

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: **Otahu**

Overview

Otahu soils occupy about 300 ha on fans and terraces on the north flanks of the Takitimu Mountains. They are formed into loess overlying tuffaceous greywacke fan gravels, and moraine gravels from Fiordland. Soils are poorly drained, with moderately deep rooting depth and moderately high plant available water. Present use is pastoral grazing with sheep, deer and cattle. Climate is cold in the winter, with regular rainfall during the year. Soils can be dry in summer.

Soil classification

NZ Soil Classification (NZSC):

Fragic Perched-gley Pallic; soils with stones; silty

Previous NZ Genetic Classification:

Moderately to strongly gleyed yellow-brown loam

Classification explanation

The NZSC of Otahu soils differs from the previous classification as the soil properties are more similar to Pallic soils than Brown soils (Yellow-brown loams). Otahu soils are poorly drained, due to perching of water on a dense fragipan. The subsoil above the fragipan also typically has high density, which limits root growth. Otahu soils have silty textures and are typically stone free above 45cm depth, with less than 35% gravel occurring in the subsoil.

Soil phases and variants

Identified units in the Otahu soils are:

- Otahu undulating deep (OaU1): usually has no gravel within 90cm depth, though some soils can have gravel horizons; occurs on slopes of 0–7°
- Otahu hilly deep (OaH1): usually has no gravel within 90cm depth though some soils can have gravel horizons; occurs on slopes of 15–25°

The soil properties described in this Technical Data Sheet are based on the most common phase, Otahu undulating deep (OaU1). 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., Otahu hilly deep (OaH1).

Associated soils

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

- Excelsior: well drained moderately deep to deep soil formed in loess
- Te Anau: occurs on glacial moraines, and is shallow to moderately deep
- Wairaki: well drained shallow stony soil that occurs on high terraces
- Glenelg: occurs on intermediate terraces from the Takitimu Mountains; a shallow stony soil

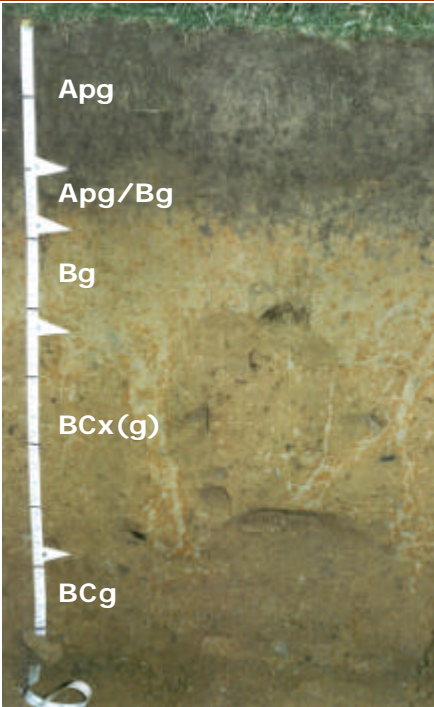
Similar soils

Some soils that have similar properties to Otahu soils are:

- Mossburn: occurs on high terraces, fans and colluvial slopes flanking hill country in the Aparima and Oreti river valleys. They are formed into dominantly deep loess, sometimes mixed with colluvium
- Waikoikoi: formed into deep loess extensively across northern Southland to west Otago

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.

Otahu profile	Horizon	Depth (cm)	Description
	Apg	0–19	Brownish grey silt loam; common yellowish grey and few reddish brown mottles; weak soil strength; weakly developed fine to coarse blocky structure; abundant roots.
	Apg/Bg	19–28	Dull yellowish brown silt loam; many greyish yellow and common reddish brown mottles; many worm casts; weak soil strength; weakly developed fine polyhedral plus coarse prismatic structure; abundant roots.
	Bg	28–43	Greyish yellow silt loam; common dull yellow orange and common bright brown mottles; weak soil strength; massive structure; many roots.
	BCx(g)	43–78	Dull yellowish brown slightly gravelly silt loam; many light grey mottles and veins with bright brown selvedge; very firm soil strength; massive structure; gravels subangular and slightly weathered; few roots in veins.
	BCg	78–90+	Greyish olive slightly gravelly silt loam; many reddish brown mottles; very firm soil strength; massive structure; gravels subangular and slightly weathered; few roots.

