



TOWN OF BLUFFTON STORMWATER PLAN CHECKLIST

This checklist is generally based on the Unified Development Ordinance, associated Manuals, other accepted Town of Bluffton plans and policies, and on best design practices. It is not all inclusive of applicable review items, but rather serves as a guide in reviewing development proposals within the Town of Bluffton.

ITEM	UDO SECTION	DESIGN MANUAL SECTION	REQUIREMENT	PROVIDED		COMMENTS
				YES	NO	
NARRATIVE AND GENERAL INFORMATION						
1	5.10.3(a)		All development shall disconnect Impervious Surfaces with vegetative surfaces to the maximum extent practicable.			
2	5.10.3(a)		Stormwater runoff shall be controlled in a manner that: <ul style="list-style-type: none"> a) Promotes positive drainage from structures resulting from development. b) Includes the use of vegetated conveyances, such as swales and existing natural channels to promote infiltration. c) Promotes runoff velocities that maintain sheet flow condition to prevent erosion and promote infiltration. d) Limits its interaction with potential pollutant sources that may become water-borne and create non-point source pollution. 			
3	5.10.3(a)		Natural vegetative buffers play an integral part in minimizing the volume of stormwater runoff by promoting infiltration and acting as a first line of treatment of water quality pollution. Development shall observe the buffer requirements of the UDO; or if applicable the relevant development agreement, concept plan, and/or approved master plan.			
4		1.1.2	The narrative shall detail, in addition to the minimum requirements listed in items 5 through 19, the general intent of the development highlighted on the proposed development plans. If the development is to be phased, a detailed description of the proposed phases should be included. The narrative should also describe the proposed stormwater management system detailing the measures included in the system such as detention, infiltration, or filtration controls and the function of each. Description of site conditions around points of all surface water discharge including vegetation and method of flow conveyance from the land disturbing activity shall be included in the narrative.			
5		1.1.1(a)	A vicinity map indicating a north arrow, scale, boundary lines of the site, and other information necessary to locate the development site.			
6		1.1.1(b)	Description of the existing and proposed topography of the development site except in the case of individual lot grading plans in single-family subdivisions.			
7		1.1.1(c)	Site map of physical improvements on the site including both existing and proposed development.			
8		1.1.1(d)	Natural Resource Conservation Service Soil Survey			



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			map indicating a north arrow, scale, and boundary lines of the site.			
9		1.1.1(d)	Provide a copy of wetland delineation and wetland certification from Corps of Engineers and SCDHEC.			
10		1.1.1(e)	Location, dimensions, elevations, and characteristics of all stormwater management facilities.			
11		1.1.1(f)	Identification of all areas within the site included in the land disturbing activities and documentation of the total disturbed area calculations.			
12		1.1.1(g)	The location of temporary and permanent vegetative and structural stormwater management control measures.			
13		1.1.1(h)	Anticipated starting and completion dates of the various stages of land disturbing activities and the expected date the final stabilization will be completed. Location of temporary and permanent vegetative and structural stormwater management control measures for each respective stage of construction.			
14		1.1.1(i)	A determination that the development is in compliance with the Stormwater Management and Flood Damage Protection requirements of the Unified Development Ordinance, Article 5.			
15		1.1.1(j)	Designation of all easements (rights-of-way) needed for inspection and maintenance of the drainage systems and stormwater management facilities.			
16		1.1.1(k)	BMPs to control the water quality of the runoff during the land disturbing activities and during the life of the development.			
17		1.1.1(l)	Proposed site(s) for water quality testing and monitoring.			
18		1.1.1(m)	Construction and design details for structural stormwater controls.			
19		1.1.1(n)	Certification by the person responsible for the land disturbing activity that the activity will be accomplished according to the approved stormwater management plan and those responsible personnel will be assigned to the project.			
DESIGN CALCULATIONS						
20		1.1.3	Drainage areas contributing to each inlet, pipe, culvert, ditch, or swale shall be delineated and tabulated. Existing stormwater conveyance systems shall be shown on the drawings with details and capacities of each system included with the calculations. All engineering calculations needed to design the system and associated structures shall be submitted, including pre- and post-development flow velocities, peak rates of discharge, and inflow and outflow hydrographs of stormwater runoff at all existing and proposed points of discharge from the site. (Items 21 through 55 pertain to requirements of the design calculations found in Section 5.10 of the UDO and the Stormwater Design Manual)			



