Elements of an Effective Erosion & Sediment Control Program

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Photo courtesy Coral Bay Community Council
Overview

◆ Why ESC is important
◆ Review of USVI Program Requirements
◆ Challenges to ESC implementation
◆ Key program elements
◆ Implementation brainstorm
Upland Reforestation
Stabilize Slopes
Control Construction Sites
Reduce Channel Erosion
Sediment Basins
Salt Pond Restoration
Reducing sediment loads to reefs
Why Implementation at construction sites is important!
Effect of Erosion and Sediment Control Measures On Suspended Sediment Concentrations From Piedmont Construction Sites

Storm Median Sediment Concentration (mg/l)

- Uncontrolled = No Erosion or Sediment Control
- Erosion = Erosion Control Only
- Sediment = Erosion and Sediment Control
- Urbanized = Post Construction Sediment Levels (NURP, 1987)
- Natural = Predevelopment, Prior to Construction

Source: Schueler and Lugbill, 1990
EPA requires:

- Ordinance/regulatory mechanism
- Site construction plan review
- Site inspection & enforcement
- Sanctions to ensure compliance
- Receipt & consideration of information submitted by public
- Best management practices (BMPs) & measurable goals
The Top 5 Excuses for Poor ESC Stateside

5. The Plans Never Work in the Field
   (who designs these things anyway?)
The Top 5 Excuses for Poor ESC Stateside

4. Nothing is leaving the site
The Top 5 Excuses for Poor ESC Stateside

3. The Subcontractors Trash My Controls!
The Top 5 Excuses for Poor ESC Stateside

2. The Dirt Cops will never catch me
The Top 5 Excuses for Poor ESC Stateside

2. The Dog ate my silt fence
What does USVI require for:

- Disturbance threshold triggers
- Review process
- ESC plan elements
- Criteria for Tier 1 and 2 or special areas
- Geotechnical reports for steep slopes
- Certification or licensing for contractors and inspectors
- Inspection frequency
- Violations
USVI challenges to implementation...

- Inspection (staff capacity)
- Enforcement authority (do field inspectors have any)
- Agency coordination
- Conventional way of doing things
- Proper design, installation and maintenance of practices (is this education, experience, or material driven?)
- Big projects versus little projects

What else???
ESC Strategy for USVI

1. Convince local leaders of ESC needs
2. Adopt necessary ordinance language to ensure authority
3. Require submittal of comprehensive ESC plans for early review
4. Increase inspection capacity
5. Balance compliance incentives and penalties
6. Invest in training/certification programs
7. Use public projects to demonstrate good/innovative practices
8. Consider watershed-based criteria*
1. Convincing local leaders

- Build interagency staff consensus prior to approaching elected officials
- Provide model program examples
- Schedule educational site visits
- Encourage watershed advocates to provide public support
- ?
2. Adopt necessary ordinance language to ensure authority

- Reference to a technical manual
- Enforcement measures to ensure maintenance
- Flexibility to change the plan in response to field conditions
- Authority for inspectors to inspect construction sites at regular intervals
- Measures to protect natural resources such as wetlands and forests
- A specific plan approval process with guidelines on plan submission

Can we change *shoulds* to *shall*...
In addition to the model ordinance, this section includes several other materials that might be useful in drafting an ordinance or as support material:

- **Erosion and Sediment Control Ordinance from Minneapolis, MN**
  Provides a few technical guidelines and references an existing technical document. An example of a very strict ordinance in terms of the sites that are required to submit sediment and erosion control plans.
  
  - WordPerfect Format (95KB, 16pages)
  - PDF Format (40KB, 16pages).

- **Clearing and Grading Ordinance from Olympia, WA**
  An example of regulating clearing and grading separately from erosion and sediment control.
  
  - WordPerfect Format (50KB, 11pages)
  - PDF Format (28KB, 12pages).

- **Erosion and Sediment Control Inspection Checklist from the Lower Platte South Natural Resources District, NE**
  A good example of a tool that can help contractors or government inspectors effectively maintain erosion and sediment control measures.
  
  - WordPerfect Format (65KB, 3pages)
  - PDF Format (9KB, 3pages).

- **Small site design guideline from the Indiana Department of Natural Resources**
  An example of a small site guideline. For sites that are not regulated by the ordinance, guidance material like this might help to reduce erosion and sedimentation.
  
  - WordPerfect Format (42KB, 8pages)
  - PDF Format (66KB, 7pages).

- **Pre-Construction Meeting Notice from Montgomery County, MD**
  An example notice for a public meeting. Materials like this notice help support the ordinance language and ensure that erosion and sediment control measures are properly installed.
  
