

Chapter 6

EROSION AND SEDIMENT CONTROL

Table of Contents

6.1 INTRODUCTION..... 2

6.2 DESIGN CRITERIA AND GUIDELINES..... 2

 6.2.1 LAND-DISTURBING ACTIVITY..... 2

 6.2.2 DESIGN CRITERIA 3

 6.2.2.1 *Fit the Activity to the Topography and Soils*..... 3

 6.2.2.2 *Minimized Duration of Exposure*..... 3

 6.2.2.3 *Stabilize Disturbed Areas Immediately* 3

 6.2.2.4 *Retain or Accommodate Runoff*..... 4

 6.2.2.5 *Retain Sediment*..... 4

 6.2.2.6 *Do Not Encroach Upon Watercourses*..... 4

6.3 PRACTICE STANDARDS..... 4

6.4 APPLICATION REQUIREMENTS..... 5

 6.4.1 PLAN REQUIREMENTS 5

6.5 CONSTRUCTION PHASING AND SEQUENCING 9

 6.5.1 INITIAL PHASE OF CONSTRUCTION 9

 6.5.2 INTERMEDIATE PHASING OF CONSTRUCTION 9

 6.5.3 CONSIDERATIONS FOR SPECIFIC TYPES OF DEVELOPMENT 10

 6.5.3.1 *Residential Subdivisions*..... 10

 6.5.3.2 *Apartments and Townhome Developments* 10

 6.5.4 FINAL PHASE(S) AND PROJECT CLOSE-OUT 10

6.6 GROUNDCOVER VS. STABILIZATION 11

 6.6.1 GROUNDCOVER..... 11

 6.6.2 STABILIZATION..... 12

6.7 SINGLE-FAMILY RESIDENTIAL CONSTRUCTION..... 13

6.8 COMPACTED PERVIOUS AREAS..... 14

6.9 POST-CONSTRUCTION SCM..... 14

6.1 INTRODUCTION

Erosion by water is the process of breaking loose and transporting soil particles. The energy of raindrops falling on exposed soils and water flowing over unprotected ground transports detached soil particles. As the volume and velocity of flowing water increases, additional soil particles are detached and transported. The further water flows, the more the flow tends to become concentrated into channelized flow. This first creates rills and eventually channels of varying widths and depths.

Sedimentation is the process where soil particles settle out of suspension as the velocity of water decreases. Heavier particles (e.g. gravel, sand, etc.) settle out more rapidly than lighter particles (e.g. fine silt, clay, etc.). Sedimentation can often be confused with turbid or discolored water. Turbidity is related to water clarity and is a function of the amount of material that stays suspended in the water column, rather than settles. Suspended materials may include soils particles (e.g. clay, silt, sand, etc.), algae, plankton and other materials.

This chapter describes the erosion and sediment control (E&SC) requirements for the City. Adherence to this chapter, as well as to the North Carolina Department of Environmental Quality (NCDEQ) "[Erosion and Sediment Control Planning and Design Manual](#)" and the City's [Unified Development Ordinance](#) (UDO) for E&SC is required.

Appropriate sediment storage, erosion control measures and perimeter sediment control measures must be installed on the site prior to any land-disturbing activities. A surety for land-disturbing activities, as specified in [UDO Section 9.4.4.A.1.c](#), shall be paid to the City prior to permit issuance. It is imperative that appropriate engineering practices are used to ensure that E&SC measures are applicable for the situation and activity.

6.2 DESIGN CRITERIA AND GUIDELINES

6.2.1 Land-Disturbing Activity

Land-disturbing activity, as defined by the UDO, is any use of the land by any person in residential, recreational, industrial, educational, service, institutional, civic, office or commercial development, highway and road construction and maintenance that changes the natural cover or topography, alters the natural structure of the land mass, or may cause or contribute to sedimentation. This includes, but is not be limited to, the following:

- Clearing and Grubbing
- Dredging
- Grading
- Excavating
- Filling
- Change of Land Use (i.e. draining a pond, etc.)
- Earthen Stockpiling
- Staging and Storage
- Construction Access
- Demolition
- Construction
- Erosion Control
- Equipment Parking

All land-disturbing activities undertaken within the City are required to provide adequate E&SC measures on-site to protect public and private property from erosion and sediment damage as a result of the land-disturbing activity, regardless of whether a Land Disturbance Permit is required for the activity.

