sub-grade density is 95% of maximum proctor density.

No base course material or curbs shall be placed prior to written approval of the sub-grade from the PW/SWD's office.

Note: Any completed and approved sub-grade left exposed for over two weeks or damaged by inclement weather must be re-inspected and approved by the PW/SWD's office. This may include another proof-roll if necessary in the judgment of the PW/SWD's office.

Any excavation within a tested and County approved sub-grade shall be treated as new excavation and complete density testing and proof-rolling requirements must be met.

Detention/Retention Ponds: Pond dikes are to be constructed with fill approved by and signed off on by the geotechnical engineer; absolutely No Organics are permitted in dikes. Fill material is to be tested every 1 ft. in elevation and every 100 l/ft., with a minimum of 2 tests per lift. Trenches through a pond dike shall be tested accordingly. All fill must be compacted to at least 95% of maximum proctor density. PW/SWD is to be copied on all testing.

County roads are not allowed over pond dams.

The PW/SWD is to be copied on all testing. If not properly notified, or if the test results are unsatisfactory, the PW/SWD shall require excavation and re-compaction of the backfill. No proof-roll of the sub-grade will be scheduled until the backfill compaction has been documented.



Flowable fill may be used in lieu of compaction in 6” lifts and geotechnical testing. Notification, however, is still required so that an inspection of the excavations can be accomplished prior to placement of flowable fill.

Embankments: All stumps and large roots must be removed from the roadbed prior to placement of fill for embankments regardless of fill height. All roadway embankment and embankment fill must be approved by and signed off on by the geotechnical engineer. Roadway embankments fill to be placed and compacted in lifts not exceeding 8”. The contractor is responsible for providing geotechnical testing and documentation that the embankment material has been compacted to 95% of maximum proctor density. Density testing of embankment fills to be performed every 1ft. of fill every 250 ft. alternating lanes with a minimum of 2 tests per road, per 1ft. of fill. The PW/SWD is to be copied on all testing. No proof-roll of the sub-grade will be scheduled until the compaction has been documented.

Embankment Modifications: Any roadway embankment modifications (extra stone, soil cement, lime treatment, geo grid, etc) must be approved by the geotechnical engineer and the PW/SWD.

Curb and Gutter Proof-Roll: Curb and gutter must be placed on compacted and approved sub-grade or base material. Prior to scheduling a curb and gutter proof-roll the PW/SWD must be in receipt of all density testing data required to be completed at this stage of construction. The geotechnical inspector, contractor, project engineer and PW/SWD shall be present for this proof-roll. Proof rolls shall be performed for curb and gutter using a motor grader or a tri-axle truck with no less than eighteen (18) tons loading. A load ticket must provided showing date, time, and amount of weight from quarry.

Contractor shall provide the PW/SWD with cylinder testing data (SC-T-41) from an independent testing lab (AASHTO certified) and inspector certified by the SCDOT to inspect and test concrete indicating compressive strength of concrete tested. A minimum of three test cylinders equally spaced shall be taken for the first 1000 linear feet. An additional cylinder shall be taken for each additional five hundred linear feet of curbing. All tests shall be identified with station identification numbers. No test cylinder shall attain less than 2500 psi while the average of all test cylinders shall be at least 3000 psi. Where any sample is less than 2500 psi or the average is less than 3000 psi than the material associated with the failed sample station number(s) shall be removed and reinstalled.

NOTE: Upon completion of a passing curb and gutter proof-roll, absolutely no excavation or trenching is to be done in a roadway or roadway Easement without the approval of the Lexington County PW/SWD.

Underdrains: The need for and location of underdrains will be identified in conjunction with the proof-roll of the sub-grade. Required underdrains will be clearly marked on the contractor’s and PW/SWD plans and must be installed prior to requesting the next inspection. The location of underdrains must also be shown on the as-built plans. Underdrains may be installed at anytime where adequate proof shows the needs for the application and will be left to the combined discretion’s of the project engineer and the PW/SWD before installation.



Shoulders and Sidewalks: Shoulders of the roadway are to be graded from back of curbing towards the edge of the right-of-way for nine (9') feet at a 50:1 cross slope downwards towards the back of curbing. Sidewalks are not required within the right-of-way. When sidewalks are to be placed, allow for a 5.0' wide grass strip and a 4.0' wide sidewalk at the required 50:1 cross slope.

However, if mandated by another entity or as part of the developer's project, these will be associated within an approved easement. The easement will be centered on the sidewalk and extend six inches (6") on either side of the sidewalk. Lexington County does not maintain sidewalks.

Catch Basins: The location and orientation of the catch basins relative to the curb and gutter, as well as the roadway width, shall be confirmed at this time. Catch basins improperly placed must be relocated and/or reconstructed. All catch basins must have a temporary drain by which standing water can be drained from the surface of the sub-grade and base during construction. These drains must be properly plugged before the final inspection is requested.

Base Course: Placement of base course material is only permitted on a County approved sub-grade. Base course material other than graded aggregate base course must be approved by the PW/SWD (sand clay, cement, stabilized, geo grid etc.) All base course materials are to be density tested every 250 feet in alternating lanes with a minimum of 2 tests on any road no matter the length. Thickness of base course material must be verified at each density test location.

The following compaction requirements must be met:

1. Graded Aggregate Base Course (95% of modified proctor density)
2. Sand Clay Base Course (100% of maximum proctor density)
3. Cement Modified Earth Base Course (95% of maximum proctor density)
4. Crushed or Recycled Concrete (98% of modified proctor density and meets the gradation of macadam stone)

It is the responsibility of the contractor to provide independent density verification at no cost to Lexington County.

Graded Aggregate Base Course: If base course is thicker than 8 inches it shall be placed and compacted in equal lifts, if base course is less than 12 inches it can be tested as 1 lift. If base course is 12 inches or greater it must be placed compacted and density tested in equal lifts (12 inches, compact and test at 6 inches and 12 inches).

Base Course Proof-roll: Prior to scheduling a Base Course Proof-Roll the County must be in receipt of all base course density testing and thickness verification reports. If the average base course thickness is found to be deficient by more than 1/2 inch or any individual measurement deficient by more than 1 inch, the deficiency will be corrected by scarifying, adding base material, re-compacting and density testing. Upon completion of the curbing and base course, the contractor shall schedule an inspection to proof-roll the base with a loaded tri-axle dump truck with no less than eighteen (18) tons loading. A load ticket must be provided showing date, time, and amount of weight from quarry. The geotechnical engineer, PW/SWD, and contractor shall be represented. The contractor will provide proctor and gradation information on the base material from an



independent testing firm as well as verification that all applicable compaction and depth requirements have been satisfied.

