

Chapter 3

Planning & Selecting Erosion & Sediment Controls

Erosion and sediment controls are required on construction sites to prevent sediment deposition in New Hampshire's wetlands and waterways. An effective plan for the implementation of such practices is a key to ensuring timely construction, minimizing erosion and subsequent pollution by sediments, and keeping construction costs down, by minimizing erosion damage, which requires additional work to correct.

An integral part of an effective erosion and sediment control plan is defining project work zones and construction phases during the planning of construction activities on a site. These areas are defined by the needs of the project (e.g., work zones defined by a road section or building) and the most efficient method to complete the project and limit the exposure of disturbed soil (phases). The delineation of work zones is typically defined by the project owner and their design team. The construction-phasing plan needs to be developed by the contractor who will be developing the site because the size of the contractor's operation and their methods will have a direct impact on the phasing of the project.

This Chapter discusses principal strategies to guide the planning and selection of erosion and sediment controls, the preparation of an erosion prevention and sediment control plan, and an erosion and sediment control selection matrix.

3-1. Erosion and Sediment Control Strategies

Some common-sense practices will reduce a construction site's vulnerability to erosion, with cost-effective results for the owner and contractor. The principal concept for the planning and selection of erosion and sediment control practices is that it is easier, less expensive, and less environmentally damaging

to prevent or reduce soil erosion in the first place than it is to control its transport and deposition (sediment control), which in turn is more effective and less costly than remediating potential damage from sedimentation after it occurs.

The following approach should guide the construction activities and dictate the selection and implementation of erosion and sediment controls:

» **Provide simple, well-documented erosion and sediment control plans.**

The field documents used by the contractor should simply, but clearly, identify the erosion and sediment control measures to be used, where they will be located, how they will be constructed, and how they must be maintained. Elements of the erosion and sediment control plan are discussed in Section 3-2.

- Details and dimensions for erosion and sediment control measures should be included.
- The erosion and sediment control plan should be at the site and readily accessible to both the contractor and regulatory personnel performing inspections.
- Pre-construction meetings should be held to review the proposed control measures, address sensitive resource areas, and clearly identify responsible parties for implementing and maintaining erosion and sediment controls, and for responding to contingency events.

» **Plan construction activities to account for sensitive site conditions.**

- Protect and maximize existing native vegetation and natural forest floor, which serve as natural buffers between construction activity and wetlands, streams, lakes, and other water bodies.
- Clearly flag areas to be protected in the field and provide construction barriers to prevent trafficking outside of designated work areas.

- Diffuse stormwater rather than concentrate it into channels.
- Divert off-site runoff or clean water away from the immediate construction area to reduce the threat of erosion, to prevent off site water from being contaminated, and reduce the volume that needs to be treated on the site.
- Install additional erosion and sediment control measures when working adjacent to environmentally sensitive areas. In areas with particularly vulnerable or irreplaceable resources, back-up protection for primary erosion control measures should be provided. The following are examples of site and/or construction characteristics that would warrant such additional protection:
 - Construction or soil disturbance within the watershed of a pond or lake that is vulnerable to the addition of phosphorous.
 - Construction or soil disturbance within 250 feet of a lake, pond, river, or perennial stream.
 - Construction or soil disturbance within 100 feet of an intermittent stream or wetland.
 - Construction that requires crossing a stream with a culvert or bridge.
 - Channel or slope construction on channels greater than 8% and slopes steeper than 4:1.
 - Channel or slope construction from September 15 to April 15, when no vegetation can grow.
 - Moderate (soil erodibility factor $K > 0.25$) to highly ($K > 0.4$) erodible soils that will be exposed for longer than one month.

» **Minimize the area of exposed soil at one time.**

Match areas of exposed soil with erosion control strategy, resources, and budget. The following measures will help

minimize exposed soil and prevent erosion in those areas that must be disturbed:

- In general, plan to build large projects in smaller phases, rather than all at once. Do not Clear-cut an entire project site, when only a portion of the site will be worked at one time. Phasing needs to be done according to the size of the contractor's operation and ability to move material.
- Use temporary mulching or provide other temporary stabilization on exposed soil until final grade and stabilization is reached (stabilization is defined on page 34).
- Immediately seed and mulch areas ready for re-vegetation. Seeded areas should be mulched and mulch should be anchored to protect the soil until vegetation is established.
- Implement special measures during construction in the late fall and winter months. Of particular concern are winter thaws and the springtime, when normal rainfall combines with snowmelt to produce increased amounts of runoff. This is particularly problematic when subsoil material is frozen, and runoff can easily mobilize the exposed layer of saturated surface soil.

» **Provide for stability of man-made channels/swales.**

- The project engineer must design new ditches for stability, as well as capacity. Ditch linings must be designed to withstand anticipated velocities.
- The capacity and stability of constructed channels/swales are designed based upon the final stabilized condition. Partially constructed swales are vulnerable to erosion and extreme damages. Constructed channels/swales should be stabilized as soon as possible after their installation. Temporary stabilization measures (such as erosion control mats, check dams, or other measures) should be planned where channels will

be vegetated, to provide for erosion protection during the period when grass is becoming established.

