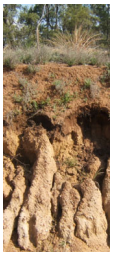
## Demonstration 1



**Soil and Water Interactions**

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## MCO 'Annual Review' 2024

- Channel Stability monitoring (section 7.3.4)
  - Bora Creek (stable)
  - Moolarben Creek (improving)
  - Murragamba Creek (variable)
  - Wilpinjong Creek (variable)

"Vulnerable locations were characterised by steep banks, little vegetative cover and **exposed dispersive subsoil**"

"above-average rainfalls increase the erosion risk"

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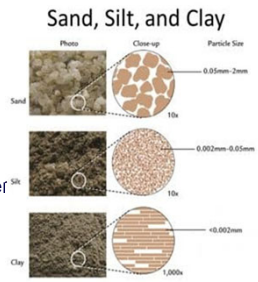
## Soil Texture

- Sand grains
  - Visible to the eye
  - Roll between fingers
- Silt grains
  - Not visible to the eye
  - Roll between the finger
- Clay grains
  - Not visible to the eye
  - Smooth to the touch

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## Dispersive Soils

- Structurally unstable in water, breaking down to constituent parts – sand, silt and clay
- Emerson Aggregate Test commonly used to identify problem soils
- Slaking vs. Dispersion – both problematic
- Mechanical dispersion

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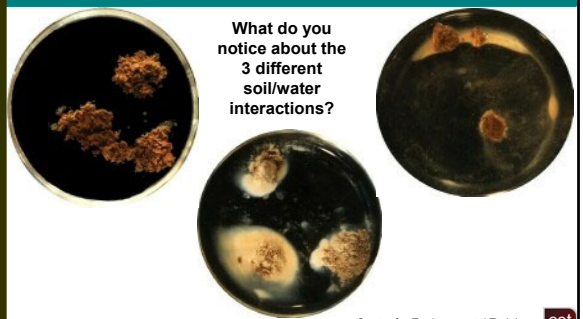
## Unstable Soils

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## Dispersive Soil Problems

- Highly erodible if exposed
- Hardsetting and low permeability
- May generate turbid runoff and include attached nutrients or metals (piggy-backing)
- Severe rilling of exposed (vertical) surfaces
- High risk of tunnel erosion or piping when used for earthworks

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## Piping and Tunnelling



## Sodic Soils

- All sodic soils are dispersive but not all dispersive soils are sodic
- Cation Exchange Capacity (CEC) ($K^+$, $Na^+$, $H^+$, $Ca^{++}$, $Mg^{++}$, $Al^{+++}$) dominated by sodium (Exchangeable Sodium Percentage - ESP)
- Fluting is a common indicator of sodic soils



## Management in Soil

- (1) Expose only by necessity
- (2) Cover with non dispersive soil before applying further treatments (erosion controls) or revegetation
- (3) Soil Amelioration:
  - Gypsum application can significantly improve soil stability (dry preferred to liquid form)
  - Blending best approach at application rates 5 – 35 t/ha

## Management in Water

- Turbid water in sediment basins etc.
- Require flocculants to enhance settling and improve water clarity:
  - Gypsum (calcium sulphate) - ~50mg/L
  - Alum (aluminium sulphate)
  - Poly Aluminium Chloride (PAC)
  - Poly Acrylamide (PAM, i.e. Zetag)
  - Other proprietary compounds (Phoslock)

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## Rainfall Activated Dosing

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## In-line Floc Socks, Floc Blocks

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