

# Dispersive Soils – High Risk of Tunnel Erosion



## What is it?

**Dispersive soils**, or **sodic soils**, collapse or disperse to form dissolved slurry when in contact with fresh water (rain). These soils are highly prone to erosion often leading to **tunnel** and **gully erosion**. Unlike other forms of erosion, dispersion and tunnel erosion result from an imbalance in soil chemistry.

- 1) Tunnel erosion occurs in all municipalities in Southern Tasmania.
- 2) Tunnel erosion results from a combination of both chemical dispersion and physical transport of dispersed clay particles.
- 3) Soils with greater than 6% exchangeable sodium are prone to dispersion.

Dispersion and tunnel erosion usually occurs in subsoils making early detection difficult. Building activities such as excavation, topsoil removal and ponding of rainwater all increase the risk of initiating tunnel erosion. Whilst wind, rain and water runoff are the typical causes of soil erosion on construction sites, the soil chemistry can also determine how prone it is to erosion. Chemistry of the soil determines how well it stays bound together when fresh water is added. Dispersive soils can be caused by high sodium content (i.e. >6% exchangeable sodium); hence they are sometimes called sodic soils. Typically dispersive soils are found in the subsoil as the topsoil is usually non-dispersive. All southern municipalities have dispersive soil risks and tunnel erosion is not uncommon. Dispersive soil can be very patchy in distribution with soil types changing over a few metres in distance, thus it is **very important** to look and test for signs of dispersive soil!

## Fact Sheet 4

## Why is it important?

Building and construction activities may increase the risk of soil dispersion and can result in the formation of tunnel erosion. Tunnel erosion initially results from the dispersion of clay soils in rainwater, but once the tunnels have formed they can quickly enlarge to form underground drainage paths. When the tunnels collapse they create gullies. Development of tunnel erosion in residential areas has resulted in damage to buildings, roads and septic systems leading to increased public health risks and major impacts on the environment.

During building and construction the runoff from areas of disturbed dispersive soils will contain large amounts of clay and will appear very cloudy. It is very difficult to remove this clay from freshwater without the addition of chemicals (e.g. gypsum). If this runoff enters local waterways it will reduce light levels and decrease water quality. Follow the practices discussed in this fact sheet and you will prevent erosion of dispersive soils from your site, meet your legal requirements and help protect our waterways.

## WHAT DO I NEED TO DO?

### **Before starting site works:**

Always ask if there has been soil testing for dispersive or sodic soils, especially in the subsoils where they are more prevalent. An appropriate soil specialist can do this.

### **Installing the control measures:**

- 1) Minimise disturbance to topsoil and vegetation.
- 2) Choose building and construction methods that minimise the need for excavation and subsoil exposure.
- 3) Avoid concentrating water flow over areas that have dispersive topsoil or subsoils. If possible divert water to areas where the soil is not dispersive (**Note:** dispersive soils can be very patchy in distribution).

- 4) When diverting water, create diversion berms/banks by pushing the soil to create banks up hill, this maintains grass in the channel and reduces infiltration directly to the subsoil and the potential for tunnel erosion.
- 5) **Do not** create soakage pits in dispersive soils.
- 6) Immediately infill any trenches or holes to prevent collection and ponding of water on subsoil surfaces.
- 7) **Always** compact dispersive subsoils that have been disturbed or excavated. Dispersive soils require above average compaction. Consider using a 'whacker packer' for small areas or a sheeps foot roller for large areas. Apply gypsum or lime according to soil test recommendations during infilling and cover with topsoil and revegetate.
- 8) **Always** bury any exposed subsoils with topsoil and revegetate.
- 9) Top dress the surface of potentially dispersive soils with gypsum (if soil pH > 6.5) or lime (if soil pH <5) or a mixture of both (if soil pH is within the range of 5 to 6.5) according to soil test recommendations to reduce dispersion.
- 10) Cover dispersive soils with a minimum 100 mm layer of non-dispersive soil prior to revegetation, or the placement of rock gabions, or concrete.

## List of fact sheets

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2. Soil & Water Management on Standard Building & Construction Sites
3. Soil & Water Management Plans
- 4. Dispersive Soils – High Risk of Tunnel Erosion**
5. Minimise Soil Disturbance
6. Preserve Vegetation
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8. Erosion Control Mats & Blankets
9. Protect Service Trenches & Stockpiles
10. Early Roof Drainage Connection
11. Scour Protection – Stormwater Pipe Outfalls & Check Dams
12. Stabilised Site Access
13. Wheel Wash
14. Sediment Fences & Fibre Rolls
15. Protection of Stormwater Pits
16. Manage Concrete, Brick & Tile Cutting
17. Sediment Basins
18. Dust Control
19. Site Revegetation

### Remember:

Everyone working on building and construction sites has a responsibility to prevent pollution. If you do have an accident and pollution occurs you are required by law to notify the site supervisor. If the site supervisor cannot be contacted, workers should immediately notify the local council so they can work with you to minimise any harm to the environment.

### Acknowledgement:

Figure 4A after Department of Construction and Environment, Land Protection Division, Victoria "Field Erosion its Characteristics and Amelioration".

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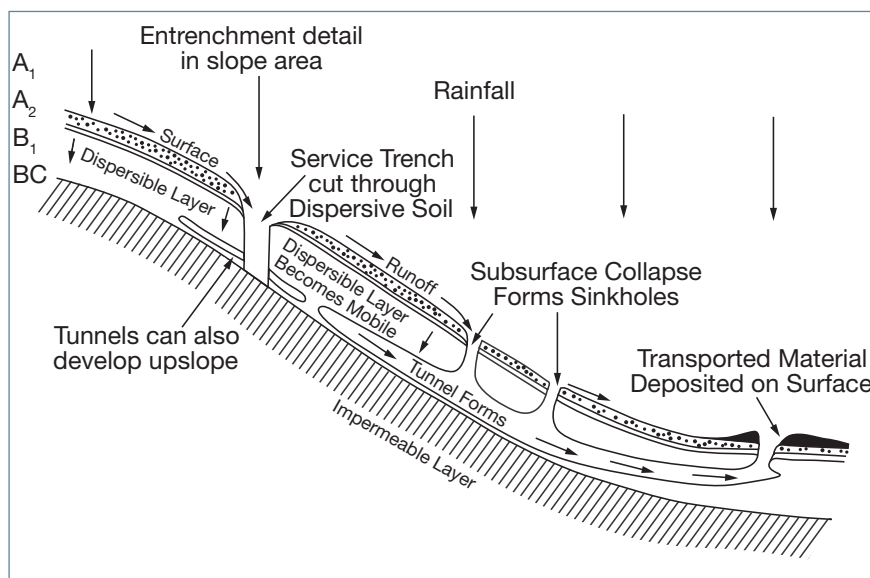


Figure 4A Tunnel erosion development in dispersive soils

**Note:** You can seek further information and advice on the issue of dispersive soils and tunnel erosion from several sources including: your local council, a soil surveyor, civil engineer or soil specialist, NRM South and the Land Conservation Branch of the Department of Primary Industries and Water (DPIW).