

3.1 CONSTRUCTION PHASE EROSION AND SEDIMENT CONTROL PLANNING

The development of and adherence to a TCEQ Stormwater Pollution Prevention Plan (SWPPP) per the TXR150000 General Permit is an important first step in meeting the State requirements for erosion and sediment control. A SWPPP is required by the State when site disturbance exceeds one acre and notification to the TCEQ is necessary when the disturbance exceeds five acres.

There are three permit categories:

- **Construction Activities that Disturb Less than One Acre:** Not part of a larger common plan of development that would disturb less than 1 acre are not required to obtain coverage under the general permit.
- **Small Construction Activities:** Disturb at least 1 but less than 5 acres and is not part of a larger common plan of development
- **Large Construction Activities:** Disturb 5 or more acres or are part of a larger common plan of development that will disturb 5 or more acres

The most effective erosion control is the minimization of disturbed area. When this practice is combined with rapid re-vegetation of disturbed areas, receiving water bodies can be protected from sedimentation. Final stabilization of soil disturbing activities is considered complete when perennial vegetative cover reaches 70% density of the native background vegetative cover for the area. Permanent best management practices (BMPs) must achieve a density of 80% vegetative cover to be considered complete.

HOW TO CREATE AN EFFECTIVE EROSION AND SEDIMENT CONTROL PLAN

The following outlines the necessary steps for creating an effective erosion and sediment control plan. Details for individual erosion and sediment control BMPs can be found in this Chapter.

1. **Assess the drainage characteristics and construction phasing of a site. This process should identify:**
 - Patterns of stormwater flowing over the site including off-site sources, sub-drainage areas, sheet-flow areas, concentrated flow areas and exit points;
 - Location of proposed cuts and fills, grading, curbing, buildings, and impacts on drainage/sequence of construction relating to initial, interim and final drainage;
 - Necessary access points;
 - Limits of construction and non-disturbance area;
 - Construction equipment storage areas.
2. **Determine the location of the temporary erosion controls by:**
 - Locating controls as close to disturbed areas as possible allowing room for construction activities and maintenance of controls;
 - Assuring there are no breaks or points where runoff can bypass or short-circuit the temporary erosion controls;
 - Locating controls so as not to create off-site flooding of adjacent properties.
3. **Based on steps 1 and 2, the category or function of controls and their phasing should be determined to reflect construction sequence and changing drainage patterns.**

4. The designer must now determine specific controls to be shown at the locations chosen in step 3.

5. Perform an adequacy check to determine compliance with the following items:

- Controls used are within the allowable drainage area limits;
- Controls are located perpendicular to the runoff flow;
- Detention controls are shaped to create adequate areas for ponding and sediment accumulation;
- Detention/filtration controls are installed along contours to promote spreading of runoff;
- Controls located in low traffic areas are easily accessible for maintenance;
- Controls phased as necessary to reflect changes in drainage patterns to remain effective throughout the construction period;
- Controls are located in areas that will not cause flooding of adjacent properties.

In order to recognize sites that have more erosion potential than others, the designer will rank the erosion potential based on the site characteristics in Table 3-1.

EROSION POTENTIAL – RANKING CATEGORIES

- **High Erosion Potential:** Key factors that impact erosion potential are steep slopes, soils conducive to erosion, construction disturbance covering a large area extending over a significant duration, and roadways planned to cross creeks.
- **Low Erosion Potential:** Minimal disturbance area, short construction period, relatively flat slopes, and non-erosion prone soils are common traits of sites that have a low potential for erosion problems.

If a development project is within different drainage areas or has more than one discharge point, then the above rating is applied to each drainage area/discharge point.

A project has a High Erosion Potential if four or more items are checked in Table 3-1.

Table 3-1: Site Characteristics for High Erosion Potential Checklist

Disturbed area > Five (5) acres

More than 25% of development area has slopes > 2 %

Soils – silts/clays from SCS Soil Surveys and field observation

Existing vegetative cover < 50 % coverage (groundcover)

Off-site drainage area > Five (5) acres (discharges to site)

Construction duration > Six (6) months

Utility and road crossing(s) of drainage ways/buffer zones

Distance of soil disturbance from creek centerline or tidal water is less than 100 feet

Sites that rank as having a high potential for erosion will require special attention in the design, implementation, and maintenance of construction activities and temporary erosion and sediment controls.

To aid in the proper selection of erosion control and stabilization techniques, Table 3-2 presents typical erosion site characteristics and the accompanying BMPs.