NOTE: Any completed and approved stone base left exposed for over one week or damage by inclement weather must be re-inspected and approved by the PW/SWD. This shall include another proof-roll if necessary.

10.6 Paving

Asphalt Requirements: Unless another type has been approved in advance, by the PW/SWD for a specific project, hot mix asphalt pavements will be:

Binder Type 1 or 2 (Intermediate Type B or C) for binder (Intermediate) courses
Surface Type 1 (Surface Type C) for surfaces courses

All hot mix asphalt will contain hydrated lime as an anti-stripping agent. A roadway will not be approved and accepted by the County without this additive in the asphalt.

Asphalt verification testing will be conducted in accordance with Section 401.30 of the SCDOT Standard Specifications for Highway Construction, Newest Edition. The contractor shall be responsible for providing verification of the asphalt type, asphalt binder content, gradation and the average laboratory bulk specific gravity (BSG) for all asphalt mixes used on Lexington County projects as well as the in-place asphalt density and thickness. The asphalt contractor must have an asphalt laboratory certified by the SCDOT for state highway projects.

For each day's production, the contractor's asphalt lab must provide:

1. Average laboratory BSG
2. Asphalt binder content
3. Gradation
4. Mix type

The in-place density and thickness determination of asphalt surface and binder courses will be based on the core data for each day's production. Cores will be obtained every 500 ft. in alternating lanes with a minimum of one core on any road, regardless of length, immediately after completion of paving; holes are to be patched with hot asphalt from the same day's production. The cores will be taken and evaluated by either the asphalt contractor or an independent materials testing firm certified by the SCDOT for state highway projects. The pavement will be rejected, removed and replaced if the average in-place core density is less than 96% of the average laboratory BSG with all cores exceeding 95%.

The average pavement thickness must be equal to or greater than the plan thickness with no individual core thin by more than 0.25". Pavements that are deficient with regard to thickness will either be removed and replaced or overlaid at the discretion of the Director of Public Works or his Designee. Each core will be tested for the presence of hydrated lime in the mix.



Documentation of the asphalt verification testing must be provided prior to requesting a final inspection. The Lexington Director of Public Works or his Designee's office reserves the right to conduct or require additional verification testing at any time.

Coordination: After approval of the base or sub-grade, there must be coordination between the paving contractor and the PW/SWD with regard to the schedule for paving. A County inspector must be present during paving operations.

1. Asphalt is only to be placed on a County approved base.
2. If more than one week passes or there is 1/4 in or more rain prior to paving an approved base, the base must be re-inspected by the County visually, and possibly proof-rolled.
3. Minimum Asphalt thickness for initial/ first lift is 2 in.
4. Asphalt concrete surface course shall not be placed during the months of December, January and February except with the written permission of the PW/SWD. Placement of hot mix Asphalt will not be authorized when surface temperatures are less than 45 degrees F and rising.
5. Lexington County PW/SWD to visually inspect pavement and review Asphalt core test data at all phases of paving, binder, intermediate and surface course.
6. Asphalt tack coat to be placed between all courses and curb, no exceptions.

Final Surface Course: An existing asphalt concrete binder or base course must be inspected and approved prior to placement of the asphalt surface course and will require proof rolls to be performed. Verification of in-place density and thickness of the binder or base course must be provided as a prerequisite to this approval. Failure to obtain this approval will make the street ineligible for final approval and acceptance by the County.

Proof-Roll of Road Right of Way: Right of Way shall be properly graded and compacted according to plans. Fill along curb line is to be a minimum of 1/2 inch above curb line and compacted. Shoulders of the roadway are to be graded from back of curbing to the edge of the right-of-way at a 50:1 cross slope downwards towards the back of curbing. No water shall be allowed to stand behind the curbing once it is completed. All water is to drain over the curb or from the edge of right-of-way away. In lieu of density testing in Road right of way, a proof-roll will be conducted by the PW/SWD. Proof-Roll is to be scheduled by the contractor prior to grassing. A rubber tire backhoe, pick-up truck, or a rubber tire skid loader is preferred for this proof-roll. A maximum of 1 inch deflection is permitted during this proof-roll.

10.7 Signs

Traffic control signs are to be fabricated and erected strictly in accordance with the Manual on Uniform Traffic Control Devices.



Developer Requirements: The developer shall be responsible for the procurement and installation of all traffic control, regulatory, and street signs. All sign locations and types shall be approved by the PW/SWD and shall be provided in the submittal. Lexington County will fabricate and install all needed traffic, regulatory, and street signage for a fee.

Custom signs are not allowed, however, the developer may customize posts, hardware and framing associated with the sign in order to accentuate a development “theme”. For developments with standard signage, the developer shall pay the calculated signage fee. Contact the PW/SWD for the fee schedule. If Lexington County needs to replace one of these signs, standard hardware will be used.

Street names and signs: A street name and appropriate signs shall be provided for each publicly or privately maintained road in Lexington County.

1. Duplication of any existing name will not be allowed, in part or as a whole. This includes one of two or more words pronounced alike but different in meaning and spelling.
2. The requested name shall consist of no more than thirteen (13) letters, and/or spaces (not including the suffix).
3. Dead end roads shall have a suffix of “Court”, “Lane or “Place” so as not to be misleading to an emergency vehicle looking for a cut-through to another street.
4. Streets having suffixes of “Circle” must have two intersections with other streets.
5. Abbreviations of street names will not be allowed.
6. All road names shall be approved by Lexington County’s Planning and GIS Department.

Standard Assemblies:

General

The sign assembly shall consist of two (2) double faced street signs mounted on a 2” x 2” galvanized steel square post. One (1) assembly will be required for T-Type and Cross-Type Intersections. Include names of both roads at intersection.