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21	5.10.3(b)		<p>Development shall control the post-development runoff discharge rate for the 2-, 10-, and 25-year, 24-hour design storm events to pre-development levels with structural BMPs.</p> <p>AND</p> <p>All development and redevelopment, including highways, shall use site planning, design, construction, and maintenance strategies for the property to maintain or restore, to the maximum extent technically feasible, the pre-development hydrology of the property with regard to the temperature, rate, volume, and duration of flow.</p>			
22	5.10.3(c)		<p>In areas of Hydrologic Soil Groups A and B, the development shall control and infiltrate the first one inch of stormwater runoff from the entire development or maintain the pre-development hydrology of the property for the Water Quality Design Storm Event, whichever is greater.</p> <p>AND/ OR</p> <p>In areas of Hydrologic Soil Groups C and D only, the development shall maintain the pre-development hydrology of the property for the Water Quality Design Storm Event.</p> <p>AND</p> <p>Undisturbed natural areas will not be required to demonstrate that such areas can retain the first one inch of runoff.</p> <p>(Water Quality Design Storm Event: The amount of rainfall that occurs with the 95% storm event utilizing historic rainfall data collected at the Savannah Airport. 1.95 inches of rainfall during a 24-hour duration storm event has been identified as the 95% storm event. (UDO 9.2))</p>			
23	5.10.3(e)		<p>Irrigation systems must first make use of all available surface stormwater runoff or other retained or detained stormwater as the water supply. No groundwater wells or use of potable water for irrigation of any kind will be permitted in developments or redevelopments unless it can be demonstrated that alternative sources of irrigation water will not exceed pre-development conditions. In addition, no irrigation systems shall be placed within fifty (50) feet of a natural creek, marsh, or estuary where soils and/or grade will allow such irrigation water to flow or migrate to such a natural creek, marsh, or estuary.</p>			
24		2.1	<p>The design storm duration shall be the 24-hour rainfall event, using the National Resource Conservation Service (NRCS), formerly known as Soil Conservation Service (SCS), Type III rainfall distribution with a maximum 6-minute time increment. (See Table 2-2 for return period rainfall depths)</p>			
25		6.1	<p>Development projects shall use a calculated natural ground cover and vegetated surface condition for</p>			



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			the determination of predevelopment discharge rates from the site.			
26		2.1	Hydrologic analysis shall use the Antecedent Moisture Condition III (AMC III) for all irrigated ground cover.			
27		2.1	All permanent ponding/storage shall be considered impervious surface for the purposes of hydrologic analysis and routing.			
STORM SEWER COLLECTION SYSTEM						
28		3.0	Pavement drainage requires consideration of surface drainage, gutter flow, inlet capacity, and storm sewer capacity. The design of these elements is dependent on storm frequency and the allowable inundation of stormwater on the pavement surface. Chapter 3 of the Stormwater Design Manual presents guidance for the design of these elements. Most of the information presented in this chapter was originally published in HEC-12, Drainage of Highway Pavements (Federal Highway Administration (FHWA) 1984) and AASHTO's Model Drainage Manual (American Association of State Highways Transportation Officials (AASHTO 1991).			
29		3.1	The 25-year design storm shall be used to design storm sewer inlets			
30		3.1	The 50-year, design storm shall be used on storm sewers crossing under arterials and multi-lane collector roadways.			
31		3.1	Minimum maintenance easement widths for a storm sewer collection system shall be the greater value of either 20 feet or the sum of the pipe diameter (in feet) plus 4 feet plus 2 times the depth from the pipe invert to the existing grade.			
CULVERTS AND BRIDGES						
32		4.0	The function of a culvert or bridge is to safely pass the peak flow generated by the design storm under a roadway, railroad, or other feature. The culvert or bridge design shall not cause excessive backwater or velocities. The design of a culvert must take into account the different engineering and technical aspects of the culvert site and adjacent areas which may be impacted by the design.			
33		4.1.1	Residential and collector roadways cross-drain culverts shall be designed to the 25-year storm event design frequency.			
34		4.1.1	Arterial road culverts shall be designed to the 50-year storm event design frequency.			
35		4.1.1	All culvert analyses shall demonstrate passage of the 100-year storm event without damage to physical facilities (such as conveyance past finished floor elevations of buildings and under roadways without washing out embankments and subgrades)			
36		4.1.2	Inlet and outlet flow velocities shall not impact channel stability. At a minimum, all inlet and outlet locations and other locations impacted by flow velocities near structures shall include design of channel protection where erosive flow velocities			



