

1.4 EROSION AND SEDIMENT CONTROL PLAN PREPARATION

This chapter is a guide for the preparation of an erosion and sediment control plan for a construction project. The plan describes the potential for erosion and sedimentation problems on a construction project. The plan also identifies and explains the measures that are to be taken to control those problems. The erosion and sediment control plan must contain sufficient information to ensure that erosion and sedimentation have been adequately addressed for the proposed project. The control plans for a single house development will be far less complicated than a large development on steep slopes or rough terrain.

This plan should have two parts: the written portion or narrative and the map or site plan. The narrative explains the erosion and sediment control decisions for a particular project and the justifications for those decisions. It is important that adequate information is provided in the narrative.

The owner or lessee of the land being developed is responsible for the plan preparation. The owner or lessee may engage an engineer or other qualified person to prepare the plan; however, the owner or lessee still has the responsibility for ensuring development of an acceptable plan.

Plan Preparation

Five steps are needed for adequate development of an erosion and sediment control plan:

1. Data inventory
2. Data analysis
3. Site plan development
4. Erosion and sediment control plan
5. Plan preparation

Step 1. Data Inventory

Gather information that will help develop the most effective erosion and sediment control plan. The information obtained should be plotted on a map and explained in the narrative portion of the plan. Such a narrative should include the following topics:

- **Aerial photo of site.** An aerial photo of the site and adjacent lands should be obtained and used to identify important site characteristics, as well as features of adjacent lands that should be considered in developing the erosion and sediment control plan. A color infrared map and a soils map of a site can be obtained from the following website: <http://igsims.igsb.uiowa.edu/website/basic/viewer.htm>.
- **Topography.** A topographic map of the site should be prepared to show the existing contour elevations at intervals of 1–5 feet, depending on the slope of the ground.
- **Drainage patterns.** All existing drainage ditches and swales must be located and indicated on the topographic map.
- **Soils.** Major soil types should be shown on the topographic map or on an overlay of the same scale for ease of interpretation.

- **Ground cover.** The existing vegetation on the site should be shown. Features such as trees, shrubs, grassy areas, native grasses, and existing denuded or exposed soil and rock outcrops should be indicated.
- **Adjacent areas (upstream and downstream).** Areas adjacent to the proposed development site should be indicated on the topographic map, including features such as streams, roads, buildings, and wooded areas. Anticipated runoff velocities and volumes from those areas should be calculated to determine the types of erosion control or flow diversion techniques that should be employed on the construction site. Streams that will receive runoff from the site should be surveyed to determine their carrying capacity and ways to control sedimentation prior to water leaving the site.

Step 2. Data Analysis

When the information in Step 1 is compiled, a picture of the site possibilities begins to emerge. The important points to consider in site analysis are as follows:

- **Topography.** The primary considerations are slope length and steepness. Longer and steeper slopes will increase the runoff flow and the erosion potential. When the percent of slope has been determined, areas of similar steepness should be grouped together. Slope gradients should be grouped into three general ranges of soil erodibility:

0%–3%—low erosion potential
3%–8%—medium erosion potential
over 8%—high erosion potential

Within these slope ranges, the greater the slope length, the greater the erosion potential. Generally the erosion potential becomes more serious if the slope lengths exceed the following distances:

0%–3%—300 feet
3%–8%—150 feet
over 8%—75 feet

- **Drainage patterns:** Natural drainage patterns exist on the land. These patterns, which consist of overland flow, swales and depressions, and natural waterways, need to be identified so that critical areas can be located where water will concentrate. The natural waterways should be used wherever possible rather than incurring the expense of constructing and maintaining an artificial waterway. Care should be taken ensure that any increase in runoff from the site will not erode or flood the existing drainage system or cause downstream damage. Such a location may require a retention pond.
- **Soils.** Soil characteristics need to be identified to determine permeability, shrink-swell potential, texture, erodibility, and water table depth and depth to bedrock. This information can be obtained from the local SWCD office or from the following website: <http://www.itc.nl/~rossiter/Docs/NRCS/620nsh.pdf>.
- **Ground cover.** A dense grass ground cover is the most important feature for preventing erosion. All existing vegetation that can be saved will help prevent erosion. This includes trees, shrubs, and other vegetative cover. Construction that can be staged, which involves stabilizing one part of the site before disturbing another, will reduce the erosion potential as well as the amount of temporary seeding and mulching required.

- **Adjacent areas.** Careful analysis of adjacent properties, especially areas upslope and downslope from the construction project is necessary. To prevent erosion from occurring in the construction area, upstream property runoff velocities and volumes must be controlled as they enter the site or flows must be diverted. Special consideration must be given to watercourses that will receive runoff directly from the construction site. The potential for sediment pollution of the watercourses needs to be considered, as well as downstream erosion due to an increased volume of runoff. The potential for sediment deposition on adjacent properties due to sheet and rill erosion should also be considered so appropriate sediment trapping measures can be planned.

