

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: **Waikaka**

Overview

Waikaka soils occupy about 5,800 ha on the downlands of eastern Southland and south Otago, typically on rolling and hilly land grading between the downlands and the hill country. They are formed in wind deposited loess derived from greywacke and schist rocks. Waikaka soils are moderately well drained and have a deep rooting depth, high water-holding capacity, and have silt loam textures with P-retention between 20 and 60%. They are used for pastoral farming with sheep beef and dairy cattle, and some cropping. Climate is cool temperate with regular rainfall. soils seldom dry out.

Soil classification

NZ Soil Classification (NZSC): Pallic Firm Brown; stoneless; silty.

Previous NZ Genetic Classification: Yellow-brown earth.

Classification explanation

The NZSC of the Waikaka soils is consistent with the previous classification. Waikaka soils are moderately well-drained Brown soils that have properties intergrading with Pallic soils, reflected in the pale yellow-brown colours (hue 2.5Y) in the lower subsoil. The lower subsoil horizon is structureless, with slightly firm or greater soil strength that may limit root penetration.

Soil phases and variants

Identified units in the Waikaka soils are:

- Waikaka rolling deep (WxR1): has no gravel within 90cm depth; occurs on slopes of 7–15°
- Waikaka undulating deep (WxU1): has no gravel within 90cm depth; occurs on slopes of 0–7°
- Waikaka hilly deep (WxH1): has no gravel within 90cm depth; occurs on slopes of 15–25°

The soil properties described in this Technical Data Sheet are based on the most common phase, Waikaka rolling deep (WxR1). 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., Waikaka hilly deep (WxH1).

Associated soils

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

- Arthurton: imperfectly drained equivalent of the Waikaka soil
- Waikoikoi: moderately deep to deep; poorly drained due to fragipan
- Wendon: shallow soils on greywacke bedrock

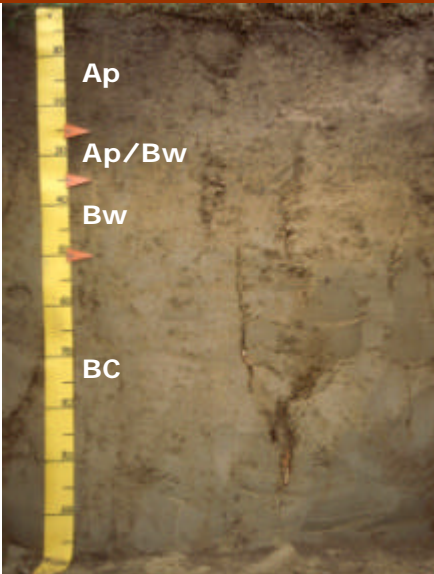
Similar soils

Some soils that have similar properties to Waikaka soils are:

- Crookston: occurs on terraces and fans across northern Southland and west Otago; typically has paler colours throughout the profile and P-retention of 20–40%
- Clinton: similar soil occurring on fans and terraces near Clinton
- Tukurau: similar soil but has loamy silt subsoil textures; formed in near-source loess adjacent to the Mataura River, between Mataura and Waimahaka
- Waikiwi: Brown soil on high terraces of the Southland plain; has P-retention of 60–80%

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.

Waikaka profile	Horizon	Depth (cm)	Description
	Ap	0–25	Brownish black silt loam; weak soil strength; strongly developed very fine to fine polyhedral structure
	Ap/Bw	25–35	Dull yellowish brown silt loam; many worm casts; weak soil strength; strongly developed very fine to medium polyhedral structure
	Bw	35–50	Dull yellowish brown silt loam; few worm casts; slightly firm soil strength; moderately developed very fine to medium polyhedral structure
	Bw	50–90+	Pale yellowish brown silt loam; firm soil strength; massive structure
	BC		

Key profile features

Waikaka soils have topsoils 20–30cm deep, with moderately to strongly developed structure. Subsoils have moderate structure that becomes more compact and structureless below 50cm depth. The weak weathering of the lower subsoil is reflected in the pale yellowish-brown colour that becomes paler with depth.