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			<p>occur. AND Culverts shall be designed to have a minimum mean velocity flowing full of 2.0 feet per second, the lower limit of scouring velocity.</p>			
OPEN CHANNEL						
37		5.0	The implementation of an open channel into the design requires careful planning and accounting for potential right-of-way constraints, utility conflicts, maintenance cost, and safety issues. Chapter 5 of the Stormwater Design Manual provides the necessary criteria and methodology for selection and design of open channels.			
38		5.1.1	Open channels shall be designed to convey the 10-year event below its freeboard height and the 25-year event below its bankfull elevation. The 100-year design storm shall be routed through the channel system to determine that no finished floor of residential dwellings, public, commercial, and industrial buildings will be inundated by the 100-year flood water surface elevation.			
39		5.1.3	<p>For channels three feet or less in depth, one half of foot of freeboard shall be provided. AND/ OR For channels deeper than three feet and up to five feet in depth, one foot of freeboard shall be provided. AND/ OR For channels deeper than five feet in depth, freeboard that is at least equal to 20 percent of the total channel depth shall be provided.</p>			
40		5.1.4	The final design of an open channel should be consistent with the velocity limitations for the selected channel lining to satisfy the condition of non-erosive velocity in the channel. Maximum velocity values for selected lining categories are presented in Table 5-1 of the Stormwater Design Manual. Velocity limitations for vegetative linings are reported in Table 5-2 of the Stormwater Design Manual. The manufactured channel lining velocity limitations will be established by manufacturer.			
41		5.1.5	<p>The channel system with the lining in place must have capacity for the peak flow expected from the design storm. AND The channel lining must be resistant to erosion for the design velocity.</p>			
42		5.1.6	A maintenance corridor shall be provided with all drainage channels. This corridor shall provide a minimum access width of 20 feet from the channel bank on each side unless otherwise approved by the Town.			
STORAGE FACILITIES						
43		6.2	The sizing of a storage facility depends on the amount of storage, its location within the system, and its operational characteristics. An analysis of storage facilities should consist of comparing the			



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			design flow at a location downstream of the proposed storage site both with and without storage. Flow in excess of the design storm flow is expected to pass through or around the storage facility safely (i.e., 100-year flood).			
44		6.1	Storage volume shall be adequate to attenuate the post-development peak discharge rates to predevelopment discharge rates for the 2-, 10- and 25-year storms.			
45		6.1	Parking lot, cul-de-sac, and traffic islands shall be designed to be depressed and open to receive stormwater runoff storage and treatment.			
46		6.1	Control structure release rates shall be less than or equal to predevelopment peak runoff rates for the 2-, 10- and 25-year storms, with emergency overflow adequately designed for the 100-year discharge.			
47		6.1	Design calculations must demonstrate that the facility will limit runoff from the 2-, 10- and 25-year post-development discharge rates to predevelopment peak discharge rates. AND Discharge velocities shall be non-erosive for the design storm.			
BEST MANAGEMENT PRACTICES – STRUCTURAL CONTROLS						
48		7.0	All projects shall have in series BMPs and all stormwater management system designs shall contain at a minimum one wet detention BMP, one vegetative BMP and one filter or infiltration based BMP. AND Projects shall be designed to include a minimum of three BMPs in series to meet the requirements set forth in the Stormwater Management Ordinance. The BMPs shall be selected based on site conditions to maximize their effectiveness. (See UDO Section 7.2 of the Stormwater Design Manual for BMP selection guidance)			
49	5.10.3(d)		The owners of all new developments that receive a permit from the Town shall be required to perform stormwater quality monitoring at their expense (for a period of 36 months) to ensure compliance with the provisions of this article and ensure that structural BMPs are operated as intended. (See UDO Section 5.10.3(d) of the UDO for water quality monitoring program requirements)			
50	5.10.3(d)		Water quality standards will be initially established as the pre development pollutant loading levels. A determination of the pre development pollutant loading shall be provided to the UDO Administrator and the UDO Administrator shall determine if such information is sufficient to establish the pre development pollutant loading levels. In all cases, post development pollutant loading cannot exceed pre development levels.			
51	5.10.4(a)		The owner of each structural BMP installed pursuant to this article shall maintain and operate it			