6.2.2 Design Criteria

All temporary E&SC measures shall be designed to the standards in the NCDEQ [“Erosion and Sediment Control Planning and Design Manual”](#) or City standards, whichever is more stringent. Adequate E&SC measures shall be planned, designed, installed and maintained throughout all phases of construction for the 25-year storm event.

In addition, for all projects with five acres or more of land disturbance, detention of stormwater shall be required during construction as per [UDO Section 9.2.2.E.1.b](#), unless the site meets the exemption specified in the UDO.

Any site or project which is subject to post-construction detention requirements shall also provide detention during construction. There shall be no increase in peak stormwater runoff leaving the site at each point of discharge between pre-development conditions and construction for the 1- and 10-year storm events. If additional post-construction detention requirements for storm events above the 10-year storm are required, then the same storm events shall also be required to be detained as described above during construction.

6.2.2.1 Fit the Activity to the Topography and Soils

Detailed planning shall be employed to ensure that roadways, buildings and other permanent features of the activity conform to the natural characteristics of the site. Large graded areas should be located on the most level portion of the site. Areas subject to flooding should be avoided. Areas of steep slopes, erodible soils and soils with severe limitations for the intended uses should not be used without overcoming the limitations through sound engineering practices.

6.2.2.2 Minimized Duration of Exposure

Clearing of natural vegetation shall be limited to only those areas of the site to be disturbed at a given time. Natural vegetation shall be retained, protected and supplemented with construction scheduling to limit the duration of soil exposure. Major land clearing and land-disturbing operations should be scheduled during seasons of low potential runoff. Reference Section 6.4.1 below for additional guidance.

6.2.2.3 Stabilize Disturbed Areas Immediately

Permanent structures, temporary or permanent vegetation and mulch, or a combination of these measures, shall be employed as quickly as possible after the land is disturbed. Temporary vegetation and mulch can be most effective on areas where it is not practical to establish permanent vegetation.

If a delay is anticipated in obtaining finished grade, temporary measures shall be employed immediately after rough grading is completed. The cut or fill finished slope shall be stable and the ease of maintenance shall be considered in the design. All roadways, parking areas and paved areas shall be stabilized with gravel subbase, temporary vegetation or mulch. See

Section 6.6 for groundcover and stabilization requirements.

6.2.2.4 Retain or Accommodate Runoff

Runoff from the development shall be safely conveyed to a stable outlet using stormwater conveyance systems, diversions, stable waterways or similar measures. Consideration shall also be given to the installation of stormwater retention structures to prevent flooding and damage to downstream facilities resulting from increased runoff from the site. Temporary or permanent measures for stormwater conveyance shall be designed to withstand the velocities of projected peak discharges. These measures should be operational as soon as possible after the start of construction and, if possible, before the disturbance of the surrounding areas. One important item to note, however, is that post-construction stormwater control measures should not be implemented until the areas draining to them are stabilized and the stormwater inspector has given approval for conversion/implementation as noted in Section 6.9 below, particularly measures which rely on filtration and vegetation as a pollutant removal mechanism.

6.2.2.5 Retain Sediment

Appropriate sediment storage designed for each drainage area shall be provided throughout all phases of construction until final stabilization of the site. The appropriate initial E&SC measures must be installed on the site and approved by the City Stormwater Inspector prior to conducting any land-disturbing activity. Measures must be installed per the approved plan and must be maintained throughout the project.

6.2.2.6 Do Not Encroach Upon Watercourses

No construction activities occurring in a Special Flood Hazard Area (SFHA) shall adversely impact water flows or increase downstream velocity of water flows. Buildings shall not be subjected to flooding, sediment damage or erosion hazards. Temporary bridges or culverts shall be employed when construction equipment is required to cross natural or constructed channels. These structures must be identified on the approved E&SC plan. Prior to installing bridges or culverts, authorization may be required by state and/or federal agencies.

