

### Session 3

## Erosion and Sediment Control Best Management Practices (BMPs)

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### Overarching Principles

#### Erosion control is the key!!!

##### Manage Water

- Look up, around and down
- Assess where water comes from, how it will move through the site, and where it ends up
- Keep clean and dirty water separate

##### Manage Soils

- Understand soil erodibility – some soils more erodible than others
- Protect soils accordingly

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### Managing Water Catch Drains/Diversion Banks



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### Perimeter Bank



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### Catch Drains



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### Protect as Necessary for Gradient



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## Clean Water Diversion



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## Purpose

- Divert clean stormwater around works areas and help keep work areas dry
- Capture and convey dirty water to sediment traps/basins
- General stormwater conveyance
- Shorten slope lengths with check dams
- Temporary or permanent features
- Very important tool in erosion control

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## Check Dams



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## Check Dams



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## Purpose

- Reduce velocity of flow in channels, reducing erosive energy
- Can provide moderate filtering/trapping capacity for coarse sediment
- Longer detention times can allow settling of some fine sediment, but this would almost certainly be re-eroded unless removed after each storm

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## Chutes for Steep Slopes Velocity Reduction



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### Inlet / Outlet Protection



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### Maintenance

- Check for erosion problems during and after rain, especially at inlets and outlets
- Repair scoured areas and line with erosion resistant materials
- Remove accumulated sediment
- Provide new drains as construction proceeds to new areas
- Look for signs of localised flooding and redesign drains if necessary

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### Failed Inlet Protection



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### Stabilised Access

- Establish a single stabilised site access
- Helps limit disturbance and reduce erosion at a high traffic point(s)
- Reduces sediment tracking to road
- Require maintenance



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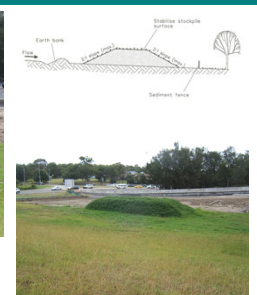
### Stockpiles

- Store topsoil and subsoil separately
- Understand dispersive soil types (typically subsoils) – do not mix
- Preserve seed viability and soil structure (minimise re-working)
- Control erosion and prevent sediment pollution
- Longer term stockpiling – mulch cover or revegetation is a good option

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### Stockpiles



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### Construction / Maintenance

- Place at least 2 m from property boundaries and hazard areas (e.g. waterways, roads, existing vegetation)
- Place stormwater diversion drains upslope and sediment fence downslope
- Keep height < 2 m if possible, and batters with 2:1 maximum slope
- Stabilise stockpiles that are in place for more than 10 days using vegetation or cover (~60% effective cover)

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### Stockpiles



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### “Stonewall” Stabilised Shoulders / Batters



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### Sediment Controls

- Erosion controls must be a major priority at any development site, but inevitably are not 100% effective
- Combine with sediment controls as part of an overall “treatment train”

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### Pollutants – Not Just Soil

- Suspended solids, especially sediment that can carry other pollutants “piggy-back” (e.g. nutrients, heavy metals)
- Nutrients
- Organic matter and other oxygen-depleting materials
- Pesticides
- Litter, construction wastes, hydrocarbons

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## Vehicle Washdown



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## Example – good practice



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## Soil Type and Sediment Trapping Effectiveness

- The coarser the sediment, the easier to trap (generally)
- Effective capture of finer silts and clays requires long detention times and/or flocculation
- Dispersible sediments in particular may never settle out except with flocculation

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## Catchment and Runoff Characteristics

- For smaller catchments (<4,000 m<sup>2</sup>) small sediment traps (e.g. sediment fence) can be used to good effect if designed and installed properly
- Larger catchments require much larger traps (i.e. sediment basins)
- Possible to estimate sediment yield to help size sediment traps
- Keep traps offline (avoid concentrated flow) and divert clean water to improve effectiveness

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## Function of Sediment Traps

