



County  
**Effingham**  
*Georgia*  
Board of Commissioners

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# Stormwater Management Local Design Manual

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January 2025

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## DEFINITIONS

**“Accidental Discharge”** shall mean a discharge prohibited by this chapter into the county separate stormwater system which occurs by chance and without planning or consideration prior to occurrence.

**“Agricultural Practices”** shall mean practices involving the establishment, cultivation, or harvesting of products of the field or orchard; the preparation and planting of pastureland, farm ponds; and the construction of farm buildings.

**“Applicant”** means a property owner or agent of a property owner who has submitted an application for a post-construction stormwater management development plan review.

**“Aquatic Buffer”** means an area of land located around or near a stream, wetland, or waterbody that has intrinsic value due to the ecological services it provides, including pollutant removal, erosion control and conveyance and temporary storage of flood flows.

**“Aquatic Resource Protection”** means measures taken to protect aquatic resources from several negative impacts of the land development process, including complete loss or destruction, stream channel enlargement and increased salinity fluctuations.

**“Better Site Design Techniques”** means site design techniques that can be used during the site planning and design process to minimize land disturbance and the creation of new impervious and disturbed pervious cover. Better site design techniques include reducing clearing and grading limits, reducing roadway lengths and widths and reducing parking lot and building footprints.

**“Better Site Planning Techniques”** means site planning techniques that can be used during the site planning and design process to protect valuable aquatic and terrestrial resources from the direct impacts of the land development process. Better site planning techniques include protecting primary and secondary conservation areas.

**“Building”** means any structure, either temporary or permanent, having walls and a roof, designed for the shelter of any person, animal or property and occupying more than 100 square feet of area.

**“Channel”** means a natural or artificial watercourse with a definite bed and banks that conducts continuously or periodically flowing water.

**“Coastal Stormwater Supplement (CSS)”** means a technical design supplement to the Georgia Stormwater Management Manual (GSMM) that was developed for coastal Georgia. The CSS addresses stormwater management practices and BMPs that are specific and applicable to coastal stormwater quantity and quality issues. The CSS can be found on the Internet by using the following link: <http://www.mpcnaturalresources.org/pdf/2009-05-05/Georgia-CSS-Final-Apr-09.pdf>.

**“Conservation Areas”** means permanently protected areas of a site that are preserved, in perpetuity, in an undisturbed, natural state.

**“Conservation Easement”** means a legal agreement between a land owner and a local, state or federal government agency or land trust that permanently protects conservation areas on the owner’s land by limiting the amount and type of development that can take place within them but continues to leave the conservation areas in private ownership.

**“Conveyance”** shall mean stormwater facilities designed for the movement of stormwater through the drainage system, such as concrete or metal pipe, ditches, depressions, swales.

**“Dedication”** means the deliberate appropriation of property by its owner for general public use.

**“Detention”** means the temporary storage of stormwater runoff in a stormwater management practice for the purpose of controlling the peak discharge rates and providing gravitational settling of pollutants.

**“Developer”** means a person who undertakes a land development project.

**“Development”** shall mean:

The division of a lot, tract or parcel of land into two or more lots, plots, sites, tracts, parcels, or other divisions by plat or deed;

The construction, installation, or alteration of a structure, impervious surface, or drainage facility;

Clearing, scraping, grubbing, or other activities that significantly disturb the soil, vegetation, mud, sand or rock of a site; or

Adding, removing, exposing, excavations, leveling, grading, digging, burrowing, dumping, piling, dredging, or otherwise disturbing the soil, vegetation, mud, sand or rock of a site.

**“Development Project”** means a new development or redevelopment project.

**“Development Site”** means a parcel of land where land disturbing activities have been or will be initiated to complete a land development project.

**“Discharge”** shall mean the release of stormwater to the county separate stormwater system.

**“Drainage”** shall mean the removal of stormwater from a given area either by gravity or by pumping.

**“Drainage Easement”** means a legal right granted by a land owner to a grantee allowing the grantee to convey, treat or manage stormwater runoff on the private land subject to the drainage easement.

**“Easement”** means a legal right granted by a land owner to a grantee allowing the use of private land for conveyance, treatment and management of stormwater runoff and access to green infrastructure and stormwater practices.

**“Employee”** shall mean any county employee as designated by the county administrator to have authority in stormwater management, planning, maintenance, or construction.

**“Exempt”** shall mean the release of the obligation to comply with specific sections of this chapter.

**“Erosion and Sediment Control Plan”** means a plan that is designed to minimize and control the accelerated erosion and increased sediment loads that occur at a site during land disturbing activities.

**“Evapotranspiration”** means the loss of water to the atmosphere through both evaporation and transpiration, which is the evaporation of water from the aerial parts of plants.

**“Extended Detention”** means the temporary storage of stormwater runoff in a stormwater management practice for an extended period of time, typically 24 hours or greater.

**“Extreme Flood Protection”** means measures taken to protect downstream properties from dangerous extreme flooding events and help maintain the boundaries of the existing 100-year floodplain.

**“Fee in Lieu Contribution”** means a payment of money in place of meeting all or part of the stormwater management criteria required by a post-construction stormwater management ordinance.

**“Flood”** shall mean a general and temporary condition of partial or complete inundation of normally dry land areas from:

The overflow of inland or tidal water; or

The unusual and rapid accumulation or runoff of surface waters from any source.

**“Flooding”** means a volume of stormwater runoff that is too great to be confined within the banks of a stream, river or other aquatic resource or walls of a stormwater conveyance feature and that overflows onto adjacent lands.

**“Green Infrastructure Practices”** means the combination of three complementary, but distinct, groups of natural resource protection and stormwater management practices and techniques, including better site planning and design techniques and low impact development practices, that are used to protect valuable terrestrial and aquatic resources from the direct impacts of the land development process, maintain pre-development site hydrology and reduce post-construction stormwater runoff rates, volumes and pollutant loads.

**Georgia Stormwater Management Manual (GSMM)**” means a technical guidance document governing stormwater management design, construction and long-term maintenance activities in Georgia. The GSMM can be found on the Internet by using the following link: <http://www.georgiastormwater.org/>.

**“Hotspot”** shall mean the same as Stormwater Hotspot, described elsewhere in these definitions.

**“Hydrologic Soil Group (HSG)”** means a Natural Resource Conservation Service classification system in which soils are categorized into four runoff potential groups. The groups range from group A soils, with high permeability and little runoff produced, to group D soils, which have low permeability rates and produce much more runoff.

**“Illicit Connection”** shall mean an unauthorized or illegal connection to a county separate stormwater system which results in discharge that is not composed entirely of stormwater runoff.

**“Impaired Waters”** means those streams, rivers, lakes, estuaries and other water bodies that currently do not meet their designated use classification and associated water quality standards under the Clean Water Act.

**“Impervious Cover”** means a surface composed of any material that greatly impedes or prevents the natural infiltration of water into the underlying native soils. Impervious surfaces include, but are not limited to, rooftops, buildings, sidewalks, driveways, streets and roads.

**“Indirect Discharge”** shall mean any discharge to the county’s separate stormwater system via another conveyance system that is not owned, operated, or maintained by the city.

**“Industrial Stormwater Permit”** means a National Pollutant Discharge Elimination System (NPDES) permit issued to an industry or group of industries that regulates the pollutant levels associated with industrial stormwater discharges or specifies on-site pollution control strategies.

**“Infill Development”** means land development that occurs within designated areas based on local land use, watershed and/or utility plans where the surrounding area is generally developed, and where the site or area is either vacant or has previously been used for another purpose.

**“Infiltration”** means the process of allowing stormwater runoff to percolate into the underlying native soils.

**“Infiltration Practice”** means a green infrastructure or stormwater management practice designed to provide infiltration of stormwater runoff into the underlying native soils. These stormwater management practices may be above or below grade.

**“Inspection and Maintenance Agreement and Plan”** means a written agreement and plan providing for the long-term inspection and maintenance of all green infrastructure practices, stormwater management practices, stormwater conveyance features and stormwater drain infrastructure on a development site.

**“Jurisdictional Wetland”** means an area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions, commonly known as hydrophytic vegetation.

**“Land Development”** means any project undertaken to change or improve a site that involves one or more land disturbing activities.

**“Land Disturbing Activity”** means any activity that changes stormwater runoff rates, volumes and pollutant loads on a site. These activities include, but are not limited to, the grading, digging, cutting, scraping, or excavating of soil, the placement of fill materials, paving, construction, substantial removal of vegetation and any activity that bares soil or rock or involves the diversion or piping of any natural or man-made watercourse.

**“Land Owner”** means the legal or beneficial owner of land, including those holding the right to purchase or lease the land, or any other person holding proprietary rights in the land.

**“LDM” or “Local Design Manual”** means the manual of design practices and approval process prescribed by Effingham County.

**“Low Impact Development Practice”** means small-scale stormwater management practices that are used to disconnect impervious and disturbed pervious surfaces from the storm drain system and reduce post-construction stormwater runoff rates, volumes and pollutant loads. Low impact development practices include soil restoration, site reforestation/revegetation, green roofs, vegetated filter strips and rain gardens.

**“Maintenance”** shall mean any action necessary to preserve stormwater facilities in proper working condition, in order to serve the intended purposes set forth in this chapter.

**“Maximum Extent Practicable (MEP)”** shall mean the discharge standards and controls necessary for the reduction of pollutants discharged into the municipal separate stormwater system. These standards and controls may consist of a combination of best management practices, control techniques, system design and engineering methods, and such other provisions for the reduction of pollutants discharged from the municipal separate stormwater system.

**“Municipal Separate Stormwater System”** shall mean a conveyance or system of conveyances (including roads with drainage systems, highways, rights-of-way, city streets, catchbasins, curbs, gutters, ditches, both natural and manmade channels, storm drains, detention ponds, drainage easements, other stormwater facilities) which meets all the following criteria:

Owned or maintained by Effingham County;

Designed or used for collecting or conveying stormwater;

Not a known combined sewer, and

Not part of a publicly owned treatment works (POTW).

**“National Pollutant Discharge Elimination System (NPDES) Stormwater Discharge Permit”** means a permit issued by the EPA, or by a State under authority delegated pursuant to 33 USC § 1342(b), that authorizes the discharge of pollutants to waters of the State, whether the permit is applicable on an individual, group, or general area-wide basis.

**“New Development”** means a land development project undertaken on a previously undeveloped or unimproved site.

**“Nonpoint Source Pollution”** means pollution from any source other than from a discernible, confined and discrete conveyance, such as a wastewater treatment plant or industrial discharge. Sources of nonpoint source pollution include, but are not limited to, agricultural, silvicultural, mining and construction activities, subsurface disposal and urban stormwater runoff.

**“Nonstructural Stormwater Management Practice”** means any natural resource protection or stormwater management practice or technique that uses natural processes and natural systems to intercept, convey, treat and/or manage stormwater runoff. Nonstructural stormwater management practices include, but are not limited to, protecting primary and secondary conservation areas, reducing clearing and grading limits, reducing roadway lengths and widths, reducing parking lot and building footprints, soil restoration, site reforestation/revegetation, green roofs, vegetated filter strips and rain gardens.

