Erosion Prevention & Sediment Control for Small Scale/Homeowner Projects

Sustainability for all the places between the buildings.

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Sustainability for all the places between the buildings.
About You
Today, we will discuss

Best management practices (BMPs) for:
Preventing erosion &
Controlling sediment
Brief Activity
Shake the Soil Jars!
The Water Balance Model

Water Quantity Before

- 100% average Annual rainfall
- 50% evaporation
- 25% groundwater (infiltration)
- 25% baseflow (infiltration)
- 0.5% runoff
- 25% groundwater (infiltration)
Water Balance BEFORE Development

- 100% annual rainfall
- 50% evaporation
- 0.5% runoff
- 25% groundwater (deep infiltration)
- 50% evaporation
- 50% evaporation
The Water Balance Model

Water Quantity After

- Reduced infiltration
- Reduced evapo-transpiration
- 98% runoff

100% rainfall yearly avg

- 2% evapo-transpiration
- 0" baseflow (infiltration)
Water Balance AFTER Development
Example: EVERYWHERE
“Before” & “After” Runoff Compared

0.5% runoff

98% runoff
Runoff Volumes: A Watershed Perspective
The Water Balance Model

Water Quality After

Sediment (air particulates)
Nutrients
Feces
Other debris

Sediment/turbidity
Hydrocarbons
Heavy metals (particles & soluble)
Other chemicals
Runoff volume

Sediment/turbidity
fertilizers
pesticides
herbicides
Runoff volume
RELATIONSHIP OF FISH ACTIVITY TO TURBIDITY

- Reduced growth rates
- Delayed hatching
- Long term reduction in feeding
- Increased respiration
- Avoidance
- Reduced feeding
- Increased coughing rates
- Stress
- Death

TURBIDITY (LOG 10)

TIME (LOG 10)
Soil is a Precious Resource (but very mobile)

Image from Soil Quality Information Sheet, U.S. Department of Agriculture
Prevent impacts/Source control
Protect resources
Mitigate impacts
Restore resources
An Ounce of Prevention...

“I’ll have an ounce of prevention.”
Place stockpiles so they don’t drain towards the street or a catch basin inlet.

Protect the soil from spills.
Source Control
Keep dirty stuff covered
Source Control

Sweep your pavement
Erosion Prevention
Retain Natural Vegetation
Tree Health During Construction

http://tinyurl.com/TreeProt

Tree Protection on Construction and Development Sites
A Best Management Practices Guidebook for the Pacific Northwest
Rent track-hoe or flotation tire equipment to do the heavy lifting.

The fencing below is great for protecting the tree, but its purpose is defeated when you move the fence to store materials inside it.
Erosion prevention is any practice that protects the soil surface and prevents the soil particles from being detached by rainfall or wind.
Erosion Prevention
Keep soils covered

Rills have formed as a result of impervious soils concentrating runoff

A generous covering of straw is one way to protect soil. Compost works, too!

Courtesy of James Santana

 Courtesy of Paul Keiran
Hydroseeding is more expensive than straw and isn’t as reliable, but has the benefit of future vegetation growth.
Erosion Prevention
Cover Soils with Fabrics
Erosion Prevention
Limit Disturbance

Fencing

Plan new infrastructure over old
Soil disturbance water quality approaches

Prevent impacts
Protect resources
Mitigate impacts
Restore resources
Soil Quality Protection
Time of Year Matters - Erosion

Dry weather is the best time to avoid impacts
Primary nesting season is Apr 15 – Jul 31

Anna’s Hummingbirds
Photo by G. Engstrom

Bird Nests in Portland

Bird Nests are found:
1 in snags (woodpeckers)

Graphics from BES Terrestrial Ecology Publication “Avoiding Impacts on Nesting Birds During Construction & Revegetation Projects”
Soil disturbance water quality approaches

Prevent impacts
Protect resources
Mitigate impacts
Restore resources
“Sediment Control is any practice that traps the soil particles after they have been detached and moved by wind or water”...
Sediment Control

...to prevent this!

Photo excerpted from “ODEQ Erosion and Sediment Control Manual”, DEQ, Apr 2005
Different strategies for two kinds of flow

Overland (aka Sheet Flow)

Concentrated
Sediment Control - Overland Flow
Sediment Fence Use & Maintenance
If you MUST use a sediment fence, use it only in sandy soils, never in clayey soils!

**Efficiency:**
This data indicates that sediment fencing can reduce TSS from 8 to 76% compared with no erosion control.

According to research conducted by Muson, 1991; Fisher et al, 1984; and Minnesota Pollution Control Agency, 1989, the following ranges of control can be obtained for TSS by using sediment fencing:

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Control Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sand</td>
<td>80% - 99%</td>
</tr>
<tr>
<td>Silt-Loam</td>
<td>50% - 80%</td>
</tr>
<tr>
<td>Silt-Clay-Loam</td>
<td>0% - 20%</td>
</tr>
</tbody>
</table>

*Photos and study and text excerpted from “BMPs for Stormwater Discharges Associated with Construction Activities”, DEQ, Feb 2006*
Sediment Control for Overland Flow
Compost Berm

May be vegetated (foreground) or non-vegetated (background)
Sediment Control for All Flows

Compost Sock

Heavy & expensive, but there’s really no substitute for controlling sediment on pavement, as shown.
Sediment Control for Concentrated Flows at Inlets

Inlet Filters
Sediment Control: Concentrated Flows
Protecting Catch Basin Inlets
Restore Soil Quality
Compost Amendment

UW Stormwater Trials
- till soil, no compost

With Compost
- less runoff, better turf

All photos from Soils for Salmon website
Soils for Salmon

Builders, developers, and landscapers are adopting practices that preserve and improve the soil on building sites, and protect waterways, and local governments are beginning to require it.

The simple soil "best management practices" (BMPs) described here include preserving site topsoil and vegetation where possible, reducing compaction, and amending disturbed soils with compost to restore healthy soil functions.

Advantages to builders, consumers, and the environment include:

- More marketable buildings
- Better erosion control
- Easier planting
- Healthy, attractive landscapes
- Easier maintenance with less water and chemical needs

Case Studies

Port Blakely Communities uses compost-amended soil for healthy, attractive landscapes, erosion control, and satisfied customers.

More case studies...

News

- Building Soil website
These poppies were planted by my wife at the same time, in identical commercial potting soil, and exposed to identical amounts of water, sunlight, etc. The pot on the right was inoculated with Plant Success™ Tabs, the one on the left was not. What a difference!

from www.fungi.com
Confirm Establishment Before Removing Controls

Courtesy of Paul Keiran
Take Home Messages

• A little bit of dirt can muddy a lot of water
• Your best, best management practices for protecting water resources from excess soils on a variety of projects are:
  • Sweeping
  • Soil cover strategies (fabrics, compost, straw)
  • Biobags
  • Compost berms
  • Wattles
• Like everything, how you install and maintain determines how well they work
For much more detailed (but easy to understand) info...

Oregon DEQ Publication: Construction Stormwater Erosion and Sediment Control Manual
http://www.deq.state.or.us/wq/wqpermit/docs/general/npdes1200c/ErosionSedimentControl.pdf
Have fun
Thank You!

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Sustainability for all the places between the buildings.
Erosion Control
Gravel Construction Entrance

Existing Pavement or approved access point

4-6” Crushed Aggregate (ie. Big, angular rocks)

Geotextile fabric (aka Filter fabric) underneath
Reduce Excavation
Salvage Materials
Recycle Construction Materials