For any development projects that require state and/or federal approval for proposed impacts to stream buffers and/or surface waters, the following shall apply:

- If the development is showing impacts associated with the City's Thoroughfare Plan, approval from the outside agencies must be provided prior to the City permitting the impact.
- If the development is showing impacts that are not associated with the City's Thoroughfare Plan, approval from the outside agencies must be provided prior to the City granting preliminary approval to the impact or permitting the impact, whichever comes first in the development approval process.

6.3 PRACTICE STANDARDS

E&SC measures shall be designed, installed and maintained per City regulations and [standard details](#) or the NCDEQ "[Erosion and Sediment Control Planning and Design Manual](#)", whichever

is more restrictive. Measures shall be appropriately selected according to their intended treatment use. All measures and design calculations shall be called out on the design plans and sealed by a North Carolina licensed professional engineer, landscape architect, or land surveyor. If the measures installed in the field do not match the design specified on the plan and do not meet applicable City requirements, Stormwater Development staff will require a plan revision.

6.4 APPLICATION REQUIREMENTS

Specific requirements for the E&SC plan submittals are located on the [Erosion and Sediment Control \(ESC\) Plan Submittal Checklist](#). As a general note, land-disturbing activities that disturb 12,000 square feet (cumulative and/or noncontiguous) or more require permitting (e.g. Land Disturbance Permit, E&SC plan submittal, etc.). See [UDO Section 9.4.4](#) for cases that require permitting for less than 12,000 square feet of land disturbance.

Land-disturbing activities that will disturb one acre or more, or that are part of a common plan of development disturbing one acre or more, are required to obtain coverage under National Pollutant Discharge Elimination System (NPDES) General Construction Permit, NCG010000 (NCG01). Coverage under the NCG01 Permit requires an approved E&SC plan with all required components listed in the NCG01. For these projects, the E&SC plan submittal to the City must also include the most recently approved [detail sheets](#) provided by NCDEQ (NCG01 Ground Stabilization and Materials Handling Plan Sheet and the NCG01 Inspection, Recordkeeping and Reporting Plan Sheet). Once the City has issued a Land Disturbance Permit, the applicant may submit an electronic Notice of Intent ([e-NOI](#)) to NCDEQ.

The signature and seal of the North Carolina licensed professional engineer, landscape architect, or land surveyor who prepared the plan must be on each sheet of the E&SC plan.

6.4.1 Plan Requirements

- All E&SC plans submitted to the City shall include all relevant items listed on the [Erosion and Sediment Control \(ESC\) Plan Submittal Checklist](#). In addition, all plans required for land-disturbing activities, as identified in this chapter, shall meet the following requirements:
 - Plans shall contain engineering drawings, maps, assumptions, calculations and narrative statements, as needed, to adequately describe the proposed development of the tract and the measures planned to comply with the requirements of this chapter and the UDO. Plan content may vary to meet the needs of specific site requirements.
 - The applicant shall complete the City's financial responsibility and ownership form signed by the person financially responsible for the land-disturbing activity or that person's attorney.
 - If the applicant is not the owner of the land to be disturbed, the E&SC plan shall include the property owner's written consent for the applicant to submit an E&SC plan and to conduct the anticipated land-disturbing activity.

