

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: **Waikiwi**

Overview

Waikiwi soils occupy about 29,000 ha on high terraces of the southern Southland Plain between the Maitai and Aparima rivers. They are formed in deep wind-deposited loess derived from greywacke and schist rocks. Waikiwi soils are well drained, have a deep rooting depth, high water-holding capacity and silt loam textures. They are high producing soils currently used for intensive sheep, dairy and deer production, with limited cropping. They have a cool temperate climate and receive regular rain over the year and seldom dry out.

Soil classification

NZ Soil Classification (NZSC):

Typic Firm Brown; stoneless; silty

Previous NZ Genetic Classification:

Southern yellow-brown earth

Classification explanation

The NZSC of the Waikiwi soils is consistent with the previous classification. Waikiwi soils are well-drained soils with yellow-brown subsoils, and rarely suffer from drought. There is a subsoil horizon that is structureless, with slightly firm or greater soil strength that may limit root penetration, and has slow permeability that may cause waterlogging during wet periods. The soils have P-retention of 30–85%, are typically stone free and have silt loam textures to 90cm depth.

Soil phases and variants

Identified units in the Waikiwi soils are:

- Waikiwi undulating deep (WiU1): has no gravel within 90cm depth; occurs on slopes 0–7°
- Waikiwi rolling deep (WiR1): has no gravel within 90cm depth; occurs on slopes 7–15°
- Waikiwi rolling moderately deep (WiR2): has gravel between 45 and 90cm depth; occurs on slopes 7–15°
- Waikiwi hilly deep (WiH1): has no gravel within 90cm depth; occurs on slopes 15–25°
- Waikiwi undulating moderately deep (WiU2): has gravels between 45 and 90cm depth; occurs on slopes 0–7°

The soil properties described in this Technical Data Sheet are based on the most common phase, Waikiwi undulating deep (WiU1). 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., Waikiwi hilly deep (WiH1).

Associated soils

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

- Woodlands: occurs on the same landforms, but has imperfect drainage
- Dacre: poorly drained soil on floodplains of streams and minor drainage channels.
- Mokotua: occurs on the same landforms, but has imperfect drainage (tending to poor); has a structured subsoil to 90cm.
- Oteramika: shallow soil occurring on shoulder and sideslopes where loess has been eroded away

Similar soils

Some soils that have similar properties to Waikiwi soils are:

- Edendale: have a similar soil profile and occur on intermediate terraces in the lower Matura and Oreti River valleys.
- Waimatuku: have a similar soil profile and occur on the high terraces of the Southland Plain west of the Waimatuku stream. They have a distinct subsoil fragipan.
- Tokanui: have a similar soil profile and occur on the rolling to hilly land east of the Matura River, south of Matura township.
- Waimahaka: occur in near-source loess east of the Matura River, east of Fortrose; has pale coloured subsoils with loamy silt textures.
- Pourakino: occur on the flanks of the Pourakino Valley; paler colours; P-retention 70–85% throughout profile.

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.

Waikiwi profile	Horizon	Depth (cm)	Description
	Ap	0–24	Greyish yellow-brown silt loam; weak soil strength; moderately developed fine polyhedral structure; abundant roots.
	Ap/Bw	24–31	Dull yellowish brown silt loam; many worm casts; weak soil strength; moderately developed fine to medium polyhedral structure; many roots.
	Bw	31–55	Dull yellowish brown silt loam; few wormcasts; slightly firm soil strength; moderately developed medium to coarse polyhedral structure; many roots
	BC	55–90	Dull yellowish brown silt loam; firm soil strength; massive structure; few roots
	BC	55–90	Dull yellowish brown silt loam; firm soil strength; massive structure; few roots

Key profile features

Waikiwi topsoils are 20–30cm deep, with a moderately developed structured. Subsoils have moderately developed structure that becomes more compact and structureless below 50cm depth. The moderate weathering of the soils is reflected in the yellowish brown colour.

