

EPSC PLANNING AND DESIGN

The purpose of erosion and sediment control planning is to clearly establish the control measures which are intended to prevent erosion and off-site sedimentation during construction. The Erosion Prevention and Sediment Control (EPSC) Plan should describe the site development and serve as a blueprint for the location, installation, and maintenance of practices to control erosion and prevent sediment from leaving the site during construction. It should also be understood that plans are only a blueprint and will require modification throughout the life of the project.

3.1 Erosion Prevention vs. Sediment Control

The driving consideration in creating and implementing an effective EPSC plan is to provide erosion prevention measures rather than sediment control. Although every EPSC plan will have elements of both, it is often far more cost effective and practical to emphasize erosion prevention. Erosion prevention measures are designed to prevent exposed soil particles from becoming dislodged by rain or wind. Such measures include temporary ground covers (mulch, temporary grasses, straw mulch, and tackifier, etc.), matting, plastic sheeting, and numerous other products designed to provide mechanical or physical protection to exposed soil. Sediment control involves techniques to re-capture transported sediment from runoff. Sediment control measures include sediment traps and basins, sediment fences, check dams, sediment barriers, catch basin filters, etc.

The benefit of erosion prevention is that it seeks to prevent the problem before it starts. It is also often impractical to recover large amounts of sediment after it becomes dislodged and suspended in runoff. On projects where the predominant soil particle size is very small (fine silts and clays, typical of Albany), the amount of time required to allow for settling of solids can reach days or even weeks. It is also generally true that erosion prevention measures are more reliable, whereas sediment control measures require continual and costly maintenance. Because successful erosion prevention requires minimizing disturbed areas, the EPSC plan should emphasize scheduling and phasing. Project scheduling and phasing is often driven by factors other than erosion control however, so contingency planning is essential. Most importantly, the EPSC plan should be designed and implemented as a living, dynamic plan that can be adapted to address changes in the project as work progresses.

3.2 Five Basic Rules

Erosion control measures are required for construction areas where the ground surface will be disturbed by clearing, grading, fills, excavations, and other construction activities. When developing an effective EPSC plan, there are several important concepts to consider:

- Timing – schedule work to minimize overall impacts
- Stage work – identify and process critical areas first
- Minimize disturbance – create buffers and reduce mass grading
- Pre-construction – during preliminary design and prior to on site grading activities
- Pictures/Video – documentation throughout life of project

The long-term benefits of an effective erosion and sediment control plan are enormous. An important concept to keep in mind when developing construction and erosion control plans is: **practices which minimize the amount of disturbed land area and avoid or minimize work on steep slopes have the greatest potential to reduce erosion.** There is less chance of soil washing off the site and clogging streets, drainage systems, and entering adjacent properties. The number and size of erosion control

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measures required will be minimized. The cost of maintaining erosion control facilities is minimized. Top soil retention on the site is maximized, making re-vegetation and landscaping easier to establish.

It is equally important to note that approval of an erosion and sediment control plan by the City of Albany does not relieve the applicant's responsibility to ensure erosion control measures are constructed and maintained to prevent sediment from leaving construction site. These requirements are upheld throughout the life of the construction project.

3.3 Designer Responsibilities

A designer generally puts the EPSC plan together in the office based on information provided from resources obtained from local and regional agencies and a detailed field site visit. In addition, the designer must identify potential erosion and sediment problems, develop design objectives, formulate and evaluate alternatives, select best erosion prevention measures, and develop a plan. A determination is made about what best management practices are appropriate. A variety of BMPs should be included on the plan in order to provide adequate tools in the field. By following the step-by-step process listed below, designers can improve overall success.

The designated person, whether contractor or erosion and sediment control specialist, and ultimately the owner, has a defined responsibility to prevent pollution from leaving the site. He or she must follow a plan, or obtain approval for a revised plan, and ensure the site is stable. Even though the EPSC plan may be followed in detail and appear to have addressed all issues, there will inevitably be obstacles along the way that will change those plans. Therefore, the best scenario includes a good plan, open lines of communication, and defined responsibilities.