- The land-disturbing activity described in the plan shall comply with all federal, state and local water quality laws, rules and regulations. The Stormwater Development Review staff may require supporting documentation.
- The land-disturbing activity described in the plan shall not result in a violation of any local ordinance, rule or regulation, including but not limited to, zoning; tree protection; stream, lake and watershed buffers; and SFHA regulations.
- Copies of the plan shall be filed with the City Development Services Department. A paper copy of the approved plan shall be maintained on the job site per 15A NCAC 04B.0118.
- Effort should be made to uncover no more than 20 acres at any one time. If more than 20 acres are to be uncovered at any one time, the plan shall contain the following:
 - Method of limiting the time of exposure and amount of exposed area to achieve the objectives of this chapter
 - Cut/fill analysis that shows where soil will be moved from one area of the tract to another as ground elevations are changed, including pre- and post-construction contours and proposed slopes
 - Construction sequencing and appropriate phasing to justify the time and amount of exposure
 - Techniques to be used to mitigate sedimentation associated with larger disturbed areas
 - Additional E&SC measures, structures and devices to mitigate sedimentation
- E&SC notes for land-disturbing activities shall include, but not be limited to, the following:
 - Primary point of contact for the project, including name, address, email and phone number.
 - Total acreage for the property/site, as well as the total proposed disturbed area.
 - The following statement: "I, [Name], certify under penalty of law that this plan was prepared after a site visit to the locations described herein by myself or by my authorized agent, who is under my supervision."
 - Prior to commencing land-disturbing activities, the approved limits of land disturbance shall clearly and accurately be demarcated with stakes, ribbons or other appropriate means, and shall be demarcated for the duration of the construction activity and no land disturbance shall occur outside the limits indicated on the approved plans.
- If any basins, excavated storage areas, diversions or outlet protection/dissipators are included as an E&SC measure on the plans, the following tables (**Table 6.4.1.a, Table**

6.4.1.b, Table 6.4.1.c and Table 6.4.1.d) with relevant information shall be shown on the sealed plan submittal. One table shall be provided for each type of measure included on the plans.

TABLE 6.4.1.a SEDIMENT BASIN CALCULATIONS ²		
<i>Sediment Trap ID</i>	<i>SB-1</i>	<i>SB-2¹</i>
Q ₂₅ (cfs)		
Bottom Length (ft)		
Bottom Width (ft)		
Sediment Depth (ft)		
Freeboard (from sediment depth) (ft)		
Depth to Crest of Spillway (ft)		
Side Slopes (ft:ft)		
Spillway Length (ft)		
Height of Berm (ft)		
Top of Basin – Length (ft)		
Top of Basin – Width (ft)		
Storage Volume Required (cf)		
Storage Volume Provided (cf)		
Sediment Surface Area Required (sf)		
Sediment Surface Area Provided (sf)		
Disturbed Area (ac)		
Drainage Area (ac)		
Skimmer Specifications (if applicable)		
Skimmer Size (in)		
Skimmer Orifice (in)		
Drawdown (days)		
¹ Additional columns shall be added so that each device is included in the table		
² US units shall be used and denoted for all values		

TABLE 6.4.1.b EXCAVATED STORAGE/INLET PROTECTION CALCULATIONS ²		
<i>Excavated Storage ID</i>	<i>ES-1</i>	<i>ES-2¹</i>
Drainage Area (ac)		
Disturbed Area (ac)		
Q ₂₅ (cfs)		
Weir Height (in)		
Storage Volume Required (cf)		
Storage Volume Provided (cf)		
Storage Volume Dimensions Required (ft x ft x ft)		
Storage Volume Dimensions Provided (ft x ft x ft)		
¹ Additional columns shall be added so that each device is included in the table		
² US units shall be used and denoted for all values		

TABLE 6.4.1.c TEMPORARY DIVERSION CALCULATIONS ²		
<i>Temporary Diversion ID</i>	<i>TD-1</i>	<i>TD-2¹</i>
Drainage Area (ac)		
Q ₂ (cfs)		
Q ₂₅ (cfs)		
Time of Concentration(min)		
Longitudinal Slope		
Diversion Width (in)		
Diversion Height (in)		
Minimum Depth (in)		
Minimum Bottom Width (in)		
Calculated Velocity –Temporary Design ³ (fps)		
Allowable Velocity –Temporary Design ³ (fps)		
Calculated Velocity – Permanent Design (fps)		
Allowable Velocity – Permanent Design (fps)		
Calculated Shear Stress (lbf/ft ²)		
Allowable Shear Stress (lbf/ft ²)		
Temporary Liner Specification		
¹ Additional columns shall be added so that each device is included in the table		
² US units shall be used and denoted for all values		
³ Temporary design refers to 2-year, bare earth conditions		