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			<p>to preserve and continue its function in controlling stormwater quality and quantity at the degree or amount of function for which the structural BMP was designed.</p> <p>AND</p> <p>The person responsible for maintenance of any structural BMP installed pursuant to this article shall submit to the UDO Administrator an annual inspection report from a registered South Carolina Professional Engineer or Landscape Architect. (See Section 5.10.4 (a) of the UDO for Inspection Report minimum requirements)</p>			
52	5.10.4(b)		<p>Prior to the conveyance or transfer of any lot or building site requiring a structural BMP pursuant to this article, the applicant or owner of the site must execute an operation and maintenance agreement. The operations and maintenance agreement must be approved by the UDO Administrator or his designee, and shall be binding on all subsequent owners of the site, portions of the site, and lots or parcels served by the structural BMP. Until the transference of all property, sites, or lots served by the structural BMP, the original owner or applicant shall have primary responsibility for carrying out the provisions of the maintenance agreement. (See UDO Section 5.10.4 (b) for Operation and Maintenance Agreement requirements)</p>			
WATER QUALITY ANALYSIS						
53		8.1	<p>The design criteria required for all new development to control and reduce water quality degradation within Town will be addressed at two levels. Pursuant to Chapter 1 of the Stormwater Design Manual and the UDO, the levels of analysis and protection in items 54 through 55 shall be adhered to for new development.</p>			
54		8.1	<p>Method 1: (For parcels less than 20 acres) Developments shall install and maintain structural BMPs approved by Town to achieve targeted pollutant removal efficiencies. The targeted pollutant for design analysis and BMP selection only shall be phosphorus. Engineering calculations shall be submitted to evaluate whether or not a proposed BMP plan for a development project will meet the recommended anti-degradation water quality goal.</p>			
55		8.1	<p>Method 2: (For parcels equal to or greater than 20 acres) Developments shall install and maintain structural BMPs approved by Town to achieve zero degradation as compared to predevelopment pollutant loads. The water quality model submittal shall include an explanation of the analysis approach, identification of pollutants or indicators and relationships thereof, description of model methodology, expected range of accuracy in result prediction, and sources of all data to be used for modeling.</p>			



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CONSTRUCTION SITE EROSION AND SEDIMENT CONTROL					
56		1.0.1	<p>The design and management of construction site runoff control measures for all qualifying developments as defined in the Ordinance shall be in accordance with SCDHEC NPDES General Permit for Stormwater Discharges from Large and Small Construction Activities, the SCDHEC Erosion and Sediment Reduction and Stormwater Management regulations and its most current version of standards, where applicable. In addition, the Town will require as a minimum, implementation of the Construction Site BMPs found in Chapter 9 of the Stormwater Design Manual.</p>		
WAIVER REQUEST					
57	5.10.3(f)		<p>Individuals seeking a waiver in connection with a Stormwater Plan may submit to the UDO Administrator a request for a waiver from the requirements of this article if exceptional circumstances applicable to a site exist such that adherence to the provisions of the article will result in unnecessary hardship and will not fulfill the intent of the article. (See UDO Section 5.10.3 (f) for Staff level waiver requirements)</p>		