



# Technical Procedure Document

**Subject:** Wetland Systems Modeling and Baseline Functionality Documentation

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## Introduction

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The City of Charleston (City) is a lowland coastal city with many wetland areas. Wetlands are important and must be protected and preserved as much as possible as they provide many benefits including providing habitat, preserving the ecosystem, enhancing water quality, and providing surface storage to hold floodwaters. Developers and designers must avoid impacting existing wetlands to the maximum extent practicable. To protect existing wetlands from over-inundation, scour, and other negative effects of development, the City prohibits the use of existing wetlands to meet applicable quantitative stormwater management requirements. Existing wetlands may only be used for stormwater conveyance purposes for a project. This Technical Procedure Document reviews the process of modeling wetland systems for conveyance of stormwater runoff for a new development or redevelopment project as well as accounts for how to document baseline wetland and stormwater conveyance conditions in and adjacent to the development site.

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## Stormwater Modeling Guidelines for Wetlands

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Developers and designers must avoid negatively affecting natural wetlands and preserve the sensitive nature of the wetland systems. Wetlands can only be used as part of site development to convey stormwater runoff from the site once the required runoff has been routed through the appropriate BMPs for qualitative stormwater management. Design for stormwater conveyance through wetland systems must adhere to the following guidelines:

- Appropriate water levels must be maintained in all wetlands during dry conditions. In order to determine these levels and the baseline dry condition, it is recommended the designer/developer engage a wetlands scientist to determine baseline functionality. The baseline dry condition water level prior to the development of the site must be maintained post-development.
- The developer/designers must confirm and demonstrate that during post-development conditions stormwater conveyance does not cause adverse impacts upstream or downstream of the site.
- The modeling analysis must show that the volume of stormwater conveyed will not cause negative effects, such as over-inundation, and varies in each individual wetland system. It is important to engage a wetland scientist to determine baseline functionality and the Ordinary High-Water Mark (OHWM) for the wetland system. In general, the City expects the water surface elevation for a 24-hour AEP to return to OHWM within 24-72 hours.

The City will use the analysis to confirm that the existing wetlands are functioning properly and can be formally integrated as a part of the City's stormwater drainage infrastructure.



## Modeling Existing Wetlands

### General Parameters

There are general parameters that are required by the City to model existing wetlands. These parameters apply to each of the three scenarios: (1) discharging to wetlands when performing the 1% AEP Analysis, (2) discharging to wetlands on an adjacent property with an easement, and (3) discharge to wetlands on an adjacent property without an easement. In order to model existing wetlands, the following parameters must be used in the model:

- Individual wetlands must be modeled with a Curve Number of 98.
- Wetlands must be modeled with an overland roughness coefficient to represent natural vegetation. This information can be obtained from the NRCS Urban Hydrology for Small Watershed - TR-55 technical document or similar hydrology document.
- Representative cross-sections should be used to model the conveyance through a wetland system that includes the main channel, the adjacent wetlands, secondary channels, and riparian zone.

### Discharging to Wetlands when Performing the 1% AEP Analysis

When performing the 1% AEP Analysis, wetlands may have storage capabilities if the site warrants it (e.g., wetland portion onsite area is 1 acre, while the total wetland area is 1000 acres). Additional parameters that should be used when performing the 1% AEP Analysis includes:

- Model wetlands as conveyance/storage as the site warrants.
- Show that the entire basin does not have adverse impacts for the 1% AEP Storm Event.
- Maximum WSE in post-development should be less or equal to the pre-development WSE.

### Discharging to Wetlands on an Adjacent Property with an Easement

Analyses are required for the site for various AEP storm events, in addition to the 1% AEP Analysis, required by the City listed **Chapter 3 of SWDSM**. If wetlands extend beyond the boundary of the project site, but an easement is in place for the wetlands, the following parameters are required for the model:

- Model the entire wetland as conveyance (no storage element)
- Make sure the post-development WSE is maintained to pre-development conditions
- No adverse impacts to the downstream system
- Does not require volume control from the wetland
- Requires water quality pre-treatment prior to the discharge to the portion of the wetland within the project site



## Discharging to Wetlands on an Adjacent Property without an Easement

For wetlands that extend past a project boundary, developer/designers must use the “glass wall method” to isolate wetlands associated with their development. The developer/designers must model the wetlands as if the wetlands do not extend past the site boundary. This is done so that water can properly be conveyed in the event that the wetlands adjacent to the site cease to exist in the future.

Representative cross sections generated from the surface should terminate at the property boundary. The water surface elevation shall not exceed the elevations associated with the property boundary. Should the OHWM established by a wetland scientist extend beyond the property boundary, the elevation associated with the property boundary shall be used as the metric for determining City compliance. Additional parameters that should be used in a model when discharging to a wetland where a portion of it is on the adjacent property of the site and the wetland is not within an easement:

- Model the wetland as conveyance within the site
- Make sure the post-development WSE is maintained to pre-development conditions
- No adverse impacts to downstream system
- Post-development volume and peak flow must be maintained the same or less than pre-development conditions
- Requires water quality pre-treatment prior to the discharge to the wetland within the project site

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## Baseline Functionality Documentation

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The purpose of the Baseline Functionality Documentation is to document the baseline wetland and stormwater conditions. When a wetland is incorporated into the stormwater management system, baseline functionality of the wetland must be made known to the City for future maintenance accommodation. Documentation of the baseline functionality must be prepared with the aid of a wetland scientist and be submitted to the City. The following must be included in the documentation at a minimum:

1. Description and Background
  - a. Acreage
  - b. USGS Quadrangle
  - c. Latitude/Longitude
  - d. Purpose
  - e. Physical Environment
  - f. Ecological Features
  - g. Hydrological Features
  - h. Man-made Structure/Improvements



2. Appendices

- a. Location Map
- b. USGS Topographic Map with Tract Boundaries
- c. Photo Location Map
- d. Infrared Soils Map
- e. Ecological Features Map
- f. Flow Map
- g. Photographic Data Sheet
- h. Photographs from Photo Locations