3.3.1 Soil Survey Information

Knowing the type of soil found on the project site will help the designer decide upon the degree of erosion protection required. Of prime importance are the predictions of soil behavior for selected land uses. As explained in Chapter 1, the potential for erosion is highly dependent on the type of soil. This will ensure the EPSC plan is adequate to control soil movement without being overly conservative. The Natural Resource Conservation Service Soil Survey, a mapped inventory with physical properties and characteristics described for each soil type for Linn and Benton Counties is available on the Internet at http://www.or.nrcs.usda.gov/pnw_soil/or_data.html

3.3.2 Climate and Precipitation Data

The occurrence and intensity of rainfall is important for the designer when placing and sizing erosion control measures. Additionally, all erosion control measures require inspection after any rain event in excess of 0.5 inches in 24 hours. Rain gauges can be used to assist in determining on-site rainfall. Precipitation and other weather data may be found on the Internet through the West Coast Weather Observation at <http://www.ocs.oregonstate.edu/index.html>. The wet weather season extends from October 1st to April 30th.

3.3.3 Topography

From the site visit, determine the drainage patterns from the topography. Does runoff flow from offsite through the construction site? If so, measures should be taken to re-route this water around areas that will have ground disturbance.

Will areas of ground disturbance occur on long slopes that are greater than two percent grade? If so, the lengths of the uninterrupted flows should be broken up so the rainfall runoff will only flow short distances thereby decreasing flow velocity and the erosive force. In flat areas, runoff is slow and soil particles are not moved far from the point of raindrop impact. If the slopes are steep and short, surface cover may be needed to decrease runoff and promote rainfall infiltration into the soil. On steep slopes, soil movement increases dramatically. Constructing very long slopes and especially, long, steep slopes should be avoided. Those that already exist should not be disturbed.

3.3.4 Revised Universal Soil Loss Equation (RUSLE)

In order to properly design sediment basins and large conveyance structures, a designer must be able to calculate the quantities of water and sediment that will be managed by the structure. The design method for calculating soil loss from disturbed land is the Revised Universal Soil Loss Equation (RUSLE). RUSLE estimates soil loss from a slope caused by raindrop impact and overland flow (collectively referred to as “inter-rill” erosion), plus rill erosion. It does not estimate gully or stream-channel erosion. RUSLE is a tool to estimate the rate of soil loss based on site-specific environmental conditions and a guide for the selection and design of sediment and erosion control systems for the site. RUSLE does not determine when soil loss is excessive at a site, when erosion control systems have failed, or sediment yield once it has left the site. The RUSLE user makes such decisions based on numerous criteria, of which soil-loss and sediment-yield estimates are an important compound.

For a complete copy of the guidelines and the public domain RUSLE software visit www.sedlab.olemiss.edu/rusle online or contact:

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3.3.5 Sensitive Areas; Waters of the State

Sensitive areas include steep slopes (those greater than 10 percent), wetlands, and areas that include or contribute directly to Waters of the State. “Waters of the State” means any lakes, bays, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Pacific Ocean within the territorial limits of the State of Oregon and all other bodies of surface or underground waters, natural or artificial, inland or coastal, fresh or salt, public or private (except those private waters that do not combine or effect a junction with natural surface or underground waters), which are wholly or partially within or bordering the State or within its jurisdiction.

Depending on several factors, an undisturbed corridor buffer of varying width is required adjacent to sensitive areas. The responsible party shall be aware of, and adhere to, any limitations in the work area in the proximity of sensitive areas imposed by environmental permits issued by the Division of State Lands (DSL), the U.S. Army Corps of Engineers (USACE), and the Federal Emergency Management Agency (FEMA). This includes work pertaining to, but not limited to:

- work in or over “navigable waters” of the United States, or which affects the course, location, condition, or capacity of such waters

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- the removal of material from, or placement of fill material into, the “Waters of the State,” including wetlands, and
- work within floodways, as mapped by FEMA

3.4 Project Scheduling

Following a specified work schedule that coordinates the timing and land disturbing activities and the installation of control measures is perhaps the most cost-effective way of controlling erosion during construction. The removal of ground cover leaves a site vulnerable to accelerated erosion. Construction procedures that limit land clearing, provide the timely installation of erosion prevention and sedimentation controls, and restore protective cover quickly can significantly reduce the erosion potential of a site.