**“Off-Site Stormwater Management Practice”** means a green infrastructure or stormwater management practice located outside the boundaries of a development site.

**“On-Site Stormwater Management Practice”** means a green infrastructure or stormwater management practice located within the boundaries of a development site.

**“Overbank Flood Protection”** means measures taken to protect downstream properties from damaging overbank flooding events.

**“Owner”** means the legal or beneficial owner of a piece of land, including, but not limited to, a mortgagee or vendee in possession, receiver, executor, trustee, lessee or other person, firm, or corporation in control of the site.

**“Permanent Stormwater Management Practice”** means a green infrastructure or stormwater management practice that will be operational after the land disturbing activities are complete and that is designed to become a permanent part of the site for the purposes of managing post-construction stormwater runoff.

**“Permit”** means the permit issued by a local development review authority to an applicant, which is required for undertaking any land development project or land disturbing activities, typically referred to as a Land Disturbance Activity (LDA) Permit.



**“Person”** means any individual, partnership, firm, association, joint venture, public or private corporation, trust, estate, commission, board, public or private institution, utility, cooperative, city, county or other political subdivision, any interstate body, or any other legal entity.

**“Pollutant”** shall mean any substance contributing to the contamination or alteration of stormwater’s physical, chemical or biological properties, including change in temperature, taste, color, turbidity, or odor; by the discharge of any liquid, gaseous, solid, radioactive, or other substance into any such waters that will or is likely to create a nuisance or have a detrimental impact on the city’s stormwater system which would preclude the legitimate use of such a system.

**“Post-Development Hydrology”** refers to the set of hydrologic conditions that may reasonably be expected to exist on a development site, after the completion of all land disturbing and construction activities.

**“Pre-Development Hydrology”** refers to the set of hydrologic conditions that exist on a development site prior to the commencement of any land disturbing activities and at the time that plans for the land development project are approved by the local development review authority.

**“Private Property”** shall mean property or facilities owned by individuals, corporations, and organizations other than the city, state, or federal government.

**“Quality”** shall mean those parameters of stormwater that relate to the physical, chemical, biological or radiological integrity of stormwater.

**“Quantity”** shall mean those characteristics of stormwater that relate to the rate, volume, and duration of concentration of stormwater runoff.

**“Receiving Stream”** or **“Receiving Aquatic Resource”** means the body of water or conveyance into which stormwater runoff is discharged.

**“Recharge”** means the replenishment of groundwater aquifers.

**“Redevelopment”** means a change to previously existing, improved property, including but not limited to the demolition or building of structures, filling, grading, paving, or excavating, but excluding ordinary maintenance activities, remodeling of buildings on the existing footprint, resurfacing of paved areas and exterior changes or improvements that do not materially increase or concentrate stormwater runoff or cause additional nonpoint source pollution.

**“Regional Stormwater Management Practice”** means a stormwater management practice designed to control stormwater runoff from multiple properties, where the owners or developers of the individual properties may participate in providing land, financing, design services, construction services and/or maintenance services for the practice.

**“Regulation”** shall mean any local, state, or federal rule, ordinance, design directive or other policies adopted by the Effingham County Board of Commissioners pursuant to the requirements of this chapter.

**“Responsible Party”** means any individual, partnership, co-partnership, firm, company, corporation, association, joint stock company, trust, estate, governmental entity, or any other legal entity; or their legal representatives, agents, or assigns that is named on a stormwater inspection and maintenance agreement and plan as responsible for the long-term operation and maintenance of one or more green infrastructure or stormwater management practices.

**“Sanitary Sewer System”** means the complete sanitary sewer system of Effingham County which discharges sewage directly or indirectly into the sewage treatment plant, including sanitary sewer pipelines, manholes and flushing inlets and appurtenances.

**“Sediment”** shall mean solid particulate matter, both mineral and organic, that has been or is being transported by water, air, ice or gravity from its origin.

**“Site”** means development site.

**“Stop Work Order”** means an order issued that requires that all land disturbing activity on a site be stopped.

**“Stormwater”** shall mean precipitation runoff, snowmelt runoff, and surface runoff.

**“Stormwater Hotspot”** means an area where land use or pollution generating activities have the potential to generate highly contaminated runoff, with concentrations of pollutants in excess of those typically found in stormwater runoff. Stormwater hotspots include, but are not limited to, fueling stations (including temporary fueling stations during construction), golf courses, public works yards and marinas.

**“Stormwater Management”** means the interception, conveyance, treatment and management of stormwater runoff in a manner that is intended to prevent increased flood damage, channel erosion, habitat degradation and water quality degradation and to enhance and promote the public health, safety and general welfare.

**“Stormwater Management Facilities”** shall mean any and all components of a stormwater drainage system, designed to perform a particular function, or multiple functions, including, but not limited to, pipe, swales, ditches, culverts, streets, detention basins, retention basins, constructed wetlands, infiltration devices, catchbasins, oil/water separators, sediment basins, natural systems, modular pavement and pump stations.

**“Stormwater Management Plan”** means a written document that details how stormwater runoff will be managed on a development site and that shows how the stormwater management criteria that apply to the development project have been met.

**“Stormwater Management Practice”** means a practice or technique, either structural or nonstructural that is used to intercept stormwater runoff and change the characteristics of that runoff. Stormwater management practices are used to control post-construction stormwater runoff

rates, volumes and pollutant loads to prevent increased flood damage, channel erosion, habitat degradation and water quality degradation.

**“Stormwater Management System”** means the entire suite of green infrastructure and stormwater management practices and stormwater conveyance features that are used to intercept, convey, treat and manage stormwater runoff on a development site.

**“Stormwater Retrofit”** means a green infrastructure or stormwater management practice designed for an existing development site that previously had no green infrastructure or stormwater management practice in place or had a practice that was not meeting local stormwater management criteria.

**“Stormwater Runoff”** means surface water resulting from precipitation.

**“Stormwater Runoff Reduction”** means providing for the interception, evapotranspiration, infiltration, or capture and reuse of stormwater runoff to help maintain pre-development site hydrology and help protect aquatic resources from several indirect impacts of the land development process, including decreased groundwater recharge, decreased baseflow and degraded water quality.

**“Subdivision”** means the division of a parcel of land to create one or more new lots or development sites for the purpose, whether immediately or in the future, of sale, transfer of ownership, or land development, and includes divisions of land resulting from or made in connection with the layout or construction of a new street or roadway or a change in the layout of an existing street or roadway.

**“Watercourse”** means a permanent or intermittent stream or other body of water, either natural or man-made, which gathers or carries surface water.

**“Watershed Management Plan”** or **“Subwatershed Management Plan”** means a document, usually developed cooperatively by government agencies and other stakeholders, to protect, restore and/or otherwise manage the water resources found within a particular watershed or subwatershed. Watershed or subwatershed management plans commonly identify threats, sources of impairment, institutional issues and technical and programmatic solutions or projects to protect and/or restore water resources.

**“Water Quality Protection”** means adequately treating stormwater runoff before it is discharged from a development site to help protect downstream aquatic resources from water quality degradation.

**“Wetland Hydroperiod”** means the pattern of fluctuating water levels within a wetland caused by the complex interaction of surface water, groundwater, topography, soils and geology within a wetland.

**“Variance”** shall mean the modification of the minimum stormwater management requirements for specific circumstance where strict adherence of the requirements would result in unnecessary hardship and not fulfill the intent of this chapter.

# 1. INTRODUCTION

The Effingham County Stormwater Management Local Design Manual (LDM) was developed to serve as a comprehensive guide to implementing stormwater management facilities, controls and systems in unincorporated Effingham County. Additionally, the Effingham County LDM was developed to supplement the technical guidance information contained in the Georgia Stormwater Management Manual (GSMM) 2016 Edition and the Coastal Stormwater Supplement (CSS) to the GSMM (April 2009). The GSMM and the CSS shall serve as technical reference guidance for the design, construction and maintenance of stormwater management systems within the County. Any conflicts or issues that may arise pertaining to information contained in the GSMM and the CSS should be addressed at the onset of the project through correspondence with the appropriate County Staff.

## 1.1. Stormwater Management Compliance Process

The following outlines the step by step process for complying with the applicable provisions of the Effingham County Stormwater Management LDM and the Effingham County Post-Construction Stormwater Management Ordinance. All projects differ with regard to the pertinent site-specific design and construction related issues and details. To that end, the step by step process outlined herein should be used as a general guide with the understanding that some variation to the process may be necessary to successfully complete a particular project.

### **Stormwater Management Site Planning and Design Criteria Process**

#### 1.1.1. Concept Design Phase

*Step 1. Review Applicable Local, State and Federal Requirements & Guidelines*

*Step 2. Schedule and Attend a Pre-Design Meeting with the County*

*Step 3. Conduct Natural Resources Inventory*

*Step 4. Assess Potential Application of Green Infrastructure Practices*

*Step 5. Apply Post-Construction Stormwater Management Criteria*

*Step 6. Prepare a Stormwater Management Concept Plan and Submit to County for Review and Approval*

*Step 7. Schedule and Attend Concept Plan and Consultation Meeting with County Staff to Review Concept Plan*

*Step 8. Revise Concept Plan (if necessary)*

(Projects of less than 1.0 acre in size may request a waiver of concept plan submittal. In lieu of the concept submittal, the items become due with the Detailed Stormwater Management Design Phase submittal below. Attendance at a DPR meeting is encouraged in lieu of the submittal).

#### 1.1.2. Detailed Stormwater Management Design Phase

*Step 7. Prepare Stormwater Management Design Plan*

*Step 7A. Perform Downstream Analysis*

*Step 7B. Prepare Stormwater Management System Inspection & Maintenance Plan (A Copy of the Agreement is Attached as Appendix A).*

*Step 7C. Prepare Erosion & Sedimentation Control Plan and Planting Plan*

**Step 8.** *Submit Plans to County with completed Stormwater Checklist (copy Attached as Appendix B).*

**Step 9.** *Address County Comments and Re-Submit for Approval*

**Step 10.** *Upon acceptance of the Stormwater Management Design Plan by the County Owner Executes and Submits Stormwater Facility Inspection and Maintenance Agreement*

1.1.3. Construction Phase

**Step 11.** *Obtain Land Disturbance Activity (LDA) Permit from County*

**Step 12.** *Attend Pre-Construction Meeting on Project Site*

**Step 13.** *Install and Maintain Site Erosion & Sedimentation Controls*

**Step 14.** *Commence Site Construction Activities*

**Step 15.** *Coordinate Field Inspections with County Staff*

1.1.4. Post-Construction Phase

**Step 16.** *Show all Stormwater Management Units in Private and Common areas on the Final Plat. Include Notations that Such Units will be Maintained in Accordance with Effingham County's Stormwater Management Ordinance.*

**Step 17.** *Record the Stormwater Facility Inspection and Maintenance Agreement (A Copy of the Agreement is Attached as Appendix A).*

**Step 18.** *Prepare As-Built Survey for all Green Infrastructure and Stormwater Management Practices Shown on the Approved Stormwater Management Design Plan. The As-Built Plans Must Show the Final Design Specifications for all Green Infrastructure and Stormwater Management Practices, the Final Stormwater System Elevations Based on the North American Vertical Datum 1988, the Final Stormwater System Volumes Where They Were Provided as Part of the System Design. As-Built Survey Field Work Shall Collect Adequate Numbers of Spot Shots to Mirror Design Info Given Upon the Approved Paving, Grading and Drainage Drawings. As-Built Drawings Shall Illustrate the Difference Between Design and As-Built by Marking Through the Design Elevation (Leaving the Result Legible) and Supply the As-Built Elevations at Elevation Breaks, Along Curbing, and at Changes in Grade for Pavement, at Top and Bottom of Ditch Banks, Top and Bottom of Pond slopes, and Each Orifice or Opening on Pond Discharge Structures. As-Built information for Stormwater Management Systems Shall be Supplied for Both Design and As-Built for Verification on Both Drawings and the Record Drawing Stormwater Management Inventory Data Sheet (See Appendix C).*

## **2. POST-CONSTRUCTION STORMWATER MANAGEMENT AND SITE PLANNING AND DESIGN CRITERIA**

The following post-construction stormwater management and site planning and design criteria shall be applied to all new development and redevelopment activities that are subject to the provisions of this ordinance. The criteria have been designed to protect valuable local natural resources from the negative impacts of the land development process.