TABLE 6.4.1.d OUTLET PROTECTION/DISSIPATOR CALCULATIONS ²		
<i>Outlet Protection ID</i>	<i>OP-1</i>	<i>OP-2¹</i>
Drainage Area (ac)		
Peak Flow (cfs)		
Outlet Protection (if applicable)		
Tailwater Depth (in)		
Plunge Pool Dimensions (in)		
Apron Dimensions (in)		
Apron Grade		
Material		
Stone Size (if applicable)		
Level Spreaders (if applicable)		
Spreader Dimensions (ft)		
Grade		
Velocity (fps)		
Vegetation Type		
Permissible Velocity of Lining		
Temporary Liner Specification		
¹ Additional columns shall be added so that each device is included in the table		
² US units shall be used and denoted for all values		

6.5 CONSTRUCTION PHASING AND SEQUENCING

All land-disturbing activities must be planned and conducted to prevent erosion on-site, which could result in off-site sedimentation. To meet these objectives, E&SC plans shall require multiple phases of construction. The number of phases necessary for a project will be site-specific and based on the complexity and/or sequencing of the site development.

6.5.1 Initial Phase of Construction

The first phase of any project shall be the installation of perimeter E&SC control measures. Limit clearing and land-disturbing activity to only the area necessary to install the permitted measures. Examples of such perimeter measures include, but are not limited to, silt fence, silt fence outlets, construction entrance, diversion ditches, basins, etc. Prior to initiation of any land-disturbing activities, an on-site pre-construction meeting shall be scheduled by contacting the Stormwater Inspection Regional Coordinator at the appropriate number.

For any project subject to the NPDES NCG01 Permit, coverage under this permit should be obtained by NCDEQ prior to initiation of any land-disturbing activities and shall be enforced by NCDEQ.

The following additional items shall be required prior to initial inspection of the site:

- The initial perimeter E&SC measures shall be installed on-site.
- The limits of disturbance of the project shall be demarcated on-site.
- If the project requires the setting of a benchmark on-site to establish the Regulatory Floodplain Protection Elevation (RFPE), the benchmark shall be established by a North Carolina licensed surveyor.
- If any SFHA exists on-site, the limits of the floodplain and/or floodway shall be delineated and flagged, and a sealed statement provided by a North Carolina licensed surveyor.
- If any riparian or other required buffer exists on-site, these buffers shall be flagged, and a sealed statement provided by a North Carolina licensed surveyor.
- If impacts to buffers, wetlands or other jurisdictional features are approved by the City and other state/federal agencies, the limits of any such disturbance shall be flagged and a sealed statement provided by a North Carolina licensed surveyor.

After installation of initial E&SC control devices, flagging of the limits of disturbance and any other required items above, an initial inspection shall be scheduled online through the City Permit and Development Portal. Upon approval of the initial inspection, land-disturbing activities, including clearing and grubbing or demolition, may commence, as per the approved E&SC plan.

6.5.2 Intermediate Phasing of Construction

One common error in E&SC plan design is a failure to provide adequate intermediate phasing to address evolving construction activities. Phasing should naturally follow changes to the site during construction, both in topography and development/construction activities. Some of these

intermediate phasing activities include, but are not limited to, bypass of off-site and on-site water, stream crossings, rough grading of the site, installation of infrastructure, fine grading, installation of pavement and buildings. Intermediate phasing and associated construction sequencing may also need to address the relocation or resizing of specific erosion control measures. Additional as-needed E&SC measures may be added during the phasing, including but not limited to, inlet protection, slope drains, basins, silt fence, silt fence outlets, etc.

6.5.3 Considerations for Specific Types of Development

6.5.3.1 Residential Subdivisions

During the permitting review process, an E&SC plan, phase and sequence may be provided to reflect the individual E&SC measures required for each lot during construction of individual homes. A typical detail may be provided highlighting general E&SC components for a single-family lot. These measures include, but are not limited to, a residential construction entrance, silt fence and silt fence outlet(s). This will allow the individual single-family homes to be constructed using the active/approved Land Disturbance Permit issued for the larger full development and may eliminate a builder having to submit separately. However, the builder is still required to submit the LGP, per requirements defined in [Chapter 2 – Site Development Requirements](#), which shall reflect the topography shown on the approved E&SC plan.

