

Revised: 5/4/2018

Overview: The Comprehensive Plan recommends the review of a Preliminary Stormwater Engineering Analysis (the SW Analysis) in conjunction with an application for a discretionary approval (Conditional Use Permit, Conditional Rezoning, etc.) of development projects in the Southern Rivers watershed. Based on recent storm events, this recommendation also applies to projects in other watersheds located in areas with known flooding issues. While the Comprehensive Plan considers this a recommendation, the receipt of the SW Analysis by city engineering staff is necessary for them to review and understand the potential impacts of the project on the stormwater system and neighboring properties and then include those findings in the staff reports to Planning Commission and City Council.

The Preliminary Stormwater Engineering Analysis is listed on the application checklist and is communicated to the developer at the time of application or during pre-submittal meetings. In order to gain staff support for a project in the discretionary approval process, the SW Analysis must be fairly comprehensive and meet certain requirements. Staff will review and use the analysis to determine if there is a strong likelihood that the project is viable from a stormwater design perspective. When the submittal is made, the review is completed by the DSC Civil/Stormwater Engineers and DSC Engineering Manager, who will respond in writing to the Planner managing the application. Any unresolved issues are communicated to the developer and the design engineer. The DSC Engineers will seek assistance from the Public Works Stormwater Engineering Center on all projects that may require complex modeling or may affect Public Works' studies or projects. When the project moves forward to Planning Commission, the staff report will include a narrative regarding the viability of the project from a stormwater design perspective.

Requirements: The following list contains the general information required in the Preliminary Stormwater Engineering Analysis. Depending on the location, topography and proposed development, more or less information may be required as necessary to support the project. The analysis generally needs to be presented as a combination of maps, drawings, narrative and calculations. The Preliminary Stormwater Engineering Analysis does not guarantee that the final design will meet stormwater requirements and be approved.

Preliminary Stormwater Engineering Analysis submittal requirements:

1. Stormwater Management narrative to include:
 - a. Description of the existing and proposed nature of the site
 - b. Description of the existing drainage patterns and the intended stormwater design
 - c. Methods used to meet water quality and quantity requirements

2. Proposed preliminary plan:
 - a. Storm system layout, stormwater management facilities (SWMF), outfall



- b. Drainage area maps/delineations. Drainage area maps shall depict on-site and off-site drainage area, land use and soil conditions. Maps should include all areas contributing to the point of analysis.
 - c. Existing and proposed impervious area tabulations per drainage area
 - d. FEMA flood zone delineation per the Flood Insurance Rate Map (FIRM) and also based on existing topography using the FEMA Base Flood Elevation
 - e. Estimated or known tidal and non-tidal wetlands locations
 - f. Average existing elevations and proposed elevations of the lots, dwellings and streets
 - g. Proposed estimated height and volume of fill needed for the project.
 - h. Location of the SWMF
 - i. SWMF cross-section with estimated volumes and calculations to show that it can be adequately sized for the given location and seasonal high groundwater elevation
3. Supporting information:
- a. Soil analysis - seasonal high groundwater elevation; soil types; existing ground cover (field, forest, etc.) based on actual soil borings or available USGS data, Aerials, field reconnaissance, adjoining projects, etc.
 - b. Any on-site ponding should be noted and approximate detention estimated.
 - c. A contributing base flow from groundwater, where BMP facilities intercept seasonal high groundwater elevation, shall be included in the analysis.
 - d. VRRM spreadsheet to show what assumptions are being used for water quality compliance
 - e. Water quantity calculations that demonstrate how requirements for channel protection, flood protection, and safe conveyance of the 100-year storm will be met.
 - f. An analysis of either a static hydraulic grade line or dynamic modeling of the system should be included.
 - g. Design must analyze the effects of tailwater on the proposed development, and other contributing drainage areas, for the 10- and 100-year return frequency storm events (and/or other return frequencies as the drainage area size may necessitate). Tailwater elevations must be approved by the City prior to beginning analysis.
 - h. The site and proposed stormwater management system must be evaluated for a 1.5-foot rise in the tailwater condition (to account for sea level rise and its related consequences).
 - i. The City of Virginia Beach recognizes that rainfall patterns are changing and is in the process of updating the requirements in the Public Works Standards and Specifications. Developer's engineer shall perform all analysis using the following inches of rain for the design storms:
 - 1-year storm - 3.60 inches
 - 2-year storm - 4.38 inches
 - 10-year storm - 6.77 inches
 - 25-year storm - 8.39 inches
 - 50-year storm - 9.91 inches
 - 100-year storm - 11.34 inches