

U-7 ENHANCED EROSION AND SEDIMENT CONTROL PRACTICES

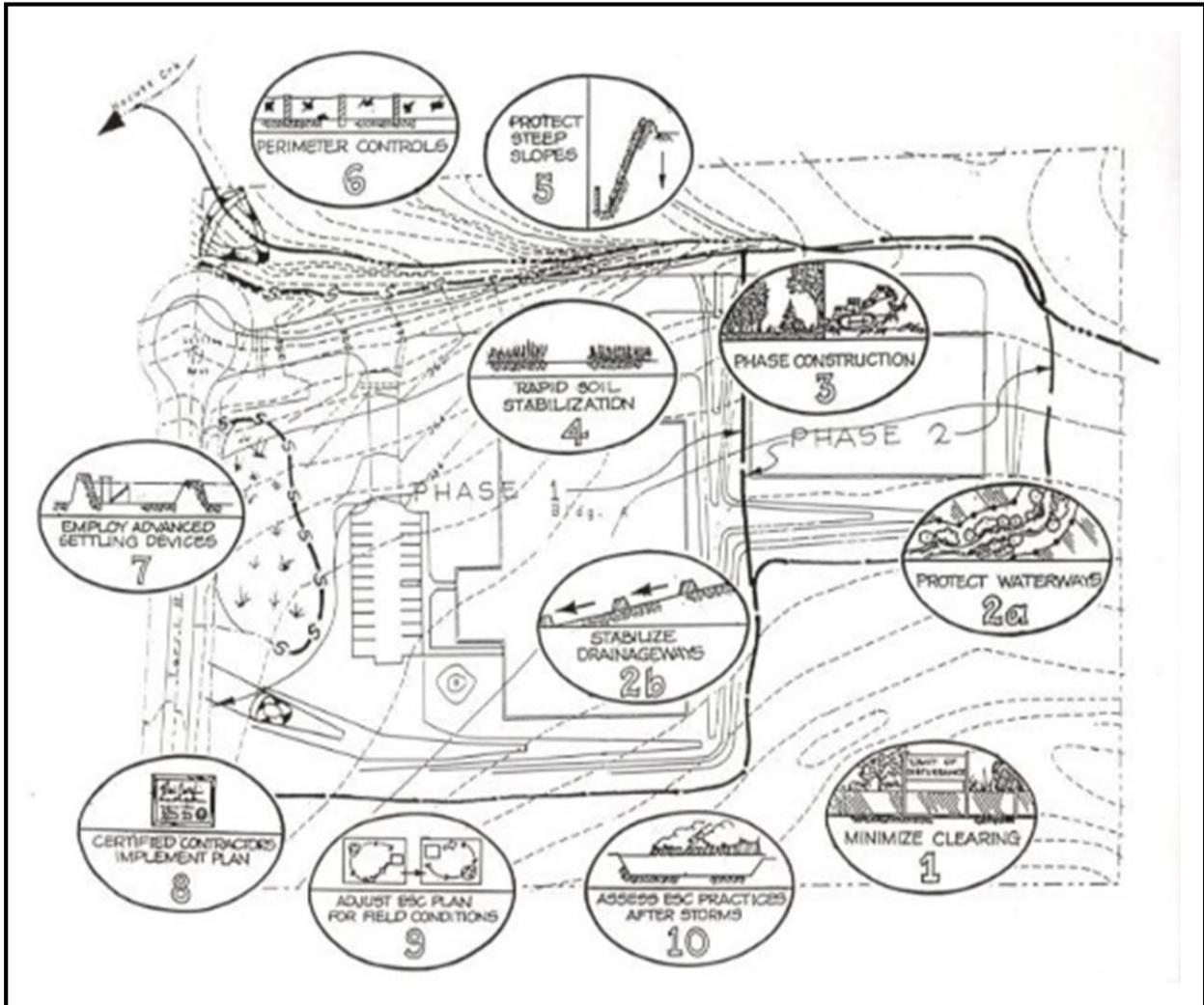
PRACTICE AT A GLANCE

- Construction sites only comprise about 84,500 acres of the Chesapeake Bay watershed in any given year, but deliver about 16% of the total annual urban sediment load to the Bay.
- Communities have made major enhancements to erosion and sediment control (ESC) practices required at active construction sites. In recent years, every Bay state has strengthened their ESC requirements, through more sophisticated technology and more stringent inspection and enforcement efforts.
- This investment has paid off in terms of much higher sediment reductions observed at construction sites, which plunged sharply from the 20 to 40 ton/acre/year erosion rates measured back in the 1960s.
- The historic sediment loads from construction sites rank as the highest recorded for any land use in the Chesapeake Bay watershed. Current level of technology (ESC Level 2) reduces sediment levels by over 85%, and discharges less than 2 tons of sediment per acre per year.
- On the other hand, current ESC technology has less impact on reducing turbidity of waters discharged from construction sites. During storms, muddy waters are still discharged from construction sites that violates state standards for water clarity. Promising technology has been developed to provide higher and more reliable turbidity control, but has not yet been widely implemented across the watershed.
- The bad news is that recent research indicates that ESC practices may not reduce nutrients, but actually become a significant nutrient source. The main reason is the high fertilizer applications used to quickly establish a dense grass cover on the bare soils of construction sites.
- The expert panel recommended a zero nutrient removal efficiency for all ESC levels, and noted that the prevailing nutrient loads for construction sites (26.4 lbs of TN/ac/yr and 8.8 lbs of TP/ac/yr) still ranked among the highest of any land use in the entire Bay watershed.
- The good news is that local governments need do not need to report anything to earn the sediment removal credit, and that the CBP partnership decided not to implement the panel's nutrient removal recommendations until 2017, so as not to penalize local governments from this unexpected finding.

Good Recipes for the Bay Pollution Diet

PRACTICE DESCRIPTION

