Chatham County Stormwater Ordinance Draft
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ARTICLE 1: AUTHORITY AND PURPOSE

100 STATUTORY AUTHORITY

Chatham County is authorized to adopt the requirements of this Article pursuant to North Carolina law including, but not limited to, North Carolina General Statutes §§143-214.7, 153A-121 and 153A-454 and Session Law 2006-246.

101 FINDINGS OF FACT

Development and redevelopment alters the hydrologic response of local watersheds and increases stormwater runoff rates and volumes, flooding, soil erosion, stream channel erosion, non-point and point source pollution, and sediment transport and deposition, as well as reduces groundwater recharge. These changes in stormwater runoff contribute to increased quantities of water-borne pollutants and alterations in hydrology that are harmful to public health and safety as well as to the natural environment. These effects can be managed and minimized by applying proper design and well-planned controls to manage stormwater runoff from development sites.

Furthermore, the Federal Water Pollution Control Act of 1972 (Clean Water Act) and Federal Phase II Stormwater Rules promulgated under it, as well as rules of the North Carolina Environmental Management Commission promulgated in response to Federal Phase II requirements, compel certain urbanized areas to adopt minimum stormwater controls such as those included in this Ordinance.

102 STATEMENT OF PURPOSE

The purpose of these requirements is to protect public health, safety, and general welfare and enhance the environmental quality of the community by establishing minimum requirements and procedures to control the adverse effects of increased stormwater runoff and non-point and point source pollution associated with existing and new developments and redevelopments, as well as illicit discharges into any conveyance or any waters of the State. It has been determined that proper management of construction-related and post-development stormwater runoff will minimize damage to public and private property and infrastructure, safeguard public health, safety, and general welfare, and protect water and aquatic resources. These requirements establish stormwater management requirements and controls to prevent surface water quality degradation to the maximum extent practicable in the streams and lakes within the jurisdiction of Chatham County. This Ordinance seeks to meet this purpose by fulfilling the following objectives:

(1) Minimize the stormwater runoff from developed areas to the maximum extent practicable for the applicable design storm in order to reduce flooding, siltation, streambank erosion, and increases in stream

temperature and to maintain the integrity of stream channels and aquatic habitats.

(2) Minimize non-point and point source pollution caused by stormwater runoff from developed areas that would otherwise degrade local water quality. Minimize the total volume of surface water runoff that flows from any specific site during and following development in order to replicate natural hydrology to the maximum extent practicable through the use of structural and nonstructural stormwater management Best Management Practices (BMPs).

(3) Establish minimum post-development stormwater management standards and design criteria for the regulation and control of stormwater runoff quantity and quality.

(4) Establish, design, and review criteria for the construction, function, and use of structural stormwater BMPs that may be used to meet the current post-development stormwater management standards.

(5) Ensure that structural and nonstructural stormwater BMPs are properly maintained, and functioning as designed and pose no threat to public health or safety.

(6) Establish provisions for the long-term responsibility for and maintenance of structural and nonstructural stormwater BMPs to ensure that they continue to function as designed, are maintained appropriately, and pose no threat to public safety.

103 APPLICABILITY AND JURISDICTION

A. Applicable Lands

Beginning with and subsequent to its effective date, this ordinance shall apply to all of Chatham County except those areas located within incorporated municipalities and their extraterritorial jurisdiction, and is applicable to all development and redevelopment creating more than 20,000 square feet of land disturbing activity, unless exempt pursuant to subsection B of this Section.

No building, structure, or land shall be used, occupied, or altered and no building, structure, or part thereof shall be erected, constructed,

reconstructed, moved, enlarged, or structurally altered unless in conformity with all applicable provisions of this Ordinance and all other applicable regulations.

B. Exemptions to Applicability

All development and redevelopment is subject to the requirements of this Ordinance except development or redevelopment which fits into one or more of the following categories:

(1) Development or redevelopment of an individual lot for single-family residential use that is not part of a larger common plan of residential development or sale, and development or redevelopment of an individual lot for single-family residential use that is part of a larger common plan of residential development or sale as long as the developer of the subdivision has obtained the Stormwater Administrator's written approval of a Stormwater Management Plan that is based on expected conditions at full build-out of the subdivision. Owners of exempted single family residential lots are strongly encouraged to Implement the stormwater management guidelines for residential use in Appendix C.

(2) Development or redevelopment for single family residential use that disturbs 20,000 square feet or less. Development or redevelopment for a residential purpose that disturbs 20,000 square feet or less is not exempt if such activity is part of a larger common plan of development or sale that cumulatively disturbs more than 20,000 square feet, even though multiple, separate, or distinct activities take place at different times on different schedules.

(3) Any non-residential development or redevelopment use that cumulatively disturbs 20,000 square feet or less. Non-residential development or redevelopment that disturbs 20,000 square feet or less is not exempt if such activity is part of a larger common plan of development or sale that cumulatively disturbs more than 20,000 square feet, even though multiple, separate, or distinct activities take place at different times on different schedules.

(4) The following actities are exempt:

a. Agricultural land, forestland and horticultural land activities pursuant to NCGS 105-277.2.

b. Emergency operations essential to protect public health, safety and welfare.

(5) Any project for which the County has issued one or more of the following valid certificates or approvals prior to the effective date of this Ordinance:

a. Building Permit;
b. Land Disturbing Permit;
c. Conditional Use Permit;
d. Sketch, Preliminary or Final Subdivision Plat.

C. Compliance and Approval

No development or redevelopment subject to this Ordinance shall occur except in compliance with the requirements of this Ordinance and the provisions, conditions and limitations of the stormwater approval as set forth in Section 405.

D. Conflict of Laws

This Ordinance is not intended to modify or repeal any other ordinance, rule, regulation, or other provision of law. The requirements of this Ordinance are in addition to the requirements of any other ordinance, rule, regulation, or other provision of law. Where any provision of this ordinance imposes restrictions different from those imposed by any other ordinance, rule, regulation, or other provision of law, whichever provision is more restrictive or imposes higher protective standards for human or environmental health, safety, and welfare shall prevail.

ARTICLE 2: DEFINITIONS

i. TERMS DEFINED

Terms for this ordinance are also defined in the Erosion and Sedimentation Control Ordinance, Watershed Protection Ordinance and Subdivision Regulations and are incorporated into this Ordinance by reference. In addition, the following terms are defined or included in this ordinance.

Best Management Practices (BMPs) are schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States, BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. Stormwater BMPs can be classified as "structural" or "non-structural."

Structural BMPs are a physical device designed to trap, settle out, or filter pollutants from stormwater runoff; to alter or reduce stormwater runoff velocity, amount, timing, or other characteristics; to approximate the pre-development hydrology on a developed site; or to achieve any combination of these goals. Structural BMP includes physical practices such as constructed wetlands, vegetative practices, filter strips, grassed swales, and other methods installed or created on real property. “Structural BMP” is synonymous with “structural practice”, “stormwater control facility,” “stormwater control practice,” “stormwater treatment practice,” “stormwater management practice,” “stormwater control measures,” “structural stormwater treatment systems,” and similar terms used in this section.