  - WordPerfect Format (13KB, 2pages)
  - PDF Format (13KB, 3pages).

Erosion and sediment control is widely accepted as a necessary practice, but there are certain ways to make even the most well-crafted ordinance more effective. First, communities need to have the staff and resources to enforce erosion and sediment control regulations; otherwise, the authority to inspect sites becomes useless. In
3. Require submittal of comprehensive ESC plans for early review

- Discuss ESC in pre-design meeting
- Provide a plan review checklist
- Ensure plan includes all important elements (short and long term)
- Require simplified ESC sketch if full plan not required
- Cross-check with Design Manual
- Cross-check with watershed plan
- Require a revised plan if not optimal
- Develop rapid review incentives
Common Plan Components…

- Vicinity map
- Limits of clearing & grading plan
- Project description
- Soils information
- Surface water locations
- Site development
- Schedule of construction activity
- Location of practices
- Detail drawings
- Land stabilization measures
- Special notes for critical areas
- Existing natural areas
- Maintenance and inspections
- Storm water runoff considerations & post-construction BMPs
- Trap efficiency, location & volume of sediment ponds
- Disposal of solid, sanitary and toxic waste
- Off-site sediment tracking
USVI *really* needs to see…

- Limits of disturbance
- Guts, wetlands, large trees
- Grading and stockpiling plan *(contours, cut & fill estimates, top soil salvage)*
- Construction schedule
- Practice location, design, and installation
- Revegetation plan
- End of day inspection and repair schedule *(during rainy season)*
10 Elements of ESC Plan

Refer to article in your notebook
Sequence Of Construction

- Protect existing vegetation
- Stabilized construction access
- Sediment traps and barriers
- Runoff conveyance system
- Clearing and grading
- Building construction
Maintenance of ESC Practices During Construction

- All ESC practices require maintenance
- Cost of ESC maintenance & repair should be included in construction plan
- Designate on-site contractor for maintenance
- Set minimum maintenance & periodic self inspection schedule
Maintenance Plan

- Identify Who Inspects the Site
- Define Frequency of Inspection
- Specify performance criteria
- Budget for routine maintenance/replacement
Incentives Through Review Process

- Review & approval process can be time consuming and results in lengthy delay
- If plan is complete and meets checklist, it becomes a fast-track priority...

**PROS**
- Carrot
- Leads to better plans
- Encourage interagency coordination

**CONS**
- Delays in approval usually a symptom of several issues (lack of staff, etc.) – may not be as simple as moving to top
- Only applies to review stage, does not ensure good implementation
- Result in inadequate review?
4. Increase Inspection Capacity

- Hire more staff
- Coordinate building/site inspections
- Increase inspection frequency
- Create standard inspection checklists/reports
- Prioritize sites for inspection
  - Watershed
  - Slope
  - Bad actor history
  - Rainy season
- Consider private inspectors
- Establish “watchdog” hotline
Preconstruction Meeting

- Before any clearing & grading can begin
- Contractor, project engineer, inspector & plan review walk the site
- Walk through may consider:
  - Field changes to ESC plan
  - Staking limits of disturbance
  - IDing resource protection areas
  - Ensuring all sediment control & tree protection measures are installed

We should have had a preconstruction meeting!
Inspection during construction

- Assess ESC practices routinely and after storms
  - Prior to construction
  - Routinely – every 7 days
  - Within 24 hours of the end of a storm event of ½” or greater
  - Final site inspection
- Maintain a record of all inspections on site
- Inspection reports should be description & prescriptive
- Keep plans on site for reference
DNREC
SEDIMENT AND STORMWATER CERTIFIED CONSTRUCTION REVIEWER
INSPECTION REPORT

Date: 8/14/00  Time Arrived: 8:30 a.m.  Time Left: 10:00 a.m.
Project/Site Name: Greater Milford Business Park
Location: Airport Road, Milford, DE

Weather Conditions: Raining, over 4" since 12 noon 8/11/00. Thunderstorms expected.

Site Status: Active  completed

Date of last inspection: 8/7/00  Active, inactive.