Typical physical properties

Note: values in *Italics* are estimates

Horizon	Depth (cm)	Bulk density	Permeability	Texture	Gravel content
Ap	0–25	Low – Moderate	<i>Moderate</i>	Silt loam	Gravel free
Ap/Bw	25–35	Moderate	<i>Moderate</i>	Silt loam	Gravel free
Bw	35–50	Moderate – High	<i>Moderate</i>	Silt loam	Gravel free
BC	50–90	Moderate – High	<i>Slow</i>	Silt loam	Gravel free

Profile drainage:	Moderately well
Plant readily available water:	<i>High</i>
Potential rooting depth:	Deep
Rooting restriction:	No major restriction

Key physical properties

Waikaka soils have a deep rooting depth and high plant available water, meaning there is no significant physical barrier to root growth. The soils are well drained but the compact subsoil is slowly permeable and may cause short-term waterlogging after heavy rainfall. Texture is silt loam in all horizons, with topsoil clay content of 20–30%. Waikaka soils are typically stone free.

Typical chemical properties

Horizon	Depth (cm)	pH	P retention	CEC	BS	Ca	Mg	K	Na
Ap	0–25	Moderate	Moderate	Moderate	Low	Low	Moderate	Moderate	Moderate
Ap/Bw	25–35	Low	Moderate	Moderate	Very low	Very low	Very low	Very low	Low
Bw	35–50	Moderate	High	Low	Very low	Very low	Very low	Very low	Very low
BC	50–90	Moderate	Moderate	Low	Very low	Very low	Very low	Very low	Very low

Key chemical properties

Topsoil organic matter values range from 6 to 9%, P-retention values 20–60% and pH values moderate (mid 5s). Cation exchange values are moderate and base saturation values low. Available calcium is low, with magnesium and potassium levels moderate. Soil reserve phosphorus levels are low. Micronutrient levels are generally adequate although molybdenum responses in legumes and boron responses in brassicas can be expected.

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 good drainage, moderate clay, organic matter and P-retention values.
Nutrient leaching	moderate	These soils have a moderate vulnerability to leaching to groundwater. This rating reflects the good drainage, which is offset by the high water-holding capacity and slow subsoil permeability.
Topsoil erodibility by water	slight	Due to the moderate clay and organic matter content, topsoil erodibility in these soils is slight. 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	slight	These soils have a slight vulnerability to waterlogging during wet periods. This rating reflects the good drainage, but slowly permeable subsoil. The hilly phase is likely to have nil vulnerability.

General landuse versatility ratings for Waikaka 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.

WxR1 (Waikaka rolling deep)

Versatility evaluation for soil WxR1		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Moderate	Risk of short-term waterlogging after heavy rain; rolling slopes
Arable	Limited	Rolling slopes
Intensive pasture	Moderate	Vulnerability of topsoil to structural degradation by cultivation and compaction; vulnerability to leaching to groundwater.
Forestry	High	Few limitations

WxU1 (Waikaka undulating deep)

Versatility evaluation for soil WxU1		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Moderate	Risk of short-term waterlogging after heavy rain
Arable	Limited	Vulnerability of topsoil to structural degradation by cultivation and compaction; risk of short-term waterlogging after heavy rain
Intensive pasture	Moderate	Vulnerability of topsoil to structural degradation by cultivation and compaction; vulnerability to leaching to groundwater.
Forestry	High	Few limitations

WxH1 (Waikaka hilly deep)

Versatility evaluation for soil WxH1		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Unsuitable	Hilly slopes
Arable	Unsuitable	Hilly slopes
Intensive pasture	Limited	Hilly slopes
Forestry	Moderate	Hilly slopes

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 and maintenance of subsurface mole and tile drains will reduce the period of short-term waterlogging.

Soil profiles available for Waikaka soils

Soil symbol	Profile ID	Topoclimate map sheet	Profile description available	Physical data available	Chemical data available	Profile photo available
WxU1	QT12	42	✓	✓	✓	✓
WxR1	QT1	42	✓	✓	✓	✓
WxU1	WCT6	34	✓	✓	✓	✓
WxU1	SB08335	34	✓	✓	✓	
WxU1	GG/GW73	35	✓	✓	✓	

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