

This Technical Data Sheet describes the *typical average properties* of the specified soil.

It is essentially a summary of information obtained from one or more profiles of this soil that were examined and described during the Topoclimate survey or previous surveys. It has been prepared in good faith by trained staff within time and budgetary limits. However, no responsibility or liability can be taken for the accuracy of the information and interpretations. Advise should be sought from soil and landuse experts before making landuse decisions on individual farms and paddocks.

The characteristics of the soil at a specific location may differ in some details from those described here.

No warranties are expressed or implied unless stated.

Soil name: **Orawia**

Overview

Orawia soils occupy about 3,200 ha on dissected rolling and hilly land in the Eastern Bush – Merrivale district of Western Southland. They are formed from calcareous sandstones and siltstones mixed with a variable depth of wind blown loess. Soils are moderately well drained, have moderately high water holding capacity and slightly deep to deep rooting depth, depending on the depth to the underlying bedrock. Present use is pastoral grazing with sheep, beef cattle and some deer. Regular summer rain occurs and soils seldom dry out.

Soil classification

NZ Soil Classification (NZSC):

Typic Orthic Brown; moderately deep on rock, soft mudstone; silty over clayey.

Previous NZ Genetic Classification:

Yellow-brown earth.

Classification explanation

The NZSC of Orawia soils is consistent with the previous classification. They are moderately leached soils with yellow-brown colours and P-retention of 45–60%. Orawia soils have heavy silt loam grading to silty clay textures in the lower subsoil. Soft mudstone bedrock typically occurs at 45–90cm depth.

Soil phases and variants

Identified units in the Orawia soils are:

- Orawia hilly deep (OwH1): has no gravel within 90cm depth; occurs on slopes of 15–25°
- Orawia hilly moderately deep (OwH2): has bedrock between 45 and 90cm depth; occurs on slopes of 15–25°
- Orawia rolling deep (OwR1): has no gravel within 90cm depth; occurs on slopes of 7–15°
- Orawia rolling moderately deep (OwR2): has bedrock between 45 and 90cm depth; occurs on slopes of 7–15°
- Orawia undulating deep (OwU1): has no gravel within 90cm depth; occurs on slopes of 0–7°

The soil properties described in this Technical Data Sheet are based on the most common phase, Orawia hilly moderately deep (OwH2). Values for other phases and variants can be taken as being similar. Where they differ significantly they are recorded with a separate versatility rating, e.g., Orawia undulating deep (OwU1).

Associated soils

Some soils that commonly occur in association with Orawia soils are:

- Kauana: shallow soil forming onto limestone bedrock

- Mangapiri: poorly drained soil forming into soft mudstone and weathered terrace gravels
- Papatotara: moderately deep to deep soil, forming into moderately weathered loamy alluvium derived from basic igneous and metamorphic rocks as well as from greywacke; occurs on low terraces.
- Makarewa: poorly drained soil on the floodplain

Similar soils

Some soils that have similar properties to Orawia soils are:

- Lyoncross: well drained deep soil formed into loess over terrace gravels. Most likely to be similar to the deep phases of the Orawia soils
- Hazlett: imperfectly drained, moderately to strongly leached soil forming from banded tertiary sandstone and mudstone
- Haycocks: well drained, moderately to strongly leached soil forming from banded tertiary sandstone and mudstone
- Lillburn: well, drained moderately to strongly leached soil forming mainly from soft Tertiary siltstone and sandstone with some mudstone and loose sand in the Lillburn and lower Waiau valleys

Typical profile features

The following is a 'generic' or composite profile description representing the most common combination of characteristics for this soil type. The actual profiles for which descriptions and data are available are listed at the end of this Technical Data Sheet.

Orawia profile	Horizon	Depth (cm)	Description
	Ap	0–24	Brownish black silt loam; weak soil strength; strongly developed very fine to medium polyhedral structure; abundant roots
	Bw	24–64	Dull yellowish brown silt loam; few worm casts; slightly firm soil strength; moderately developed medium to coarse blocky and fine polyhedral structure; common roots
	2BR(g)1	64–88	Grey strongly weathered soft mudstone; silt loam texture; few dull yellowish and few bright brown mottles; common dull yellowish brown clay coats on fracture faces; firm soil strength; massive structure; few roots
	2BR(g)2	88–90+	Bright brown strongly weathered soft mudstone; silty clay texture; common grey mottles; firm soil strength; massive structure; no roots

Key profile features

Orawia soils have a 20–25cm deep topsoil that has a moderate to strongly developed structure. Subsoil structure is moderately developed and typically grades to weathered bedrock below 45cm depth.