6.5.3.2 Apartments and Townhome Developments

Later phase(s) of the erosion control plan should reflect silt fence around the building's limit of disturbance with controlled openings/access points for construction access. The silt fence will help prevent tracking of sediment from un-sodded/non-stabilized areas around active building construction onto the newly paved surfaces and then off the site.

6.5.4 Final Phase(s) and Project Close-Out

All E&SC plans shall have a final phase that includes conversion of devices and permanent stabilization of the site. See Section 6.6 below for specific information on stabilization requirements. No temporary E&SC measures shall be removed without approval of the City Stormwater Inspector.

Prior to conversion of any temporary measures to permanent, post-construction SCMs, the pipe system on-site shall be flushed to avoid pollution into any stream/jurisdictional feature or post-construction device. No conversion of erosion control measures to SCMs shall occur without the approval of the City Stormwater Inspector. E&SC plans shall address conversion of devices within the construction sequence to include, at a minimum:

1. Obtain permission from the City Stormwater Inspector to convert the basin(s)
2. Notifications to any additional permitting agencies regarding the conversion
3. Dewatering of the basin and techniques to avoid erosion and sedimentation issues
4. Preparation for conversion, including mucking out the basin and minor regrading or reshaping as needed
5. Final stabilization of the device

For any projects subject to the NPDES NCG01 Permit, notification of any non-surface withdrawal draw-down for maintenance and/or close-out of a basin is required in accordance with that permit.

Sequencing for the final phase of construction shall include any information or certifications required prior to final approval of permits and/or Certificate of Occupancy, as detailed below.

- As-built certifications of all post-construction SCMs on-site shall be provided to the City a minimum of seven calendar days prior to scheduling the final inspection. Refer to the [Stormwater Control Measure \(SCM\) As-Built Submittal Checklist](#) for required items and submittal process. As-built device certifications must be accepted in writing prior to a Certificate of Occupancy or Certificate of Compliance being issued.
- As-built impervious surveys are required if impervious restrictions are a permit condition of approval for a project and shall be sealed by a North Carolina licensed surveyor.
- As-built built area surveys are required if built area restrictions are a permit condition of approval for a project within water supply watershed areas and shall be sealed by a North Carolina licensed surveyor.
- As-built Stormwater infrastructure inventory data, for any new private or public stormwater infrastructure associated with the development shall be provided per the [Stormwater Conveyance As-Built Submittal Checklist](#).
- Elevation Certificate, if required by a Floodplain Permit, shall be submitted.
- Floodproofing Certification, if required by a Floodplain Permit, shall be submitted.

After final stabilization of the site and Stormwater Development Review staff acceptance of all items required above, the applicant shall schedule a final inspection online through the City Permit and Development Portal. After approval of the final inspection, the applicant may request return of the submitted E&SC surety from the City. Projects subject to the NPDES NCG01 Permit may also apply for termination of coverage of this permit from NCDEQ.

Other required information to be addressed through notes on the plan:

- Self-Inspection Requirements (City and/or NCDEQ)
- Statement of the City's Right to Inspect

6.6 GROUNDCOVER VS. STABILIZATION

6.6.1 Groundcover

When a land-disturbing activity occurs, the person undertaking the activity shall install groundcover, devices or structures sufficient to restrain erosion and retain sediment within the boundaries of the tract at all times. Erosion control can be addressed using a variety of measures. However, groundcover has proven to be an excellent source of erosion control and, when applied quickly to a site, can be more cost effective over time versus solely using structural techniques.

The City supports the use of many types of groundcover, including but not limited to, seed/ straw, seed/straw/tackifier, hydroseed, rolled erosion control products (e.g. matting, etc.), pine or hardwood mulch, and tarps and landscaped areas (e.g. shrubs, trees, pine straw, etc.). It is important to identify what type of groundcover(s) is suitable for a site. Aspects to consider include landscape position, slope, sun/shade exposure, soil type, duration of groundcover application and/or stabilization requirement at project completion.