Non-Structural BMPs are land use practices that maintain the natural hydrology of a property or project, such as limiting total disturbed area or impervious surfaces.

Development is any land disturbing activity which adds to or changes the amount of impervious or partially impervious cover on a land area or which otherwise decreases the infiltration of precipitation into the soil.

Land Disturbing Activity is any use of the land by any person for single family residential or a non-residential purpose, such as industrial, educational, institutional, or commercial development, highway and road construction and maintenance that results in a change in the natural or existing ground cover or topography and that may cause or contribute to sedimentation.

Low Impact Development (LID) practice is an innovative stormwater management approach with a basic principle to mimic natural hydrologic conditions by managing rainfall runoff close to the source, minimizing development impacts and disturbance, using existing site characteristics and

conditions and decentralized drainage and treatment systems. LID also incorporates design techniques that infiltrate, filter, store, reuse, evaporate, and/or detain runoff close to its source. LID practices include open space/natural space preservation, limited site disturbance, limited impervious surfaces, landscapes that also treat stormwater runoff, and innovative designs such as green roofs, streets and streetscapes, parking lots, sidewalks, lots, and medians. LID is a versatile approach that can be applied to new development, redevelopment, retrofits and other public and private improvement projects. Acceptable LID practices may be used in accordance with the design manuals and guidelines referenced by Chatham County.

Non-residential use for the purpose of this ordinance includes all uses other than single family residential use, including, but not limited to, condominiums, apartments, institutional, commercial, industrial, schools and parking lots.

Redevelopment includes all development that is proposed on previously developed land, regardless of whether it increases or decreases the total amount of impervious surface.

Stormwater Adminstrator is the Director of the Environmental Resources Division or his/her staff designee. The duties include the administration of the stormwater management program and overseeing the review and approval of stormwater management application submittals, performing site visits and providing technical assistance to the general public, developers and county staff and elected officials.

ARTICLE 3: ADMINISTRATION AND PROCEDURES

300 GENERAL

Chatham County will administer this Ordinance. The Environmental Resources Director or his designee shall serve as the Stormwater Administrator. In addition to the powers and duties that may be conferred, the Stormwater Administrator shall have the following powers and duties under this Ordinance:

(1) Review and approve or disapprove applications for approval of plans pursuant to the requirements of this Ordinance.

(2) Make determinations and render interpretations of the requirements of this Ordinance.

(3) Establish application requirements and schedules for submittal and review of applications and appeals and to review and approve applications.

(4) Enforce the provisions of this Ordinance in accordance with its enforcement provisions.

(5) Make records, maps, and official materials in relation to the adoption, amendment, enforcement, or administration of this Ordinance.

(6) Provide expertise and technical assistance to Chatham County.

(7) Carry out the technical duties outlined in this Ordinance. (The Stormwater Administrator may contract such services to another local government or private entity.)

(8) Designate other person(s) who shall carry out the powers and duties of the Stormwater Administrator, as appropriate and/or necessary.

(9) Take necessary actions to administer the provisions of this Ordinance.

ARTICLE 4: REQUIREMENTS

400 STORMWATER DESIGN STANDARDS

Design standards are established for the purpose of promoting sound development practices with respect to minimizing impacts from developed areas and are not intended to prohibit the use of innovative and alternative techniques that demonstrate the ability to successfully achieve the objectives of this Ordinance. Land development activities shall be performed in such a manner as to minimize the degradation of the receiving waters and protect existing developments. All activities subject to this Ordinance shall adhere to the following provisions for managing stormwater runoff. Subsection (5) below sets forth alternative design standards for certain types of development or redevelopment, including Minor Subdivisions, that can be met in lieu of the stormwater quality and/or quantity requirements in subsections (2) and (3).

(1) General

a. The Stormwater Management Plan to be prepared (see Section 403) shall be based on full build-out conditions for the proposed development or redevelopment.

b. Hydrologic analysis shall be performed in a manner using generally accepted engineering methods for analyzing rainfall to runoff responses by employing appropriate models and calculations. Appropriate methods include the Soil Conservation Service Curve Number and the Rational Method for total drainage areas of less than 200 acres. Other models and methods should produce results reproducible by the Stormwater Administrator and should receive prior verbal or written approval from the Stormwater Administrator before they are employed.

c. The rainfall data for Chatham County shall be the latest information from the National Oceanic and Atmospheric Administration (NOAA). (http://hdsc.nws.noaa.gov/hdsc/pfds/index.html). This information is continuously updated and will note the precipitation depths and intensities at any location in the County. Applicants shall download the latest information from NOAA and include copies with their stormwater calculations.

d. Hydraulic analysis shall be performed in a manner using generally accepted engineering methods for analyzing peak discharge rates in open channel and closed conduit conditions by employing appropriate models and calculations. Appropriate methods include Manning's Equation for free flowing systems and Energy Equation for pressurized systems. Other models and methods should produce results reproducible by the Stormwater Administrator and should receive prior

verbal or written approval from the Stormwater Administrator before they are employed.

e. Emergency overflow devices for water quantity detention BMPs are required and must be designed to safely convey the 50-year, 24-hour peak discharge while maintaining twelve inches of freeboard in the basin.

f. No one stormwater BMP device shall receive runoff from a drainage area greater than three acres. However, the total drainage area for BMPs used in series and for different treatment purposes may exceed this three-acre maximum.

g. The North Carolina General Statute 143-215.23 et seq. (the Dam Safety Law of 1967) and any subsequent revisions shall be adhered to when applicable.

h. Where practicable, stormwater management BMP facility design and location, shall be landscaped and integrated into the development and the surrounding community and serve as a community or development amenity. Fencing of BMPs for public health and safety purposes is allowed.

i. Temporary sediment and erosion control facilities used during construction may be converted to permanent stormwater management facilities after construction is completed and the project is sufficiently stabilized pursuant to the Chatham County Soil Erosion and Sedimentation Control Ordinance

(2) Stormwater Quality Systems

a. At a minimum effectively and efficiently capture, and treat the runoff volume produced from the 1-year, 1-hour storm event. (See Appendix A).
b. At a minimum remove 85% of the average annual Total Suspended Solids (TSS) from the development produced runoff.
c. Where any stormwater quality control measure utilizes a temporary water quality storage pool as a part of its designed treatment system the drawdown time shall be as close to 72-hours as reasonably possible; however, no less than 48 hours and no more than120 hours.

(3) Stormwater Quantity Systems

a. The post development peak flow discharged rates shall not exceed the pre-development peak discharge rates for all storms up to and including the 10-year, 24-hour event. Analysis of the 1-, 2-, 5-, and 10-

year, 24-hour storm events shall be submitted to confirm this requirement.

b. Additional peak discharge rate reduction may be required by the Stormwater Administrator where the capacity of the receiving system is limited and/or documented downstream flooding would be exacerbated by the minimum requirements.