Key profile features

Otahu soils have a 15–25cm deep topsoil that has moderate to weakly developed structure. Subsoil structure is weak in the upper subsoil, abruptly changing in the lower subsoil to the structureless firm fragipan. Greyish colours are dominant in the upper subsoil, indicating the poor drainage caused by water perching on the fragipan. In some soils, where thick loess has accumulated, the fragipan occurs below 90cm depth.

Typical physical properties

Note: values in *Italics* are estimates

Horizon	Depth (cm)	Bulk density	Permeability	Texture	Gravel content
Apg	0–19	Low – Moderate	<i>Moderate</i>	Silt loam	Gravel free
Apg/Bg	19–28	Low – Moderate	<i>Moderate</i>	Silt loam	Gravel free
Bg	28–43	Moderate	<i>Slow</i>	Silt loam	Gravel free
BCx(g)	43–78	High	<i>Slow</i>	Silt loam	Slightly gravelly
BCg	78–90+	High	<i>Slow</i>	Silt loam	Slightly gravelly

Profile drainage:	Poor
Plant readily available water:	<i>Moderately high</i>
Potential rooting depth:	Moderately deep
Rooting restriction:	Fragipan

Key physical properties

Otahu soils have a moderately deep (60–90cm) rooting depth, and moderately high plant available water, that is restricted by the subsoil fragipan. The soils are poorly drained due to the slow subsoil permeability that may significantly limit aeration during wet periods. Textures are silt loams in all horizons. Topsoil clay content is about 20–30%. The soils are typically stone free above 45cm depth, with less than 35% gravels occurring in the subsoil.

Typical chemical properties

Horizon	Depth (cm)	pH	P retention	CEC	BS	Ca	Mg	K	Na
Apg	0–19	Moderate	Moderate	Moderate	Moderate	High	Very low	Very low	Very low
Apg/Bg	19–28	Moderate	High	Moderate	Very low	Very low	Very low	Very low	Very low
Bg	28–43	Moderate	Moderate	Low	Low	Very low	Very low	Very low	Very low
BCx(g)	43–78	Moderate	Moderate	Moderate	Low	Low	Moderate	Very low	Low
BCg	78–90+	—	—	—	—	—	—	—	—

Key chemical properties

Topsoil organic matter levels are 10–13%; P-retention 40–70% and pH moderate (high 5s). Cation exchange values are moderate. Base saturation and available calcium values moderate to high in the topsoil, but low in the subsoil. Magnesium, potassium and sodium values are low to very low throughout the soil. Soil reserve phosphorus and sulphur levels 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	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, offset by the moderate clay, organic matter and P-retention values.
Nutrient leaching	slight	These soils have a slight vulnerability to leaching to groundwater. This rating reflects the slow permeability, moderately high water-holding capacity and poor drainage.
Topsoil erodibility by water	slight	Due to the moderate clay and organic matter content, topsoil erodibility in these soils is moderate. Erodibility is highly dependent on management, particularly when there is no vegetation cover.
Organic matter loss	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).
Waterlogging	severe	These soils have a severe vulnerability to waterlogging during wet periods. This rating reflects the poor drainage and slow permeability.

General landuse versatility ratings for Otahu 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.

OaU1 (Otahu undulating deep)

Versatility evaluation for soil OaU1		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Limited	Inadequate aeration during wet periods; restricted rooting depth.
Arable	Limited	Inadequate aeration during wet periods; risk of short-term waterlogging after heavy rain
Intensive pasture	Limited	Risk of short-term waterlogging after heavy rain
Forestry	Limited	Inadequate aeration during wet periods; restricted rooting depth

OaH1 (Otahu hilly deep)

Versatility evaluation for soil OaH1		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Unsuitable	Hilly slopes
Arable	Unsuitable	Hilly slopes
Intensive pasture	Limited	Hilly slopes.
Forestry	Limited	Inadequate aeration during wet periods; restricted rooting depth

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 minimised during these periods.
- Installation of sub-surface tile and mole drains (if practical) will reduce the risk of short-term waterlogging.

Soil profiles available for Otahu soils

Soil symbol	Profile ID	Topoclimate map sheet	Profile description available	Physical data available	Chemical data available	Profile photo available
Oau1	KT7	5	✓	✓	✓	✓
OaU1	PT9	38	✓	✓	✓	✓

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