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## 9.0 EROSION AND SEDIMENT CONTROL

Sedimentation involves three basic geologic processes: erosion, transportation, and deposition. These are natural geologic phenomena, however, land development activities may initiate severe, highly undesirable and damaging alterations in the natural sedimentation cycle by drastically accelerating the erosion and transportation process. Receiving waters are the final destination for sediment transport and deposition. However, natural streams and lakes are not capable of handling the excessive sediments created by this accelerated cycle. Therefore, excessive sediment loads result in turbid waters and heavy deposition over the substrate. The impact of these events directly affects the propagation of aquatic life which relies on clear substrates and water to feed and reproduce. Sediment laden waters affect human activities through the degradation of waters used for aquatic recreation and sport fishing and complicate water treatment processes. Consequently, minimizing the occurrence of erosion and effective control of sediment transport is imperative to all.

### 9.0.1 Sedimentation Cycle

Soil erosion is usually caused by the impact force of raindrops and by the sheer stress of runoff flowing in rills and streams. Raindrops falling on bare or sparsely vegetated soil detach soil particles; runoff, in the form of sheet flow along the ground, picks up and carries these particles to surface waters. As the runoff gains velocity and concentration, it detaches more soil particles, cuts deeper rills and gullies into the surface of the soil, and adds to its own sediment load. Coalescing rivulets produce streams which have a larger volume and usually an increased velocity. These increasing streams have a greater capacity to remove sediment and transport it downstream. The further the runoff runs uncontrolled, the greater its erosive force and the greater the resulting damage. As the distance and volume of uncontrolled flow increase the control becomes increasingly difficult. At some point, the energy in the stream dissipates to level that can no longer support the transport of the sediment. At this time, the sediment falls out of the water column and deposits. Over time the sediment will either be incorporated into the substrate or be re-suspended for further transport.

### 9.0.2 Factors Influencing Erosion

The erosion potential of a site is principally determined by the soil type, vegetative cover, topography, climate, and season. These factors contribute to the detachment of soil particles and their transport off-site.

- Soil Type – Erodibility, the amount of energy needed to break down soil structure, is dependant on soil composition and texture. Soils with high erodibility require less energy to detach soil particles.
- Vegetative Cover – Vegetation shields soils from the impact energy of raindrops and traps suspended sediment from runoff.
- Topography – Steeper and longer slopes generate runoff with more velocity and energy to erode and transport more sediment.
- Climate – Rainfall frequency and intensity cumulatively contribute energy in the form of raindrop impact and runoff volume to detach and transport soil particles.
- Season – Seasonal variations in wind, temperature, humidity, and rainfall may create more ideal conditions for erosion.

### 9.0.3 Concepts of Erosion and Sedimentation Control

Principles of erosion and sedimentation control are based on minimizing the effects of the soil and climatologic factors just discussed. None of the following concepts provide a singular solution for controlling those factors, nor can they all be performed at every site. However, the integration of as many concepts as possible provides the most effective erosion and sedimentation control:

- A. Compatible Site Planning
  - Minimize development within sensitive areas (e.g. highly erosive soils).
  - Limit the length and steepness of the designed slopes.
  - Maintain natural vegetative cover when possible.
- B. Disturbed Areas Reduction
  - Minimize the extent of the disturbed area and the duration of exposure.
  - Phase or stage development so that only the areas that are actively being developed are disturbed.
  - Minimize large or critical area grading during the season of maximum erosion potential.
- C. Disturbed Areas Protection
  - Complete grading as quickly as possible.
  - Establish permanent vegetation as soon as possible on disturbed areas.
  - Divert runoff from disturbed areas.
- D. Sediment Retention within Site Boundaries
  - Filter runoff as it flows from a disturbed area
  - Impound sediment-laden runoff temporarily so that the soil particles are deposited onsite.

## 9.1 REGULATIONS

There are a number of South Carolina statutes that govern project permitting for land disturbing activity. Some of these laws pertain to land disturbing activity occurring on state owned land or performed by the state Department of Transportation. All other projects are regulated by the South Carolina Stormwater Management and Sediment Reduction Act of 1991 (Act). The Act aims to "reduce the adverse effects of storm water runoff and sediment and to safeguard property and the public welfare by strengthening and making uniform the existing storm water management and sedimentation control program."

The Act defines a land disturbing activity as "any use of the land by any person that results in a change in the natural cover or topography that may cause erosion and contribute to sedimentation and alter the quality and quantity of storm water runoff. Unless exempted, no person may engage in a land disturbing activity without first submitting a storm water management and sedimentation control plan to the appropriate implementing agency and obtaining a permit to proceed."

The Act provides for the promulgation of regulations (R.72-300 South Carolina Standards for Stormwater Management and Sediment Reduction) which, at a minimum, are required to address the following:

- criteria for the delegation of program elements and review and revocation of delegated program elements;
- appeal procedures for local governments requesting delegation of program elements;
- types of activities that require storm water management and sedimentation control permits;
- waivers, exemptions, variances, and appeals;
- storm water management and sedimentation control plan application fees;
- criteria for distribution of funds collected by storm water management and sedimentation and erosion control plan approval;
- criteria for implementation of a storm water management utility;
- specific design criteria and minimum standards and specifications;
- permit application and approval requirements;
- specific enforcement options;
- criteria for approval of designated watersheds;
- criteria regarding correction of off-site damages resulting from the land disturbing activity;
- construction inspections;
- maintenance requirements for sedimentation control structures during construction and storm water management structures after construction is completed;
- procedures to accept and respond to citizen complaints on delegated program components and individual site problems; and
- schedule for implementing this chapter considering such factors as demographics, growth, development, and state and local resources.

The NPDES Phase II storm water regulations enacted by the Clean Water Act of 1972 and promulgated by Stormwater Phase II Final Rule (1999) require that any activity disturbing an acre or greater of land, or a smaller project part of a larger common plan for development or sale, obtain NPDES construction permit coverage. This regulation differs somewhat from the South Carolina state regulations relating to areas of disturbance. Any land disturbing activity in the County that meets the aforementioned criteria of one acre or more of disturbance will need to will comply with the state process for permitting. Application and issuance of an approved permit under the South Carolina state regulations for erosion and sedimentation control will meet the requirements for coverage under NPDES Phase II as well.

## **9.2 REFERENCES**

The Office of Ocean and Coastal Resource Management (OCRM) is the delegated authority for the County in administering the Sediment, Erosion, and Stormwater Management Program and the Construction Coverage aspect of the NPDES Phase II Program. Permit applications are received and approved by OCRM. A local NPDES storm water permit from the County will be conditional upon the approval of a State Sediment, Erosion, and Stormwater Management Permit. Permit application and guidance documents can be obtained at the DHEC Environmental Quality Control website, OCRM website, or the local OCRM office.