Not Applicable (N/A)  Satisfactory (S)  Unsatisfactory (U) (see written comments)

1. Stabilized Construction Entrance  S
2. Earth Berms/Dikes/Swales  S
3. Inlet Protection  U  note 2 and 3
4. Vegetative Stabilization  S
5. Stormwater Management Facilities Construction  S
   (For Stormwater Management Ponds, Attach Pond Inspection Checklist)
6. Silt Fence  S
7. Sediment Traps/Basins  S
8. Outlet Protection  U  note 2
9. Stone Check Dams  S

Written Comments:

1. The contractor was on site, but left because of rain
2. Heavy rains since last Friday, August 11, 2000, have caused some problems. Older areas of the job site are taking the weather very well. However the new system of catch basins from the western most outfall of pond 4, basins 26, 27, 36 and 37 have not had proper inlet protections installed and have failed. This has allowed some sediment into the stormwater system and Pond 4. The pond is processing the runoff adequately and no sediment is leaving the pond. Protection should be re-installed per details on page SWM 10. The outfall entering pond 4 from this system is still not installed, and the area around it is eroding.
5. Balance incentives and penalties to increase compliance

- Accountability thru sign-offs
  Engineers, contractors, operators
- Performance Bonds
- Conditions in contracts
- Clear instructions on inspection reports
  (what is to be done by when)
- Set follow-up expectations
- Stop work orders
- Civil fines
Make ‘em sign it!

- Owner/Developer/Operator certification to implement plan
- Responsible Person certification
- Right of Entry certification

2. OPERATOR'S CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. Further, I hereby certify that the SWPPP meets all Federal State and local erosion and sediment control requirements. I am aware that false statements made herein are punishable as a class A misdemeanor pursuant to Section 216.45 of the Penal Law."

Name (please print)  
Title  
Date:  
Address:  
Phone:  
Email:  

OWNER CERTIFICATION:

I HEREBY CERTIFY THAT ALL CLEARING, GRADING, CONSTRUCTION AND/OR DEVELOPMENT WILL BE DONE PURSUANT TO THIS PLAN, AND THAT ALL RESPONSIBLE PERSONNEL INVOLVED IN THE LAND DISTURBING ACTIVITIES WILL HAVE A SEDIMENT AND STORMWATER MANAGEMENT CERTIFICATION FROM THE DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL. I HEREBY AUTHORIZE THE RIGHT OF ENTRY FOR PERIODIC ON SITE INSPECTIONS BY STATE OF DELAWARE, DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL COMPLIANCE PERSONNEL AND/OR AUTHORIZED AGENTS.

[Signature]

Address: 30045 Eagles Nest Road
Unit 2
Milton, DE 19968
(302) 646-2333
# Performance Bonds

- Financial surety posted prior to plan approval and/or grading permit
- Motivator for compliance
- Usually required in code
- Allows program authority to cash bond & conduct work if applicant is not in compliance

### PROS
- Economic incentive for compliance
- Good complement to other enforcement tools

### CONS
- Administrative burden (compute bonds, inspections, data base)
- Politically & administratively difficult to cash bonds & perform work
- Bonds need a life span
Performance Bond Example: Albemarle County, VA

- Bond posted for Erosion & Sediment Control & Stormwater Management prior to plan approval
- Bond estimate based on cost + 25%
- Partial bond reductions based on inspection – retain 20% until complete
- Annual renewal fee – extensions beyond 1 year discouraged
- Bonds tracked in data base
- Bonds cashed in rare instances
- Administration – 20% of FTE (60 bonds annually)
# Conditions in Contracts

Contracts for government work (roads, municipal projects, etc.) specify training, preparation of plans, and compliance. May be coordinated with training and/or certification program.

**Pros**
- Highlights Erosion Control
- Early in Process (contract)

**Cons**
- Often forgotten during construction, except if there is conflict
- Difficult to Enforce (legal action)
Enforcement Tools

- Written warning with voluntary compliance
- Written notice of violation ordering compliance
- Administrative penalties
- Civil penalties
- Compensatory action
- Criminal prosecution
- Cost of abatement of the violation / property liens
- Stop work order
- Withhold building permits / certificates / payment

% Fees and fines should go back into program....
Civil Penalties

- Specified in Code
- Civil Fines for Specified Violations (like a traffic ticket)
- Requires Trained Inspection Staff

**PROS**
- Effective Compliance
- Easier to Apply than Criminal Penalties

**CONS**
- Political Will Needed to Apply Tool
- Need Control of “Renegade” Inspectors
- Need Enough Inspectors to Document Conditions at Sites
- Judges Not Always Sympathetic
Civil Penalties Example:
Roanoke County, VA Ticket Book

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ROANOKE COUNTY COMMUNITY DEVELOPMENT
EROSION & SEDIMENT CONTROL
SUMMONS

Project Name/Tax Map #: ____________________________ File No. ____________ Inspection Date: ______ Time: ______
Inspected by: ____________________________ Owner/Developer: ____________________________ RLD: ____________________________
Location of Violation(s): ____________________________