» **Protect cut and fill slopes caused by construction activities.**

- Construction activities must consider the structural stability of these slopes. Terracing may be required to adequately handle anticipated runoff.
- Plan for control of groundwater seepage on cut slopes, where encountered.
- Intercept runoff from areas above newly exposed slopes and divert and disperse it to a stable area.
- Convey the water down the slope in a stabilized channel or slope-drain.
- Stabilize slopes as soon as possible following grading activity.

» **Protect storm drain inlets and culverts from sediment.**

- Provide construction sequencing, erosion controls, sediment traps, and other measures to keep sediment-laden water away from these inlets to the extent possible.
- Install sediment barriers and sediment traps at inlets to prevent sediment from entering the drainage system.
- Clean catch basins, drainage pipes, and culverts if significant sediment is deposited.

» **Avoid tracking mud into roadways.**

- Install and maintain stone construction exits at the intersection of the construction access and any paved road.
- Provide for washing truck tires before vehicles leave the construction site, as necessary.
- Sweep all construction related debris and soil from all adjacent paved roadways as needed.

» **Monitor erosion and sediment controls and adjust them to meet changing conditions**

Monitor the erosion and sediment control measures and maintain, repair, adjust, and supplement them as construction and weather conditions require. See further discussion of inspection and monitoring in Section 4.4. Provide for regular inspection and maintenance in every erosion control plan, including the following:

- Designate inspection tasks and frequencies and a responsible party to perform inspections and follow-up adjustments and repairs.
- Designate a responsible party to monitor weather.
- Post erosion and sediment control plan drawing in the project field office.
- Document changes to the erosion and sediment control plans and/or SWPPP. Changes can be handwritten and strikeouts in the original document.
- Monitor and replenish stored erosion control supplies and equipment to respond to the occurrence of unforeseen weather conditions and erosion and sediment problems.
- Store records of inspection, maintenance, corrective action at the site.

» **Remove temporary erosion and sedimentation measures.**

When construction activity has ceased and a healthy stand of vegetation is established at the site, the temporary erosion and sediment control items (such as silt fencing, diversions, perforated risers) need to be removed.

- Refer to the erosion and sediment control plan and/or SWPPP for the items that must be removed, and designate a party responsible for this activity.
- All facilities should be cleaned of accumulated sediment, with the removed material graded onto the

site and stabilized, or removed for suitable off-site disposal.

3-2. The Erosion and Sediment Control Plan

Erosion and sediment control planning is done primarily through the development and implementation of planning documents, such as an Erosion and Sediment Control (E&SC) Plan or a Stormwater Pollution Prevention Plan (SWPPP). An E&SC Plan is a requirement of the NH Alteration of Terrain Permit (AoT), and a SWPPP is a requirement of the National Pollutant Discharge Elimination System (NPDES) Permit. These documents must be developed as part of the application for their respective permits. It is noted that while significant portions of an E&SC Plan and a SWPPP contain similar information, there are specific requirements for each plan. In situations where both an NH AoT Permit and a NPDES permit are required for a single project, the documents can be joined to contain all pertinent information required under both programs. Although formal erosion and sediment control plans are often only developed for a project requiring a permit, they should be developed and implemented for all projects.

The erosion and sediment control plan generally consists of two components: a narrative describing the project, control practices, and implementation procedures, and drawings showing plans and details of the erosion and sediment control practices. The narrative may appear as notes on the drawings, but more typically, it is provided as a separate document due to its length, particularly in larger projects that have more than one construction phase.

For sites where the erosion and sediment control measures require engineering analysis and design, the hydrologic and hydraulic calculations and other support documentation may be part of or appended to the narrative plan.

The plan set should have separate sheets for the phasing of the project and for the placement of erosion and sediment controls. Detailed drawings should also be provided to clearly show the

dimensioning, materials, and installation details for the erosion and sediment control practices.

The following information should be included in the Erosion and Sediment Control Plan:

Erosion and Sediment Control Plan Narrative

- Designation of responsible parties for installation and maintenance of erosion and sediment control measures, monitoring and inspection, and emergency response. Prior to initiating construction, specific persons should be identified in the plan, together with contact information for both normal business hours and during contingencies.
- Brief description of the proposed land-disturbing activities, existing site conditions (including soil and vegetation), and adjacent areas (such as streams, wetlands, property lines and buildings) that might be affected by the proposed clearing and grading;
- Detailed description of critical areas on the site, including:
 - Areas that have a potential for serious erosion problems (such as steep slopes, highly erodible soils, areas exposed to runoff discharged from other areas of the site);
 - Water resources (wetlands, streams, lakes, and other receiving waters) that must be protected from discharges of sediment.
- Dates that grading will begin and stabilization will be completed, as determined by the contractor.
- Specific limits on the time frame between initial exposure of soils by construction activity to the temporary or final stabilization of those surfaces.
- Specific time frames when temporary and permanent seed mixes may be used.