Road Signs

Each sign plate shall be extruded 6” x 24”, 30” or 36”. The sign material shall be extruded aluminum. Background facings for the signs shall be White HIP “High Intensity Prismatic” with a transparent green overlay or equivalent. The finished sign shall have a green background with white copy and white border. The street name legend shall be made with 4” Series “C” letters. The designation of Avenue, Street, Road, Drive, etc., shall be abbreviated and shall be made with 2” Series “C” letters. Periods will not be used after the abbreviations. Painted and/or beaded signs will not be acceptable.



Posts

The sign posts shall be 2" x 2" galvanized square tubing.

Brackets

The brackets shall be cast aluminum and in two (2) parts, a cap and a spacer. The cap shall fit over the top of the tubing and have a slot in its top to hold the Street Name Sign. The spacer shall be made with two (2) slots at 90 degrees to each other to fit over one Street Name Sign and to hold the other. The bracket parts shall be provided with Allen Head Set Screws to hold the entire assembly together on the post.

Installation

- a. Each installation shall consist of two (2) double faced street name signs mounted one above the other on top of a 2" x 2" galvanized steel tube.
- b. Cross-type and T-type intersection shall have one (1) sign assembly. Where the intersection has more than four (4) street legs, more than one (1) sign assembly will be required.
- c. The installation shall not be closer to the edge of the pavement than six (6) feet nor more than twelve (12) feet from the pavement edge.
- d. The bottom of the signs shall be seven (7) feet above the center line finished grade of the street.

Traffic Control and Regulatory Signs:

Placement /Location

- a. Standardization of position cannot always be attained in practice; however, the general rule is to locate signs on the right hand side of the roadway, where the driver is most likely to look for them. The sign assembly shall be placed not less than three (3') feet, but not more than six (6') feet from the traveled way. The clearance from the bottom of the sign to the traveled roadway ground shall be five (5') feet. If signs are next to sidewalks or areas frequented by pedestrians, the clearance is to be seven (7') feet. Posts are to be 2" x 2" galvanized square tubing.
- b. If there is any question about placement/location, the PW/SWD will determine location.

Traffic Control and Warning Sign Standards:

- a. The sign assembly shall consist of a sign and a post. The sign shall meet the standard requirement of MUTCD standards for size and shape. (They are found in the Manual for Uniform Traffic Control Devices.) The sign shall be covered with HIP "High Intensity Prismatic" sheeting or equivalent. Standard signs are to be of aluminum construction and at least .080 gauge thickness. Signs are to be erected on posts no less than ten (10') feet in length.
- b. Sign posts and their foundations and sign mountings shall be constructed so as to hold signs in a proper and permanent position, to resist swaying in the wind or displacement by acts of vandalism.



Regulatory Sign Standards:

- a. Stop Sign - A “Stop” sign shall be placed at the intersection of two or more roads. The road(s) of less importance as determined by the PW/SWD shall be the road to stop and yield the right-of-way. Stop signs shall conform to the following standards:

Number	Size	Class
R1-1-30	30” x 30”	Local
R1-1-48	48” x 48”	Collector

Background: Red – Reflectorized.
 Legend and Borders: White – Reflectorized

- b. Yield Sign - Use of a “Yield” sign must be approved by the PW/SWD. Since it does not require all vehicles to stop, it shall only be used where visibility of other approaching traffic is good from the approach on which the yield sign is proposed.

Number	Size	Class
R1-2-36	36”x36”x36”	Standard
R1-2-48	48”x48”x48”	Major

Background: Red – Reflectorized
 Legend and Border: White – Reflectorized

Warning Signs:

Warning signs shall be erected in accordance with the general requirements for sign position in accordance with MUTCD. Warning signs primarily function to call attention to conditions unexpected to the road user. Their use shall be based on engineering judgment or engineering study.

No Outlet: The “No Outlet” sign shall be posted as near as practical to the entry point or at a sufficient advance distance to permit the road user to avoid the no outlet condition by turning at the nearest intersecting street.

Background: Yellow – Reflectorized
 Legend and Border: Black

- a. Stop Ahead Signs - A “Stop Ahead” sign is intended for use upon approaching a Stop sign that is not visible for sufficient distance to permit the driver to bring his vehicle to a stop at the Stop Sign. Obstruction(s) causing the limited visibility may be permanent or intermittent.

Number	Size	Class
W3-1-36	30” x 30”	Local
W3-1-48	36” x 36”	Collector

Background: Yellow – Reflectorized



Arrow and Border: Black
 Symbol: White Border on Red Background – Reflectorized

- b. Yield Ahead Signs - A “Yield Ahead” sign is intended for use upon approaching a Yield sign that is not visible for sufficient distance to permit the driver to bring his vehicle to a stop at the Yield sign. Obstructions(s) causing the limited visibility may be permanent or intermittent.

Number	Size	Class
W3-2-36	30” x 30”	Local
W3-2-48	36” x 36”	Collector

- c. Background: Yellow – Reflectorized
 Arrow and Border: Black
 Symbol: White Margin, Red Border on White Background – Reflectorized

- d. Bridge End Markers - “Bridge End” Markers shall be used to mark the end of bridges for approaching traffic. On a two-lane roadway one Bridge End Marker shall be used on each side of the bridge. On a divided multi-lane roadway, one Bridge End Marker shall be used on each side of the approach end of each bridge. On a multi-lane facility where the roadways carrying opposing traffic are separated only by a raised median and only one bridge exists, one Bridge End Marker shall be used on the right side of each end of the bridge.

Number	Size	Class
W18-1R-12	12” x 36”	Local
W18-1L-12	12” x 36”	Local

Yellow Stripes – Reflectorized
 Alternate Stripes – Black

- e. Other Warning Signs - Warning signs other than those specified may be required under special conditions. Warning signs shall conform to the general specifications for shape, color, and placement of warning signs.

The applications of such signs are sufficiently apparent as to require no detailed specifications. (They are found in The Manual for Uniform Traffic Control Devices.)

- f. Privately Maintained Roads Signs - Privately maintained road signs shall be placed on the street sign post with green background with white lettering.