Construction projects should be sequenced to reduce the amount and duration of soil exposure to erosion by wind, rain, runoff, and vehicle tracking. The construction schedule is an orderly listing of all major land disturbing activities together with the necessary erosion and sedimentation control measures planned for a project. This type of schedule guides the contractor on work sequencing so serious erosion and sedimentation problems can be avoided.

The EPSC plan should indicate for all the scheduled work, how the proposed erosion/sediment control measures will divert flows, limit runoff from exposed areas, stabilize exposed soil and filter sediment. The following activities should be included in the schedule, if applicable:

- Clearing and grubbing for perimeter controls
- Installation of perimeter controls
- Construction phasing
- Clearing and grubbing, grading and trenching for activities other than perimeter control
- Grading (including off-site activities) related to the project
- Final grading, landscaping, and stabilization
- Work on or at bridges and other water course structures
- Utility installation and removal
- Work required in any wetland
- Monitoring of rainfall
- Inspection of controls
- Installation and maintenance of permanent controls
- Installation, maintenance, and removal of temporary controls
- Disposal of waste materials generated on-site

Note that the construction activities listed above do not usually occur in a specified linear sequence, and schedules will vary due to weather and other unpredictable factors. Schedules for temporary and permanent erosion control work required in any wetlands, as are applicable for clearing and grubbing, grading, trenching, bridges, and other structures at water courses, construction, and paving should be submitted for review by the City. Plans for erosion control on haul roads and borrow pits and plans for disposal of waste materials should also be submitted. The contractor may submit the EPSC plan from the project plans if it is correct for the proposed stage of construction, or prepare a modified version, proposing methods, materials, and procedures, to be used for the weather and site conditions at the time of construction, if applicable.

3.5 Developing an Erosion Prevention and Sediment Control Plan

Following are recommended steps and check lists to use in the development and implementation of an acceptable Erosion Prevention and Sediment Control plan. This information will provide the necessary tools to gain the City's approval and reduce overall environmental risks. After the project site has been assessed, the catch points for cuts and fills, drainage areas and drainage patterns, sensitive areas, size and location of drainage structures, and disturbances should be located on the base map. Approximate final grades and any known problems such as highly erodible soils or unstable slopes should also be noted. A sample EPSC Plan and details can be found in Appendix A.

Step 1: Identify Potential Issues

- Federal and State Environmental Regulations
- Public Agencies
- Environmental interest groups
- Public opinion

Step 2: Goals and Objectives

- Meet all regulations
- Enhance the environment
- Higher emphasis on stabilizing steep slopes (2:1 or greater)
- Reduce short- and long-term erosion
- Reduce or eliminate irrigation costs
- Maximize use of on-site materials (cost-effective solutions)
- Reduce overall maintenance
- Decrease liability
- Improve aesthetics
- Minimize negative public opinion

Step 3: Erosion Study

- Sediment sources
- Review relative sources
 - Maps and aerial photos
 - Distinctive minerals
 - Alluvial
- Review regional factors
 - Temperature
 - Precipitation
 - Wind
 - Freeze/thaw
 - Snow melt
- Review watershed
 - Watershed size
 - Topography
 - Channel density
 - Soil types
 - Ground cover
 - Land use

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Step 4: Selection of Erosion and Sediment Control Materials

- Effectiveness
- Environmental impacts
- Regulatory acceptability
- Material Cost
- Long-term cost (maintenance)
- Public acceptability
- Risk/liability
- Aesthetics

Step 5: Developing the EPSC Plan (where to go)

- City of Albany Community Development and Public Works Departments
 - Regulations and ordinances
 - Prior land use
 - Adjacent and downstream uses
- NRCS/District Conservationist
 - Soils
 - Climate
 - Vegetation/habitat
 - Water management
 - Recreational potential
 - Aerial surveys
- U.S. Geological Survey
 - Topographical maps
 - Major drainage ways
- State Environmental Agencies
 - Stream surveys
 - Wildlife habitat
 - ESA
 - Wetlands
 - Sensitive areas
- Local Flood Control
 - Rainfall data
 - Storm records
 - Flood plains