ESC includes a combination of practices designed to reduce sediment export from active construction sites. The specific practices can be divided into broad categories, including **Protecting Natural Resources**, **Minimizing Disturbance**, **Soil Stabilization**, **Internal Drainage**, **Perimeter Controls** and **Sediment Traps and Basins**. The specific techniques used within these categories, combined with inspection frequency and level of oversight, are used to classify the ESC “Level of Practice” (See Table 1).



Elements of Erosion and Sediment Controls at Construction Sites

Good Recipes for the Bay Pollution Diet

Table 1. “Level of Practice” Definitions for ESC			
Practices	1990’s (Level 1)	Current (Level 2)	Next Generation (Level 3)
Protect Natural Resources	Locate natural areas and mark LOD (up to edge of natural area)	Level 1 and add buffers to LOD to prevent discharge to natural areas	Level 2, and provide enhanced perimeter controls at LOD boundary for sensitive areas
Minimize Disturbance	No numeric construction phasing requirement	Construction phasing required for large projects (e.g., >25 acres)	Construction phasing required for smaller projects
Stabilize Soils	Stabilize w/in 14 to 21 days	Stabilize w/in 7 to 14 days	Stabilize in less than 7 days
Internal Drainage	Temporary swales	Swales/diversions with check-dams and erosion control blankets	Level 2, but enhance with passive use of polymer (e.g., floc logs or wattles)
Perimeter Controls	Standard Controls (e.g., hay bales, entrance stabilization)	Reinforced silt fence and berms/diversions	Enhanced perimeter controls (i.e., super silt fence, compost logs, and filtering practices)
Sediment Traps and Basins	Sediment traps, filters, and basins sized to capture 1,800 cf/acre	Sediment traps, filters, and basins sized to capture 3,600 cf/acre with permanent pools and/or dewatering control devices (e.g., skimmers)	Level 2, and enhance performance with passive use of chemical additives to improve settling, filtration and surface outlets
Inspections	Monthly	Every 1 to 3 weeks	Every seven days and after each precipitation event > 1.0"
LOD: Limits of Disturbance			



Good Recipes for the Bay Pollution Diet

A developer must submit an ESC plan for their construction project that specifies a unique combination of erosion and sediment controls for the unique conditions of the site. The plan is reviewed as part of the state and/or local land development approval process, and the ESC practices must be installed prior to construction activity. Construction sites are inspected periodically to ensure the practices are intact and working properly to prevent off-site sediment discharge.