If local natural resource protection and stormwater management goals and objectives warrant greater protection than that provided by the post-construction stormwater management and site planning and design criteria outlined below, Effingham County may impose additional requirements on new development and redevelopment activities that it has determined are necessary to protect local aquatic and terrestrial resources from the negative impacts of the land development process.

### **2.1. Natural Resources Inventory**

Prior to the start of any land disturbing activities, including any clearing and grading activities, acceptable site reconnaissance and surveying techniques should be used to complete a thorough assessment of the natural resources, both terrestrial and aquatic, found on a development site. The natural resources inventory shall be completed in accordance with the information presented within the latest edition of the CSS and the GSMM. The Natural Resources Inventory data compilation effort should be performed in general accordance with Section 4.3.1 and Table 4.2 of the CSS.

The preservation and/or restoration of the natural resources found on a development site, through the use of green infrastructure practices, may, at the discretion of Effingham County, be assigned quantifiable stormwater management “credits” that can be used when calculating the stormwater runoff volumes associated with the post-construction stormwater management criteria outlined in the applicable sections of the Effingham County Post-Construction Stormwater Management Ordinance. The green infrastructure practices that qualify for these “credits,” and information about how they can be used to help satisfy the post-construction stormwater management criteria outlined in the Effingham County Post-Construction Stormwater Management Ordinance, is provided in the latest edition of the CSS and the GSMM.

### **2.2. Use of Green Infrastructure Practices**

Green infrastructure practices shall be used to the maximum extent practical during the creation of a Stormwater Management Concept Plan for a proposed development project. Green infrastructure practices can be used to not only help protect local terrestrial and aquatic resources from the direct impacts of the land development process, but also to help maintain pre-development site hydrology and reduce post-construction stormwater runoff rates, volumes and pollutant loads.

All green infrastructure and stormwater management practices shall be selected, designed, constructed and maintained in accordance with the information presented in the latest edition of the CSS, the GSMM and the Effingham County LDM. Applicants are referred to the latest edition

of the CSS, the GSMM, and the Effingham County LDM for guidance on selecting green infrastructure and stormwater management practices that can be used to satisfy the post-construction stormwater management criteria outlined in the applicable sections of the Effingham County Post-Construction Stormwater Management Ordinance.

For green infrastructure or stormwater management practices that are not included in the CSS and/or the GSMM for which pollutant removal and runoff reduction rates have not been provided, the effectiveness of the green infrastructure and/or stormwater management practice must be documented through prior studies, literature reviews or other means, and receive approval from Effingham County before being included in a stormwater management system.

### **2.3. Stormwater Runoff Reduction**

The stormwater runoff volume generated by the first 1.2” of rainfall is called the runoff reduction storm event ( $RR_v$ ). The  $RR_v$  shall be captured on-site. In general, a stormwater management system is presumed to comply with these criteria if:

1. It includes green infrastructure practices that provide for the interception, evapotranspiration, infiltration or capture and reuse of stormwater runoff, that have been selected, designed, constructed and maintained in accordance with the information presented in the latest edition of the CSS to the GSMM and the Effingham County LDM; and
2. It is designed to provide the amount of stormwater runoff reduction specified in the latest edition of the CSS to the GSMM.

The County Engineer **may** reduce the amount of stormwater runoff reduction needed to satisfy this criteria on development sites that are considered to be stormwater hotspots or that have site characteristics or constraints, such as high groundwater, impermeable soils, contaminated soils or confined groundwater aquifer recharge areas that prevent the use of Green Infrastructure(GI)/Low Impact Development(LID).

When seeking a reduction in  $RR_v$  applicants shall provide adequate documentation to the County to show that GI/LID practices have been used on the development site to the maximum extent practicable.

In accordance with applicable sections of the Effingham County Post-Construction Stormwater Management Ordinance, any of the stormwater runoff volume generated by the runoff reduction storm event that is not reduced on the development site shall be intercepted and treated in one or more stormwater management practices that provide at least an 80 percent reduction in total suspended solids loads and that reduce nitrogen and bacteria loads to the maximum extent practical.

## **2.4. Stormwater Quality Protection**

In order to protect local aquatic resources from water quality degradation, post-construction stormwater runoff shall be adequately treated before it is discharged from a development site. Applicants can satisfy these criteria by satisfying the stormwater runoff reduction criteria. However, if any of the stormwater runoff volume generated by the runoff reduction storm event, as defined in the latest edition of the CSS to the GSMM, cannot be reduced on the development site, due to site characteristics or constraints, it shall be intercepted and treated in one or more stormwater management practices that provide at least an 80 percent reduction in total suspended solids loads and that reduce nitrogen and bacteria loads to the maximum extent practical. When seeking to satisfy these criteria through the use of one or more stormwater management practices, applicants shall:

1. Intercept and treat stormwater runoff in stormwater management practices that have been selected, designed, constructed and maintained in accordance with the information presented in the latest edition of the CSS to the GSMM and Effingham County LDM; and
2. Provide adequate documentation to Effingham County to show that total suspended solids, nitrogen and bacteria removal were considered during the selection of the stormwater management practices that will be used to intercept and treat stormwater runoff on the development site.

## **2.5. Aquatic Resources Protection and Energy Dissipation**

In order to protect local aquatic resources from several other negative impacts of the land development process, including complete loss or destruction, stream channel enlargement and increased salinity fluctuations, applicants shall provide aquatic resource protection in accordance with the with the information provided in the latest edition of the CSS to the GSMM.

### **2.5.1. Aquatic Resources Protection for New Development and Redevelopment Projects**

Aquatic resources protection shall be provided for each site through management and extended detention of the 1-year 24-hour storm event released over a period of 24-hours to reduce the frequency and duration of channel forming bankfull and near bankfull events.

### **2.5.2. Energy Dissipation**

Velocity control and energy dissipation measures shall be installed at all new and existing stormwater outfalls in accordance with criteria and guidance provided in Section 4.5 of the GSMM (Volume 2) and applicable sections of the CSS.



## **2.6. Overbank Flood Protection**

All stormwater management systems shall be designed to control the peak discharge generated by the overbank flood protection storm event, as defined in the latest edition of the CSS to the GSMM, to prevent an increase in the duration, frequency and magnitude of downstream overbank flooding. A stormwater management system is presumed to comply with these criteria if it is designed to provide overbank flood protection in accordance with the information provided in the latest edition of the CSS to the GSMM.

Effingham County may modify or waive this criteria on development sites where both the on-site and downstream stormwater conveyance systems are designed to safely convey the peak discharge generated by the overbank flood protection storm event to a receiving stream, tidal creek or other aquatic resource without causing additional downstream flooding or other environmental impacts, such as stream channel enlargement or degradation of habitat.

## **2.7. Extreme Flood Protection**

All stormwater management systems shall be designed to control the peak discharge generated by the extreme flood protection storm event, as defined in the latest edition of the CSS to the GSMM, to prevent an increase in the duration, frequency and magnitude of downstream extreme flooding and protect public health and safety. A stormwater management system is presumed to comply with these criteria if it is designed to provide extreme flood protection in accordance with the information provided in the latest edition of the CSS to the GSMM.

Flood mitigation capacity must come from below the flood elevation determined from the latest FEMA maps for the project site. Such capacity is to be determined separate from overbank flood or aquatic resource protection detention capacity.

The County Engineer may modify or waive this criteria on development sites where both the on-site and downstream stormwater conveyance systems are designed to safely convey the peak discharge generated by the extreme flood protection storm event to a receiving stream, tidal creek or other aquatic resource without causing additional downstream flooding or other environmental impacts, such as stream channel enlargement or degradation of habitat.

## **2.8. Redevelopment Criteria**

Development activities that are considered to be redevelopment activities shall meet at least one of the following criteria:

1. **Reduce Impervious Cover:** Reduce existing site impervious cover by at least 20%.
2. **Provide Stormwater Management:** Manage the stormwater runoff from at least 20% of the site's existing impervious cover and any new impervious cover in accordance with the post-construction stormwater management criteria outlined in the applicable sections of the Effingham County Post-Construction Stormwater Management Ordinance. The green infrastructure and stormwater management practices used to

comply with these criteria shall be selected, designed, constructed and maintained in accordance with the information presented in the latest edition of the CSS to the GSMM and Effingham County LDM.

3. **Provide Off-Site Stormwater Management:** Provide, through the use of off-site stormwater management practices, a level of stormwater quality and quantity control that is equal to or greater than that which would be provided by satisfying the post-construction stormwater management criteria outlined in the applicable sections of the Effingham County Post-Construction Stormwater Management Ordinance.
4. **Combination of Measures:** Any combination of (1) through (3) above that is acceptable to Effingham County.

### **3. APPROVED HYDROLOGIC & HYDRAULIC METHODS**

#### **3.1. Hydrologic Methods**

##### **3.1.1. Rational Method**

The rational method **may** be used with the approval of the County Engineer or his designee to develop peak runoff flows for culverts or stormwater drainage systems with contributing drainage areas that are less than 10 acres in size and that are described by a single runoff coefficient. No prorating of runoff coefficients shall be acceptable. Rational method shall not be used for estimating runoff for detention sizing. All computations shall be in accordance with Section 2.1.4 of the GSMM (Volume 2) and Section 5.0 of the CSS. Rainfall intensities shall be derived from Table A-13 (Savannah) of Appendix A of the GSMM (Volume 2).

The use of the rational method, or any method other than the TR-55 method, described below, requires prior approval of the County Engineer or his designee. Plans submitted without prior approval may not be reviewed until calculations are confirmed by the permittee utilizing approved methods.