Table 3-2: Erosion Control Selection Guidance - Suggested Techniques to Minimize Soil Erosion

Site Characteristics	Management Approach	BMP Tools	Comments
Disturbed Area > 5 acres	Limit disturbance, control access to non-construction areas and buffers	Silt fence Rock berms Brush berms	Identify disturbed and protected areas on the construction plans
Slopes > 2%	Limit construction on steep slopes, stabilize immediately	Silt Fencing Rock berms Compost/mulch/seed	Seed and vegetate as soon as possible, use soil protection blankets or compost-seed mixes
Soils – Clay/Silt	Minimize excavation, cover/vegetate immediately	Silt Fence Blankets & Matting Compost/mulch/seed/ Sod	Difficult to settle soil particles, minimize disturbed area
Vegetative Cover < 50%	Minimize disturbance in this area, enhance vegetation	Seed Sod Compost/mulch/seed	Promote rapid vegetation growth
Off-site Drainage Area > 5 acres	By-pass runoff around site, or convey in stable manner	Diversion Dikes Interceptor Dikes Pipe/slope/Drain	Maintain diversion BMPs during construction to prevent sedimentation of devices
Construction Duration > 6 months	Phase construction disturbance, stabilize disturbed areas	Vegetation Blankets & Matting	Develop construction disturbance and re-vegetation plan as part of construction sequence
Road Crossings of Drainage Ways	Minimize crossings, stabilize road cuts as soon as possible	Temporary Sediment Basins that intercept runoff before reaching the drainageway	Basin size – 8,000 cubic feet per disturbed acre drainage to basin
Distance < 100 feet from Drainage	Relocate disturbed areas beyond the buffer zone limits	Silt Fence Rock Berms Sediment Basins	Identify buffer zones, use temporary fencing around buffer zones, perform work and maintain stockpiles outside of this zone

Temporary Erosion Controls should be considered the first line of defense for the prevention of water pollution during construction activities. It is much simpler to maintain soil cover than to attempt to trap sediment once it has been mobilized. In addition, effective erosion prevention can result in cost savings, since repair of erosion damage can be minimized.

Permanent Erosion Controls are used to reduce the potential of erosion after construction activities are complete to ensure proper stabilization of areas disturbed by construction.

Primary erosion control strategies are to divert runoff away from unstable areas or to provide a stable surface that will resist the effects of rain and runoff. The Principle measures for diverting runoff during construction include building perimeter swales, dikes, and slope drains. Existing trees and vegetation should be protected to help maintain a stable ground surface and prevent loss of valuable topsoil. Forms of temporary vegetation, such as blankets, matting, and mulches, can stabilize an area until vegetation is established.

Final stabilization is achieved when all soil disturbing activities at site have been completed and a uniform vegetation cover with a density of 70% of the native background vegetative cover for the area has been established.

Contractors are encouraged to install and maintain practices carefully and minor adjustments should be anticipated to assure proper performance. Intensive maintenance and extensive use of vegetation, mulch, and other ground covers may be required to achieve optimum performance. The erosion and sediment control practices should be specified in the [Stormwater Pollution Prevention Plan](#) and in the general construction contract so that any unexpected expenses can be approved before they are incurred. When these controls are removed after final stabilization of the site, it is important to also remove or stabilize any accumulated sediment.

Periodic inspection and maintenance is vital to the performance of erosion and sedimentation control measures. It is recommended that all temporary erosion controls be inspected weekly and after every rainfall; however, daily inspections may be warranted when environmentally sensitive features are located on or immediately adjacent to the site. If not properly maintained, some practices may cause more damage than they prevent.

Always evaluate the consequences of a measure failing when considering which control measure to use, since failure of a practice may be hazardous or damaging to both people and property. For example, a large sediment basin failure can have disastrous results; low points in dikes can cause major gullies to form on a fill slope. It is essential to inspect all practices to determine that they are working properly and to ensure that problems are corrected as soon as they develop. The project owner should assign an individual to be responsible for routine checks of erosion and sedimentation control practices.

3.2 TEMPORARY EROSION AND SEDIMENT CONTROL DETAILS

The Texas Department of Transportation (TXDOT) provides design and construction details for many practices to manage construction erosion and sedimentation. [This website](#), dated September 18, 2018, can be referenced for plan details that designers and engineers can include in their construction plans. Details from the website are found below:

- [Silt fence and vertical tracking](#)
- [Rock filter dams](#)
- [Construction exits](#)
- [Dikes and earthwork](#)
- [Swales and earthwork](#)
- [Sediment basins and traps](#)
- [Temporary pipe slope drains](#)
- [Temporary paved flumes](#)
- [Erosion control log](#)