Step 6: Developing the EPSC Plan (collecting data)

- Photo/video documentation
- Field survey and evaluation (existing)
 - Topography and contours
 - Existing drainage upstream and downstream
 - Identify sensitive areas
 - Soil samples
 - Soil survey (NRSC)
- Field survey and evaluation (future)
 - Topography and contour design
 - Site drainage system type and location
 - Impervious areas

- Climate and rainfall information
 - Onsite rain gauges
 - Meteorologists
 - Airport
- Critical habitat
 - Wetlands vegetation profile
 - Mitigation/enhancement
- Revised Universal Soil Loss Equation (RUSLE)

$$A = R \times K \times LS \times C \times P$$

A = Average annual rate of erosion in tons/acres/years

R = Rainfall factor

K = Soil erodibility factor

L = Slope length

S = Slope gradient

C = Cover

P = Conservation practice

Step 7: Lay out Pre-construction Plan & Base Measures

- Adapt the plan to the resources available
- Fit the development to the existing terrain whenever possible
- Plan must be flexible
- Keep communication lines open at all times
- All reports and instructions must be clear
- Determine construction timing and sequence
- Establish primary access point (s) for construction traffic
- Lay out limits of clearing and construction activities
- Restrict all activities in sensitive areas (mark accordingly)
- Establish base measures including sediment control at toe of disturbed area & stabilized construction entrances
- Establish maintenance procedures for EPSC Measures

Step 8: Identify Measures During Construction

- Install additional base measures as site clearing/disturbances occur, including stockpiles and slope contours
- Determine if construction may occur during wet weather season (October 1st – April 30th)
- Establish and schedule wet weather measures including cover measures over exposed soils
- Continue to establish maintenance procedures for erosion control measures

Step 9: Post Construction Measures

- Establish ground cover or permanent landscaping prior to removing base measures

Step 10: Plans and Specifications (Sample EPSC Plan - Appendix A)

- Project description
- Construction notes (see Appendix B)
- BMPs standard symbols (see Appendix B)
- Names of existing roads, waterways, and drainage features

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- Boundaries of environmentally sensitive areas such as wetlands
- Rights-of-way and easements
- Statement of existing conditions to include highly erodible areas (steep slopes)
- Existing and proposed contour lines
- Run-off calculations
- Calculations of desired performance standards
- Description of erosion control treatment areas
- Detailed grass establishment instructions
- Detail for each BMP used
- Wind erosion control during/following construction

Step 11: Operations and Maintenance

- Guidelines
- Maintenance instructions
 - Provide operating procedures during/after storm events
- Standards of performance
- Periodic inspection reports w/supported pictures
- Vegetation criteria
- Monitoring
 - Establish procedures for monitoring performance
 - Provide adjustment to mitigation measures as needed
- Monitoring and maintenance plan
- Maps
 - Project boundaries
 - Adjacent areas
 - Existing and final topographic features
 - Drainage areas
 - Location of existing problems
 - Location of potential problems
 - Location and extent of BMPs

3.6 Internet Access Sites

Oregon Seed Certification Service www.oscs.orst.edu

Natural Resource Conservation Service www.or.nrcs.usda.gov

International Erosion Control Association www.ieca.org

Pacific Northwest Chapter IECA www.escpnw.com/

West Coast Weather Observations www.wrh.noaa.gov/index.php

Oregon Coast and Pacific Northwest Weather <http://IWIN.nws.noaa.gov/iwin/or/or.html>

Oregon Division of State Lands (DSL) <http://statelands.dsl.state.or.us/>

Oregon Department of Fish and Wildlife (DFW) <http://www.dfw.state.or.us/>

Oregon Department of Environmental Quality (DEQ) <http://www.oregon.gov/deq/wq/>

Oregon Department of Agriculture (ODA) <http://www.oda.state.or.us>