Enhanced ESC practices do a great job in reducing the mass of sediment exported from active construction sites by 85%, even accounting for intense storms that reduce the functional performance of ESC practices at construction sites.

The current level of ESC practice, however, has no ability to remove nutrients and may actually serve as a nutrient hotspot. Annual nutrient loads from construction sites are estimated to be among the highest in the Chesapeake Bay watershed (26.4 of lbs TN/ac/yr and 8.8 lbs of TP/ac/yr).

The major reason appears to be the risk of fertilizer wash off used to quickly stabilize construction sites with grass and other vegetation. The typical fertilization rate in the Bay states is 74 lbs of TP per acre, and 114 TN lbs per acre, most of which is in water soluble form. The most critical period is during the three to five weeks it takes for the grass to become established and stabilize bare soils. Any intense storms that occur during this time frame have a good chance of delivering nutrients to the Chesapeake Bay.

Enhanced ESC practices provide other benefits beyond keeping sediments from leaving construction sites. ESC practices:

- Protect forests, wetlands, streams and other environmentally sensitive lands from damage during construction.
- Establish and protect open space, better site design practices and suitable locations for low impact stormwater practices.
- Conserve natural soil properties and contours at the site, including their ability to infiltrate rainfall

EROSION AND SEDIMENT CONTROL PRACTICES



Soil Stabilization: Erosion Control Blanket
Source: bassoseeding.com



Internal Drainage: Pipe Slope Drain
Source: Robert Pitt



Perimeter Control: Super Silt Fence
Source: Getsco.net

Good Recipes for the Bay Pollution Diet

WHERE TO FIND THE BEST OPPORTUNITIES IN YOUR COMMUNITY

Erosion and Sediment Control is not a discretionary practice; it is required for all new development, redevelopment and infill construction sites that exceed a given size threshold, which varies from a disturbed area of 5,000 square feet up to an acre.

ESC practices are implemented on construction activities across all of the Bay States. However, there is an opportunity to improve ESC by implementing more advanced techniques and rigorous oversight. Municipalities with highly qualified plan review and site inspection staff may represent the best opportunity to improve ESC practices. At the site level, sites in sensitive environmental areas, or with high sediment export potential, may be the best opportunities to implement more advanced ESC measures.

The main choice for most Bay communities is to decide whether to stick to their current programs (ESC Level 2) or shift to a higher level of practice (ESC Level 3).

To upgrade to Level 3, a state or local jurisdiction must demonstrate that they have implemented several features, including the following:

- Passive chemical treatment is utilized within the construction site by adding
- Poly-Acrylamide (PAM) or other flocculants to hydro-seeding, site conveyance channels, or in sediment basins or traps.
- Enhanced sediment basin design to include skimmers or surface outlets
- ESC maintenance inspections at least once a week.
- Enhanced measures for perimeter controls and natural resource buffers.
- More stringent stabilization and construction phasing requirements than currently required.



Another key choice is to put together urban nutrient management plans for construction sites that can reduce the risk of fertilizer wash off based on soil tests and other site data. More information on how urban nutrient management is credited can be found in fact sheet U-5.

GENERAL COST INFORMATION

Communities have been required to do ESC by state law as well as MS4 stormwater permits for decades, so the cost of compliance should already be a fixed part of your existing budget. The basic role of local government is to play a strong quality control role to ensure that the ESC

Good Recipes for the Bay Pollution Diet

practices maintained by the private sector meets local and state performance standards. This involves staff time for plan review and site inspections to make sure the practices are being maintained properly.

WHAT DEGREE OF TECHNICAL SUPPORT IS NEEDED

Reviewing ESC plans and inspecting construction sites often requires a professional license, or should at least be conducted under the direction of a licensed professional, such as professional engineers, certified land surveyors or landscape architects.

COMPUTING THE POLLUTANT REMOVAL CREDIT

Local governments do not need to compute the sediment reduction credit for enhanced ESC practices, as it is automatically calculated by the state based on the estimated number of acres subject to construction each year. For now, the effective sediment removal rate is 85%, as all Bay states are currently operating at ESC Level 2 (Table 2).

