

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: Makarewa

### Overview

Makarewa soils occupy about 38,500 ha on the flood plains of rivers and streams across the Southland region. They are formed in fine alluvium from mixed sources that commonly has some influences of tuffaceous greywacke and basic rocks in western Southland. These soils are deep to moderately deep, poorly drained, and have silty clay textures. They are used for intensive pastoral farming with sheep, dairy and deer, with some cropping. Climate is cool temperate with regular rain and soils rarely dry out.

### Soil classification

**NZ Soil Classification (NZSC):** Typic Orthic Gley; stoneless; clayey.

**Previous NZ Genetic Classification:** Moderately to strongly gleyed recent soil.

### Classification explanation

The NZSC for Makarewa soils is consistent with the previous classification. The soils are poorly drained due to a high groundwater table, and accumulation of sediment is sufficiently slow that subsoils show structural development. The soils are typically stone free, and have silty clay textures.

### Soil phases and variants

Identified units in the Makarewa soils are:

- Makarewa undulating deep (MkU1): has no gravel within 90cm; occurs on slopes of 0-7°.
- Makarewa undulating moderately deep (MkU2): has gravel between 45 and 90cm; occurs on slopes of 0-7°
- Makarewa undulating deep recent variant (MkU1vr): has no gravel within 90cm; formed in recent alluvial deposits; occurs on slopes of 0-7°

The soil properties described in this Technical Data Sheet are based on the most common phase, Makarewa undulating deep (MkU1). Values for other phases and variants can be taken as being similar.

### Associated soils

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

- Dacre: poorly drained soil on floodplains of streams and minor drainage channels.
- Hedgehope: moderately well to imperfectly drained soils formed on levees
- Jacobstown: similar profile, but has silty textures
- Lumsden: shallow, poorly drained soil with silty textures
- Pukemutu: poorly drained due to water perching on a fragipan.

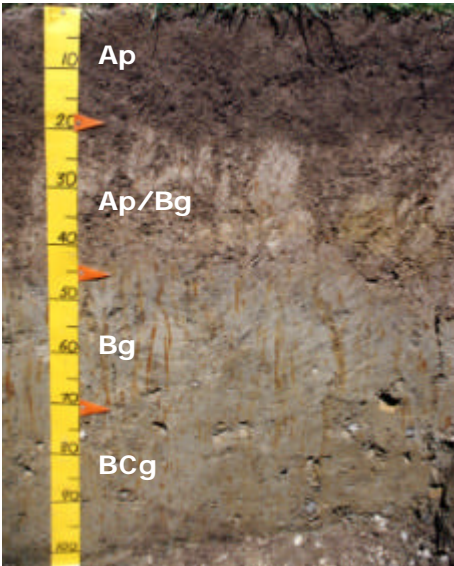
## Similar soils

Some soils that have similar properties to Makarewa soils are:

- Braxton: occurs on terraces; textures vary from silt loam to silty clay
- McLeish: shallow, poorly drained soil with clayey textures
- Caroline: has a cemented ironpan in the subsoil
- Titipua: has over-thickened slightly peaty topsoils

## 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.

Makarewa profile	Horizon	Depth (cm)	Description
	Ap	0-22	Greyish yellow-brown silty clay; weak soil strength; strongly developed medium polyhedral structure; many roots
	Ap/Bg	22-45	Greyish yellow silty clay; common orange mottles; many worm casts; weak soil strength; moderately developed very coarse prismatic breaking to medium polyhedral structure; common roots
	Bg	45-70	Light grey silty clay; common orange mottles; weak soil strength; weakly developed very coarse prismatic breaking to medium polyhedral structure; few roots
	BCg	70-90	Light grey slightly gravelly silty clay; common orange mottles; slightly firm soil strength; massive structure; no roots

## Key profile features

Makarewa soils have a topsoil 20-30cm deep which has a moderate to strongly developed structure. Subsoil structural development is also moderate and grades to a massive structure with depth. The dominance of grey colours throughout the subsoil reflects the poor drainage.

## Typical physical properties

Note: values in *Italics* are estimates

Horizon	Depth (cm)	Bulk density	Permeability	Texture	Gravel content
Ap	0-22	Moderate	<i>Moderate</i>	Silty clay	Gravel free
Ap/Bg	22-45	Moderate – High	<i>Moderate</i>	Silty clay	Gravel free
Bg	45-70	Moderate – High	<i>Slow</i>	Silty clay	Gravel free
BCg	70-90	Moderate – High	<i>Slow</i>	Silty clay	Gravel free

<b>Profile drainage:</b>	Poor
<b>Plant readily available water:</b>	<i>Moderately high</i>
<b>Potential rooting depth:</b>	Deep
<b>Rooting restriction:</b>	Limited subsoil aeration during sustained wet periods

## Key physical properties

Makarewa soils have a deep rooting depth and moderately high available soil water, although the rooting depth may be limited by poor aeration during wet periods due to the poor drainage and slow subsoil permeability. Texture is variable, with layered texture profiles common, but there is always at least one horizon with silty clay texture and topsoil clay content is 30-60%. The soils are typically stone free, although the moderately deep phase will have gravel between 45 and 90cm depth.