(4) Stormwater Conveyance Systems

a. Stormwater conveyance systems, both public and private, including culverts, pipes, inlets, junctions, ditches, and swales shall be designed to minimally meet the guidelines outlined by the North Carolina Department of Transportation Hydraulics Unit.

b. Discharge velocities shall be non-erosive velocity flow from a structure, channel, outlet or other control measure for the 2-year, 24-hour design storm.

c. New stormwater conveyance systems shall be sized to accommodate all the runoff which would flow to the structure including, but not limited to, the following:

i) The runoff produced from all development and redevelopment activities within the site.

ii) The runoff produced from all new and existing roads within the site.

iii) The runoff produced off-site that cannot be diverted around the site.

d. New stormwater conveyance systems shall be checked by model or calculation to ensure all existing and proposed structures (eg: houses, buildings, etc.) on the property and adjacent to the property will be protected from flooding during the 50-year, 24-hour storm event and due to the proposed development.

(5) Alternative Design Standards

If it can be shown by detailed engineering calculations and analysis and approved by the Stormwater Administrator that a project meets one or more of the following criteria then the project shall be deemed to comply with the Article 400 subsections (2) and (3) stormwater quality and/or quantity requirements, as specified below. The requirements for stormwater conveyance systems in subsection (4) above shall still apply to any project that meets the stormwater quality and/or quantity requirements pursuant to an alternative design standard set forth in this subsection.

a. Redevelopment projects may meet the stormwater quality and quantity requirements of this ordinance by implementing one of the following options:
   i. Provide a 20% reduction in impervious surface area; or
   ii. Provide water quality measures for 30% of the total impervious area; or
   iii. Provide a combination of impervious area reduction and water quality measures equivalent to a 25% reduction in impervious surface area.

b. Development and redevelopment projects utilizing Low Impact Development (LID) may meet the stormwater quality requirements, Section 400 (2) of this Ordinance if such LID project cumulatively captures and treats the runoff volume from, at a minimum, the 1-year, 1-hour storm event and by substantially preventing it from exiting the development site via surface flow.

c. Development and redevelopment projects may meet the stormwater quantity requirements of this Ordinance by providing a detailed hydrological and hydraulic analysis of the watershed, including existing, proposed and future conditions, which demonstrates though validated scientific analysis that there is sufficient existing capacity in the receiving stream or drainage systems (no overtopping, surcharge, backwater, etc.). The recognized “10% rule” shall be used in this analysis. (Appendix D).

d. Development or redevelopment of a Minor Subdivision that cumulatively disturbs more than 20,000 square feet can also demonstrate compliance with this ordinance by: (i) either meeting the water quality requirements of Section 400(2) or ensuring that the stormwater management guidelines for residential use in Appendix C will be implemented at each individual lot, and (ii) ensuring that post development (gross development area) peak flow discharge rates do not exceed the pre-development peak discharge rates for the 2-year, 24-hour storm event by more than 10%, rounded up to the nearest whole number. If 10% is exceeded, detention for water quantity is required to meet that standard.

e. A combination of the above or other stormwater management methods that meets or exceeds the performance standards of this Ordinance and is appoved by the Stormwater Administrator.

Approval of one of the alternative design standards specified above to demonstrate compliance with stormwater quality and/or quantity requirements shall only be granted after a written request is submitted to the Stormwater Administrator by the applicant containing descriptions, drawings, engineering calculations, model input and output data and any other information that is necessary to sufficiently evaluate the proposed development or redevelopment. A separate written request shall be required if there are subsequent additions, extensions, or modifications which would alter the approved stormwater runoff characteristics of the development or redevelopment.

401 DESIGN MANUALS

Chatham County shall utilize the latest edition of the design manuals listed in the document entitled, "Stormwater Management Design Manuals for Chatham County, NC".

Stormwater management practices that are designed, constructed, or maintained in accordance with the Design Manuals approved by Chatham County are presumed to comply with these requirements. However, the Chatham County shall have the right to add, delete or modify design manuals and/or consult with engineers and duly qualified professionals and to impose any reasonable conditions or require any reasonable modifications deemed necessary to meet the purpose, intent, and requirements of this Ordinance.

402 RIPARIAN BUFFER REQUIREMENTS

All activities subject to the requirements if this ordinance must also comply with Section 304, Riparian Buffers, of the Chatham County Watershed Protection Ordinance.

403 STORMWATER APPROVAL, PLAN SUBMITTAL, AND REVIEW

A. Stormwater Approval

No person shall initiate any development or redevelopment activity which is subject to the requirements of this Ordinance, (other than activity subject to Appendix C above), without first being issued a written Stormwater Management Plan approval by the Stormwater Administrator.

All other required applications must be received and permits must be obtained prior to the start of the work. These may include, but are not limited to, the following:

Soil Erosion and Sedimentation Control; Flood Damage Prevention; Subdivision, Building Permits, and Inspections, other local regulations; NC Department of Transportation; NC Division of Water Quality; US Army Corps of Engineers; and NC DENR-Dam Safety.

A stormwater approval governs the design, installation, construction and maintenance of stormwater management and control practices on the site including structural BMPs and elements of site design for stormwater management other than structural BMPs.

B. Stormwater Management Plan

1. Content

The Stormwater Administrator shall establish requirements for the content and form of all Stormwater Management Plans and establish a submittal checklist.

At a minimum, the Stormwater Management Plan shall be a bound document and plan sheets describing in detailed narrative how post development stormwater runoff will be controlled and managed, the assumptions, site conditions and the design of all stormwater BMP facilities and practices, and how the proposed project will meet the requirements of this Ordinance. The Stormwater Management Plan shall be supported by the appropriate calculations, plan sheets, grading plans, planting plans and details and specifications.

The submittal shall include all of the information required in the submittal checklist established by the Stormwater Administrator.

2. Preparer

The Stormwater Management Plan shall be prepared and sealed by a qualified registered North Carolina professional engineer or landscape architect, and the professional shall perform services only in their area of competence. The professional shall verify that the design of all stormwater management facilities and practices meets the submittal requirements for complete applications, that the designs and plans are sufficient to comply with applicable standards and policies and that the designs and plans ensure compliance with the requirements of this Ordinance.

C. Review Fees

The County Board of Commissioners may adopt stormwater review fees applicable to the specific development or redevelopment. Additional fees

may be required for reviews that are contracted to another local government or private entity.

D. Schedule

The Stormwater Administrator shall establish a submission and review schedule for applications. The schedule shall establish deadlines by which complete applications must be submitted for the purpose of ensuring that there is adequate time to review applications and that the various stages in the review process are accommodated.

E. Submittal

The Stormwater Management Plan shall be submitted to the Stormwater Administrator pursuant to the policies of the County for development application submittals.

The Stormwater Management Plan shall be considered as submitted only when it contains all elements of a complete application pursuant to this Ordinance, along with the appropriate fee, if applicable. If the Stormwater Administrator finds that a Stormwater Management Plan is incomplete, the applicant shall be notified of the deficient elements and shall be provided with an opportunity to submit a complete Stormwater Management Plan.