10.8 Final Approval

Final Inspection:

After the paving is completed and all utility, storm drainage and associated work is complete, a final inspection can be scheduled. The developer, project engineer, contractor and the Director of Public Works or his Designee's office shall be present during the final inspection. The following items shall all be completed before a final inspection is requested:

- Permanent grass on road shoulders; cut and fill slopes and easements
- Fence around detention ponds
- Street name signs (County Standard or an approved alternate)
- Traffic control signs (per SC MUTCD)
- Pavement marking (Thermoplastic)
- As-built Drawings

Documentation:

As a prerequisite to conducting the final inspection, the following must be provided:

- 24"x36" hard copy of as-built plans
- Documentation of asphalt verification testing

Bond Estimate:

If approval of a bond in lieu of completion is sought, the engineer must provide an estimate of the quantities of the uncompleted items of work together with their contract values and total cost. When the uncompleted work includes the final surface course, the estimate must include remedial work on a minimum of 25% of the total pavement area. The bond will be 125% of total cost of all work left to be completed (see Chapter 7 for bonding).

Punch List:

A written punch list of deficiencies found during the final inspection will be provided. All items shall be completed before requesting a re-inspection.

Final Approval:

Upon satisfactory completion of all punch list items, final plats must be signed and recorded at the County Deeds of Records and the warranty period will start.

Failure to comply with any of the above listed requirements could render the streets and storm drainage systems ineligible for acceptance by Lexington County.

10.9 Encroachment Permits

An encroachment permit, approved by the PW/SWD, is required for all construction, undertaken by parties other than the Lexington County Public Works Department or its authorized contractor, within or affecting the right-of-way of any County maintained road. This requirement applies, but is not be limited, to:



1. Driveway connections involving a curb cut or pipe installation
2. Curb cuts
3. Utility taps
4. Utility crossings
5. Storm drainage installation
6. Storm drainage discharge
7. Subdivision entrance signs or gateways
8. Signage installation

The permittee is required to indemnify the County for any liability incurred or damages sustained as a result of the encroachment. The permittee is responsible for:

1. Notifying the PW/SWD when construction begins on an encroachment
2. Ensuring that a copy of the encroachment permit is on the construction site
3. Ensuring that the construction and the restoration of the roadway have been approved by the PW/SWD
4. All construction

The encroachment permit application form may be obtained from the PW/SWD.

Anyone who encroaches on the right-of-way of a County maintained road without securing an encroachment permit or who fails to adequately restore the road and right-of-way after an encroachment is subject to daily fines in accordance with the County Stormwater Management Ordinance.



11 FLOOD DAMAGE PREVENTION

11.1 Flood Damage Prevention

The National Flood Insurance Program (NFIP) provides federally backed flood insurance within Lexington County. To qualify for the NFIP, the County has adopted and enforces a Flood Damage Prevention Ordinance to regulate development in flood hazard areas, protect human life and health, minimize property damage, and encourage appropriate construction practices to minimize the potential for flood damage to future development. Under the NFIP, Lexington County is required to regulate all land development activities within the identified Special Flood Hazard Area (SFHA), which are subject to a 1-percent annual chance of flooding, formerly called the 100-year floodplain. Development is defined by the Federal Emergency Management Agency (FEMA) as any man-made change to improved or unimproved property including, but not limited to, buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations.

Development and/or land uses permitted within the SFHA of Lexington County shall be in accordance with Lexington County's Flood Damage Prevention Ordinance and as summarized in the following sections of this manual. The Lexington County Floodplain Manager may also refer to the State of South Carolina and FEMA publications, policies and guidelines to assist in the implementation of these regulations.

11.2 Overview of Floodplains

The SFHA is comprised of the floodway and flood fringe (See Figures 11-1 and 11-2). The floodway is the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to pass the base flood discharge without increasing flood depths. The figures on the following page present the special flood hazard area in a cross-sectional view and on a sample Flood Insurance Rate Map. The "South Carolina Quick Guide for Riverine Floodplains, Development, and Maps" is a recommended source for basic information on watersheds and riverine floodplains. The Guide also provides an overview of the methods used to develop and maintain flood maps. The Guide is available for download from the South Carolina Department of Natural Resources website.

The SFHA for Lexington County is identified by FEMA in a scientific and engineering report entitled "Flood Insurance Study for Lexington County, South Carolina, and Incorporated Areas" with an accompanying Flood Insurance Rate Map (FIRM). The current Flood Insurance Study and the effective FIRM are available at FEMA's website, on the County's website, or at the Floodplain Manager's office at 212 South Lake Drive, Lexington, SC 29072.

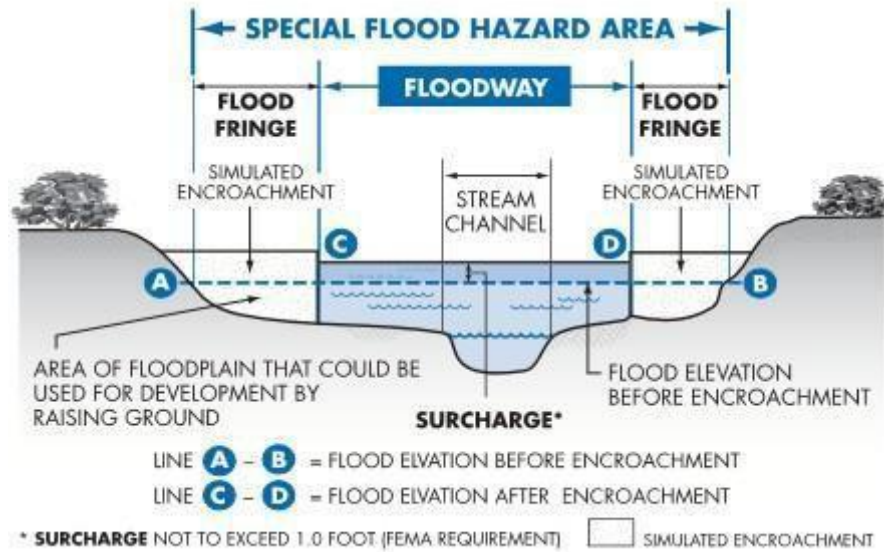


Figure 11-1. Cross Section of the Special Flood Hazard Area.
(Source: SCDNR)