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
Ap/Bw	24–31	Moderate	<i>Moderate</i>	Silt loam	Gravel free
Bw	31–55	Moderate – High	<i>Moderate</i>	Silt loam	Gravel free
BC	55–90	Moderate – High	<i>Slow</i>	Silt loam	Gravel free

Profile drainage: Well
Plant readily available water: *High*
Potential rooting depth: Deep
Rooting restriction: No major restriction

Key physical properties

Waikiwi 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 25–30%. Waikiwi soils are typically stone free, although the moderately deep phases have gravels between 45 and 90cm depth that may restrict rooting depth and available water to moderately high.

Typical chemical properties

Horizon	Depth (cm)	pH	P retention	CEC	BS	Ca	Mg	K	Na
Ap	0–24	Moderate	Moderate	Moderate	Moderate	Moderate	Low	Moderate	Low
Ap/Bw	24–31	Moderate	High	Moderate	Low	Low	Low	Low	Low
Bw	31–55	Moderate	High	Low	Low	Low	Very low	Low	Low
BC	55–90	Moderate	High	Low	Low	Low	Very low	Low	Low

Additional chemical properties (as a profile average)

High subsoil sulphate sulphur values; low reserve potassium values.

Key chemical properties

Topsoil organic matter levels are 6–8%; P-retention values 40–60% but higher in the subsoil; pH values are moderate in all horizons. Cation exchange and base saturation values are moderate, with low availability of magnesium and potassium. Reserve phosphorus levels are low and sulphate sulphur levels are high in the subsoil. Micro-nutrient levels are generally adequate, although boron responses in brassicas and molybdenum responses in legumes can occur.

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, and the topsoil clay and P-retention values.
Nutrient leaching	moderate	These soils have a moderate vulnerability to leaching to groundwater. This rating reflects the high water-holding capacity and slow subsoil permeability, but is offset by the good profile drainage.
Topsoil erodibility by water	slight	Due to the clay content, the topsoil erodibility of these soils is slight compared to other Southland soils. 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 slowly permeable subsoil.

General landuse versatility ratings for Waikiwi 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.

WiU1 (Waikiwi undulating deep)

WiU2 (Waikiwi undulating moderately deep)

Versatility evaluation for soil WiU1; WiU2		
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
Forestry	High	Few limitations.

WiR1 (Waikiwi rolling deep)

WiR2 (Waikiwi rolling moderately deep)

Versatility evaluation for soil WiR1; WiR2		
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 to nutrient leaching to ground water; rolling slope
Forestry	High	Few limitations.

WiH1 (Waikiwi hilly deep)

Versatility evaluation for soil WiH1		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Unsuitable	Hilly slope
Arable	Unsuitable	Hilly slope
Intensive pasture	Limited	Hilly slope
Forestry	Moderate	Hilly slope

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.
- Installation and maintenance of sub-surface mole and tile drains will reduce the risk of short-term waterlogging.
- If compaction occurs, aeration at the correct depth and soil moisture can be of benefit.

Soil profiles available for Waikiwi soils

Soil symbol	Profile ID	Topoclimate map sheet	Profile description available	Physical data available	Chemical data available	Profile photo available
WiU1	SB9215	14	✓	✓		
WiU1	GG/WD13	14	✓			✓
WiU1	UT2	14	✓	✓	✓	✓
WiU1	UT7	14	✓	✓	✓	✓
WiU1	UT13	14	✓	✓	✓	✓
WiU1	UT14	14	✓	✓	✓	✓
WiU1	IT5	21	✓	✓	✓	✓
Wiu1	GMT12	27	✓	✓	✓	✓
Wiu1	CT12	6	✓	✓	✓	✓
WiU1	ET13	28a	✓	✓	✓	✓
WiU1	GG/WD9	14	✓	✓		
Wiu1	GG/WD43	14	✓	✓		

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