F. Review

The Stormwater Administrator shall review the Stormwater Management Plan for completeness and determine whether the Stormwater Management Plan complies with the requirements of this Ordinance.

1. Approval

If the Stormwater Administrator finds that the Stormwater Management Plan complies with the requirements of this Ordinance, the Stormwater Administrator shall approve the Stormwater Management Plan. The Stormwater Administrator may impose conditions of approval as needed to ensure compliance with this Ordinance and other county ordinances. The conditions shall be included as part of the approval.

2. Failure to Comply

If the Stormwater Administrator finds that the Stormwater Management Plan fails to comply with the requirements of this Ordinance, the

Stormwater Administrator shall notify the applicant in writing with a disapproval letter and shall indicate how the Stormwater Management Plan fails to comply. The applicant shall have an opportunity to submit a revised Stormwater Management Plan.

3. Plan Revision and Subsequent Review

A complete revised Stormwater Management Plan shall be reviewed by the Stormwater Administrator after its re-submittal and shall be approved, approved with conditions, or disapproved. If a revised Stormwater Management Plan is not re-submitted within 90 calendar days from the date the applicant was notified by disapproval letter, the Stormwater Management Plan shall be considered withdrawn and a new submittal for the same or substantially the same project shall be required along with a fee (if applicable)for a new plan submittal.

4. Plan Pre-submittal Meeting

A pre-submittal meeting is encouraged but not required prior to the submittal of the Stormwater Management Plan. The purpose of this meeting option is to discuss the post construction stormwater management measures necessary for the proposed project, as well as to discuss and assess constraints, opportunities, and potential approaches to stormwater management designs before formal site design and engineering is commenced.

In preparation for the meeting and the plan submittal, the following information should be included; at least two weeks in advance of a scheduled meeting:

(1) Existing conditions / proposed site plans and grading plans.
(2) Basins, sub-basins and drainage networks existing and proposed.
(3) Environmental conditions such as natural resource areas including but not limited to soils, landcover, wetlands, floodplains, steep slopes, identified wildlife habitat areas, etc.
(4) Proposed stormwater management systems and BMP features for the proposed development.

404 VARIANCES

Any person may petition Chatham County for a variance granting permission to use the person's land in a manner otherwise prohibited by this Ordinance. To qualify for a variance, the petitioner must show all of the following:

(1) Unnecessary hardships would result from strict application of the requirements of this Ordinance.

(2) The hardships resulting from conditions that are peculiar to the property, such as the location, size, or topography of the property.

(3) The hardships did not result from actions taken by the petitioner.

(4) The requested variance is consistent with the spirit, purpose, and intent of this Ordinance; will secure public safety and welfare; and will preserve substantial justice.

Chatham County may impose reasonable and appropriate conditions and safeguards upon any variance it grants. Additional fees may be required for the technical evaluation of variances that are contracted to another local government or private entity.

405 AS-BUILT AND FINAL PLAT APPROVAL

A. As-Built Requirements

Upon completion of a project or before a certificate of compliance/occupancy shall be granted, the applicant shall certify that the completed project is in accordance with the approved stormwater management plans and designs and shall submit actual "as-built" plans for all stormwater management measures after final construction is completed.

The "as-built" plans shall show the final, (field located by survey), design location for all stormwater management facilities and practices including the field location, size, depth, elevations and planted vegetation of all measures, controls, and devices, as installed. The "as-built" plans shall certify, under seal, by a qualified registered North Carolina professional engineer or professional land surveyor, that the constructed stormwater measures, controls, and devices are substantially located in accordance with the approved stormwater management plan. A final inspection and approval by the Stormwater Administrator may occur.

B. Final Plat Requirements

The exact boundary of all stormwater management BMPs shall be shown on final plats prepared by a professional land surveyor. These plats shall contain the following statement: "This plat contains a stormwater management measure that must be maintained in accordance with the recorded Covenant or Operations and Maintenance Agreement."

C. Stormwater Easements

Stormwater Easements shall be noted on the appropriate final plan sheet(s) and on the final recorded plat. Unless specifically designated as being "Public" the Stormwater Easement and the facilities they protect are considered to be private, with the sole responsibility of the owner to provide for all required maintenance and operations as approved by the Stormwater Administrator. Any proposed County-owned public stormwater easements must be accepted by the county before being designated as being “Public”.

i. All infrastructures not located within a road right of way and used for the collection, conveyance, storage, and/or treatment of stormwater shall be placed in a “Stormwater Easement”, and shall be reserved from any development which would obstruct or constrict the effective conveyance and control of stormwater from or across the property, other than the approved design and operation functions.

ii. The size of the Stormwater Easement shall be sufficient to allow access of equipment to the BMP and drainage infrastructure for maintenance and repairs from a public right of way. The minimum width of the Stormwater Easement shall be sufficient to encompass the infrastructure and, plus an additional ten feet on either side.

Maintenance access to the Stormwater Easement from a public right of way must be provided and shown on the plans and final plat.

406 FLOODPLAIN REQUIREMENTS

All activities subject to the requirements if this ordinance shall be in compliance with the Chatham County Flood Damage Prevention Ordinance where applicable.

ARTICLE 5: MAINTENANCE AND INSPECTIONS

500 OPERATIONS AND MAINTENANCE AGREEMENT

A. Private Development

Prior to the conveyance or transfer of any private lot or building site to be served by a structural BMP pursuant to this Ordinance and prior to issuance of any permit for development or redevelopment requiring a structural BMP pursuant to this Ordinance, the applicant or owner of the site must execute an operation and maintenance agreement that shall be binding on all subsequent owners of the site, portions of the site, and lots or parcels served by the structural BMP. Until the transference of all property, sites, or lots served by the structural BMP, the original owner or applicant shall have primary responsibility for carrying out the provisions of the maintenance agreement.

B. Public Development

BMPs that are constructed on public land within public rights-of-way and/or within public easements shall be maintained by the public body with ownership or jurisdiction of the subject property. The appropriate encroachment permits, easements and maintenance agreements shall be obtained prior to beginning construction.

C. Agreement Requirements

The operation and maintenance agreement shall require the owner or owners to maintain, repair, and, if necessary, reconstruct the structural BMP and shall state the terms, conditions, and schedule of maintenance for the structural BMP. In addition, it shall grant Chatham County a right of entry in the event that the Stormwater Administrator has reason to believe it has become necessary to inspect, monitor, maintain, repair, or reconstruct the structural BMP. However, in no case shall the right of entry, of itself, confer an obligation on Chatham County to assume responsibility for the structural BMP.

The operation and maintenance agreement must be approved by the Stormwater Administrator prior to plan approval and it shall be referenced on the final plat and shall be recorded with the County Register of Deeds upon final plat approval. A copy of the recorded operations and maintenance agreement shall be given to the Stormwater Administrator following its recordation.

