

# Stormwater, Critical Area and Engineering

## CHAPTER 1

### INTRODUCTION

- A. Purpose** This manual has been prepared by the staff of The Town of Ocean City in order to provide a comprehensive tool to develop the means for, as stated in Title 4, Subtitle 2 of the Environment Article and the Title 8, Subtitle 18 of the Natural Resources Article of the Annotated code of Maryland, "...the management of stormwater runoff...necessary to reduce..., pollution, siltation and sedimentation, and local flooding, all of which have adverse impacts on the water, and land resources in Maryland." Additionally, as referenced to in Chapter 30 ENVIRONMENT Article III Stormwater Management and Article VII Atlantic Coastal Bays Critical Area Program of the City Code. The purpose of stormwater management in the Town is to:
1. Protect, maintain, promote and enhance the public health, safety, and general welfare through the management of stormwater.
  2. Protect public and private property from damage,
  3. Reduce the adverse effects of development
  4. Reduce the effects of land use changes on stream channel erosion,
  5. Preserve and enhance the environmental quality of streams and stream valleys,
  6. Minimize adverse impacts on water quality and conserve plant, fish, and wildlife habitat,
  7. Reduce flooding,
  8. Maintain after development, as nearly as possible the pre-development runoff characteristics, and ,
  9. Establish the minimum requirements and procedures to control the adverse impacts associated with increased stormwater runoff."
- B. Goal** The goal of this manual, the 2000 Maryland Stormwater Design Manual, and the Critical Area 10% Rule Guidance Manual is to serve the developer, consultant and the City staff as the source of all procedures, processed, policies and regulations for providing their developments with the appropriate stormwater management techniques to adequately address the State and City stormwater management regulations.
- C. Authority**
- 1. State Design Manual** The 2000 Maryland Stormwater Design Manual prepared by the Maryland Department of the Environment became effective on July 1, 2001 and established the parameters for the minimum requirements necessary to provide stormwater management on all development sites around the state. It also established recharge volume (Re), water quality volume (WQ), and the channel protection volume (Cp) as the limit of the State responsibility, (see Chapter 2 of this manual for explanations of these parameters). The enforcement of the

remaining parameters; overbank flood protection ( $Q_p$  or  $Q_{10}$ ), and the extreme flood ( $Q_f$  or  $Q_{100}$ ) (see Chapter 2 of this manual for explanations of these parameters), are left to the local jurisdictions' discretion.

2. **Ordinance:** <http://www.town.ocean-city.md.us/clerk/code/index.html>
  - a. Environment
    - i. Erosion and Sediment Control
    - ii. Stormwater Management
    - iii. Critical Area
    - iv. Lot Maintenance
  - b. Flood
  - c. Building Code
    - i. Property Maintenance Code
    - ii. International Residential Code
    - iii. International Building Code
  - d. Zoning Code
  - e. Waterways
  - f. Streets Sidewalks and other Public Places
  - g. Vegetation
3. **Town of Ocean City Comprehensive Plan**
  - a. Community Facilities and Public Services
  - b. Sensitive Area and the Environment
4. **Maryland Coastal Bays Comprehensive Conservation Management Plan**
  - a. Water Quality
  - b. Fish and Wildlife
  - c. Recreation and Navigation
  - d. Economic and Community Development
- D. **General Performance Standards** The following performance standards, in addition to those in the 2000 Maryland Stormwater Design Manual and the Critical Area 10% Rule Guidance Manual, shall be addressed at all sites, to prevent adverse impacts from stormwater runoff, where stormwater management and critical area compliance is required (some of the standards are not new but are revised from the state standards, therefore, if any of the following standards have italicized portions they represent changes from the State Performance Standards):
  1. **Standard No. 1** - Site designs shall minimize the generation of stormwater runoff and maximize pervious areas for stormwater treatment. Water Quality volume will be based on the existing and proposed impervious surfaces. Under the redevelopment credit you will be required to provide 20% reduction of impervious surface or treatment of the first inch of rain off 20% of existing impervious surface and 100% of the first inch off the increased impervious surface. (Unless otherwise defined in Standard No. 3)
  2. **Standard No. 2** - The use of nonstructural stormwater management practices shall be implemented to the maximum extent practicable for satisfying the

recharge volume requirement prior to the use of structural stormwater management practices to more closely mimic the pre-development hydrology and to discourage the reliance on structural BMP's.