Groundcover is required on any portion of a site upon which further land-disturbing activity has ceased (temporarily or permanently). It is important to understand the groundcover requirements that apply to the site and comply with timeframes for groundcover application. These timeframes should be clearly presented in the construction sequence on the approved plans. The City has varying groundcover timeframe requirements, see [UDO Article 9.4](#) for most current requirements, but in no event shall it exceed 14 calendar days. If more stringent, state and/or federal timeframe requirements for groundcover application shall be followed.

When land-disturbing activities have ceased but final grade has not yet been established, temporary groundcover may be used. However, when final grade has been met, permanent groundcover must be installed, and permanent stabilization must be achieved. Therefore, when approaching project completion, it is important to plan ahead and select the appropriate groundcover to achieve stabilization.

6.6.2 Stabilization

While the application of groundcover is intended to counteract the erosive influences of rainfall, rain runoff and wind on bare soil, stabilization prevents the mobilization and subsequent transport of soil particles by preventing erosion. Therefore, stabilization is required prior to closing the Land Disturbance Permit and prior to issuance of Certificate of Occupancy(s) and/or Certificate of Compliance.

Stabilization of soil can be achieved using one or a combination of the following methods:

- Grass – When grass is used for stabilization requirements, permanent groundcover must be applied over 100% of the disturbed area. Permanent stabilization is achieved when 80% of the permanent groundcover is growing and established with no evidence of large bare patches or erosion.
- Sod – When sod is used to achieve stabilization, comply with the following requirements:
 - Lay sod strips across the slope starting at the bottom of the slope and working up.
 - Place sod strips with snug even joints and stagger joints to prevent voids that could cause air drying of roots and/or accelerated erosion.
 - Roll or tamp sod immediately following placement to ensure solid contact of root mat and soil surface.
 - On steep slopes, secure sod to soil surface with wire staples.
 - Immediately following rolling and anchoring sod, apply water until moisture

penetrates the soil layer beneath sod. Maintain optimum moisture until sod is growing.

- Mulch – When using mulch for stabilization, triple-shredded hardwood mulch at a depth of six inches must be applied to prevent movement of mulch.
- Impervious surface – When using impervious surface for stabilization, it must be permitted and may include parking lots, buildings, gravel, rip rap, etc.
- Landscaping – When using landscaping for stabilization, shrubs, trees, pine straw and/or mulch must be used in combination with any of the above methods and cannot be the sole method to stabilize a site.

6.7 SINGLE-FAMILY RESIDENTIAL CONSTRUCTION

A Land Disturbance Permit is required when 12,000 square feet or more of land disturbance will occur within a new proposed development plan, on a single lot, or on multiple lots by the same person within the same subdivision. A person conducting land-disturbing activity is any individual, partnership, firm, association, joint venture, public or private corporation, trust, estate, commission, board, public or private institution, utility, cooperative, interstate body or other legal entity.

When determining the area of land disturbance, the square footage of disturbance shall be aggregated, regardless of:

- Whether the lots are under single or diverse ownership;
- Whether the lots are adjoining or not;
- The date of the subdivision.

Under certain circumstances, a Land Disturbance Permit is required when less than 12,000 square feet of land is disturbed (See [UDO Section 9.4.4](#) for permitting requirements). For single-family lots that do not require a Land Disturbance Permit, E&SC measures are required to be installed per City standard details. These measures include, but are not limited to:

- Construction entrance for each point of access measuring, at a minimum, 12 feet in width by 20 feet in length and composed of two- to three-inch railroad ballast or at least six inches of surge stone;
- Silt fence on the low sides of the lot, as well as at the back of curb along the street front (regardless of landscape position), to restrict access to the construction entrance.

The NCG01 Permit requires a Certificate of Coverage from NCDEQ if a single-family lot(s) is within a common plan of development that disturbs one acre or more.

A common plan of development is when a site has a single development plan, regardless of ownership of the parcels, which governs a site where multiple separate and distinct development activities may occur at different times and on different schedules. Information that may be used to determine a "common plan of development" includes, but is not limited to, plats, blueprints,

marketing plans, contracts, building permits, public notices or hearings, zoning requests and infrastructure development plans.