D. Construction of Stormwater Management BMPs and Drainage Infrastructure

Stormwater management BMPs and infrastructure shall be constructed in accordance with approved plans and maintained in proper working condition. The applicant/ property owner is responsible for ensuring that the construction of drainage structures and stormwater management measures are completed in accordance with the approved plan and specifications.

Inspections which may be performed by Chatham County during construction will not relieve the developer of the responsibility to install stormwater management and drainage facilities in accordance with the approved plan.

Revisions which affect the intent of the design or the capacity of the system shall require prior written approval by the Stormwater Administrator.

501 INSPECTIONS

A. Function of BMP as Intended

The owner of each structural BMP installed pursuant to this Ordinance shall maintain and operate the BMP so as to preserve and continue its function in controlling stormwater quality and quantity at the degree or amount of function for which the structural BMP was designed.

B. Right of Entry for Inspection

When any new BMP is installed on private property, the property owner shall grant to the Stormwater Administrator the right to enter the property at reasonable times and in a reasonable manner for the purpose of inspection.

Inspections may be conducted by the Stormwater Administrator on any reasonable basis including, but not limited to: routine inspections of BMPs; random inspections of BMPs or conveyance; inspections based upon complaints or other notice of possible violations; inspections of drainage basins or areas identified as higher than typical sources of sediment or other contaminants or pollutants; inspections of businesses or properties associated with the possible illicit discharge of contaminants or pollutants; or which may cause violations of state or federal water quality standards; and joint inspections with other agencies inspecting under environmental and safety laws. Inspections may include, but are not limited to: reviewing maintenance and repair records; sampling discharges, surface water, groundwater, soils and/or material or water in BMPs; and evaluating the condition of BMPs and stormwater management practices.

C. Periodic Inspections

Inspections shall be conducted as prescribed by the operations and maintenance agreement. The person responsible for maintenance of any structural BMP installed pursuant to this Ordinance shall submit to the Stormwater Administrator an inspection report from one of the following persons performing services only in their area of competence: a qualified registered professional engineer, licensed in the State of North Carolina; a registered landscape architect or a professional or technician certified by the North Carolina Cooperative Extension Service or the North Carolina Division of Water Quality for stormwater treatment practice inspection and maintenance.

The inspection report shall minimally contain the following:

(1) The name and address of the land owner.

(2) The recorded book and page number of the lot of each structural BMP.

(3) A statement that an inspection was made of all structural BMPs.

(4) The date the inspection was made.

(5) A statement that all inspected structural BMPs are performing properly and are in compliance with the terms and conditions of the approved maintenance agreement required by this ordinance.

(6) Signature and seal of a registered engineer, landscape architect, or person certified by the North Carolina Cooperative Extension Service or North Carolina Department of Water Quality for stormwater treatment practice inspection and maintenance.

All inspection report may be provided by the Stormwater Administrator. An initial inspection report shall be provided to the Stormwater Administrator with the as-built certification. In the first year, quarterly reports shall be submitted to ensure the BMP(s) are functioning properly. Thereafter, unless otherwise directed by the Stormwater Administrator, annual reports shall be submitted within thirty days of the date on the as-built certification.

ARTICLE 6: ENFORCEMENT AND VIOLATIONS

600 GENERAL

The requirements of this Ordinance shall be enforced by the Stormwater Administrator, his or her designee or any authorized agent of Chatham County.

601 CIVIL PENALTIES

Civil penalties may be imposed as follows:

(1) Any person who violates any of the provisions of this Ordinance, or rules and orders adopted or issued pursuant to this Ordinance, or who initiates or continues development or redevelopment for which a plan is required except in accordance with the terms, conditions, and provisions of an approved plan is subject to a civil penalty. Civil penalties may be assessed up to the full amount allowed by law.

(2) Each day of a continuing violation shall constitute a separate violation. Additional fees may be charged for remedies and enforcement of this Ordinance.

(3) No penalty shall be assessed until the applicant has been notified of the violation by registered or certified mail, return receipt requested, or other means reasonably calculated to give actual notice. The notice shall describe the violation with reasonable particularity, specify a reasonable time period within which the violation can be corrected, and warn that failure to correct the violation within the time period will result in the assessment of a civil penalty or other enforcement action.

(4) If the violation has not been corrected within the designated time period, a civil penalty may be assessed from the date the violation is detected.

(5) Refusal to accept the notice or failure to notify the Stormwater Administrator of a change of address shall not relieve the violator's obligation to pay such a penalty.

(6) The Stormwater Administrator or other authorized agent may implement the following enforcement actions until the applicant has taken the remedial measures set forth in the notice of violation and cured the violations described therein:

a. Issue a stop work order to the person(s) violating the requirements of this Ordinance. The stop work order shall remain in effect until the person has taken the remedial measures set forth in the notice of violation or has otherwise cured the violation or violations

described therein. The stop work order may be withdrawn or modified to enable the person to take the necessary remedial measures to cure such violation or violations.

b. Refuse to issue a certificate of occupancy for any building or other improvements constructed or being constructed on the site and served by the stormwater practices.

c. Disapprove or withhold subsequent permits and development applications.

d. Institute an action in a court of competent jurisdiction for a mandatory or prohibitory injunction and order of abatement to correct a violation of the requirements of this Ordinance. Any person violating this Ordinance shall be subject to the full range of equitable remedies provided in the General Statutes or at common law.

(7) It is unlawful for a property owner to fail to meet the requirements of the operations and maintenance agreement. Any person or association that fails to meet the requirements of the operations and maintenance agreement shall be subject to a civil penalty assessed by Chatham County up to the full amount of penalty allowed by law.

ARTICLE 7: ILLICIT DISCHARGES

700 GENERAL

A. Prohibited Discharges

No person shall cause or allow the discharge, emission, disposal, pouring, or pumping directly or indirectly to any stormwater conveyance, the waters of the State, or upon the land in manner and amount that the substance is likely to reach a stormwater conveyance or the waters of the State unless permitted by an NPDES Permit. Prohibited substances and discharges include, but are not limited to:

- Wastewater
- Greywater (such as from washing machines)
- Food waste
- Petrochemicals and Petroleum products such as oil, gasoline, diesel fuel
- Grease
- Household, industrial, and chemical waste
- Anti-freeze
- Animal waste
- Paints
- Paint wash water
- Commercial car washes
- Garbage
- Litter
- Chlorinated swimming pool discharges
- Leaves
- Grass clippings
- Dead plants
- Sediment/soil

B. Allowable Discharges

Non-stormwater discharges associated with the following activities are allowed provided that they do not significantly impact water quality:

- Drinking water line flushing
- Discharge from emergency fire fighting activities
- Irrigation water
- Diverted stream flows
- Uncontaminated ground water
- Uncontaminated pumped ground water
- Residential foundation/footing drains
- Air conditioning condensation

- Uncontaminated springs
- Water from crawl space pumps
- Individual non-commercial car washing operations
- Flows from riparian habitats and wetlands
- Street wash water
- Swimming pool discharges that have been through a de-chlorination process
- Other non-stormwater discharges for which a valid NPDES discharge permit has been authorized and issued by the U.S. Environmental Protection Agency or by the State of North Carolina, provided that any such discharges to the municipal separate storm sewer system shall be authorized by the Chatham County.