##### **3.1.2. SCS TR-55 Method**

The Soil Conservation Service (SCS) method is the accepted method of Effingham County and must be utilized to size detention. All computations shall be in accordance with Section 2.1.5 of the GSMM (Volume 2) and Section 5.0 of the CSS. Rainfall depths shall be derived from Table A-13 (Savannah Rainfall Data) of Appendix A of the GSMM (Volume 2). A Type II storm with a peaking factor of 323 shall be used. Table 1 provides the rainfall depths for use in Effingham County:

**Table 1: Effingham County Rainfall Data**

<b>Design Storm</b>	<b>Rainfall Depth</b>
1-Year 24-Hour	3.60"
2-Year 24-Hour	4.80"
5-Year 24-Hour	6.00"
10-Year 24-Hour	6.72"
25-Year 24-Hour	7.92"
50-Year 24-Hour	8.88"
100-Year 24-Hour	9.84"

Time of concentration methods shall be in accordance with Section 2.1.5 of the GSMM (Volume 2). Triangular shaped hydrographs are not acceptable. Time of concentration must be calculated taking into account the condition of the site soil. If roughened by tire ruts, local depressions, poor drainage, or silvicultural practice, adjust roughness values accordingly. The maximum length of any sheet flow calculation shall be 300 feet.

### 3.1.3. Other Methods

Prior approval by the County Engineer or his designee is required for use of any other runoff calculation method, (i.e., TR-20, XP-SWMM, etc.) The determination as to whether another method may be approved is determined by both the method's ability to accurately determine information required, and to be checked by the County. Use of StormWise, XP-SWMM, or other dynamic model must include adequate documentation of input parameters, to afford checking of the calculations.

### 3.2. **Hydraulic Methods**

All hydraulic calculations shall be made in accordance with Chapter 4 of the GSMM (Volume 2) and applicable sections of the CSS.

## 4. **LEVEL OF SERVICE STANDARDS**

### 4.1. **General**

The designer should endeavor to meet the applicable stormwater management design criteria outlined herein to the maximum extent possible for each design project. Successful incorporation of these criteria into the overall design process should: (1) help maintain pre-development site hydrology; (2) protect natural resources; and (3) minimize the impacts of post construction stormwater runoff.

## 4.2. Stormwater Runoff Detention and Discharge Rate Requirements

Chapter 3.0 of the GSMM and applicable sections of the CSS should be consulted with regard to the design of stormwater runoff detention and discharge rate requirements for new development and redevelopment projects.

### 4.2.1. Discharge Rates for New Development and Redevelopment Projects

Development plans including site grading and drainage plans should be developed to mimic existing site conditions and to minimize disruption of natural infiltration, retention and site drainage patterns. Additionally, no increases in stormwater runoff rates shall be allowed at any discharge point from the site unless approved by the County. The baseline or pre-developed site conditions shall be defined as the hydrologic conditions that exist on a development site prior to the commencement of any land disturbing activities and at the time that plans for the land development project are approved by the County, and shall model any depression storage and/or any detention storage. The development shall be analyzed for the following storm events:

- 1-year 24-hour Design Storm
- 2-year 24-hour Design Storm
- 5-year 24-hour Design Storm
- 10-year 24-hour Design Storm
- 25-year 24-hour Design Storm
- 50-year 24-hour Design Storm
- 100-year 24-hour Design Storm

Where downstream conditions indicate that the conveyance and/or storage capacity of existing infrastructure could be impacted by the post development conditions; a more stringent standard may be required. For example, if the project site drains into an existing detention pond within the study area then the designer will be required to demonstrate that the discharge rates from the proposed development will still allow the detention pond to operate at a level commiserate with the site in an undeveloped state. Detention facilities should be designed upon the basis of known or projected developments (proposed by the developer) for the contributing drainage basin. Although, the developer is only required to construct the facility with sufficient volume to provide detention for the proposed development, a design shall be provided to the County demonstrating the ultimate configuration of the proposed detention facility at full site build-out. Additionally, the proposed site plan should have sufficient land around the facility reserved to construct the ultimate configuration without significant demolition.

If a proposed development activity discharges stormwater runoff into a substandard stormwater conveyance system that is a part of the County's municipal storm sewer system (MS4), the submittal must demonstrate at least one of the following options:

- No increase in the development site's peak rate and total volume discharged to the substandard system; and
- The site stormwater management plan should provide other engineering solutions that are designed to mitigate adverse impacts on the conveyance system. The proposed solutions

must be submitted for review and approval by the County Engineer or his designee prior to implementation.

### **4.3. Drainage Stormwater Conveyance Practices**

Stormwater conveyance practices, which may include, but are not limited to, storm drain pipes, culverts, catch basins, drop inlets, junction boxes, headwalls, gutters, ditches, open channels, swales and energy dissipaters, shall be provided when necessary to convey post-construction stormwater runoff and protect private properties adjoining development sites and/or public rights-of-way. Stormwater conveyance practices that are used to convey post-construction stormwater runoff on development sites shall meet the following requirements:

1. Methods used to calculate stormwater runoff rates and volumes shall be in accordance with the information presented in the latest edition of the GSMM, the CSS and the Effingham County LDM;
2. All culverts, pipe systems and open channel flow systems shall be sized in accordance with the information presented in the latest edition of the GSMM, the CSS and the Effingham County LDM;
3. Planning and design of stormwater conveyance practices shall be completed in accordance with the information presented in the latest edition of the GSMM, the CSS and the Effingham County LDM; and,
4. Adequate easements or right-of-ways for maintenance access shall be provided and recorded with required public documents.

#### **4.3.1. Bridges**

All bridges that will serve as an evacuation route shall be designed to accommodate the 100-year 24-hour design storm with no over topping of the roadway/street. A bridge that is not identified for an evacuation route can be designed to a reduced conveyance Level of Service(LOS) with the approval of the County. A bridge that serves as ingress/egress to a critical facility as described in the County's Flood Protection Ordinance shall be designed to accommodate the 500 year 24 hour storm with no overtopping of the roadway/street.

4.3.2. Culverts & Pipe Systems

**Table 2: Culvert & Pipe LOS Criteria**

Roadway Classification / Use	Minimum Allowable Design LOS
Arterial/Emergency Evacuation Route	50-Year
Collector Roads	<del>25-Year</del> 50-Year
Neighborhood(Local) Roads	<del>10-Year</del> 25-Year
Roads with No Other Outlet	50-Year
Parking Lots / Material Storage Areas / Landscape Areas	10-Year

Culverts with contributing drainage areas greater than 10 acres shall be designed using the SCS TR-55; 24-hour storm. If a proposed culvert system will connect to an existing culvert system that does not achieve the design LOS depicted in Table 2 above, then the proposed system shall be designed with an equivalent LOS to the existing system, but the LOS shall not be less than the minimum allowable shown in Table 2 unless approved by the County Engineer or his designee. In situations where emergency evacuation issues arise during the Concept Design Phase, the County may require that the conveyance LOS for both the proposed culvert system and the existing culvert system to be increased. The designer should consult with the County during the Concept Design Phase of the project to ascertain the applicable design and LOS requirements.

The allowable headwater depth is the depth of water that can be ponded at the upstream end of the culvert during the design-year storm, and is limited by one or more of the following:

- To protect the roadway pavement, the minimum allowable freeboard shall be 1 ft as measured from the edge of the pavement structure to the design-year headwater elevation.
- The headwater elevation should not be greater than the elevation at which flow diverts around the culvert.

4.3.3. Inlets (Catch Basins, Yard Inlets, Drop Inlets, Hooded Grate Inlets and Flumes)

Inlets collecting stormwater runoff from street surfaces and area inlets shall be sized to capture the storm event specified for the pipe system to which it drains and a maximum flooding depth as determined by the following table:

**Table 3: Flooding LOS Criteria**

Roadway Classification / Use	Flooding Depth LOS
Arterial / Emergency Evacuation Route	One Lane Width Open
Collector Roads	One Lane Width Open
Neighborhood/Local Roads	<del>8.0 ft Lane Width Open</del> One Lane Width Open
Roads with No Other Outlet	One Lane Width Open

Roadway Classification / Use	Flooding Depth LOS
Parking Lots	<del>Maximum 0.5 ft Depth</del> <b>Maximum 0.25 ft Depth</b>
Detention Areas utilized for other purposes (i.e. parking lot detention, etc.) with flood warning sign	Maximum 1.5 ft Depth
Material Storage Areas / Landscape Areas	Maximum 2.0 ft Depth

*Note: The County can modify these requirements if the designer demonstrates that an alternate design criterion is acceptable.*

Inlets and grading adjacent to habitable structures shall be designed to prevent stormwater runoff from entering the structure during the 100-year design storm.

#### 4.3.4. Inlets (Headwalls, Flared End Sections, etc.)

Inlets that utilize the opening of the pipe as the inlet (i.e. headwalls, flared end sections, etc.) shall be sized to capture the storm event specified for the pipe system to which it drains and a maximum flooding depth that will not result in bypass of the inlet or cause structural flooding. The headwater conditions induced by the inlet should minimize impacts to any upstream drainage structures. The designer should consult with the County during the Concept Phase to determine if any unacceptable flooding will occur and if such a condition is acceptable/allowable.

**Riprap at a minimum shall be placed around and above the crown of the pipe on the upstream and downstream side of the pipe to prevent scouring and erosion of for pipes equal to or less than 30” in diameter. A headwall for pipes larger than 30” in diameter shall be required and submitted to the county engineer or designee for approval.**

#### 4.3.5. Roadside Ditches

Roads constructed without curb and gutter shall incorporate ditches that are designed to the specific design storms as shown in the following table:

**Table 4: Roadside Ditch LOS Criteria**

Roadway Classification / Use	Minimum Allowable Design LOS	Allowable Headwater Depth Design LOS
Arterial/Emergency Evacuation Route	50-Year	1.0 ft below edge of pavement
Collector Roads	<del>25-Year</del> 50-Year	1.0 ft below edge of pavement
Neighborhood Roads	<del>40-Year</del> 25-Year	1.0 ft below edge of pavement
Roads with No Other Outlet	50-Year	1.0 ft below edge of pavement

If a proposed roadside ditch system will connect to an existing drainage system (i.e. open ditch, pipe, etc) that does not achieve the design LOS depicted in Table 4 above, then the proposed ditch system may be designed with an equivalent LOS to the existing system to which it will

connect, but the LOS shall not be less than the minimum allowable shown in Table 4 unless approved by the County Engineer or his designee. In situations where emergency evacuation issues arise during the Concept Design Phase, the County may require that the conveyance LOS for both the proposed ditch system and the existing culvert system be improved. This may require that the conveyance capacity of the proposed ditch system be increased to provide storage of rainfall to minimize flooding, or that the existing pipe system conveyance LOS be increased, or that a combination of these stormwater runoff management measures be implemented. The designer should consult with the County during the Concept Design Phase of the project to ascertain the applicable design requirements.

The allowable headwater depth is the depth of water that can be ponded at the upstream end of the culvert during the design-year storm, and is limited by one or more of the following:

- To protect the roadway pavement, the minimum allowable freeboard shall be 1 ft as measured from the bottom of the pavement structure to the design-year HW elevation.
- The HW elevation should not be greater than the elevation at which flow diverts around the culvert.