Step 3. Site Plan Development

After reviewing the data and noting the site limitations, development of the site plan can begin. The planner should locate the proposed buildings, roads, and parking areas, and develop a landscape plan to exploit the strengths and take into account the limitations of the site. The following items should help in the planning decisions:

- **Fit the development to the site conditions.** Doing so will avoid unnecessary land disturbance, minimize cut and fill, and reduce erosion potential and development costs.
- **Limit construction activities to the least critical areas.** Land disturbance of the more erodible areas will require the installation and maintenance of costly control measures. Cluster buildings together: this plan will reduce the amount of disturbed area. Concentrating utility lines and connections in one area will provide more natural open space. The cluster concept lessens the erodible area, reduces runoff, and usually reduces development costs.
- **Minimize paved areas.** Keep paved areas such as roads, drives, and parking lots to a minimum. The more land kept in vegetative cover, the more water will infiltrate, thus minimizing runoff and erosion.
- **Use the natural drainage system.** By retaining the natural drainage system, the potential for downstream damage due to increased runoff can be minimized and storm water management made easier.

Step 4. Erosion and Sediment Control Plan

Once the plan for the site has been decided, a plan to control erosion and sediment from the disturbed areas must be prepared.

The planner should refer to Section 1.6 of this manual, “Implementation Guidelines, Erosion Control Measures,” to help select the most appropriate control measure. The following procedure is suggested for erosion and sediment control planning:

- **Determine the limits of clearing and grading.** Determine which areas must be disturbed for the proposed construction. Note critical areas that must be disturbed.
- **Divide the site and adjacent runoff-contributing properties into individual drainage areas.** Determine how the runoff will travel over the site. Determine how erosion and sedimentation can be controlled in each small drainage area before reviewing the whole site. It is easier to control erosion than to contend with sediment after it has been carried downstream.
- **Select erosion and sediment control measures for the construction site and the runoff contributions of adjacent runoff contributing areas.** Erosion and sediment

control measures can be divided into three categories: vegetation and soil stabilization measures, structural measures and special conditions.

- *Vegetation and soil stabilization measures.* The objective is to prevent erosion and to protect the soil from the impact of raindrops and the overland flow of runoff. The best way to protect the soil is with a cover of grass. If disturbance is necessary, seed, mulch, and fertilize the area as soon as possible. If the area will be disturbed again, then temporarily seed the area and mulch if necessary. The erosion and sediment control plans must contain provisions for permanent stabilization of the disturbed areas. Selection of permanent vegetation should include the following considerations: establishment requirements, adaptability to the site, aesthetics, and maintenance requirements.
 - *Structural measures.* Structural measures are generally more costly and less efficient than vegetation. Nevertheless, they are usually necessary, since not all disturbed areas can be protected with vegetation. However, it is very important that the structural measures selected be designed and installed according to standard engineering practices. Improper use or incorrect installation can create larger problems than those the structure was designed to solve.
 - *Special conditions.* These measures are needed for special situations and may require a special design for an installation.
- **Storm water permit requirements.** Land-disturbing activities that will disturb an area of one or more acres are required to be covered by an NPDES permit. The stormwater permits are managed by the Environmental Services Division of the Iowa DNR, Wallace State Office Building in Des Moines, Iowa.

Step 5. Plan Preparation

The planning work has been done in Steps 1–4. The final step consists of consolidating the pertinent information and developing a specific erosion and sediment control plan for the project. The plan consists of two parts: a narrative and a site plan. The narrative explains the problems and the solutions, along with necessary documentation. The site plan is one or a series of maps or drawings showing the location of the various control measures. The following checklist should be included in the plan:

- **Description.** Describe the land, purpose, and the amount of grading involved.
- **Site conditions.** Describe the existing topography, vegetation, and drainage.
- **Adjacent areas.** Describe the neighboring areas, drainageways, buildings, streams, roads, land use, etc.
- **Soils.** Briefly explain the soils, soil names, soil depth, erodibility, and texture.
- **Critical areas.** Note areas on the site that have potentially serious erosion problems.
- **Erosion and sediment control measures.** The measures selected for use on the site are listed and illustrated in Chapters 2–4 of this document.
- **Permanent stabilization.** Briefly describe how the site will be stabilized after construction is completed.
- **Stormwater permit requirements.** Identify whether the development of the site will increase the runoff and whether a discharge permit will be required.
- **Maintenance.** Provide a schedule for inspection and repair of erosion and sediment control measures.

- **Calculations.** Calculations for the design of such items as sediment basins, diversions, waterways, and retention basins should be included.
- **Wetlands.** Identify steps to be taken to comply with all regulations and include drainage patterns.

The following checklist should be included in the site plan:

- **Location map.** Show the location of the proposed construction site in relation to the surrounding area on the map.
- **Identify owner and developer.**
- **North point.** Indicate the north point and the scale.
- **Contours.** Show the existing contours of the site on a map.
- **Existing vegetation.** Show tree and shrub lines, grassy areas, or special vegetation on a map.
- **Soils.** Show the boundaries of different soil types on a map.
- **Critical erosion areas.** Indicate areas with the potential for serious erosion problems on a map.
- **Drainage patterns.** Show the dividing lines and the direction of flow for the different drainage areas on the map.
- **Final contours.** Show changes to the existing contours on a map.
- **Clearing and grading.** Outline areas to be cleared and graded on a map.
- **Location of control measures.** Indicate the location of the various erosion and sediment control measures on a map.
- **Drawings.** As necessary, provide detailed drawings and explanations of structural control measures, especially for measures not referenced in this manual.