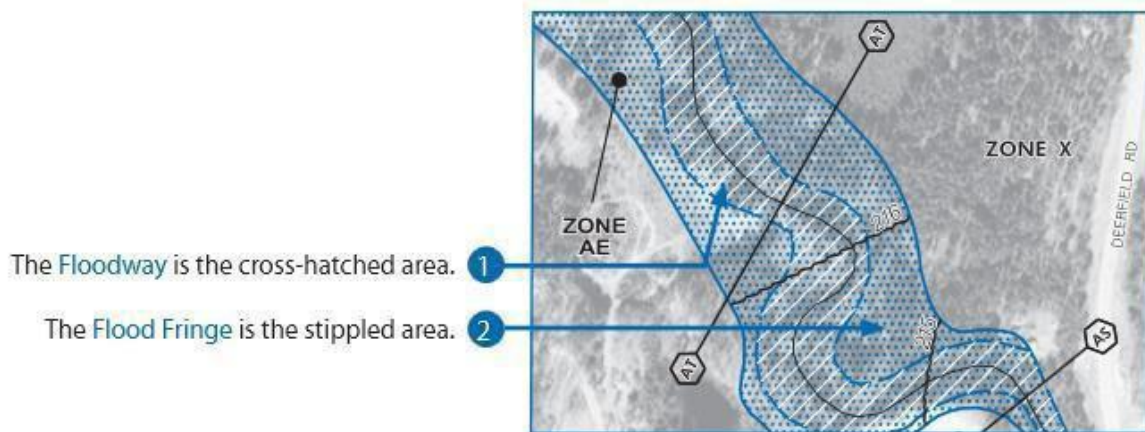


Figure 11-2. Special Flood Hazard Area.
(Source: SCDNR)

11.3 Floodplain Development

Before construction or development begins within the SFHA, a building permit shall be attained by first submitting the application forms furnished by the Community Development Department. If the application or the construction documents indicate construction or development within the SFHA, the applicant shall be referred to the Lexington County Floodplain Manager within the Community Development Department for further consultation.

The Lexington County Floodplain Manager will inform the applicant of the floodplain regulations and provide guidance on residential and commercial construction within the SFHA (see Appendix F). In addition to the building permit application, the Lexington County Floodplain Manager may require:



1. Plans drawn to scale (including dimensions) showing the nature, location, and elevation of the area in question; existing and proposed structure locations; fill, storage, or materials site; flood-proofing measures; mean sea level elevation of lowest floor including basement or crawl space of proposed structures; location of the channel.
2. A plan view of the proposed development indicating external dimensions of structures, street or road finished grade elevations, well locations, individual sewage treatment and disposal sites, excavation and/or fill quantity estimates, and site plan and/or construction plans.
3. Specifications for flood-proofing, filling, excavating, grading, rip-rapping, storage of materials, and location of utilities.
4. A professional engineer or registered architect design calculations and certification that the proposed activity has been designed to be in compliance with these regulations.

Based upon the information provided, the applicant may be required to obtain a floodplain permit.

11.4 Floodplain Regulations

11.4.1 Development Standards within SFHA with Base Flood Elevations and Designated Floodways

Specific standards for development and/or land uses within the SFHA where base flood elevations are provided are detailed in Lexington County's Flood Damage Prevention Ordinance. Critical elements of these provisions include, but are not limited to, the following requirements:

1. New construction and substantial improvement of any residential structure (including manufactured homes) shall have the lowest floor elevated at least two (2) feet above the base flood elevation.
2. New construction and substantial improvement of any commercial, industrial, or non-residential structure (including manufactured structures) shall have the lowest floor elevated at least two (2) feet above the level of the base flood elevation. Non-residential structures may instead be floodproofed with the submittal of an engineer's certification that the techniques meet all FEMA requirements for floodproofing.
3. No basements are permitted.
4. If fill is placed for a building pad and the floodplain line is moved, the ground shall be sloped from the pad down to the 1% annual chance flood elevation over a distance of 10 or more horizontal feet.
5. Should solid foundation perimeter walls be used to elevate a structure, flood openings sufficient to automatically equalize hydrostatic flood forces shall be provided based on the following criteria:



- a. Provide a minimum of 2 openings on at least 2 separate walls having a total net area of not less than 1 square-inch for every 1 square-foot of enclosed area.
 - b. The bottom of openings shall be no higher than 1 foot above grade.
 - c. Openings may be equipped with screens, louvers, valves, or other covering devices that permit the automatic flow of floodwater in both directions, provided they cannot be closed at any time.
6. Electrical, ventilation, plumbing, heating and air conditioning equipment (including ductwork), and other service facilities shall be designed and/or located at least 2 feet above the base flood elevation. This requirement does not preclude the installation of outdoor faucets for shower heads, sinks, hoses, etc., as long as cut off devices and back flow devices are installed to prevent contamination to the service components and thereby minimize any flood damages to the building.
 7. Fuel storage tanks located below the base flood elevation must be secured against flotation and lateral movement. This can be accomplished by anchoring the tank with tie down straps or anchor bolts onto a concrete slab or counterweight.
 8. Non-residential structures may be flood-proofed in lieu of elevation provided that all areas of the structure below the required elevation are watertight with walls substantially impermeable to the passage of water, using structural components having the capability of resisting hydrostatic and hydrodynamic loads and the effect of buoyancy. A registered, professional engineer shall certify that the standards of this subsection are satisfied.
 9. All critical type developments shall be elevated to the 0.2%-annual chance flood (formerly called the 500 year flood) elevation or be elevated to the highest known historical flood elevation (where records are available), whichever is greater. Critical type developments are defined in Lexington County's Flood Damage Prevention Ordinance. If no data exists establishing the 0.2%-annual chance flood elevation or the highest known historical flood elevation, the applicant shall provide a hydrologic and hydraulic engineering analysis that generates the 0.2%-annual chance flood elevation data.

11.4.2 Development Standards within SFHA without Base Flood Elevations and Designated Floodways

Specific standards for development and/or land uses within the SFHA without established base flood elevations and designated floodways are provided and detailed in Lexington County's Flood Damage Prevention Ordinance. Highlights of these provisions include the following requirements:

1. The applicant shall provide a hydrologic and hydraulic engineering analysis, in accordance with the FEMA map revision submittal process (See Section 11.6.2), that generates base flood elevations and designated floodways for all subdivision proposals and other proposed developments containing at least 50 lots or 5 acres, whichever is less. As each development is affected by a wide array of extenuating circumstances, the final decision for the scope of the flood study will be made by the County Floodplain Manager.