C. Illicit Connections

(1) Connections to a stormwater conveyance or stormwater conveyance system that allow the discharge of non-stormwater, other than the exclusions described in this Ordinance, are unlawful. Prohibited connections include, but are not limited to, industrial/commercial floor drains, waste water or sanitary sewers, wash water from commercial vehicle washing operations or steam cleaning operations, and waste water from septic systems.

(2) Where such connections exist in violation of this Ordinance and said connections were made prior to the adoption of this provision or any other ordinance prohibiting such connections, the property owner or the person using said connection shall remove the connection within one (1) year following the effective date of this Ordinance.

However, the one-year grace period shall not apply to connections which may result in the discharge of hazardous materials or other discharges which pose an immediate threat to health and safety or are likely to result in immediate injury and harm to real or personal property, natural resources, wildlife, or habitat. The one-year grace period shall also not apply to connections made in violation of any applicable regulation or code other than this Ordinance.

(3) The Stormwater Administrator shall designate the time period within which the connection shall be removed. In setting the time limit for compliance, the Stormwater Administrator shall take into consideration the quantity and complexity of the work, the consequences of delay, the potential harm to the environment, public health, and public and private property, and the cost of remedying the damage.

D. Spills and Accidental Discharges

In the case of accidental discharges, the responsible party shall immediately begin to collect and remove the discharge and restore all affected areas to

their original condition unless the material is considered to be hazardous. If considered as hazardous, the responsible party shall immediately notify the Chatham County of the accidental discharge including the location of the discharge, type of pollutant, volume or quantity discharges, time of discharge, and the corrective actions taken.

Notification shall not relieve any person of any expenses related to the restoration, loss, damage, or any other liability which may be incurred as a result of said spill or leak, nor shall such notification relieve any person from other liability which may be imposed by State or other law.

ARTICLE 8: STORMWATER UTILITY SERVICE FEE

800 GENERAL

A. Authority

Pursuant to N.C.G.S. Article 16 of Chapter 160A (public enterprise?), Chatham County is authorized to create a stormwater services utility and enterprise fund and, in so doing, establish a schedule of rents, rates, fees, charges, and penalties for the use of or the services furnished by such public enterprise.

B. Purpose

A stormwater services utility is an identified fiscal and accounting fund for the purpose of comprehensively addressing the stormwater management needs of Chatham County through programs designed to protect and manage water quality and quantity by controlling the level of pollutants, stormwater runoff, and the quantity and rate of stormwater received and conveyed by structural and natural stormwater and drainage systems of all types. It provides a schedule of rents, rates, fees, charges and penalties necessary to assure that all aspects of the stormwater program are managed in accordance with federal, state, and local laws, rules, and regulations.

The County Board of Commissioners may, by adopting a schedule of rents, rates, fees, charges, and penalties for the use of or the services furnished by a public enterprise, establish a stormwater service utility at any point in the future.

C. Jurisdiction

The boundaries and jurisdiction of the stormwater services utility shall extend to the Jurisdiction of Chatham County, including all areas hereafter annexed thereto.

APPENDIX A: CHATHAM COUNTY RAINFALL DISTRIBUTIONS

It has been determined that the rainfall totals and intensities for Pittsboro, NC are suitable for the entire County and as shall be used as the rainfall data for Chatham County. This information is from the current NOAA National Weather Service Precipitation Frequency Data Server (PFDS) for Pittsboro, NC (latitude 35.71, longitude -79.18)

This table can also be found at: http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html.

Chatham County Precipitation (inches)											
Duration		5 min	10 min	15 min	30 min	1 hr	2 hr	3 hr	6 hr	12 hr	24 hr
Frequency (yr)	1	0.42	0.67	0.84	1.15	1.43	1.69	1.80	2.15	2.55	2.96
	2	0.50	0.79	1.00	1.38	1.73	2.05	2.18	2.60	3.08	3.57
	5	0.57	0.92	1.16	1.65	2.12	2.54	2.71	3.24	3.85	4.47
	10	0.63	1.01	1.27	1.85	2.40	2.90	3.12	3.74	4.48	5.18
	25	0.69	1.10	1.40	2.07	2.76	3.37	3.65	4.41	5.33	6.13
	50	0.73	1.17	1.48	2.23	3.02	3.73	4.07	4.94	6.01	6.89
	100	0.77	1.23	1.55	2.37	3.27	4.08	4.49	5.48	6.72	7.67
	200	0.80	1.27	1.61	2.50	3.51	4.42	4.92	6.04	7.47	8.46
	500	0.84	1.33	1.67	2.66	3.81	4.87	5.49	6.79	8.50	9.56
	1000	0.86	1.36	1.71	2.77	4.04	5.21	5.93	7.39	9.34	10.43

Chatham County Rainfall Intensities (inches/hour)											
Duration		5 min	10 min	15 min	30 min	1 hr	2 hr	3 hr	6 hr	12 hr	24 hr
Frequency (yr)	1	5.04	4.02	3.36	2.30	1.43	0.85	0.60	0.36	0.21	0.12
	2	6.00	4.74	4.00	2.76	1.73	1.03	0.73	0.43	0.26	0.15
	5	6.84	5.52	4.64	3.30	2.12	1.27	0.90	0.54	0.32	0.19
	10	7.56	6.06	5.08	3.70	2.40	1.45	1.04	0.62	0.37	0.22
	25	8.28	6.60	5.60	4.14	2.76	1.69	1.22	0.74	0.44	0.26
	50	8.76	7.02	5.92	4.46	3.02	1.87	1.36	0.82	0.50	0.29
	100	9.24	7.38	6.20	4.74	3.27	2.04	1.50	0.91	0.56	0.32
	200	9.60	7.62	6.44	5.00	3.51	2.21	1.64	1.01	0.62	0.35
	500	10.08	7.98	6.68	5.32	3.81	2.44	1.83	1.13	0.71	0.40
	1000	10.32	8.16	6.84	5.54	4.04	2.61	1.98	1.23	0.78	0.43

APPENDIX B: CURVE NUMBERS AND RUNOFF COEFICIENTS

The tables below are the accepted values for Curve Numbers (CN) and Runoff Coefficients (C) in Chatham County for Hydrological Analysis. Other CN Tables may be used as deemed appropriate by the Stormwater Administrator:

CURVE NUMBERS FOR VARIOUS HYDROLOGICAL CONDITIONS

	Average % impervious area	Hydrologic Soil Group A	B	C	D
Pervious Areas:					
Parks, Golf Courses, Lawns, Cemeteries, etc.					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover 75% to 95%)		39	61	74	80
Very Good condition (grass cover > 95%)		30	55	70	77
Woods and Grass combination (parks, orchards and tree farms)					
Poor condition (ground cover sparse)		57	73	82	86
Fair condition (ground cover moderate)		43	65	76	82
Good condition (ground cover good)		32	58	72	79
Very Good condition (ground cover excelent)		28	53	69	76
National/State Forrest					
Poor condition (ground cover sparse; < 50%)		45	66	77	83
Fair condition (ground cover moderate; 50% to 75%)		36	60	73	79
Good condition (ground cover good; 75% to 95%)		30	55	70	77
Very Good condition (ground cover excelent; > 95%)		25	50	68	75
Impervious Areas:					
Paved parking lots, roofs, driveways, etc.		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding ROW)		98	98	98	98
Paved; curbs, storm sewers, sidewalks & grass plot (including ROW)		86	91	93	95
Paved; curbs, storm sewers, sidewalks & tree plot (including ROW)		82	88	91	92
Paved; open ditches (including ROW)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Urban Districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential Districts by average lot size:					
1/8 acre or less (town house)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing Urban Areas:					
Newly graded areas (pervious areas only)					
Poor condition (No vegetation, Bare Soil)		77	86	91	94
Fair condition (Sparse vegetation, Some ground cover)		76	85	90	93
Good condition (Established vegetation, ground cover good)		74	83	88	91
Very Good condition (ground cover excelent, Hydroseed, Flexterra)		68	79	85	88

note: some curve numbers are interpolated based on similar hydrological conditions and engineering judgment; JWH

													Grass				Tree			
													30	58	71	78	28	53	69	78
Total Width	ROW Width	# of Travel Lanes	Width of Travel Lanes	# of Parking Lanes	Width of Parking Lanes	# of Landscape Plots	Width of Landscape Plots	# of Sidewalks	Width of Sidewalks	One foot separation Edge of ROW	Impervious	pervious	A	B	C	D	A	B	C	D
40	40	2	11	0	6	2	5	2	4	0	30	10	81	88	91	93	81	87	91	93
50	50	2	12	1	6	2	5	2	5	0	40	10	84	90	93	94	84	89	92	94
60	60	2	12	2	8	2	5	2	5	0	50	10	87	91	94	95	86	91	93	94
70	70	3	13	1	8	2	5	2	6	1	59	11	87	92	94	95	87	91	93	95
80	80	3	13	2	8	2	6	2	6	1	67	13	87	92	94	95	87	91	93	94
90	90	4	12	2	8	2	6	2	7	0	78	12	89	93	94	95	89	92	94	95
100	100	5	12	2	8	2	6	2	6	0	88	12	90	93	95	96	90	93	95	95
110	110	5	13	2	8	2	7	2	7	1	95	15	89	93	94	95	88	92	94	95
120	120	5	13	2	8	2	10	2	9	1	99	21	86	91	93	95	86	90	93	94
													87	91	93	95	86	90	93	94

CURVE NUMBERS FOR VARIOUS HYDROLOGICAL CONDITIONS

	Average % impervious area	Hydrologic Soil Group A	B	C	D
Pervious Areas:					
Parks, Golf Courses, Lawns, Cemeteries, etc.					
Flat Slope (0% to 1%)		0.04 - 0.09	0.07 - 0.12	0.11 - 0.16	0.15 - 0.20
Average Slope (2% to 7%)		0.09 - 0.14	0.12 - 0.17	0.16 - 0.21	0.20 - 0.28
Steep Slopes (>8%)		0.14 - 0.18	0.17 -0.24	0.21 - 0.31	0.28 - 0.38
Woods and Grass combination (parks, orchards and tree farms)					
Poor condition (ground cover sparse)					
Fair condition (ground cover moderate)					
Good condition (ground cover good)					
Very Good condition (ground cover excelent)					
National/State Forrest					
Poor condition (ground cover sparse; < 50%)					
Fair condition (ground cover moderate; 50% to 75%)					
Good condition (ground cover good; 75% to 95%)					
Very Good condition (ground cover excelent; > 95%)					
Impervious Areas:					
Paved parking lots, roofs, driveways, etc.		0.95	0.95	0.95	0.95
Streets and roads:					
Paved; curbs and storm sewers (excluding ROW)					
Paved; curbs, storm sewers, sidewalks & grass plot (including ROW)					
Paved; curbs, storm sewers, sidewalks & tree plot (including ROW)					
Paved; open ditches (including ROW)					
Gravel (including right-of-way)					
Dirt (including right-of-way)					
Urban Districts:					
Commercial and business	85	0.81 - 0.84	0.82 - 0.85	0.83 - 0.86	0.84 - 0.87
Industrial	72	0.70 - 0.74	0.71 - 0.75	0.72 - 0.78	0.73 - 0.79
Residential Districts by average lot size:					
1/8 acre or less (town house)	65				
1/4 acre	38				
1/3 acre	30				
1/2 acre	25				
1 acre	20				
2 acres	12				
Developing Urban Areas:					
Newly graded areas (pervious areas only)					
Poor condition (No vegetation, Bare Soil)					
Fair condition (Sparse vegetation, Some ground cover)					
Good condition (Established vegetation, ground cover good)					
Very Good condition (ground cover excelent, Hydroseed, Flexterra)					

note: some curve numbers are interpolated based on similar hydrological conditions and engineering judgment; JWH

													Grass				Tree			
													80	58	71	78	28	53	69	76
Total Width	ROW Width	# of Travel Lanes	Width of Travel Lanes	# of Parking Lanes	Width of Parking Lanes	# of Landscape Plots	Width of Landscape Plots	# of Sidewalks	Width of Sidewalks	One foot separation Edge of ROW	Impervious	pervious	A	B	C	D	A	B	C	D
40	40	2	11	0	8	2	5	2	4	0	30	10	81	88	91	93	81	87	91	93
50	50	2	12	1	8	2	5	2	5	0	40	10	84	90	93	94	84	89	92	94
60	60	2	12	2	8	2	5	2	5	0	50	10	87	91	94	95	86	91	93	94
70	70	3	13	1	8	2	5	2	6	1	59	11	87	92	94	95	87	91	93	95
80	80	3	13	2	8	2	6	2	6	1	67	13	87	92	94	95	87	91	93	94
90	90	4	12	2	8	2	6	2	7	0	78	12	89	93	94	95	89	92	94	95
100	100	5	12	2	8	2	6	2	6	0	88	12	90	93	95	96	90	93	95	95
110	110	5	13	2	8	2	7	2	7	1	95	15	89	93	94	95	88	92	94	95
120	120	5	13	2	8	2	10	2	9	1	99	21	86	91	93	95	86	90	93	94
													87	91	93	95	86	90	93	94

APPENDIX C: SINGLE-FAMILY RESIDENTIAL LOT GUIDELINES FOR STORMWATER MANAGEMENT

The practices below are the recommended as guidelines for better lot design with regard to managing stormwater runoff from single-family residential uses. Chatham County encourages the use of one or more of these practices to reduce total runoff quantity and quality from a lot. It also serves to limit negative impacts to downstream or off-site property in terms of scour, sedimentation, flooding or other potential damages.