ESC Scenario	Discharged Load	Effective Removal Rate
ESC Sites Operating at Level 1	3.1 t/ac/yr	74%
ESC Sites Operating at Level 2 *	1.75 t/ac/yr	85%
ESC Sites Operating at Level 3	1.25 t/ac/yr	90%

* The expert panel determined that all Bay States are currently operating at this level

The nutrient removal rate for construction sites will stay the same until 2017, when it will be reduced to zero in the next version of the Chesapeake Bay Watershed Model (Table 3). For most Bay communities, this lower rate should not make a major difference in meeting goals for the Bay pollution diet, given the comparatively few acres of new construction that occur each year.

Nutrient	Until 2017	After 2017
Total Phosphorus	40%	0%
Total Nitrogen	25%	0%

HOW TO REPORT THE PRACTICE TO THE STATE

Local governments do not need to report any new construction data to the state, other than whatever data they currently report as part of their MS4 stormwater permit or state construction general permit.

WHAT IS REQUIRED TO VERIFY THE PRACTICE OVER TIME

Since ESC is highly regulated through both state and local oversight, no supplemental verification is needed to receive credit for ESC.

Good Recipes for the Bay Pollution Diet

STATE-SPECIFIC INFORMATION

Table 4 includes web links to each of the Chesapeake Bay watershed state's Erosion and Sediment Control program pages and manuals.

Table 4
Web Links to Each Bay State ESC Program Page and ESC Manual

State	Type	Link
DE	Program	http://www.dnrec.delaware.gov/swc/pages/sedimentstormwater.aspx
	Manual	http://www.dnrec.state.de.us/DNREC2000/Divisions/Soil/Stormwater/New/Delaware%20ESC%20Handbook_06-05.pdf
MD	Program	http://www.mde.state.md.us/programs/Water/StormwaterManagementProgram/SoilErosionandSedimentControl/Pages/Programs/WaterPrograms/SedimentandStormwater/erosionsedimentcontrol/index.aspx
	Manual	http://www.mde.state.md.us/programs/Water/StormwaterManagementProgram/SoilErosionandSedimentControl/Documents/2011%20MD%20Standard%20and%20Specifications%20for%20Soil%20Erosion%20and%20Sediment%20Control.pdf
NY	Program	http://www.dec.ny.gov/chemical/8694.html
	Manual	http://www.dec.ny.gov/chemical/29066.html
PA	Program	http://www.dep.pa.gov/Business/Water/Waterways/NPDES-Construction-and-Erosion-Control/Pages/default.aspx#.VwPmH_krLIU
	Manual	http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-88925/363-2134-008.pdf
VA	Program	http://www.deq.virginia.gov/Programs/Water/StormwaterManagement/ErosionandSedimentControl.aspx
	Manual	http://www.deq.virginia.gov/Programs/Water/StormwaterManagement/Publications/ESCHandbook.aspx
WV	Program	http://www.dep.wv.gov/WWE/Programs/stormwater/csw/Pages/home.aspx
	Manual	http://www.dep.wv.gov/WWE/PROGRAMS/STORMWATER/CSW/Pages/ESC_BMP.aspx

Good Recipes for the Bay Pollution Diet

RESOURCES

The following resources are available for help with all aspects of this practice:

Type of Resource	Title of Resource	Web link
Expert Panel Report	Recommendations of the Expert Panel to Define Removal Rates for Erosion and Sediment Control Practices (2014)	http://chesapeakestormwater.net/wp-content/uploads/downloads/2014/05/WQGIT-APPROVED-ESC-EXPERT-PANEL-REPORT_SHORT-04142014.pdf
Archived webcast	Enhanced Erosion and Sediment Control Measures Webcast (2014)	http://chesapeakestormwater.net/events/webcast-ms4/
More Tools & Resources	Final Recommended Guidance for Urban Stormwater BMP Verification	http://chesapeakestormwater.net/wp-content/uploads/dlm_uploads/2013/01/USWG-Approved-Urban-BMP-Verification-Guidance-08112014.pdf