

# Soil landscapes - understanding geomorphology

## The relationship between geomorphology and sustainable soil management

**“No one knows enough about what goes on below the ground.”  
(participating farmer)**

The term “geomorphology” encompasses a range of insights into the soil constraints and opportunities that farmers experience on a daily basis.

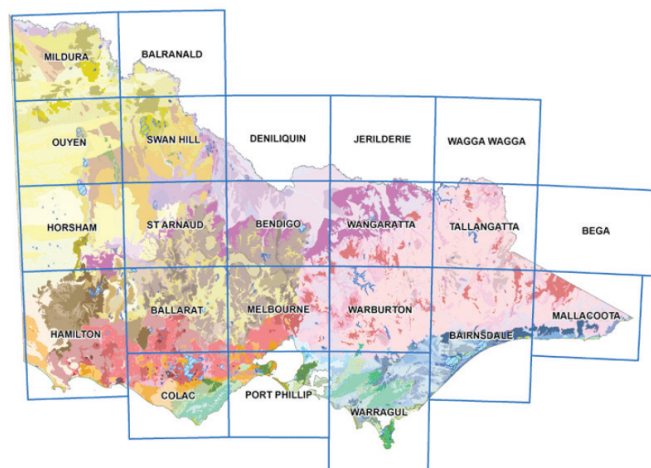
For Phil Dyson, Project Manager of the Farming for Sustainable Soils (FSS) Project. As a geologist and geomorphologist he defines geomorphology as the study of soil landscapes—recognising that the shape, character and properties of the land are products of a range of biophysical processes that have modified the regional geology.

At a regional level the geomorphic character of the land can be described in accordance with geology. For example, we can classify granitic landscapes in terms of relief, slope aspects and intensity of weathering. This informs our understanding of threats to soil health that might include: dryland salinity, gully and tunnel erosion, hostile soils and waterlogging. It also informs our understanding of the suitability of landscape components for different land uses that include horticulture, cropping and pastoral enterprises, and even peri-urban development.

At more detailed scales, an understanding of soil landforms helps with farm scale planning. For example, in a granitic landscape, the character of the land may define options for remediation of salinity and gully erosion issues. It may point to the best places to plant trees for salinity control, where horticulture might be best placed, areas likely to be constrained by siliceous soils, or areas where it may be possible to supplement surface water with fresh groundwater.

**“The science of soil-landscapes underpins all of our work.” (Phil Dyson, FSS Project Manager)**

Phil has a strong grounding in the science behind natural resource management and is passionate about soil health. He has worked at the North Central Catchment Management for nine years, and explains that “a lot of the things we attempt to do in our efforts to improve soil health are in response to our understanding of the inherent physical character of the land. We recognise, and have mapped 18 different land types in our region at a scale of about 1:100,000”.



Sourced from Agriculture Victoria at [agriculture.vic.gov.au](http://agriculture.vic.gov.au)



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## Geomorphology and sustainable land management

Understanding the land, its condition and inherent capability is a foundation of sustainable land management. The FSS Project aims to help farmers link their soil management responses to the inherent characteristics of their land. As Phil explains:

**“Communities intent on improving the health of their soils need an appreciation of their soil-landscapes. They need to know something about the geomorphic context their soils exist within.”**

**“In geomorphic terms we describe this context in terms of the character of the ‘regolith’, where the regolith includes all of the substrate (including the soil) down to solid rock. The character of the soil is most often intimately linked to the character of the underlying parent materials.”**



For example, the soils at this property in Dunluce demonstrate that the granitic substrate influences farming practices and soil management. This soil pit was conducted as part of the FSS Project to help landholders in the Timor West FSS Group to understand how the profile of their soils is inherently linked to deeper geomorphological processes.

Part of the value of the FSS Project is that farmers not only come to understand the geomorphic profile of their own soils, but gained an appreciation of the diversity of other soil landscapes in north central Victoria. As Farmer Andrew Jones reflects: “it’s such a diverse range of soil types. Not everyone [has] the same issues because we cover such a wide area—I think that is beneficial”.

Across the catchment, participants in the FSS Project have been able to discover the ways that the granitic soils of Timor West differ compared to the volcanic clays of Smeaton, the red duplex soils of Glenloth East, and the sandy salty country of Pyramid Hill—and the varying opportunities and challenges associated.



## Geomorphic frameworks

Geomorphic frameworks and maps can include information about altitude, slope, aspect, soils, climate and vegetation. This can then allow land managers to further understand and analyse other natural resource processes that manifest on their properties—like erosion and the water holding capacity of soils.

Geomorphology information relevant to the North Central catchment can be found on the CMA website at [nccma.vic.gov.au/imap](http://nccma.vic.gov.au/imap).

**“The more you know about it, the better you can manage it.” (James Allan, participating farmer)**