Single Family Residential Lots

At least one of the following design standards should be utilitzed in the development or redevelopment of an individual lot for a single family residence:

i. All roof downspouts shall discharge onto the surface of the natural ground at-least 25 feet from the property boundary and in accordance with all applicable Building Codes ;

ii. Collect the first ½" equivalent runoff volume from at-least 1/2 of the total roof area by connecting downspouts to operating rain barrels or cisterns;

iii. Driveways, walkways and patios shall consist of properly designed porous pavers or pavement;

iv. Driveways, walkways and patios shall drain into well maintained landscaped beds using native vegetation and amended soils.

APPENDIX D: THE 10% RULE

3.1.9 Calculating Downstream Impacts (the Ten Percent Rule)

In the Chatham County Stormwater Management Manual, the "ten-percent" rule has been adopted as the approach for ensuring that stormwater quantity detention ponds maintain pre-development peak flows through the downstream conveyance system.

The ten-percent rule recognizes the fact that a structural control providing detention has a "zone of influence" downstream where its effectiveness can be observed. Beyond this zone of influence the structural control becomes relatively small and insignificant compared to the runoff from the total drainage area at that point. Based on studies and master planning results for a large number of sites, that 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 is 100 acres or greater.

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

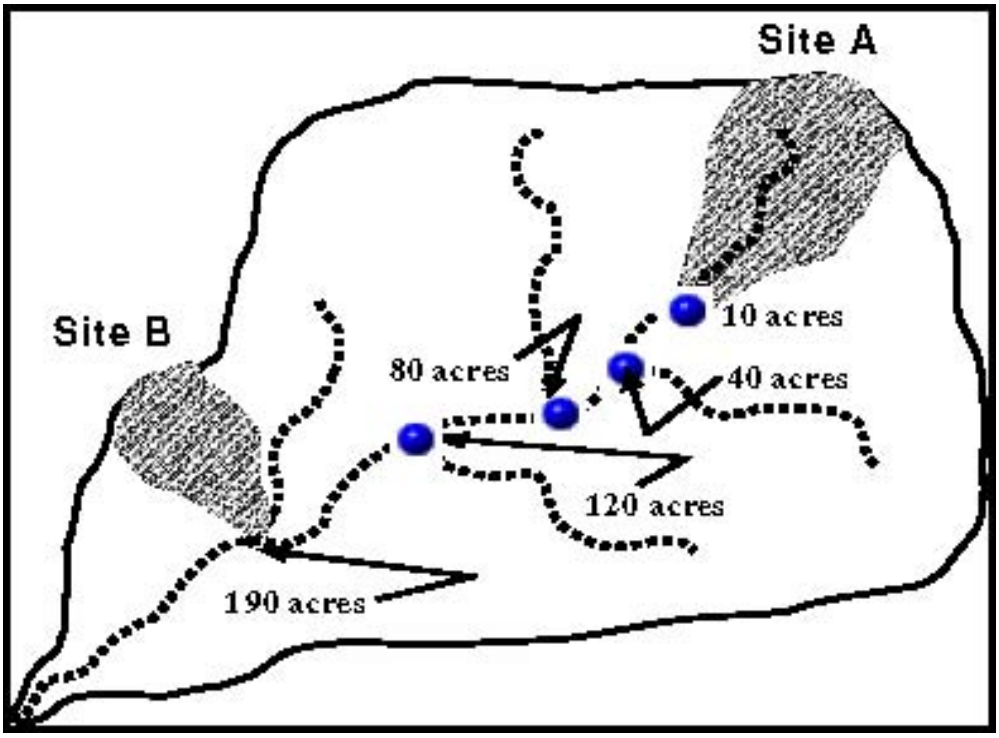
1. Using a topographic map determine the lower limit of the "zone of influence" (i.e., the 10% point), and determine all 10% rule comparison points (at the outlet of the site and at all downstream tributary junctions).

2. Using a hydrologic model determine the pre-development peak discharges (pre-Qp2, pre-Qp10, pre-Qp25, and pre-Qp100) and timing of those peaks at each tributary junction beginning at the pond outlet and ending at the next tributary junction beyond the 10% point.

3. Change the site land use to post-development conditions and determine the post-development peak discharges (post-Qp2, post-Qp10, post-Qp25, and post-Qp100). Design the structural control facility such that the post-development peak discharges from the site for all storm events do not increase the pre-development peak discharges at the outlet of the site and at each downstream tributary junction and each public or major private downstream stormwater conveyance structure located within the zone of influence.

4. If post-development conditions do increase the peak flow within the zone of influence, the structural control facility must be redesigned or one of the following options must be chosen:

    - Control of the Qp2, Qp10, Qp25, and/or Qp100 may be waived by the



Director of Engineering and Public Works (the Director) if adequate over bank flood protection and/or extreme flood protection is suitably provided by a downstream or shared off-site stormwater facility, or if engineering studies determine that installing the required stormwater facilities would not be in the best interest of Chatham County. However, a waiver of such controls does not eliminate the requirement to comply with the water quality and channel protection standards defined in the Ordinance and in this Stormwater Management Manual.

- The developer can coordinate with Chatham County Engineering (and other state/federal agencies as appropriate) to determine other acceptable approaches to reduce the peak discharges (and, therefore the flow elevation) through the channel (e.g., conveyance improvements) for all design storm events.
- The property owner can obtain a flow easement from downstream property owners through the zone of influence where the post-development peak discharges are higher than pre-development peak discharges.

Example 3-9.TenPercentRule Example

The figure below illustrates the concept of the ten-percent rule for two sites in a watershed.

Site A is a development of 10 acres, all draining to a wet ED stormwater pond. The over bank flooding and extreme flood portions of the design are going to incorporate the ten-percent rule. Looking downstream at each tributary in turn, it

is determined that the analysis should end at the tributary marked“80 acres.”The 100-acre (10%) point is in between the 80-acre and120-acretributaryjunction points.

The assumption is that if there is no peak flow increase at the 80 acre point then there will be no increase through the next stream reach downstream through the 10% point (100acres) to the 120-acre point. The designer constructs a simple HEC-1(HEC-HMS) model of the 80-acre are as using single existing condition sub-watersheds for each tributary. Key detention structures existing in other tributaries must be modeled. An approximate curve number is used since the actual peak flow is not the key for initial analysis; only the increase or decrease is important. The accuracy in curve number determination is not as significant as an accurate estimate of the time of concentration. Since flooding is an issue downstream, the pond is designed (through several iterations) until the peak flow does not increase at junction points downstream to the 80-acre point

Site B is located downstream at the point where the total drainage areais190acres.The site itself is only 6 acres. The first tributary junction downstream from the 10% point is the junction of the site out let with the stream. The total 190 acres is modeled as one basin with care taken to estimate the time of concentration for input into the TR-20model of the watershed. The model shows that a detention facility, in this case, will actually increase the peak flow in the stream.