



Fact Sheet 8H - Dispersive Soils

Dispersive soils, also known as dispersible soil, are structurally unstable in water due to their chemistry. This means they break down or disperse in water. This happens because the clay particles become suspended in water, making the water look dirty. The negatively charged clay particles zoom around in the water looking for positively charged particles.

If exposed, these soils are highly erodible and structurally unstable. They can often be seen in road cuttings.



Where are they found?

Soil landscape maps can be used to identify if the soil in your area is likely to be dispersive. Generally, all soils in Lake Macquarie have been identified as being dispersive, except for the sandy soils on the eastern side of the Lake between the Lake and the ocean in areas including South Belmont, Jewells, and Swansea.

What do they look like?

Dispersive soils can be identified in the field by their distinctive erosion patterns which can be seen when exposed by a cut, erosion or a batter. The 'wriggling' shown right is caused by the breakdown of soil as water passes through the soil profile creating an ooze much like a thickshake.

Dispersive soils can also be identified by undertaking appropriate pre-construction soil testing focused on exchangeable sodium percentage and Emersion Aggregate classes.

Two onsite tests that indicate the presence of dispersible soils are:

1. Aggregate immersion test (AIT) – Place 10mm piece of soil (aggregate) in deionised water. Observe any crumbling of the aggregate and cloudiness of the water. If the water clouds, you may have dispersive soils and professional testing is recommended to determine their severity.
2. Settlement test – place a crushed soil sample (50c piece) in a jar of deionised water, shake vigorously, and leave undisturbed. Water that is still murky after a day or two indicates that the soil may be dispersive and chemical flocculation of sediment basins may be required to settle the clay out the water prior to discharge from site.

Neither test is a substitute for professional soil testing. Professional soil tests and expert erosion and sediment control advice are recommended on sites with dispersive soils.



AIT



Settlement



Dispersive soils can be problematic during construction because they:

- can result in high levels of sediment in runoff (measured as Total Suspended Solids (TSS) mg/L) that requires appropriate treatment to prevent sediment leaving the site;
- are highly susceptible to tunnel erosion (a cause of dam, and infrastructure failure);
- can result in severe rilling of exposed batters (a cause of failure and infrastructure damage);
- transport of nutrients and metals 'piggybacking' on the dispersed clays; and
- can make rehabilitation and revegetation of the construction site difficult.

Managing dispersive soils onsite

- Identify areas on your site likely to have dispersive soils (you can use a combination of visual inspection, field or lab testing or Soil Landscape Maps).
- Minimise the area disturbed by construction and length of time your site is disturbed.
- Install and maintain erosion and sediment controls onsite which are appropriate for dispersive soils. For example: sediment fences are not appropriate as clay particles pass through the sediment fence (see photo below).
- Exposed dispersive subsoils should be covered as soon as practical with a non-dispersive soil treatment before any final treatment.
- If the topsoil to be used for stabilisation/revegetation contains dispersive soils, mix it with gypsum, or other appropriate ameliorant prior to stockpiling. The ameliorant depends on the pH adjustment required – seek professional advice.



Environmental legislation and Council Development Consents

Under the *Protection of the Environment Operations Act 1997* (POEO), allowing sediment or sediment laden water to enter any waterway including street gutters, stormwater drains, swales or creek lines (flowing or not) is considered to be water pollution. Penalties and notices can apply including fines of up to \$5 million.

Council will enforce the POEO where necessary, however we endeavour to provide information about erosion and sediment control and encourage you to help us protect the Lake by reducing water pollution.

Non-compliance with the conditions of a Development Consent is a breach of the *Environmental Planning and Assessment Act 1979* and may also attract fines.

Further information

- **Council's website;**
- the '**Blue Book**' - *Managing Urban Stormwater: Soils and Construction*, Landcom (2004) 4th Ed.;
- International Erosion Control Association (Australasia) (IECA) (free downloads) www.austieca.com.au;
- Call Council's Erosion and Sediment Control Officer on **02 4921 0333**; or
- *Newcastle and Gosford-Lake Macquarie Soil Landscape Maps*. Department of Conservation and Land Management. 1995 and 1993.

Acknowledgements and disclaimer:

This fact sheet contains information from *Erosion and sediment control – A field guide for construction managers*. Catchment and Creeks 2012., and *Best Practice Erosion and Sediment Control*. IECA, Nov. 2008.

This fact sheet is for general information only and is not intended to cover every situation. It is not a regulatory document. Obtain your own independent professional advice.

Published by Lake Macquarie City Council, July 2015, Box 1906, HRMC NSW 2310.