If a person disturbs less than 12,000 square feet within a common plan of development, the City will not require a Land Disturbance Permit. However, a NCG01 Permit must be obtained from NCDEQ. Therefore, an E&SC plan approval may be required by NCDEQ.

If a person disturbs 12,000 square feet or more within a common plan of development, the City will require a Land Disturbance Permit. The Land Disturbance Permit submittal to the City must include the most recent NCDEQ approved NCG01 Ground Stabilization and Materials Handling Plan Sheet and the NCG01 Inspection, Recordkeeping and Reporting Plan Sheet. Once the City has issued a Land Disturbance Permit, the person shall submit an electronic Notice of Intent ([e-NOI](#)) to NCDEQ.

6.8 COMPACTED PERVIOUS AREAS

It is acknowledged that it may not be practical to prevent disturbance or compaction of all pervious receiving areas on a site. Pervious receiving areas compacted during construction shall be restored by tilling and adding compost and/or soil amendments prior to stabilizing the area. Please refer to [Chapter 3 - Hydrology](#), Section 3.5.4.3, for more detailed requirements.

6.9 POST-CONSTRUCTION SCM

For post-construction stormwater designs that include stormwater ponds, wetlands or similar control measures, it is common practice for the control measure to be installed initially as a temporary sediment/skimmer basin. The timing of conversion from temporary to permanent control measure depends on the exposed areas and continued land disturbance. **Table 6.9** provides general guidance (not device-specific) for the planning and conversion of E&SC measures to post-construction SCMs. The E&SC plan should account for these items and provide a site- and device-specific phasing plan for the conversion of any measures.

TABLE 6.9
CONVERTING E&SC MEASURES TO POST-CONSTRUCTION SCMs

<i>Topic</i>	<i>Conversion Guidance</i>
Drainage Areas	Drainage areas shall be limited by the appropriate post-construction SCM design specifications, even if construction phase drainage areas could be larger. This means that sites may have to be divided into smaller drainage areas with the use of multiple E&SC basins and other E&SC measures.
Grading to Blend into Topography	Some temporary E&SC measures are graded into slopes, have steep embankments or side slopes and otherwise do not blend well into the surrounding topography. These types of measures are not good candidates to convert to post-construction SCMs, unless regrading is part of the conversion plan. A sounder approach is to design the temporary E&SC practice so that this type of regrading is not necessary, which may include changing the footprint, grading, slopes and other features of the E&SC practice.
Stabilizing the Drainage Area	Ensure that the contributing drainage area is stabilized prior to conversion. This is a positive aspect to using E&SC basins, because they cannot be removed until their erosion control function is complete. Therefore, the tendency to prematurely install post-construction SCMs is lessened. The conversion can proceed when City Stormwater Inspectors indicate that the drainage area is properly stabilized, and conversion may begin. In addition to drainage area stabilization, other supplemental E&SC measures may be warranted, such as diverting flow around the practice during the conversion process and using silt fence or matting/sod on the side slopes of the practice.
Removing Construction Sediment	All construction sediment shall be removed as the first step in the conversion process. This may also involve flushing all stormwater infrastructure of sediment and dewatering the E&SC practice using an approved dewatering and sediment capture method (e.g. silt bags, etc.). All notification requirements by permitting agencies shall be met prior to and during dewatering the basin for conversion.
Excavating Below the E&SC Measure Bottom Elevation	The bottom of the post-construction SCM shall be at least one foot lower than the temporary E&SC measure bottom elevation. It is important that the bottom of the post-construction SCM will be in undisturbed soils that are not impacted by construction activities. During excavation to the post-construction design elevation, scarify or rip the underlying soil to promote infiltration.
Installing Underdrains	It is recommended that a permanent riser be installed while the device is temporary if it will have underdrains as a permanent SCM. During the conversion to a permanent measure, the underdrains may then be installed.
Post-Construction SCM Installation	Install the SCM per the approved construction plans. Some minor grading or adjustments to the footprint may be needed to meet the post-construction design.
Easement/SCM Location Awareness	Because the post-construction SCM must be located within an easement, it is very important to make sure the final SCM is within the specified area to avoid costly relocation of the SCM or re-recording of the required easement.