Typical physical properties

Note: values in *Italics* are estimates

Horizon	Depth (cm)	Bulk density	Permeability	Texture	Gravel content
Ap	0–24	Moderate	<i>Moderate</i>	Silt loam	Gravel free
Bw	24–64	Moderate – High	<i>Moderate</i>	Silt loam	Gravel free
2BR(g) 1	64–88	Moderate – High	<i>Slow</i>	Silt loam	Extremely gravelly
2BR(g) 2	88–90+	High	<i>Slow</i>	Silty clay	Extremely gravelly

Profile drainage: Moderately well
Plant readily available water: *Moderately high*
Potential rooting depth: Slightly deep
Rooting restriction: Presence of bedrock

Key physical properties

Orawia soils have a slightly deep rooting depth and moderately high plant available water, which is restricted by the bedrock between 45–90cm depth. The soils are moderately well to well drained with permeability that may be restricted in the subsoil by the bedrock. Textures are heavy silt loams, with topsoil clay content of 30–35%, grading to silty clay in the subsoil where weathered bedrock is present. The deep phases generally have no bedrock within 90cm depth, and will have a deep rooting depth and high water holding capacity.

Typical chemical properties

Horizon	Depth (cm)	pH	P retention	CEC	BS	Ca	Mg	K	Na
Ap	0–24	Moderate	Moderate	Moderate	Moderate	Moderate	Low	Very low	Low
Bw	24–64	Moderate	High	Moderate	Low	Low	Very low	Very low	Low
2BR(g)1	64–88	Moderate	Moderate	Moderate	Moderate	Low	Moderate	Very low	Low
2BR(g)2	88–90+	Moderate	Low	Moderate	Moderate	Low	Moderate	Very low	Low

Key chemical properties

Topsoil organic matter levels are about 7%; P-retention 45–60%, with pH moderate (high 5s). Cation exchange and base saturation are moderate throughout the profile. Available calcium is moderate and magnesium and potassium levels low. Reserves of phosphorus are low. Micronutrient levels are generally adequate.

Vulnerability to environmental degradation

Note: the vulnerability ratings given in the table below are generalised and should not be taken as absolutes for this soil type in all situations. The actual risk depends on the environmental and management conditions prevailing at a particular place and time. Specialist advice should be sought before making management decisions that may have environmental impacts. Where vulnerability ratings of Moderate to Very severe are indicated, advice may be sought from Environment Southland or a farm management consultant.

Vulnerability factor	Rating	Vulnerability compared to other Southland soils
Structural compaction	slight	These soils have a slight vulnerability to structural degradation by long-term cultivation, or compaction by heavy stocking and vehicles. This rating reflects the good drainage, moderate clay, P-retention and organic matter levels.
Nutrient leaching	moderate	These soils have a moderate vulnerability to leaching to groundwater. This rating reflects the good drainage, offset by the moderately high water holding capacity and slow permeability.
Topsoil erodibility by water	slight	Due to the moderate clay and organic matter levels, topsoil erodibility in these soils is slight. Erodibility is highly dependent on management, particularly when there is no vegetation cover.
Organic matter loss	minimal	Vulnerability to long-term decline in soil organic matter levels is partly dependent on soil properties and highly dependent on management practices (e.g., crop residue management and cultivation practices).
Waterlogging	slight	These soils have a slight vulnerability to waterlogging during wet periods. This rating reflects the good drainage, but slow permeability.

General landuse versatility ratings for Orawia soils

Note: The versatility ratings in the table below are indicative of the major limitations for semi-intensive to intensive landuse. These ratings differ from those used in the past in that sustainability factors are incorporated in the classification.

Refer to the Topoclimate district soil map or property soil map to determine which of the soil symbols listed below are applicable, then check the versatility ratings for that symbol in the appropriate table.

OwH1 (Orawia hilly deep)

OwH2 (Orawia hilly moderately deep)

Versatility evaluation for soil OwH1, OwH2		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Unsuitable	Hilly slopes
Arable	Unsuitable	Hilly slopes
Intensive pasture	Limited	Hilly slopes
Forestry	Moderate	Hilly slopes; moderately deep soils have limited versatility due to the restricted rooting depth.

OwR1 (Orawia rolling deep)

Versatility evaluation for soil OwR1		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Moderate	Risk of short-term waterlogging after heavy rain
Arable	Limited	Rolling slopes
Intensive pasture	Moderate	Vulnerability to leaching to groundwater; rolling slopes
Forestry	High	No major limitation

OwR2 (Orawia rolling moderately deep)

Versatility evaluation for soil OwR2		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Limited	Restricted rooting depth.
Arable	Limited	Rolling slopes
Intensive pasture	Moderate	Vulnerability to leaching to groundwater; rolling slopes
Forestry	Limited	Restricted rooting depth.

OwU1 (Orawia undulating deep)

Versatility evaluation for soil OwU1		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Moderate	Risk of short-term waterlogging after heavy rain
Arable	Moderate	Risk of short-term waterlogging after heavy rain.
Intensive pasture	Moderate	Vulnerability to leaching to groundwater; risk of short-term waterlogging after heavy rain.
Forestry	High	No major limitation

Management practices that may improve soil versatility

- Careful management after heavy rain and wet periods will reduce the impact of short-term waterlogging. Intensive stocking, cultivation and heavy vehicular traffic should be minimised during these periods.
- Management of nutrient applications to minimise leaching losses.

Soil profiles available for Orawia soils

Soil symbol	Profile ID	Topoclimate map sheet	Profile description available	Physical data available	Chemical data available	Profile photo available
OwR2	EMT10	18	✓	✓	✓	✓
OwH1	168/75/42	18	✓			
OwR1	168/73/13	18	✓			

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