3. **Standard No. 3** – North of 33<sup>rd</sup> Street and east side of Coastal Highway, and where ever the City Engineer deems appropriate, quantity control must be provided. The water quantity volume will be 1” (P) off the entire impervious surface \* .95/ 12. No re-development credit applies. In addition, safe conveyance of the extreme storm events, over 1”, through or around site to a City street or alley must be provided. The City street or alley must also have positive conveyance and not pond or create a drainage nuisance.
4. **Standard No. 4** All BMP's shall have an enforceable and recorded operation and maintenance agreement to ensure the system functions as designed.
5. **Standard No. 5** Stormwater discharges from land uses or activities with higher potential for pollutant loadings, defined as hotspots in Chapter 2 of the State Manual, may require the use of specific structural BMP's and pollution prevention practices. In addition, stormwater from a hotspot land use cannot be infiltrated.
6. **Standard No. 6** Stormwater design is based on proposed impervious surface area as shown on the site plan. An as-built survey of the property will be required to verify impervious surface computations used in design. Perviousness to groundwater must be substantiated.
7. **Standard No. 7** Grading plan must be submitted to show elevations of paving, curbing, landscaping and adjoining property elevations. No grading on neighboring property is allowed. If a retaining wall is needed due to grade differential a detail must be shown on plans. Provide a 1” in 10’ minimum slope across property and a maximum 3:1 side slope on landscaping. Stabilization measure must be specified. Timbers and retaining walls must be shown on site plan and considered in the landscaping plan. The entire lot must drain to a city street per Flood Code.
8. **Standard No. 8** Single Family home impervious surface limit.
  - < 5000 SF 60% of site upland area,
  - 5000 to 6000 SF - Flat 3,000 SF
  - > 6000 SF 50% of site upland areaIf unwilling to maintain impervious surface limit Stormwater and Mitigation per 10% rule worksheet or other measure approved by the City Engineer will be required.
9. **Standard No. 9.** Roof drainage may not be automatically directly discharged through a bulkhead without first providing water quality treatment. Waivers must be obtained in writing from the City Engineer. Prior direct connection is not grandfathered and must be evaluated on a case-by-case basis.

## CHAPTER 2

### SIZING REQUIREMENTS

A. Unified Stormwater Sizing Criteria - This chapter explains the sizing criteria needed for Stormwater Management Plans in the Town of Ocean City. This chapter also outlines the basis for design calculations, acceptable BMP's and City Requirements in excess of the State requirements

1. Water Quality Volume (WQ<sub>v</sub>) WQ<sub>v</sub> is the storage needed to capture and treat the stormwater runoff from 90% of the average annual rainfall. The specific rainfall depth to be used will be 1.0" (P) as per the Eastern Rainfall Zone. The WQ<sub>v</sub> will be based the following equation:
  - a.  $P * .95 * (\text{area of impervious surface}) / 12$
  - b. Water quality requirements for 10% rule within the Critical Area must be met and may be addressed by the State water quality requirements. But this must be verified by the applicant
2. Recharge Volume (Re<sub>v</sub>) Re<sub>v</sub> is that portion of the water quality volume used to maintaining ground water recharge rates at development sites. The criteria for maintaining recharge is base on the average annual recharge rate to the hydrologic soil group(s) present at a site a determined from the USDA and NCRS Soil Surveys which creates a direct relationship between the rainfall rate and the recharge rate for each hydrologic soil group. With this said, the Recharge Volume (Re<sub>v</sub>) for the Town of Ocean City is not strictly enforced but should be provided wherever possible to help prevent saltwater intrusion. There are no ground water recharge zones thus the need for groundwater recharge is not applicable to a barrier island system with direct release to tidal wasters of the Atlantic Ocean and the Maryland Coastal Bays.
3. Overbank or Flood Protection Volume (Q<sub>p</sub>) The primary purpose of the flood protection volume sizing criteria is to prevent an increase in the frequency and magnitude of known flooding problems by the development.
  - a. North of 33<sup>rd</sup> street and east of Coastal Highway will require storage for 1" of rainfall off proposed impervious surfaces. No redevelopment credit applies
4. Extreme Flood Due to Ocean City's location, geology, topography and site constraints Extreme Flood volumes control will not be required. The Town exceeds the FEMA building requirements for flood protection. However, safe passage of the extreme storm events must be shown by the grading plan. All grades on site and under buildings must have positive drainage toward city street. 1" in 10' minimum across property.