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<th>Violation Description</th>
<th>Daily Penalty</th>
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<th>DAYS</th>
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<td>X</td>
<td></td>
</tr>
<tr>
<td>STD 3.01..... Safety Fence</td>
<td>$1000/DAY</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>STD 3.02..... Construction Entrance</td>
<td>$1000/DAY</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>STD 3.03..... Construction Road Stabilization</td>
<td>$1000/DAY</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>STD 3.04..... Straw Bale Barrier</td>
<td>$1000/DAY</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>STD 3.05..... Silt Fence</td>
<td>$1000/DAY</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>STD 3.06..... Brush Barrier</td>
<td>$1000/DAY</td>
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<td></td>
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<tr>
<td>STD 3.07..... Storm Drain Inlet Protection</td>
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<td></td>
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<tr>
<td>STD 3.08..... Culvert Inlet Protection</td>
<td>$1000/DAY</td>
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<td></td>
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</tbody>
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Which watchdog in the room called in this site?
6. Invest in training/certification

* Certification/ licensing program for contractors, private inspectors, and plan preparers
  - Attend training, take exam & receive official sanction
  - Maintain an official list
  - List tied to certain requirements - plan approval, weekly inspections, onsite presence, etc.

* Training for agency inspectors
  - Can be tied to private certifications
  - Can consist of a 1 day course covers minimum standards; specs for conservation practices, basic soil mechanics and inspector skills
  - Require recertification every 3 years or so
Private Certification and Licensing: Delaware Sediment & Stormwater Program

- State requires a Certified Construction Reviewer (CCR) to provide inspection duties
- State provides certification
- CCR must become familiar with site plan
- Reports prepared by CCR on weekly basis
- ESC controls must be in accordance with approved plan and Handbook
- Non-compliance must be reported to State
- State pursues enforcement actions
- State has ability to revoke certification
Virginia DOT: Contractor Certification

Required for Contractor to Get State Contract for Road Work
Training for Inspectors Example: Virginia DCR

Erosion and Sediment Control Training and Certification

- Localities are required to have a certified inspector.
- Initial certification requires an Erosion and Sediment Control 101 course and one specifically geared at inspection.
- Inspectors must be recertified every 3 years.
- Recertification can be completed through online course.
- Maintains a list of certified inspectors on website.
7. Use public projects to demonstrate good/innovative practices

- Demo projects that illustrate the use, design, installation and maintenance of innovative erosion and sediment control practices
- Incorporate into workshops, certifications, tours, websites, etc.

**PROS**
- Non-threatening but convincing
- Allows govt agencies to set good example and high bar
- Good outreach potential
- Grants/ Funding

**CONS**
- Temporary
- Risk factor - some projects fail
- One piece of puzzle

Grants/Funding
Demonstration Projects Example:
UVI Cooperative Extension Service

- CES Home Demonstration Garden
- Demonstrate use and installation of practices not widely used in the territory: (erosion control mats, hydroseeding, and triangular dikes)
- Demonstrate the siting, installation, maintenance of silt fencing
- Display native and adapted grasses and ground covers for erosion control
- Provide public education and outreach on effective erosion and sediment control methods
- 4 year project funded through EPA 319 grant

Figure 3.8. Hydroseeding side slopes and outside rim of a sediment basin (Estate New Hermhut, St. Thomas, 1998).
8. **Apply watershed-based criteria***

Variable criteria can be based on watershed sensitivity (TMDL, erosion potential, steep slope)

- disturbance thresholds triggering ESC plan
- Plan approval process
- Inspection frequency
- Enforcement actions
B. **Grading season:** Grading shall be prohibited during the period from October 15th through May 1st unless otherwise provided by this Chapter. The County requires complete winterization of any project by October 15th.

C. **Other agencies:** All grading work shall conform to any restriction required by other federal, state, or local agencies.

D. **Applicability:** Except for Section 15.14.150 (Exemptions), the provisions of this Chapter shall apply to grading activities in the Tahoe Basin.

E. **Permit waivers:** The Director may waive the requirement for a grading permit if the work complies with all the following conditions:

1. The excavation does not exceed five (5) feet in vertical depth at its deepest point measured from the original ground surface, and does not exceed three (3) cubic yards per site.
2. The fill does not exceed three (3) feet in vertical depth at its deepest point measured from the original ground surface and the fill material does not exceed three (3) cubic yards per site.
3. Clearing of vegetation does not exceed one-thousand (1,000) square feet in area.

http://www.co.el-dorado.ca.us/DevServices/pdf/GradingOrdinanceDraft.pdf
What would it take to implement?

1. Convince local leaders of ESC needs
2. Adopt necessary ordinance language to ensure authority
3. Require submittal of comprehensive ESC plans for early review
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