- a. If the site is less than 1,000 feet to the downstream detailed study area, then BFE and floodway must be established within the subject property and to the limits of the detailed study.
 - b. If the site is greater than 1,000 feet, but less than 3,000 feet from a downstream detailed study area, then BFEs must be established to the limits of the detailed study area and a floodway must be established within the subject property, only.
 - c. If the site is greater than 3,000 feet from a detailed study area, then BFEs and a floodway must be established within the subject property, only.
 - d. All floodway delineations that are created when converting an Approximate Zone (A) area to a detailed study area (AE) will be based on maximum 0.5 foot surcharge.
 - e. All floodway delineations that are created when converting an Approximate Zone (A) area to a detailed study area (AE) and that are located within new development may be deeded to a Homeowners or Property Owners Association, placed into a conservation easement, or the landowner may retain ownership of the delineated floodway provided there are deed restrictions filed that prohibit any activities or disturbance not in accordance with this chapter.
 - f. If the areas of special flood hazard are identified as an area of open space and is dedicated as such on the final plat, then a hydrologic and hydraulic engineering analysis that generates base flood elevations for the subdivision proposal would not be required.
2. If the provisions noted above are satisfied, all new construction and substantial improvements shall comply with all applicable flood hazard reduction provisions and shall be elevated or flood proofed in accordance with the elevations established.
 3. No encroachments, including fill, new construction, substantial improvements or new development shall be permitted within 50 feet of the stream bank unless certification with supporting technical data by a registered, professional engineer is provided demonstrating that such encroachments shall not result in any increase in flood levels during the occurrence of the base flood discharge.

11.4.3 Development Standards within SHFA with Base Flood Elevations but without Designated Floodways

Specific standards for development and/or land uses within the SFHA with established baseflood elevations but without designated floodways are provided and detailed in Lexington County's Flood Damage Prevention Ordinance. Highlights of these provisions include the following requirements:

1. No encroachments, including fill, new construction, substantial improvements or new development shall be permitted within 50 feet of the stream bank unless certification with supporting technical data by a registered, professional engineer is provided demonstrating that such encroachments shall not result in any increase in flood levels during the occurrence of the base flood discharge.
2. If the provision noted above is satisfied, all new construction and substantial improvements shall comply with all applicable flood hazard reduction provisions.



11.4.4 Development Standards within Designated and Undesignated Floodways

Located within areas of special flood hazard are areas designated as floodways. The floodway is an extremely hazardous area due to the velocity of floodwaters that carry debris and potential projectiles. These areas have a high erosion potential and may not be shown on the Flood Insurance Rate Map. Specific standards for development and/or land uses within designated floodways are provided and detailed in Lexington County's Flood Damage Prevention Ordinance. Highlights of these provisions include the following requirements:

1. No encroachments, including fill, new construction, substantial improvements, or other development shall be permitted in the floodway. Floodways may or may not be shown on the Flood Insurance Rate Maps (FIRM). The following types of development may be allowed in the floodway with the proper documentation and permitting:
 - a. Functionally dependent water use facilities which must be located in close proximity to water in order to perform its intended purpose. These may include but not limited to: wastewater treatment facilities and water treatment plants. It must be demonstrated that no alternatives are available, and a no-rise certification from an engineer must be submitted and approved by the floodplain manager. The floodplain manager may request FEMA review and acceptance of the no-rise certification.
 - b. Roadway crossings may be allowed with a no rise certification.
 - c. Temporary stream crossings may be allowed as follows:
 - i. For timber harvesting operations, the Forestry Best Management Practices (BMP) manual shall be followed.
 - ii. All other development types shall be allowed as permitted by the U.S. Army Corps of Engineers (USACE) and in accordance this manual.
2. Permissible uses within floodways may include: general farming, pasture, outdoor plant nurseries, horticulture, forestry, wildlife sanctuary, game farm, and other similar agricultural, wildlife, and related uses. Also, lawns, gardens, play areas, picnic grounds, and hiking and horseback riding trails are acceptable uses, provided that they do not include structures or fill. Development of a permissible use may require a no-rise certification. The uses listed in this subsection are permissible only if and to the extent that they do not cause any increase in base flood elevations or changes to the floodway configuration.
3. All floodway delineations that are created when converting an Approximate Zone (A) area to a detailed study area (AE) will be based on maximum 0.5 foot surcharge.

11.4.5 Development Standards outside the SFHA

Encroachment upon all natural channels, creeks or rivers draining more than 300 acres and the adjacent overflow land shall be avoided as much as possible. All unavoidable improvements such



as culverts or bridges along these channels shall be designed to carry a flow resulting from 1%-annual chance storm event. If there are no detailed flood studies with base flood elevations available in these areas, the applicant shall provide a detailed flood study delineating the 1%-annual chance floodplain and floodway and show it on the engineering plans and final plat if applicable.

11.5 Damage to Structures in the Floodplain

Every effort is made to prevent or reduce impacts from disasters to new structures built based upon the current floodplain standards and building codes. However, development that predated current regulations and/or current flood mapping may be subject to flooding and damage. If a structure is located within a SFHA and is damaged by any disaster (not just flooding), the following procedures must be followed to repair the damage or reconstruct the structure:

1. The County Floodplain Manager or Community Development Department must be notified of any damages to the structure prior to initiating the repairs or reconstruction.
2. Once notified, the County will perform a damage assessment of the structure to determine the extent of damage. This assessment will be based upon the structure only (not the land), the market value before the damage occurred, and the anticipated repairs/reconstruction costs.
3. The County will also review building permit records for the previous 5 year period to determine the cumulative damages and improvements to the structure (called “cumulative damages”).
4. After the damage assessment and cumulative damages research have been completed, the County will notify the property owner of the options for repair/reconstruction.
 - a. Properties that have cumulative damages/improvements of 50% or greater are considered substantially damaged and may obtain a building permit only if the repairs/reconstruction meet the criteria established in the current floodplain ordinance.
 - b. Properties that the County has determined to have between 35% and 50% cumulative damage/improvement must submit a contractor's itemized quote to complete the repairs/reconstruction.
 - i. If the cumulative damage with the contractor's quote is 50% or greater, the structure is considered substantially damaged, and a building permit may be obtained only if the repairs/reconstruction meet the criteria established in the current floodplain ordinance.
 - ii. If the cumulative damage with the contractor's quote is less than 50%, a floodplain permit will be issued and building permits may be obtained for repair/reconstruction without bringing it into compliance with the current



floodplain ordinance. Flood proofing and flood prevention construction techniques should be strongly considered with repairs/reconstruction.