Riprap at a minimum shall be placed around and above the crown of the pipe on the upstream side of the pipe to prevent scouring and erosion of for pipes equal to or less than 30” in diameter. The headwall for pipes larger than 30” in diameter shall be submitted to the county engineer or designee for approval.

#### 4.3.6. Drainage Channels

For a proposed drainage channel designed to convey stormwater runoff either from or to an existing culvert system, the proposed channel should be designed to the LOS established for the existing pipe system, unless directed otherwise by the County Engineer or his designee.

#### 4.3.7. Easements and Right-of-Ways

Minimum Right-of-Way and Easement widths for stormwater ditches, swales, canals, etc. shall be determined as follows:

1. For ditches 1-5 ft., the easement/right-of-way width shall be 20-ft. plus top width of the ditch. The 20-ft. access maintenance shall be provided on one side of the ditch within the easement/right-of-way.
2. For ditches 5-25 ft., the easement/right-of-way width shall be 10-ft. on one side and 20-ft. on the other side of the ditch plus top width of the ditch.
3. For ditches greater than 25 ft., the easement/right-of-way width shall be 20-ft. on both sides of the ditch plus top width of the ditch.

Minimum Right-of-Way and Easement widths for underground stormwater shall be determined as follows:



1. For pipe depths 5.0 feet and less from pipe invert to proposed finished grade, the easement or right-of-way width is to be 20 feet.
2. For pipe depths between 5.1 and 10.0 feet and less from pipe invert to proposed finished grade, the easement or right-of-way width is to be 25 feet.
3. For pipe depths 10.1 feet and greater from pipe invert to proposed finished grade, the easement or right-of-way width is to be 30 feet.

Drainage easements may be used for other easements with the written approval of the County Engineer or his designee and with consent of the easement holders. Nothing shall be constructed which prohibits the use of the drainage easements for access to various properties and other compatible uses without the written authorization of the County Engineer or his designee.

All stormwater drainage easements shall be recorded with the clerk of Superior Court of Effingham County.

A developer may be required to provide adequate easements downstream from his proposed discharge if adequate public or private facilities do not exist to carry the proposed discharge.

#### 4.3.8. Flood Elevation Impacts

All design work should be performed in strict conformance with applicable local, state, and federal government agency requirements pertaining to floodplain management. All development activity shall be designed to maintain the flooding capacity of the flood hazard area, unless:

1. It can be demonstrated that there is no increase, either upstream or downstream in the base flood elevation after the proposed improvement; and,
2. Compensating storage is provided for all flood volume displaced by the proposed development or redevelopment activities below the base flood elevation.

It is the policy of Effingham County that raising the flood water elevation on an adjacent property shall not be acceptable. As such, the LOS standards outlined in the Effingham County LDM shall be considered minimum standards. Where flood elevation(s) on an adjacent property will be increased due to development and/or construction of a drainage system, the LOS may be increased by the County Engineer or his designee in an effort to minimize impacts to the adjacent property. This requirement may be waived at the County's discretion if the adjacent property owner provides a permanent drainage easement between the two property owners. The easement shall provide that the owner of the impacted property acknowledges that an increase in flood elevations will occur on their property as a result of the proposed development. Additionally, the easement shall include at a minimum a map showing the extent of the pre-development and post-development 100-year floodplains. The party responsible for causing the impacts to the floodplain shall address any applicable FEMA or other regulatory requirements as part of the design and permitting effort.

Finally, the easement must be recorded with the Clerk of Superior Court of Effingham County as an attachment to the affected property's land deed and shall be binding on all future property

owners. Long term maintenance of the easement shall be the responsibility of the private property owners in accordance with the provisions outlined in the easement.

## **5. APPROVED CONSTRUCTION MATERIALS**

### **5.1. Conveyance Structures**

#### **5.1.1. Pipes under Roads and Pavement**

All pipes under roadways, parking lots and other surfaces designed for vehicular traffic shall be constructed of reinforced concrete pipe (RCP) meeting Effingham County Standard Specifications.

#### **5.1.2. Pipes Not Under Roads and Pavement**

Pipes not under roadways, parking lots and other surfaces meant for vehicular traffic shall be constructed of RCP or HDPE meeting Effingham County Standard Specifications or approved by the County Engineer or his designee.

#### **5.1.3. Channels**

All channels must be protected from erosion through the use of rip-rap, concrete, erosion control matting or similar method acceptable to the County Engineer or his designee. All channel side slopes shall have a maximum of a 3-foot horizontal to 1-foot vertical (3:1) slope or less, unless otherwise approved by the County Engineer or his designee.

#### **5.1.4. Inlets**

All inlets shall be constructed of materials and methods meeting Effingham County Standard Specification or designs pre-approved by the County Engineer or his designee.

### **5.2. Detention Ponds**

All stormwater management and detention facilities constructed in accordance with the requirements of the LDM shall be constructed on subdivided parcels deeded to the property owner (for non-residential parcels) or the homeowners association (for residential parcels). No stormwater management or detention facility for residential subdivisions shall be constructed in whole or part on a parcel or lot intended for future sale or use as a residential property.

Detention ponds built to serve residential or commercial subdivisions with public rights-of-ways shall have County access easements to all pond inlets and outlets. A flow through easement shall be dedicated to the County for all detention ponds, granting the County access to all outlet structures.

### 5.2.1. Dry Earthen Detention Ponds

Dry detention ponds shall be designed to provide for positive drainage on the pond floor to the outlet of the pond. Side slopes shall be designed to have a maximum of 3-foot horizontal to 1-foot vertical (3:1) slopes. If the 100-year maximum water surface depth is equal to or greater than four feet, then a standard four foot high chain link fence shall be constructed around the detention pond with a 20-foot gate provided to allow access. A chain link fence may not be required when the site in which the pond is to be constructed is zoned non-residential and is a sufficient and safe distance from properties zoned residential or publicly owned property (excluding right-of-way). The County should be consulted on any waiver regarding erection of a fence around the detention pond.

Acceptable backfill and fill materials shall consist of suitable soils for earthen embankment construction. The material should be free of rock or gravel larger than three inches in any dimension, debris, waste, vegetation, and other deleterious matter. Backfill and fill materials should be placed in layers not more than eight inches in loose depth for material compacted by heavy compaction equipment, and not more than four inches in loose depth for material compacted by hand-operated tampers. Each layer should be uniformly moistened or aerated before compaction to achieve optimum moisture and density per ASTM D698. All backfill and fill materials should be placed evenly to required elevations, and uniformly along the full length of the embankment. Additionally, soils should be compacted to at least 95% maximum dry unit weight per ASTM D 698.

### 5.2.2. Dry Underground Detention Ponds

No underground detention pond shall be constructed on residential development projects. Underground detention ponds may be considered on non-residential development projects after the designer has sufficiently demonstrated to the County Engineer or his designee that construction of an above ground detention pond is infeasible.

### 5.2.3. Wet Detention Ponds

Wet detention ponds may be constructed if the facilities are designed to the criteria outlined in Section 3.2.1.5 of the GSMM (Volume 2), Section 8.0 of the CSS and Effingham County Ordinances.

## 5.3. **Water Quality Best Management Practices (BMPs)**

### 5.3.1. Green Infrastructure Practices

The designer is encouraged to review and consult the information contained in Section 7.0 of the CSS and the Green Growth Guidelines (<http://crd.dnr.state.ga.us/content/displaycontent.asp?txtDocument=969>) regarding the recommended green infrastructure practices.

### 5.3.2. Recommended Stormwater Management Practices

The designer is encouraged to review and consult Section 8.0 of the CSS for guidance regarding the recommended stormwater management practices and selection of appropriate stormwater management practices.

### 5.3.3. Proprietary Stormwater Management Practices

The County Engineer or his designee may at their discretion allow proprietary stormwater management controls. Prior to specification of such a device, the designer shall consult the County Engineer or his designee to determine if the control will be acceptable. Proof of performance history including active references is expected.

## **6. SPECIAL DISTRICTS**

The County Engineer or his designee may establish special design criteria for select areas based on the findings of watershed assessments, hydrologic and hydraulic reports, known flooding issues, geographic specific service delivery considerations or State 303(d) water quality impairment listings. The designer is should consult with the County Engineer or his designee to determine if any special watershed districts exist within Effingham County.

## **7. PROCEDURES AND REQUIREMENTS**

All development projects must submit the required information as indicated in the Effingham County Post-Construction Stormwater Management Ordinance.

All reports shall include adequate narrative to describe the design theory, basis, inputs, and results in comparison to standards. Raw computer generated data outputs without adequate description will not be reviewed. Assure that reports of computer inputs are adequately described relating to design standards. Similarly, assure that computer outputs are adequately described and compared to standards to prove compliance with design standards.

Utilize a tailwater hydrograph for analysis of flow when available. Sources of tailwater conditions include FEMA FIS, U.S. Army COE basin studies, or other engineering studies.

The following subsections outline the basic requirements.

### **7.1. Stormwater Management Concept Plan**

The Stormwater Management Concept Plan should include the information stipulated in the Effingham County Post-Construction Stormwater Management Ordinance and Section 4.2. Prior to preparation of the concept plan, the designer should consult with the County Engineer or his designee regarding the existence and /or applicability of any existing County developed drainage master plans. As part of the concept design process, a consultation meeting shall be scheduled

with the County to review the pertinent site design issues in accordance with the Effingham County Post-Construction Stormwater Management Ordinance.

The stormwater management concept plan shall include the following information:

1. Project Narrative: The project narrative shall include a vicinity map, the common address of the development site and a legal description of the development site.
2. Site Fingerprint: The site fingerprint shall illustrate the results of the natural resources inventory, which is used to identify and map the natural resources found on the development site, as they exist prior to the start of any land disturbing activities.
3. Existing Conditions Map: The existing conditions map shall include all of the information shown on the site fingerprint and shall illustrate:
  - (a) Existing roads, buildings, parking areas and other impervious surfaces;
  - (b) Existing utilities (e.g., water, sewer, gas, electric) and utility easements;
  - (c) Existing primary and secondary conservation areas;
  - (d) Existing low impact development and stormwater management practices;
  - (e) Existing storm drain infrastructure (e.g., inlets, manholes, storm drains); and,
  - (f) Existing channel modifications (e.g., bridge or culvert installations).
4. Proposed Conditions Map: The proposed conditions map shall illustrate:
  - (a) Proposed topography (one-foot contours);
  - (b) Proposed drainage divides and patterns;
  - (c) Proposed roads, buildings, parking areas and other impervious surfaces;
  - (d) Proposed utilities (e.g., water, sewer, gas, electric) and utility easements;
  - (e) Proposed limits of clearing and grading;
  - (f) Proposed primary and secondary conservation areas;
  - (g) Proposed low impact development and stormwater management practices;
  - (h) Proposed storm drain infrastructure (e.g., inlets, manholes, storm drains); and,
  - (i) Proposed channel modifications (e.g., bridge or culvert installations).