B. Acceptable Best Management Practice BMP Groups, (See details in appendix)

1. Infiltration- Infiltration or Exfiltration Trenches, Pervious Pavers
2. Filtration – Sand filter
3. Bioretention – As filter or infiltration
4. Wetlands- Pocket Wetland

5. Ponds- Pocket Pond
6. Non-structural (see design manual for applicability)
  - a. Natural area conservation
  - b. Disconnect of rooftop runoff
  - c. Disconnect of non-rooftop runoff
  - d. Sheet flow to buffers
  - e. Grass or open channel use
  - f. Environmentally sensitive development

**Note:**

Calculation of impervious surface must include all impervious surfaces. This will include the proper size for Solid Waste removal and Recycling, water meter vaults, egress paths, transformers, generators, and all other utilities.

## Stormwater in Ocean City

With MDE and DNR each passing state laws regarding storm water management and requiring Ocean City to meet the intent of both has been a challenge to say the least. MDE requires water quality volume treatment and DNR requires proof of pollutant reduction and habitat enhancement. Therefore, Best Management Practices must be utilized on new development and re-development projects to meet the intent of both regulations. The MDE Stormwater Regulation starts at lots 5,000 SF in size and DNR's regulations starts at any thing over 250 SF of disturbance. Therefore, most all development/re-development in the town must incorporate some sort of Best Management Practice that treats Stormwater.

The choices of BMP's in Ocean City are very limited. Lot size and value is the main restriction. Buildings are located setback to setback and along with, parking requirements, landscaping requirements, location of utilities, (electric pad, phone pedestals, water meters, etc.) stormwater management is the last to be incorporated into the site plan. Other consideration in choosing BMP's is the location of Ocean City. Ocean City is a flat barrier island 100% urban. Oceanside of the island is very sandy however the Bayside is ? (Made land). Made lands is a mixture of dredge spoil and whatever they trucked in. Soil infiltration rates, property slope, groundwater elevation, along with the other site requirement have to be considered in Stormwater Management Design. We encourage the designer to utilize pervious paving techniques to jointly meet parking and stormwater requirements as well as including Bioretention techniques in landscaping plan to meet landscaping requirements. With this in mind the following are the BMP's out of the 2000 Maryland Stormwater Design Manual that are viable in the Town:

- Infiltration-
  - Exfiltration Trench – (minimum 2' clearance to water table)
  - Pervious Pavers can be designed as and infiltration trench
  - Bioretention (as infiltration)
- Filters-
  - Bioretention
  - Sand Filters
- Non-Structural Techniques-
  - Disconnect rooftop runoff
    - Swales and raingardens and other landscaped areas
  - Disconnect of non-rooftop runoff
    - Sheet flow of parking to swales/bioretention
  - Maximum impervious surface requirements
  - Pervious paver, pervious deck design, pervious sidewalks, pervious concrete and asphalt.
- Ponds/wetlands
  - Pocket ponds and wetlands
  - Larger SWM pond/wetland facilities have a very limited feasibility