5. Properties that have cumulative damages/improvements of less than 35% will be issued a floodplain permit, and building permits may be obtained for repair/reconstruction without bringing it into compliance with the current floodplain ordinance. Flood proofing and flood prevention construction techniques should be strongly considered with repairs/reconstruction.
6. If an owner disagrees with the County's damage assessment or cumulative damages, an appeal may be filed. See section 11.8 for more information on appeals.

11.6 Floodplain Modeling

11.6.1 Hydraulic Analysis

Floodplain modeling may be required to demonstrate that a proposed development project does not impact the floodway or cause an unacceptable flow depth or condition. The standard program for computing water surface profiles is the U.S. Army Corps of Engineers (USACE) Hydrologic Engineering Center's River Analysis System (HEC-RAS). This program supersedes the USACE's HEC-2 program which was widely used in the preparation of Flood Insurance Studies. FEMA has adopted the guidance that hydraulic analyses should be conducted using HEC-RAS instead of HEC-2. Additional models meeting the minimum requirement of the NFIP can be found on FEMA's website.

11.6.2 Dam Breach Analysis

Within Lexington County, any development impacted by a dam requires a dam breach analysis with the subsequent inundation zones determined by a dam breach hydrograph and flood routings. The dam breach analysis method shall be the "sunny day" failure scenario for complete dam failure while the impoundment level is at the principal spillway crest. The scope of the study area shall be defined as the length of conveyance needed for the volume held by the dam to reach its natural state. The potential need for a dam breach analysis should be identified by the appropriate County staff at pre-development meeting. The study area shall be consistent with parameters included in Sections 3.9.3, 3.9.4, and 3.9.5 of the LDM or an agreed upon area by the design engineer and appropriate County staff. The dam breach hydrograph must be developed using BREACH, HEC-HMS or HEC-RAS (unsteady flow), DAMBRK software programs, or an approved equal. Flood routings must be performed using HEC-RAS (unsteady flow), FLDWAV and DAMBRK. The applicant shall be responsible for determining the dam breach parameters so a breach outflow hydrograph can be developed and that resultant hydrograph routed downstream through the area of new development.

The dam breach inundation zones within the new development will be treated as floodways under the Lexington County Stormwater Management Ordinance and all development in these areas must meet the criteria established for development in a floodway and a floodplain. Each downstream development will have to be determined on a case-by-case basis by the Lexington County Floodplain Manager and/or the Plan Review Engineer. A preliminary breach routing analysis may be required to determine if the development will be effected by the breach.



11.7 Revisions to Mapped Floodplain and Floodway

11.7.1 Development Proposals

All development proposals that modify the FEMA designated floodplains and floodways are required to submit a map revision request to FEMA. These development proposals include, but are not limited to:

1. Approved floodway encroachments, where allowed;
2. Fill sites to be used for the placement of proposed structures where the applicant desires to remove the site from the special flood hazard area;
3. Alteration of watercourses that result in a relocation or elimination of the special flood hazard area, including the placement of culverts;
4. Subdivision or large scale development proposals requiring the establishment of base flood elevations.

Depending on the type and extent of proposed modifications, the applicant can submit a request for one or more of the following FEMA map revisions:

1. Conditional Letter of Map Amendment (CLOMA) – A letter from FEMA stating that a proposed structure that is not to be elevated by fill would not be inundated by the base flood if built as proposed. (FEMA Form MT-1)
2. Letter of Map Amendment (LOMA) – A letter from FEMA stating that an existing structure or parcel of land that has not been elevated by fill would not be inundated by the base flood. The LOMA is used to amend the effective flood map by letter and establishes a property's location in relation to the SFHA based on detailed elevation surveying and/or topographic mapping of natural conditions. (FEMA Form MT-1)
3. Conditional Letter of Map Revision based on Fill (CLOMR-F) – A letter from FEMA stating that a parcel of land or proposed structure that is to be elevated by fill would not be inundated by the base flood if fill is placed on the parcel as proposed or the structure is built as proposed. FEMA can determine whether the proposed fill would be sufficient to elevate and remove the desired structures or areas from the floodplain. Once FEMA approves the CLOMR-F, and the fill is constructed, a follow-up LOMR-F would be submitted to FEMA. The LOMR-F contains as-built information and elevations, which should be consistent with the grading shown in the initial CLOMR-F submittal. (FEMA Form MT-1)
4. Letter of Map Revision based on Fill (LOMR-F) – A letter from FEMA stating that an existing structure or parcel of land that has been elevated by fill would not be inundated by the base flood. When fill has been placed on the property to raise the lot or building site to an elevation that is above the BFE, FEMA can revise the FIRM by letter to remove the



raised area from the SFHA. This is a man-made change to the floodplain. (FEMA Form MT-1)

5. Conditional Letter of Map Revision (CLOMR) – A letter from FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision or proposed hydrology changes. The CLOMR is FEMA’s comment on a proposed project that would affect the hydrologic or hydraulic characteristics of a flooding source and thus result in the modification of the existing regulatory floodway, base flood elevations, or limits of the Special Flood Hazard Area. The Lexington County Floodplain Manager may also require processing of a CLOMR for other projects when it is important to ensure that the Special Flood Hazard Area will be revised, based on a proposed project or the use of better data. (FEMA Form MT-2)
6. Letter of Map Revision (LOMR) – A letter from FEMA officially revising the current NFIP map to show changes to floodplains, floodways, or flood elevations. (FEMA form MT-2)

Note that more information on the process for revising or modifying maps as well as all of the referenced FEMA forms can be found on FEMA’s website.

11.7.2 Submittal Process for Development Proposals

The applicant submitting the development proposal is required to fill out and submit to FEMA the appropriate map revision forms and is responsible for the associated review/processing fee. Application forms, instructions, and certificates can be downloaded from the FEMA website.

Application forms and certificates must also be submitted to Lexington County as part of the plans review process prior to submittal to FEMA. The following list summarizes the FEMA map revision submittal process.

1. A CLOMA, CLOMR-F, or CLOMR report shall be submitted to Lexington County for review and comment. The Conditional Letter of Map Revision (CLOMR) shall be prepared by the applicant for:
 - a. Proposed floodway encroachments that would result in any increase in the base flood elevation; and
 - b. Proposed development which increases the base flood elevation by more than 0.5 foot in areas where FEMA has provided base flood elevations but no floodway.
2. Once the application has been reviewed by Lexington County, the applicant shall submit the conditional map revision request report to FEMA along with the required FEMA review/processing fee and forms.
3. Once the application has been reviewed and approved by FEMA, a CLOMA, CLOMR-F, or CLOMR will be issued by FEMA for the proposed project.