## Typical chemical properties

Horizon	Depth (cm)	pH	P retention	CEC	BS	Ca	Mg	K	Na
Ap	0-22	Moderate	Moderate	High	High	High	Moderate	Very low	Low
Ap/Bg	22-45	Moderate	Moderate	Moderate	High	High	Moderate	Very low	Low
Bg	45-70	Moderate	Moderate	Moderate	High	Moderate	High	Very low	Low
BCg	70-90	Moderate	Moderate	Moderate	High	Moderate	High	Very low	Low

## Key chemical properties

Topsoil organic matter levels range from 6 to 10%; P-retention values 30-50% and pH values moderate. Cation exchange and base saturation levels are moderate to high throughout the profile, resulting in high availability of cations present. Potassium levels are very low. Reserve phosphorus levels are also low and there are moderate levels of sulphate sulphur in the subsoil. Micro-nutrient 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
<b>Structural compaction</b>	moderate	These soils have a moderate vulnerability to structural degradation by long-term cultivation, or compaction by heavy stocking and vehicles. This rating reflects the poor drainage.
<b>Nutrient leaching</b>	slight	These soils have a slight vulnerability to leaching to groundwater. This rating reflects the poor drainage, high water holding capacity and slow subsoil permeability.
<b>Topsoil erodibility by water</b>	minimal	Due to the moderate to high clay content, the topsoil erodibility of these soils is minimal. Erodibility is highly dependent on management, particularly when there is no vegetation cover.
<b>Organic matter loss</b>	slight	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).
<b>Waterlogging</b>	severe	These soils have a severe vulnerability to waterlogging during wet periods. This rating reflects the poor drainage and slow subsoil permeability.

## General landuse versatility ratings for Makarew soils

**Note:** The versatility ratings in the table below are indicative of the major limitations for semi-intensive to intensive land use. 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.

**MkU1 (Makarewa undulating deep)**

**MkU2 (Makarewa undulating moderately deep)**

**MkU1vr (Makarewa undulating deep recent variant)**

Versatility evaluation for soil MkU1, MkU2, MkU1vr		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Limited	Inadequate aeration during wet periods; risk of short-term waterlogging after heavy rain.
Arable	Limited	Inadequate aeration during wet periods; risk of short-term waterlogging after heavy rain.
Intensive pasture	Moderate	Inadequate aeration during wet periods; vulnerability of topsoil to structural degradation by cultivation and compaction.
Forestry	Limited	Inadequate aeration during wet periods; potential flood risk.

### 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 use should be minimal during these periods.
- Installation and maintenance of subsurface mole and tile drains will reduce the risk of short-term waterlogging.
- If compaction occurs, aeration at the correct depth and moisture condition can be of benefit.

## Soil profiles available for Makarewa soils

Soil symbol	Profile ID	Topoclimate map sheet	Profile description available	Physical data available	Chemical data available	Profile photo available
MkU1	ET10	28A	✓	✓	✓	✓
MkU1	BT15	12	✓	✓	✓	✓
MkU1	CCT13	6	✓	✓	✓	✓
MkU1	CT18	6	✓	✓	✓	✓
MkU1	DT4	37	✓	✓	✓	✓
MkU2	ET11	28A	✓	✓	✓	✓
MkU1	FT16	15	✓	✓	✓	✓
MkU1	GMT8	27	✓	✓	✓	✓
MkU1	IT15	8	✓	✓	✓	✓
MkU1	JT1	21	✓	✓	✓	✓
MkU1	K1167R	42	✓	✓	✓	✓
MkU1	M341	11	✓	✓	✓	✓
MkU1	MT7	7	✓	✓	✓	✓
MkU1	ONT1	25	✓	✓	✓	✓
MkU1	RT11	11	✓	✓	✓	✓
MkU1	XT12	13	✓	✓	✓	✓
MkU2	YT6	9	✓	✓	✓	✓
MkU2	YT7	9	✓	✓	✓	✓
MkU1	IT7	8	✓	✓	✓	✓

Published by Crops for Southland with financial support from Environment Southland.

**Copyright © 2002, Crops for Southland**

This Technical Data Sheet may be reproduced in whole or in part and in any form for educational or non-profit purposes without special permission from the copyright holder, provided acknowledgement of the source is made. Crops for Southland and Environment Southland would appreciate receiving a copy of any publication that uses this Technical Data Sheet as a source.

No use of this Technical Data Sheet may be made for resale or for any other commercial purpose whatsoever without prior permission in writing from Crops for Southland.

Crops for Southland  
PO Box 1306, Invercargill. New Zealand



[www.cropssouthland.co.nz](http://www.cropssouthland.co.nz)