- Sediment traps generally work by reducing flow velocities, allowing sediment and other pollutants time to settle
- It is a common misconception that traps work by “filtering” water (although this may be a partial mechanism in some traps)

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## Maintenance of Sediment Traps

- Inspect devices after each storm and:
  - remove sediment when sediment reaches 1/3 to 1/2 capacity
  - repair damage
  - assess effectiveness and install additional erosion and sediment controls as required
  - flocculate sediment basins capturing fine or dispersible sediment

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## Sediment Fence



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## Purpose

- Use downslope of all disturbed areas
- Best used to dam water where it is inclined to pond (e.g. flat areas at base of batters)
- Designed for sheet flow, not concentrated flow
- Not appropriate in waterways
- Woven geotextile supported by star pickets, hardwood posts etc.
- Reinforce with steel wire or mesh for higher flows
- Construct along the contour to prevent water concentrating at one point
- Trap mainly sand and gravel – most silt and clay will pass through

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## Effectiveness

- Sediment fence typically has pore openings typically ~ 0.035 mm
- Clay and silt are <0.02 mm and much will pass straight through
- Sand >0.02 mm and gravel caught with greater efficiency
- Trapped material will improve efficiency to a point.....maintenance required to ensure continued performance

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## Poor Practice, Poor Location



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## Examples - Good Practice



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## Inappropriate Use



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### Mulch Bund Filter Strip



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### Coarse Sediment Traps



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### Example – 'U' Traps



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### Protecting Drop Inlets

- Used to protect stormwater inlets, grated drains etc.
- Can be moderately effective at trapping coarse sediment when selected, installed and maintained correctly
- Remove sediment regularly otherwise it will be re-mobilised
- Take care to avoid causing downstream flooding

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### Example – Good Practice



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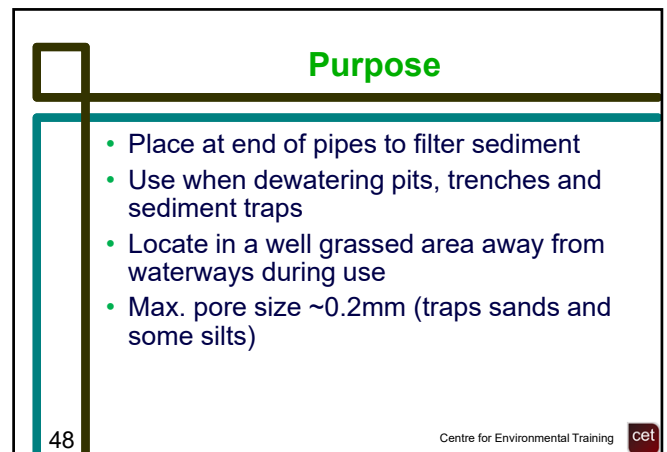
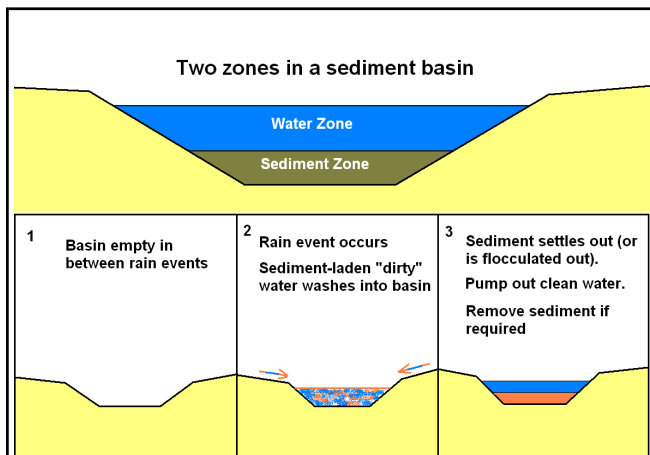
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### Example What's Good? What's Bad?



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### Dewatering – Example



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