5. Post-Construction Stormwater Management System Narrative: The post-construction stormwater management system narrative shall include information about how post-construction stormwater runoff will be managed on the development site, including a list of the low impact development and stormwater management practices that will be used. It shall also include calculations showing how initial estimates of the post-construction stormwater management criteria that apply to the development project were obtained, including information about the existing and proposed conditions of each of the drainage areas found on the development site (e.g., size, soil types, and land cover characteristics).

## **7.2. Stormwater Management Design Plan**

The Stormwater Management Design Plan should include the information stipulated in the Effingham County Post-Construction Stormwater Management Ordinance. The stormwater management design plan shall include all of the information contained in the stormwater management concept plan, plus:

7.2.1. Existing Conditions Hydrologic Analysis: The existing conditions hydrologic analysis shall include:

- (a) Existing conditions map;
- (b) Information about the existing conditions of each of the drainage areas found on the development site (e.g., size, soil types, land cover characteristics);
- (c) Information about the existing conditions of any off-site drainage areas that contribute stormwater runoff to the development site (e.g., size, soil types, land cover characteristics);
- (d) Information about the stormwater runoff rates and volumes generated, under existing conditions, in each of the drainage areas found on the development site;
- (e) Information about the stormwater runoff rates and volumes generated, under existing conditions, in each of the off-site drainage areas that contribute stormwater runoff to the development site; and
- (f) Documentation (e.g., model diagram) and calculations showing how the existing conditions hydrologic analysis was completed.

7.2.2. Proposed Conditions Hydrologic Analysis: The proposed conditions hydrologic analysis shall include:

- (a) Proposed conditions map;
- (b) Information about the proposed conditions of each of the drainage areas found on the development site (e.g., size, soil types, land cover characteristics);

- (c) Information about the proposed conditions of any off-site drainage areas that contribute stormwater runoff to the development site (e.g., size, soil types, land cover characteristics);
- (d) Information about the stormwater runoff rates and volumes generated, under proposed conditions, in each of the drainage areas found on the development site;
- (e) Information about the stormwater runoff rates and volumes generated, under proposed conditions, in each of the off-site drainage areas that contribute stormwater runoff to the development site; and
- (f) Documentation (e.g., model diagram) and calculations showing how the proposed conditions hydrologic analysis was completed.

7.2.3. Post-Construction Stormwater Management System Plan: The post-construction stormwater management system plan shall illustrate:

- (a) Proposed topography;
- (b) Proposed drainage divides and patterns;
- (c) Existing and proposed roads, buildings, parking areas and other impervious surfaces;
- (d) Existing and proposed primary and secondary conservation areas;
- (e) Plan view of existing and proposed low impact development and stormwater management practices;
- (f) Cross-section and profile views of existing and proposed low impact development and stormwater management practices, including information about water surface elevations, storage volumes and inlet and outlet structures (e.g., orifice sizes);
- (g) Plan view of existing and proposed storm drain infrastructure (e.g., inlets, manholes, storm drains);
- (h) Cross-section and profile views of existing and proposed storm drain infrastructure (e.g., inlets, manholes, storm drains), including information about invert and water surface elevations; and
- (i) Existing and proposed channel modifications (e.g., bridge or culvert installations).

### **7.3. Downstream Analysis**

The downstream analysis should provide the reader with a comprehensive picture of the downstream areas and their capacity to accommodate stormwater runoff from the proposed development.

#### **7.3.1. Drainage Basin Maps**

- (a) Develop and provide Drainage basin delineations showing the point at which the contributing area of the project represents 10% of the total drainage basin area as defined in Section 2.1.9.2 of the GSMM;
- (b) Identify culverts, channels and other structural stormwater controls that the stormwater runoff must pass through prior to the 10% point identified previously.

#### **7.3.2. Project Narratives**

- (a) Develop and provide supporting calculations for a downstream peak flow analysis using the 10% rule necessary to show safe passage of the post-development design flows downstream

### **7.4. Erosion & Sedimentation Control Plan**

The erosion and sedimentation control plan should be included in the report demonstrating the plan to effectively mitigate stormwater impacts during construction. The following elements should be included in this section of the report.

- (a) All elements specified in the Georgia Erosion and Sediment Control Act and local ordinances and regulations;
- (b) Sequence/phasing of construction and temporary stabilization measures;
- (c) Temporary structures that will be converted into permanent stormwater controls.

### **7.5. Planting/Landscape Plan**

A planting plan should be included in the report for all water quality BMPs that utilize vegetation as a pollutant removal method. Examples of these types of controls include but are not limited to stormwater wetlands, enhanced swales, etc.

#### **7.5.1. Post-Construction Stormwater Engineering Report Deliverables**

The post-construction stormwater management system narrative shall include information about how post-construction stormwater runoff will be managed on the development site, including a list of the low impact development and stormwater management practices that will be used. It shall also include documentation and calculations that demonstrate how the selected low impact



development and stormwater management practices satisfy the post-construction stormwater management criteria that apply to the development site, including information about the existing and proposed conditions of each of the drainage areas found on the development site (e.g., size, soil types, and land cover characteristics).

If a computer program is used, assure that key input parameters are provided. These parameters include tailwater condition, beginning water levels, friction coefficients, and if overbank situations are encountered, the topographic and friction parameters for the overbank area. If standard computer output does not provide adequate clarity, annotations may be applied to help identify required data.

Similarly, assure that output parameters are provided. Provide hydraulic grade lines for the 25 year and the 100 year storms on pipe or ditch profiles. If a spreadsheet is used, identify peak elevations, alarm levels, and how they pertain to nearby structures. If standard computer output does not provide adequate clarity, annotations may be applied to help identify required data.

Summarize calculations with narratives and tables. Reference tables with calculation locations. Provide well planned and communicated information in order to facilitate efficient and timely review.

Provide stage area storage analysis of detention pond performance for the required storm passage. Utilize inflow/outflow analysis to compute peak elevations and discharge flows. Clearly demote the freeboard of the bank, and describe freeboard to nearby structures (adjacent buildings and infrastructure) that may be adjacent or downstream.

Tables showing predevelopment peak flows, total quantities, and peak discharge elevations for each outfall and I total shall be compared to post development flows, total quantities, and peak discharges for each outfall and in total.

#### 7.5.2. Certification by Plan Preparer

The stormwater management design plan shall be prepared by a certified design professional, such as a landscape architect, professional surveyor or professional engineer, who must certify that the design of the stormwater management system meets the requirements of the ordinance and the latest edition of the CSS to the GSMM, and any relevant local addenda.

- (a) Each report should begin with the following certification statement and be signed and sealed by the professional who prepared the report and analysis:

*“I, (Name of Professional), a Registered (Professional Engineer / Land Surveyor) in the State of Georgia, hereby certify that this stormwater management plan for the project known as (Project Name), lying in Land Lot (XXX), of the (XX) District, Effingham County, Georgia, has been prepared under my supervision, and, in my opinion, meets the stormwater management and site planning and design criteria presented in the CSS and the GSMM. This (day) day of (Month), (Year).”*

- (b) Each report should begin with the following certification statement and be signed and sealed by the owner/developer for the project:

*“I, (Name of Owner/Developer, a hereby certify that all clearing, grading, construction, and land disturbing activities for the project known as (Project Name), lying in Land Lot (XXX), of the (XX) District, Effingham County, Georgia, will be performed according with this stormwater management design plan. This (day) day of (Month), (Year).”*

## **7.6. Stormwater Management System Inspection and Maintenance Agreement and Plan**

7.6.1. The inspection and maintenance agreement and plan shall include the following information:

- (a) Identification by name or official title the person(s) responsible for carrying out the inspection and maintenance;
- (b) A statement confirming that responsibility for the operation and maintenance of the stormwater management system, unless assumed by Effingham County, shall remain with the property owner and shall pass to any successive owner;
- (c) A provision stating that, if portions of the development site are sold or otherwise transferred, legally binding arrangements shall be made to pass responsibility for the operation and maintenance of the stormwater management system to the appropriate successors in title; these arrangements shall designate, for each portion of the stormwater management system, the person(s) to be permanently responsible for its inspection and maintenance;
- (d) A maintenance schedule stating when and how often routine inspection and maintenance will occur to ensure proper function of the stormwater management system; and,
- (e) Plans for annual inspections to ensure proper performance of the stormwater management system between scheduled maintenance activities.

The inspection and maintenance agreement and plan shall be approved by the County Engineer or his designee prior to approval of the stormwater management design plan and recorded with the deed upon approval of the stormwater management design plan.

In addition to enforcing the terms of the inspection and maintenance agreement and plan, Effingham County may also enforce all of the provisions for ongoing inspection and maintenance contained in the ordinance.

The terms of the stormwater management system inspection and maintenance agreement and plan shall provide for the County Engineer or his designee to enter the property at reasonable times and in a reasonable manner for the purpose of inspection. These terms include the right to enter a property when the County Engineer or his designee has a reason to believe that a violation of an approved stormwater management system inspection and maintenance agreement and plan has occurred and when necessary for abatement of a public nuisance or correction of a violation of this ordinance or an approved stormwater management system inspection and maintenance agreement and plan.

#### **7.7. Long Term Maintenance Requirements**

The owner shall comply with all applicable requirements as set forth in Effingham County Development Regulations. A copy of the Effingham County Stormwater Facility Inspection & Maintenance Agreement is provided in Appendix A.

### **8. Stormwater Hot Spots**

The Concept Design Phase of development plans for parking garages, vehicle storage lots, vehicle fueling areas and gas stations, auto repairs shops, golf courses, marinas and transportation equipment repair facilities are required to submit plans with best management practices for stormwater hotspots. Fuel and vehicle maintenance areas must provide oil/water separators for stormwater that comes into contact with these operations. The stormwater inspection and maintenance plan must specifically address maintenance and inspection of oil/water separators or other devices used for hotspots

# **APPENDIX A**

# Effingham County

## Stormwater Facility Inspection & Maintenance Agreement

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THIS AGREEMENT, made and entered into this \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, by and between (Insert Full Name of Owner) \_\_\_\_\_ his/her successors and assigns, including but not limited to any homeowners association, commercial developer, holder of any portion of the below described property, and/or similar (hereinafter called the "Landowner"), and the Effingham County Board of Commissioners, hereinafter called the "County".

WITNESSETH, that WHEREAS, the Landowner is the owner of certain real property described as (*Effingham County Tax Map/Parcel Identification Number*) \_\_\_\_\_ and recorded by deed in the land records of Effingham County, Georgia, Deed Book \_\_\_\_\_ Page \_\_\_\_\_, hereinafter called the "Property".

WHEREAS, the Landowner is proceeding to build on and develop the property; and

WHEREAS, the Stormwater Management Plan and the Operations and Maintenance Plan (O&M) known as \_\_\_\_\_, (insert name of development) hereinafter called "the Plan", which is expressly made a part hereof, as approved or to be approved by the County, provides for detention of stormwater within the confines of the property; and

WHEREAS, the County and the Landowner, its successors and assigns, agree that the health, safety, and welfare of the residents of Effingham County, Georgia, require that on-site stormwater management facilities be constructed and maintained on the Property and in accordance with the Plan; and

WHEREAS, the County requires that on-site stormwater management facilities as shown within the Plan be constructed and adequately maintained by the Landowner, its successors and assigns.