## Glossary

### Definitions

- A. In this Manual the following words have the meaning indicated;
1. **“Administration”** means the Maryland Department of the Environment, Water Management Administration.
  2. **“Adverse Impact”** means any deleterious effect on waters or wetlands, including their quality, quantity, surface area, species composition, aesthetics, or usefulness for human or natural uses that:
    - a. is or may be harmful or injurious to human health, welfare, safety, or property, or to biological productivity, diversity or stability; or
    - b. unreasonably interferes with the enjoyment of life or property, including outdoor recreation.
  3. **“Approving Authority”** means:
    - a. for a building permit the Office of Planning and Zoning; and
    - b. for grading and Storm Water Management permit, the Engineering Department.
  4. **“Best Management Practice”** means a structural stormwater management practice or nonstructural stormwater management practice designed to store temporarily or treat stormwater runoff in order to mitigate flooding, reduce pollution, and provide other amenities.
  5. **“Clear”** means to cut or remove trees, ground cover, stumps, roots or any other vegetative material:
    - a. but does not include to mow grass.
  6. **“City Procedures Manual”** means the Town of Ocean City Stormwater Management Practices and Procedures Manual.
  7. **“Critical Area”** means all land and water areas in the county within 1,000 feet measured planimetrically beyond the landward boundaries of tidal wetlands and the heads of tides of the Atlantic Coastal Bays.
  8. **“Department”** means the Engineering Department.
  9. **“Design Standards”** means:
    - a. the 2000 Maryland Stormwater Design Manual Volumes I and II (Maryland Department of the Environment, April 2000);
    - b. USDA Natural Resources Conservation Service, Maryland Conservation Practice Standard Pond Code 378 (January 2000); and
    - c. The City Procedures Manual.
  10. **“Developer”** means a person who undertakes development subject to this title.

## Glossary

### Definitions (cont)

11. **“Development”** means a subdivision of land or a man-made change to improved or unimproved real property that changes the stormwater runoff characteristics of a site, and includes:
  - a. Any construction, reconstruction, modification, extension, or expansion of buildings or other structures, placement of fill or concrete, dumping, mining, dredging, clearing, grading, paving, drilling, storage of materials, land improvement, landfill operations, or any combination of these activities.
12. **“Direct Discharge”** means the concentrated release of stormwater from development to tidal waters or vegetated tidal wetlands.
13. **“Director”** means the Director of the City Engineer of Inspections and Permits or the Director’s designee.
14. **“Drainage Area”** means that area enclosed by a ridge line that contributes stormwater runoff to a single point measured in a horizontal plane.
15. **“Extended Detention”** means a stormwater management design feature that provides gradual release of a volume of water in order to increase settling of pollutants and protect downstream channels from storm events, for which the method of calculation is specified in the 2000 Maryland Stormwater Design Manual, Volumes I and II.
16. **“Extreme Flood Volume (Qf)”** means the storage volume required to control infrequent, large storm events in which overbank flows reach or exceed the boundaries of the 100-year floodplain.
17. **“Flooding”** means stormwater runoff from a natural or man-made stormwater runoff conveyance system that:
  - a. inundates an existing structure; or
  - b. overflows onto land that lies outside of floodplain easements, drainage easements, or areas shown on federal insurance rate maps as flood-prone areas.
18. **“Grade”** means to strip, scarify, excavate, or stockpile earth materials or to grub, fill, or otherwise move root-mat or topsoil.

19. **“Impervious Surface”** means a surface in the landscape that does not allow the infiltration of rainfall and shall include but not limited to:
- a. hot bituminous asphaltic pavement, cold mix asphaltic pavement, compacted gravel surfacing, Portland cement concrete, type 1 fill or type 2 fill as defined in §2-101 of Article 21 used within road rights-of-way, sidewalks, driveways, curbs and gutters, patios, porches, walkways, swimming pools, tennis courts, parking areas, and principal and accessory structure coverage area, utilities/water meter.
20. **“Infill Development”** means the development on an unimproved site for which subdivision approval is not required.
21. **“Infiltration”** means the passage of water into the soil surface.
22. **“Intermittent Stream”** means a stream, or reach of a stream, that is below the local water table for at least some part of the year, and obtains its flow both surface runoff and ground water discharge, or those areas that are surface waters, contained within a defined channel or bed, that flow at least once per year. (a defined channel or bed is indicated by hydraulically sorted sediment, or the removal of vegetative litter or loosely rooted vegetation by the action of moving water).
23. **“New Development”** means development on:
- a. an unimproved site where subdivision approval is required; or
  - b. a portion of a site on which there is an existing commercial industrial, institutional, or multifamily residential use, if the portion of the site has not been part of the existing use.
24. **“Nonstructural Stormwater Management Practice”** means a stormwater management practice designed to minimize the use of structural stormwater management practices and the increase in stormwater runoff from development, and includes:
- a. Natural Area Conservation;
  - b. Disconnection of Rooftop Runoff;
  - c. Disconnection of Non-rooftop Runoff;
  - d. Sheet Flow to Buffers;
  - e. Grass Channels; and
  - f. Environmentally Sensitive Development.
25. **“Outfall”** means the point at which a proposed stormwater, conveyance system carrying stormwater runoff from a site discharges into an existing man-made or natural stormwater conveyance system.
26. **“Overbank Flood Protection Volume (Op)”** means the volume controlled by structural stormwater management practices to prevent an increase in the frequency of out-of-bank flooding generated by development, for which the method of calculation is specified in the 2000 Maryland Stormwater Design Manual, Volumes I and II (Maryland Department of the Environment, April 2000)