4. The applicant shall design and construct the necessary drainage improvement facilities and prepare “as-built” drawings. It is the responsibility of the applicant to have technical data and as-built drawings prepared in a format required for a Letter of Map Revision, and submitted to FEMA within ninety (90) days of completion of construction. Submittal and processing fees for these map revisions shall also be the responsibility of the applicant.
5. In order to insure the project is built in compliance with the CLOMA, CLOMR-F, or CLOMR, the applicant must provide a Map Revision agreement for 100% of the costs to obtain the LOMR.
6. Repeat steps “1” though “3” to obtain a LOMA, LOMR-F or LOMR from FEMA to officially remove the property from the FEMASFHA.

Floodplain development proposals approved by the Lexington County Floodplain Manager shall be conditioned upon the applicant obtaining a Letter of Map Revision from FEMA for any development proposal that modifies the FEMA designated floodplains and floodways.

11.7.3 Floodplain Studies

All floodplain studies shall follow the guidelines and procedures as set forth by the National Flood Insurance Program (NFIP) and Lexington County. The general criteria and requirements have been established to help clarify the procedures related to performing floodplain studies in Lexington County are as follows:

1. The project must be consistent with applicable State and Federal regulations.
2. A professional engineer registered in the State of South Carolina shall prepare all studies.
3. All hydraulic computer models acceptable by FEMA for use in floodplain studies can be used.
4. The floodplain analysis shall include the 10-, 50-, 100-, and 500-year, 24-hour storm events.
5. All floodway delineations that are created when converting an Approximate Zone (A) area to a detailed study area (AE) will be based on maximum 0.5 foot surcharge.
6. Backwater conditions, local obstructions, bridges, culverts, and stormwater conveyance systems shall be considered.
7. Digital data shall have the following characteristics:
 - a. Horizontal datum: NAD83 (1986) or referenced to the datum contained on the current effective FIRM;
 - b. Coordinate system: UTM Zone 17;
 - c. Vertical datum: NAVD88; and
 - d. Units: international feet.



8. Data capture methods must result in new data meeting State and FEMA horizontal and vertical accuracy standards. See the current edition of FEMA's "Guidelines and Specifications for Study Contractors" for more information.
9. Calculated flood boundaries shall be submitted in a digital format that is compatible with Lexington County's GIS data.
10. Submitted information must include:
 - a. FIRM panel number(s) that cover the project area and their latest date(s) and whether any portion of the project lies within a Special Flood Hazard Area;
 - b. The application must be signed and stamped by a South Carolina Registered Engineer, Surveyor, or other qualified Federal Government employees and the applicant must sign the application;
 - c. 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; and
 - d. 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 FEMA's website or from the SCDNR website.

11.8 Appeals and Variances

As noted previously, the County must maintain compliance with the floodplain ordinance to be eligible for federally-backed flood insurance for Lexington County. The following sections outline the processes for filing appeals of and requesting variances from the floodplain ordinance. It also outlines the circumstances under which appeals and variances may be granted. Note that failure to follow FEMA's NFIP requirements may make disaster recovery funding unavailable for the County and make property owners in the County ineligible for flood insurance at reduced rates.

11.8.1 Appeals

Appeals of the decision of the Lexington County Floodplain Manager may be taken to the Planning Commission. The procedures and requirements for the filing of appeals and variance requests are set forth in Lexington County's Flood Damage Prevention Ordinance. In reviewing such applications, the Commission shall consider all technical evaluations, all relevant factors, all standards specified in other sections of this Manual and Ordinances and:

1. The danger that materials may be swept onto other lands to the injury of others;
2. The danger to life and property due to flooding or erosion damage, and the safety of access to the property in times of flood for ordinary and emergency vehicles;
3. The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner;



4. The importance of the services provided by the proposed facility to the community;
5. The necessity of the facility to a waterfront location, where applicable;
6. The availability of alternative locations, not subject to flooding or erosion damage, for the proposed use;
7. The compatibility of the proposed use with existing and anticipated development;
8. The relationship of the proposed use to the Lexington County Comprehensive Plan;
9. The expected heights, velocity, duration, rate of rise, and sediment transport of the floodwaters and the effects of wave action, if applicable, expected at the site;
10. The costs of providing governmental services during and after flood conditions including maintenance and repair of public utilities and facilities such as sewer, gas, electrical and water systems, and streets and bridges.

11.8.2 Appeal of Damage Assessment

If a property owner disagrees with the damage assessment or cumulative damages/improvement value for a structure after it has been damaged, the owner may file an appeal. The following steps outline the appeal process:

1. Submit to the County Floodplain Manager a signed, written estimate from a licensed contractor to repair all damages sustained in the disaster. The estimate must be itemized to address all damaged components and cannot be a “lump sum” estimate.
2. Submit a written estimate from your flood insurance adjuster.

These documents will be reviewed and assessed for final determination. The County will notify the landowner of the final determination and next steps.

11.8.3 Conditions for Variances

1. Variances may be issued for the repair or rehabilitation of historic structures upon the determination that the proposed repair or rehabilitation will not preclude the structure’s continued designation as a historic structure and the variance is the minimum necessary to preserve the historic character and design of the structure.
2. Variances may be issued to wet flood proof an agricultural structure in accordance with Technical Bulletin 7-93, Wet Flood proofing Requirements for Structures Located in Special Flood Hazard Areas in accordance with the National Flood Insurance Program.

3. Variances shall not be issued within any designated floodway if any increase in flood levels during the base flood discharge would result unless a CLOMR is obtained prior to issuance of the variance. In order to insure the project is built in compliance with the CLOMR for which the variance is granted the applicant must provide a Map Revision agreement for 100% of the costs to obtain the LOMR.
4. Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief.
5. Variances shall only be issued upon:
 - a. A showing of good and sufficient cause;
 - b. A determination that failure to grant the variance would result in exceptional hardship to the applicant; and
 - c. A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expenses, create nuisances, cause fraud on or victimization of the public, or conflict with existing local laws or ordinances.