NOW, THEREFORE, in consideration of the foregoing premises, the mutual covenants contained herein, and the following terms and conditions, the parties hereto agree as follows:

1. The on-site stormwater management facilities shall be constructed by the Landowner, its successors and assigns, in accordance with the specifications identified in the Plan.
2. The Landowner, its successors and assigns, shall adequately maintain the stormwater management facilities and perform the work necessary to keep those facilities in good working order at all times, as described in the Plan. This includes all pipes, channels or other conveyances built to convey stormwater to the facility, as well as all structures, improvements, and vegetation provided to control the quantity and quality of the stormwater runoff. Adequate maintenance is herein defined as good working condition so that these facilities are performing their approved design functions.
3. The Landowner, its successors and assigns, shall inspect the stormwater management facility and submit an inspection report annually to the County Administrator (or his designee). The purpose of the inspection is to ensure safe and proper functioning of the stipulated facilities. The inspection shall cover all applicable stormwater management facilities, including but not limited to, conveyance measures, berms, outlet structures, pond areas, access roads, etc. Deficiencies shall be noted in the inspection report along with a schedule for repair. The inspection procedures, frequency and report shall follow the procedures established and approved in the Plan.
4. The Landowner, its successors and assigns, hereby grant permission to the County, its authorized agents and employees, to enter upon the Property and to inspect the stormwater management facilities whenever the County deems necessary. The County shall provide the Landowner, its successors and assigns, copies of the inspection findings and a directive to commence with the repairs if necessary.

5. In the event the Landowner, its successors and assigns, fails to maintain the stormwater management facilities in good working condition acceptable to the County, the County may issue citations to the Landowner for resulting, continuing ordinance violations, on a daily basis, until such time as the issues are satisfactorily resolved. Additionally, the County may enter upon the Property and take whatever steps necessary to correct deficiencies identified in the inspection report and to recover the costs of such repairs from the Landowner, its successors and assigns through the appropriate means. This provision shall not be construed to allow the County to erect any structure of permanent nature on the land of the Landowner outside of the easement for the stormwater management facilities. It is expressly understood and agreed that the County is under no obligation to routinely maintain or repair said facilities, and in no event shall this AGREEMENT be construed to impose any such obligation on the County.
  6. Landowner, its successors and assigns, will perform the work necessary to keep these facilities in good working order as appropriate. In the event a maintenance schedule for the stormwater management facilities (including sediment removal) is outlined on the approved plan, the schedule will be followed.
  7. In the event the County, pursuant to this AGREEMENT, performs work of any nature, or expends any funds in performance of said work for labor, use of equipment, supplies, materials, and the like, the Landowner, its successors and assigns, shall reimburse the County upon demand, within thirty (30) days of receipt thereof for all actual costs incurred by the County hereunder.
  8. This Agreement imposes no liability of any kind whatsoever on the County and the Landowner agrees to hold the County harmless from any liability in the event the stormwater management facilities fail to operate properly.
  9. This Agreement shall be recorded among the land records of Effingham County, Georgia, and shall constitute a covenant running with the land, and shall be binding on the Landowner, its administrators, executors, assigns, heirs and any other successors in interests, including any homeowners association.
-

**AUTHORIZATION**

**OWNER:**

WITNESS the following signatures and seals:

\_\_\_\_\_  
Company/Corporation/Partnership Name (Seal)

By: \_\_\_\_\_

\_\_\_\_\_  
(Type Name and Title)

The foregoing AGREEMENT was acknowledged before me this \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, by

\_\_\_\_\_.

\_\_\_\_\_  
NOTARY PUBLIC

My Commission Expires: \_\_\_\_\_

**COUNTY OF EFFINGHAM, GEORGIA**

By: \_\_\_\_\_

\_\_\_\_\_  
(Type Name and Title)

# **APPENDIX B**



## STORMWATER MANAGEMENT SITE DEVELOPMENT PLAN REVIEW CHECKLIST

**This checklist must be completed, signed, and submitted by the Consultant with the design phase submittal. The purpose of this checklist is not only to facilitate an efficient review, but also to assist the Consultant in planning their site design work flow, to aid in QA/QC of complete submittal packages, and ultimately to assist in achieving faster permitting. To complete the form, circle the appropriate response, "Y, N, or N/A", for each item, to designate if performed, and documentation included in submittal. Under "note", include location within submittal package (sheet number, and location or detail number, or page number and paragraph of report, etc.) for Y items. Alternately, include why N or N/A is acceptable for the site, based upon the Stormwater Management Ordinance and the Local Design Manual. Feel free to contact the Effingham County Development Services Department at 912-754-2105 if you have any questions.**

### **Concept Design Phase**

	Circle one	Note
1. Procure and provide site mapping to illustrate the layout of the proposed development project and show in general how post construction stormwater runoff will be managed on the development site. Mapping for concept may be based on preliminary survey information such as enlarged USGS map, GIS data, deed plots, or old field survey, etc.	Y N N/A	
2. Provide a thorough assessment of the Natural Resources including both terrestrial and aquatic found on the development site by acceptable site reconnaissance and surveying techniques.	Y N N/A	
3. Show the site at adequate scale to demonstrate location within the City limits. Including, at minimum, the following details in a conceptual proposal, using appropriate tables, plans, and narratives as required:	Y N N/A	
A) Project acreage	Y N N/A	
B) Building location, area (foot print) and finish floor elevations	Y N N/A	
C) Most current FEMA flood zone delineation, include the Flood Insurance Rate Map, Community map number and the effective date.	Y N N/A	
D) Impervious area (pre and post development condition)	Y N N/A	
E) Stormwater unit area, parking and tree area delineation	Y N N/A	
F) Wetland delineations. Clearly note on plan if there are or aren't any wetland areas found in and/or within 200 feet of the project area.	Y N N/A	
G) Waters of the State within 200 feet of the project area.	Y N N/A	

H) A presentation of proposed phasing plan(s) if the project will be divided into several phases.	Y N N/A	
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4. Assess potential application of green infrastructure practices in the form of better site planning and design techniques. Low impact development practice should be used to the maximum extent practicable during the creation of a stormwater management concept plan. At a minimum, the following site information shall be considered, utilizing available information instead of field exploration for concept development:	Y N N/A	
A) Soil type (from Soil Study)	Y N N/A	
B) Depth of ground water on site	Y N N/A	
C) Whether the type of development proposed is a hotspot as defined by the Ordinance and Design Manual. If yes, address how this influences the concept proposal?	Y N N/A	
5. Provide preliminary calculation to verify the site is suitable for the proposed project scale and layout to satisfy the Post- construction Stormwater Management Design Criteria and requirements of the current Effingham County Stormwater Ordinance.	Y N N/A	
6. Briefly summarize in separate report the stormwater management strategy to be utilized for the proposed site design. This report shall be signed and sealed by the GA Registered PE.	Y N N/A	

## **Detailed Design Phase**

	Circle One	Note
1. Provide site survey plan with the drainage submittal. The site survey plan shall include but is not limited to the following:	Y N N/A	
A) Date(s) of survey and revisions	Y N N/A	
B) Bench mark with elevation, the bench mark shall have coordinates based on the Georgia State Plane Coordinate System, East Zone, North American Datum of 1983 (NAD 83). Elevation shall be based on the North American Vertical Datum of 1988 (NAVD 88).	Y N N/A	
C) Existing and proposed right of way, easements and set backs	Y N N/A	
D) Adjacent structures and names of property owners	Y N N/A	
E) Property identification number (Map and Parcel)	Y N N/A	
F) Gross acreage of property	Y N N/A	
G) Show environmental features, including landfills	Y N N/A	
H) Topographic contours in 1 foot intervals	Y N N/A	
I) Property line bearings and distances	Y N N/A	
J) North arrow and scale.	Y N N/A	
K) Professional stamp and signature	Y N N/A	

L) Location of all existing utilities, structures above ground and underground (pipe, manholes/catch basins with top and invert elevations, drive, walkway, fence, etc.), information on downstream system which the proposed storm system is connecting to. At least two (2) downstream manholes shall be surveyed.	Y N N/A	
M) Most current FEMA flood zone delineation, include the Flood Insurance Rate Map, Community map number and the effective date.	Y N N/A	
N) Wetland delineations. Clear note on plan if there are or aren't any wetland areas found in and within 200 feet of the project area.	Y N N/A	
O) Water of the state within 200 feet of the project area.	Y N N/A	
2. Provide a thorough assessment of the Natural Resource Inventory including both terrestrial and aquatic found on the development site by acceptable site reconnaissance and surveying techniques if Concept Design phase was not exercised.	Y N N/A	
3. Assess potential application of green infrastructure practices in a detailed manner. Better site planning and design techniques and low impact development practice shall be used to the maximum extend practical. The following site information shall be considered:	Y N N/A	
A) Soil type.	Y N N/A	
B) Depth of ground water on site.	Y N N/A	
C) Whether the type of development proposed is a hotspot as defined by the Ordinance and Design Manual. How does this influence site design?	Y N N/A	
4. Provide a summary narrative/report of how the post-construction stormwater runoff will be managed on the development site meeting the five (5) post-construction stormwater management criteria as described in Effingham County Stormwater Management LDM.	Y N N/A	
A) Meeting Stormwater Runoff Reduction	Y N N/A	
B) Meeting Stormwater Quality Protection	Y N N/A	
C) Meeting Aquatic Resource Protection	Y N N/A	
D) Meeting Overbank Flood Protection	Y N N/A	
E) Meeting Extreme Flood Protection	Y N N/A	
F) Provide soil maps; boring locations with geotechnical report if needed.	Y N N/A	
G) Hydrology: provide runoff curve number determinations, time of concentration, and hydrograph generation (SCS methods) for pre and post developed conditions with worksheets.	Y N N/A	