27. **“Qualitative Stormwater Management”** means a system of vegetative, structural, and nonstructural practices that reduce or eliminate pollutants that might otherwise be carried by stormwater runoff and included water quality volume and recharge volume design parameters.

28. **“Quantitative Stormwater Management”** means a system of vegetative, structural, and nonstructural practices that control the increased volume and rate of stormwater runoff caused by development and includes channel protection storage volume, overbank flood protection volume, and extreme flood volume design parameters.

29. **“Recharge Volume (Re,)”** means that portion of the water quality volume used to maintain groundwater recharge rates at a development site, for which the method of calculation is specified in the 200 Maryland Stormwater Design Manual, Volumes I and II (Maryland Department of the Environment, April 2000).

30. **“Redevelopment”** means development on:

- a. a site on which there is an existing commercial, industrial, institutional, or multifamily residential use;  
or
- b. a portion of a site on which there is an existing commercial, industrial, institutional, or multifamily residential use, if that portion of the site has been part of the existing use.

31. **“Retrofit”** means to:

- a. construct a structural Best Management Practice in a previously developed area;
- b. modify an existing structural Best Management Practice; or
- c. implement a nonstructural stormwater management practice to improve water quality over current conditions.

32. **“Sediment”** means soils or other surficial materials transported or deposited by the action of wind, water, ice, or gravity as a product of erosion.

33. **“Site”** means a tract, lot, or parcel of land or a combination of tracts, lots or parcels of land that are:

- a. in one ownership; or
- b. contiguous and in diverse ownership if development is to be performed as part of a unit, subdivision, or project.

34. **“Stormwater Management Plan”** means a set of drawings, reports, and other documents, submitted by a developer as a prerequisite to obtaining stormwater management approval, that contain all of the information and specifications required by this title.

35. **“Structural Stormwater Management Plan”** means a stormwater management practice designed to satisfy the applicable minimum control requirements established in this title and include:

- a. a stormwater management pond;
- b. a stormwater management wetland;
- c. stormwater management infiltration;
- d. a stormwater management filtering system; and
- e. a stormwater management open channel system.

36. **“Tidal Waters”** means watercourses in which velocity, depth, and width are influenced by tidal action.

37. **“Tributary Outfall”** means the point, downstream of an outfall, at which the site tributary is joined by another tributary whose drainage area equals or exceeds the drainage area of the site tributary.

38. **“Waiver”** means the relinquishment of stormwater management requirements by the Approving Authority for a specific development.

39. **“Watercourse”** means any natural or artificial stream, river, creek, ditch, channel, canal, conduit, culvert, drain, waterway, gully, ravine, or wash, in and including any adjacent area that is subject to inundation from overflow or flood water.

40. **“Watershed”** means the total drainage area contributing stormwater runoff to a single point.

41. **“Water Quality Volume (Wq<sub>v</sub>)”** means the volume needed to capture and treat the stormwater runoff from 90% of the average annual rainfall at a development site, for which the method of calculation is specified in the 2000 Maryland Stormwater Design Manual, Volumes I and II (Maryland Department of the Environment, April 2000)