- Brief description of the measures that will be used to control erosion and sedimentation on the site and when these measures will be implemented. This should include a description of measures anticipated for installation at specific stages of construction, and also contingency practices for addressing erosion and sediment problems as they arise.
- Description of an inspection and maintenance program, with provisions for frequency of inspection, repair and reconstruction of damaged structures, cleanout and disposal of trapped sediment, duration of the maintenance program, and final disposition of the measures when site work is complete.

Erosion and Sediment Control Drawings

Site plans should show the following information:

- All critical areas within or near the project site, such as streams, lakes, wetlands, as well as the aerial extent of erodible soils.
- Existing contours at sufficient interval and scale to identify runoff patterns before disturbance.
- Final contours.
- Limits of clearing and grading.
- Setbacks and clearances from property lines, water resources, and other features as provided by applicable regulations and permit requirements.
- Existing buffers and vegetated areas that must be retained and protected.
- Proposed general construction phasing and any required sequencing of site disturbance activities. Detailed construction phasing and sequencing plans need to be documented in the SWPPP by the selected contractor.

- The location and types of erosion and sediment control measures, including the aerial extent of vegetative treatments.

Construction detail drawings should show the following information:

- Detailed drawings of erosion and sediment control structures and measures, showing dimensions, materials, installation requirements, and other detailed information needed for proper application of the controls.
- General sizing and other design criteria for control measures that may vary in the field, depending on site conditions (e.g., sediment traps sized based on contributing area, limits on length of slope and contributing area draining to silt fence). Specific sizing and design should be finalized in the SWPPP by the selected contractor.
- Seeding or vegetation specifications.
- Inspection and maintenance notes.

Key Actions for Successful Erosion & Sediment Control

Successful erosion and sediment control depends on clear coordination of construction activities and a commitment by all project and construction staff to work responsibly to minimize site disturbances and prevent degradation of water quality. Preventing erosion during severe storms requires good judgment and timely action.

- Plan ahead and phase project to address stormwater issues and construction implementation throughout the project.
- Mark soil disturbance limits on the site before starting construction.
- Recognize nearby sensitive areas.
- Match erosion control strategies with construction activities.
- Communicate changes in construction sequence and resulting erosion control strategies.
- Monitor weather and plan for major and severe weather events.
- Recognize the potential impact of frozen soils or frost during rain events and spring thaw, particularly in cut areas.
- Install sediment barriers before disturbing soils.
- Understand the characteristics of site soils (i.e., potential to create off-site turbidity) and limit the amount of soil disturbance at any one time.
- Divert, disperse, and direct water run-on away from construction activity areas and toward stabilized areas.

(Continued)

*Key Actions for Successful Erosion & Sediment Control**(Continued)*

- Construction of steep slopes and swales/channels should be stabilized immediately.
- Inspect and repair erosion controls and sediment trapping measures before and after every storm.
- Stabilize all disturbed soils before winter.
- Limit earthwork in the winter.
- Remove temporary erosion controls when soils on the site are permanently stabilized.
- Divert, disperse, and direct treated stormwater run-off from construction areas to stabilized natural upland areas wherever possible. Management of off-site discharges should be performed in a manner to avoid creating localized flooding or impacts to adjacent properties.
- Remove temporary erosion controls when soils on the site are permanently stabilized.

3-3. Erosion and Sediment Control Selection Table

Chapter 4 presents a description of Erosion Control Practices and Sediment Control Practices. The BMPs presented in that chapter are summarized in the following table, with information to guide selection of practices based on their intended control objective.

Table 3-1. Selection of Erosion and Sediment Control Practices

Best Management Practice	Chapter Env-Wq 1500 Reference	Control Objective													
		Enhance settling of fine silts and clays	Intercept sediment from excavation dewatering	Intercept sediment from construction traffic	Intercept sediment, area > 5 acres	Intercept sediment, area < 5 acres	Intercept sediment, sheet flow, slope length > 100 ft	Intercept sediment, sheet flow, slope length < 100 ft	Convey construction runoff	Prevent gully erosion	Prevent wind erosion	Prevent sheet and rill erosion	Prevent soil displacement by raindrop splash	Prevent natural resource degradation	Cold Weather Stabilization
Erosion Control Methods During Construction															
Construction Phasing															
Dust Control															
Grading practices						○									
Soil Stockpile Practices															
Temporary and Permanent Mulching	1506.01														
Vegetation	1506.02														
Temporary Erosion Control Blanket	1506.03														
Diversion								●							
Slope drain								●							
Sediment Control Methods															
Silt Fence	1506.04														
Erosion Control Mix Berms	1506.05					○			●						
Straw or Hay Bale Barrier	1506.06					○			●						
Temporary Check Dam	1506.07					○			●						
Temporary Storm Drain Inlet Protection	1506.08					○			●						
Temporary Construction Exit	1506.09					○			●						
Temporary Sediment Traps	1506.10					○			●						
Temporary Sediment Basins						○			●						
Construction Dewatering	1506.11					○			●						
Flocculants	1506.12					○			●						

○ May be applicable w/ careful design

● Applicable

3-3. Erosion and Sediment Control Selection Table