H) Hydraulics: Specify assumptions and coefficients used; Provide stage-storage table and curve. Provide pond routing of post-development hydrographs for appropriate design storms as defined in the Effingham County Stormwater Management Local Design Manual; Provide riser/outlet structure analysis and emergency spillway adequacy/capacity analysis.	Y N N/A	
I) Provide pipe size calculations.	Y N N/A	
5. The detention facility calculated volume base elevation shall be above the 25 year flood elevation, such elevation and the tail water elevation for the County's outfall shall be obtained from the latest FEMA Flood Insurance Rate Map Study. A soil survey may be required within the proposed detention facility which demonstrates the elevation as above the seasonal ground water elevation.	Y N N/A	
6. Match pipe crown elevations, at minimum where possible.	Y N N/A	
7. Show drainage pattern, property ridge line(s), and building finish elevation on the grading plan or neighborhood grading plan.	Y N N/A	
8. Clearly note on plans:	Y N N/A	
A) A Right of Way Permit shall be obtained prior to performing construction activity in the County's R.O.W	Y N N/A	
B) Chlorinated disinfected water shall not be discharged into the stormwater system.	Y N N/A	
C) Call before you dig note.	Y N N/A	
9. Provide downstream and surrounding neighborhood area analysis to identify any existing capacity hotspots, and drainage blockage situation at neighboring property due to the proposed development.	Y N N/A	
10. Direct connection of a building's downspouts into a County system shall be discouraged.	Y N N/A	
11. No stormwater discharge to the adjacent property allowed without written approval of the neighboring property owner. Stormwater private easement and agreement shall be provided for neighboring property.	Y N N/A	
12. Provide stormwater pipe profiles with 25 and 100 year HGL. Show all existing and proposed utility crossings on profiles.	Y N N/A	
13. Note on plans the County's right to always allow access property to inspect stormwater facilities.	Y N N/A	
15. Prepare Stormwater management system inspection and maintenance plan.	Y N N/A	
16. Provide Soil Erosion/Sedimentation Control plan to include the following information:	Y N N/A	

A) Description of site activity and amount/degree of disturbance.	Y N N/A	
B) Existing site conditions (topography, vegetation, drainage)	Y N N/A	
C) Soil type, description, and boundary	Y N N/A	
D) Name and 24 hour number of local contact responsible for erosion and sedimentation control	Y N N/A	
E) Methods to be used in Erosion and Sedimentation Control plan	Y N N/A	
F) Permanent site stabilization, establishment and maintenance	Y N N/A	
G) Provisions for use of onsite detention pond as temporary sediment basin with clean out schedule & instructions for conversion to a permanent facility.	Y N N/A	
H) Calculations needed to assure adequacy of basin and structures	Y N N/A	
I) Construction schedule (graph or table), including a note in <b>Bold Letter</b> : "The escape of sediment from the site shall be prevented by the installation of erosion and sediment control measures and practices prior to, or concurrent with, land disturbing activities."	Y N N/A	
J) Maintenance statement note: "Erosion control measures will be maintained at all times. If full implementation of the approved plan does not provide for effective erosion control, additional erosion and sediment control measures shall be implemented to control or treat the sediment source."	Y N N/A	
K) Note: "Any disturbed area left exposed for a period greater than 14 days shall be stabilized with mulch or temporary seeding."	Y N N/A	
17. All plans and reports shall be signed and sealed by registered Georgia Professional Engineer	Y N N/A	

<p>19. After the project has been constructed, As-builts (Record Drawings) must be submitted to the Effingham County Development Services Department. The size of the drawings shall be 24" x 36". As-builts shall have a coordinate system based on the Georgia State Plane Coordinate System, East Zone, North American Datum of 1983 (NAD 83). Elevations shown shall be based on the North American Vertical Datum of 1988 (NAVD 88). All measurements and coordinates shown shall use the U.S. Survey Foot definition. Coordinates shall be shown on all drainage structures, detention outlet control structures, manholes. It is suggested that this data format be used at the beginning of the project in the site design phase.</p>	Y N N/A	
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The above checklist shall be used as a minimum guideline for drainage development requirements and must be completed and signed by the engineer proposing the development with his/her plans to the Development Service Department. As the developer's engineer completes an item, he/she shall document the fact of completion by circling the appropriate 'Y, N, or N/A' in the box for that particular item. The box at the right of the form is for explanation of where to find items included for each Y response. Alternately, the box is for explaining why N or N/A is appropriate, based upon the County's Stormwater Ordinance and/or Local Design Manual. Please ensure that the portion below is filled out in its entirety:

Name of Development: \_\_\_\_\_  
Developer's Engineer Name: \_\_\_\_\_  
Developer's Engineering Firm: \_\_\_\_\_  
Developer's Engineer Signature: \_\_\_\_\_  
Date County Reviewer Received: \_\_\_\_\_  
Date County Review Comments Issued: \_\_\_\_\_

## Record Drawing Stormwater Management Inventory Data

The Inventory is intended to be completed and provided to the Development Services Department with the first as-built drawing submittal to the County Engineer.

<b>Project Name:</b>		<b>Date of Final Inspection:</b>	
<b>Project Number:</b>		<b>Project Total Disturbed Area:</b>	
<b>Project Location:</b>		<b>Project Total Impervious Area:</b>	
<b>Consultant:</b>		<b>Site APv:</b>	
<b>SW Structure List:</b>	<b>ID/Name:</b>		
Wet Pond			
Dry Pond			
Stormwater Wetland			
Vegetated Filter Strip			
Bioretention/Rain Garden			
Underground Storage			
Permeable Pavement			
Green Roof			
Other: _____			

<b>Describe Stormwater Treatment Train: (Attach additional pages if necessary)</b>



### Record Drawing Stormwater Management Inventory Data

Flood Protection Table:								
SWMU ID	Volume(cf) / Elevation (NAVD88)	N/A	1yr-24hr	5yr-24hr	10yr-24hr	25yr-24hr	50yr-24hr	100yr- 24hr

<b>Wet Pond:</b>	<b>SWMU ID:</b>	<i>Provide table for each SWMU ID</i>	
Description of unit's design function in the stormwater management train:			
Permanent Pool Volume:		Forebay Sediment Volume:	
Side slopes not to exceed:		Pond Sediment Volume:	
Outfall structure coordinates (to nearest hundredth):	<b>X:</b> <b>Y:</b>	Aquatic vegetation provided (list/quantity):	
Outfall Design Detail:			

## Record Drawing Stormwater Management Inventory Data

<b>Dry Pond:</b>	<b>SWMU ID:</b>	<i>Provide table for each SWMU ID</i>	
Description of unit's design function in the stormwater management train:			
Storage Volume:		Sediment Storage Volume:	N/A
Flow Path Width:		Outfall Design Detail:	
Side slopes not to exceed:	3		
Outfall structure coordinates (to nearest hundredth):	<b>X:</b> <b>Y:</b>		

<b>Vegetated Filter Strip:</b>	<b>SWMU ID: N/A</b>	<i>Provide table for each SWMU ID</i>	
Description of unit's design function in the stormwater management train:			
Flow Path Width:		Sediment Storage Volume:	
Side slopes not to exceed:		Outfall Design Detail:	
Outfall structure coordinates (to nearest hundredth):	<b>X:</b> <b>Y:</b>		

<b>Grass Channel:</b>	<b>SWMU ID: N/A</b>	<i>Provide table for each SWMU ID</i>	
Description of unit's design function in the stormwater management train:			
Flow Path Width:		Sediment Storage Volume:	
Side slopes not to exceed:		Outfall Design Detail:	
Outfall structure coordinates (to nearest hundredth):	<b>X:</b> <b>Y:</b>		

## Record Drawing Stormwater Management Inventory Data

<b>Stormwater Wetlands:</b>	<b>SWMU ID:</b>	<i>Provide table for each SWMU ID</i>	
Description of unit's design function in the stormwater management train:			
Surface Area (at outfall elevation): Depth (max): Volume:		Sediment Volume:	
Outfall Structure Coordinates (to nearest hundredth):	<b>X:</b> <b>Y:</b>	Aquatic Vegetation Provided (list/quantity):	
Outfall Design Detail:			

<b>Bioretention Areas and Rain gardens:</b>	<b>SWMU ID:</b>	<i>Provide table for each SWMU ID</i>	
Description of unit's design function in the stormwater management train:			
Depth Of Constructed Soil		Inlet Design:	
Underdrain: Y / N	Size:	Outfall Structure: Y / N	
Outfall Structure Coordinates (to nearest hundredth):	<b>X:</b> <b>Y:</b>	Vegetation Provided (list/quantity):	
Outfall Design Detail:			

## Record Drawing Stormwater Management Inventory Data

<b>Underground Detention:</b>		<b>SWMU ID:</b>	<i>Provide table for each SWMU ID</i>
Description of unit's design function in the stormwater management train:			
Volume:		Diagram of Inlets and Chambers:	
Outfall Structure Coordinates (to nearest hundredth):	<b>X:</b>		
	<b>Y:</b>		
Outfall Design Detail:			

<b>Permeable Pavement:</b>		<b>SWMU ID:</b>	<i>Provide table for each SWMU ID</i>
Description of unit's design function in the stormwater management train:			
Volume of Storage (cf):		Detail of full depth cross-section:	
Underdrain: Y/N			
Type:			
Diameter:			

## Record Drawing Stormwater Management Inventory Data

<b>Green Roof::</b>	<b>SWMU ID:</b>	<i>Provide table for each SWMU ID</i>
Description of design function in the stormwater management unit train:		
Square feet of green:  Media depth:  Detention volume:  Overflow elevation (height above roof surface):	Detail of full depth cross-section:	
Overflow Storage?    Y/N	Storage volume:	
Provide flow diagram of green roof overflow detention/reuse system:		

<b>Infiltration Trench:</b>		<b>SWMU ID:</b>	<i>Provide table for each SWMU ID</i>
Description of unit's design function in the stormwater management train:			
Storage Volume:		Inlet design:	
SWMU location (to nearest hundredth):	<b>X:</b> <b>Y:</b>	Cross Section of Trench:	
Underdrain: Y/N			
Pipe Size:			
Length:			
Diagram:			
<b>Other Units:</b>		<b>SWMU ID:</b>	<i>Provide table for each SWMU ID</i>
Description of unit's design function in the stormwater management train:			
Design Capacity/Volume:		Diagram of Unit:	
Outfall Coordinates (to nearest hundredth):	<b>X:</b> <b>Y:</b>		

Signed: \_\_\_\_\_

Georgia PE Registration # \_\_\_\_\_ Date: \_\_\_\_\_

# **APPENDIX C**

**Instructions for completing Record Drawing Stormwater Management Unit Inventory data sheet:**

Project Name, Number, Location and Consultant should be identical to initial submittal information for the project.

Provide the date of the final inspection for the project.

Total disturbed and total impervious areas are provided with the project's Hydrology Report but shall be provided as-built to reflect any changes since the design submittal.

Site APv is the project's Aquatic Resource Protection Volume from the accepted project concept plan or stormwater design plan.

Stormwater Structure List is to include the Stormwater Management Units (SWMUs) and a unique identifier for the project. Stormwater structures for the purposes of this form do not include manholes, inlets, ditches (unless provided as a swale), headwalls, pipes (unless provided as underground detention) or pipe flared end sections.

Stormwater treatment train should show in sequence all Stormwater Management practices used to address the Stormwater Management Ordinance. This may include BMPs such as downspout disconnects, reduced pavement area on lots, curb inlet inserts and other engineered methods.

Enter both as-built elevation and volume of design storms for SWMUs that provide overbank flood protection.

For each SWMU provide the description of the unit's design function in the stormwater management train. The description should include how the RRV, APv and/or OFP are addressed with this unit. This information should agree with the stormwater design submittal for the project and may come directly from the CSS Site Planning and Design Worksheet. Provide requested documentation of as-built details for post-construction inspection and maintenance program.

Provide Georgia Professional Engineer's signature, registration number and date as certification of the review and accuracy of this submittal