

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: **Kuriwao**

Overview

Kuriwao soils occupy about 4,100 ha on hilly slopes in eastern Southland between Matura and Clinton. They are formed in mixed bess and stony colluvium from tuffaceous greywacke. Kuriwao soils vary in depth from shallow to moderately deep, depending on the abundance of gravels in the subsoil. They are well drained, with a slight to moderately deep rooting depth and moderately high water-holding capacity. Kuriwao soils are moderately leached, with P-retention of 50–80% and pH of <5.5 typical in the subsoil. Climate is cool temperate with regular rain and soils seldom dry out.

Soil classification

NZ Soil Classification (NZSC): Acidic Orthic Brown; with stones; clayey

Previous NZ Genetic Classification: Strongly leached yellow-brown earth

Classification explanation

The NZSC of Kuriwao soils is consistent with the previous classification. They are moderately leached soils with yellow-brown colours, P-retention of 50–80% and subsoil pH of less than 5.5. Kuriwao soils have silt loam textures, and variable amounts of gravel in the subsoil.

Soil phases and variants

Identified units in the Kuriwao soils are:

- Kuriwao hilly moderately deep (KuH2): has gravel between 45 and 90cm depth; occurs on slopes of 15–25°
- Kuriwao hilly shallow (KuH3): has gravel within 45cm depth; occurs on slopes of 15–25°
- Kuriwao steep shallow (KuS3): has gravel within 45cm depth; occurs on slopes >25°

The soil properties described in this Technical Data Sheet are based on the most common phase, Kuriwao hilly moderately deep (KuH2). 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., Kuriwao steep shallow (KuS3).

Associated soils

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

- Otarai: moderately leached Brown soil formed in deep loess
- Kaihiku: shallow weakly leached soil formed into stony colluvium on north facing slopes
- Tyneholm: moderately leached Brown soil with tuffaceous greywacke bedrock within 45cm depth

Similar soils

Some soils that have similar properties to Kuriwao soils are:

- Craigdale: moderately leached Brown soil formed in moderately deep loess overlying tuffaceous greywacke bedrock
- Kaiwera: shallow, well drained strongly leached soil forming into stony colluvium or bedrock; has P-retention of >85%
- Waiarikiki: moderately deep equivalent of the Kaiwera soil; formed in gravelly colluvium, but the very gravelly horizon with >35% gravel occurs deeper, at between 45 and 90cm depth
- Josephville: Brown soil formed into moderately deep and deep loess overlying tuffaceous greywacke bedrock and stony colluvium; the soils are only weakly leached with P-retention of 20–40%.

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.

Kuriwao profile	Horizon	Depth (cm)	Description
No profile photo available	Ah	0–18	Very dark greyish brown clay loam; weak soil strength; strongly developed fine polyhedral structure; many roots
	Ah/Bw	18–30	Yellowish brown slightly gravelly clay loam; abundant worm casts; weak soil strength; moderately developed very fine blocky and very fine polyhedral structure; gravels angular; many roots
	Bw1	30–62	Yellowish brown moderately gravelly clay loam; weak soil strength; moderately developed very fine blocky structure; gravels angular; common roots
	Bw2	62–90	Yellowish brown moderately gravelly clay loam; weak soil strength; weakly developed fine blocky structure; gravels angular; few roots

Key profile features

Kuriwao soils have a 20–25cm deep topsoil with strongly developed structure. Subsoil structure is moderate, grading to weakly developed in the lower subsoil.

Typical physical properties

Note: values in *Italics* are estimates

Horizon	Depth (cm)	Bulk density	Permeability	Texture	Gravel content
Ah	0–18	Moderate – High	<i>Moderate</i>	Clay loam	Very slightly gravelly
Ah/Bw	18–30	Moderate	<i>Moderate</i>	Clay loam	Slightly gravelly
Bw1	30–62	Moderate – High	<i>Moderate</i>	Clay loam	Slightly gravelly
Bw2	62–90	Moderate – High	<i>Moderate</i>	Clay loam	Moderately gravelly

Profile drainage: Well

Plant readily available water: *Moderately high*

Potential rooting depth: Moderately deep

Rooting restriction: Subsoil gravels in some soils

Key physical properties

Kuriwao soils have a moderately deep rooting depth, and moderately high plant available water. The soils have good aeration and permeability throughout the profile. Textures are clay loams in all horizons, with topsoil clay content of 30–40%. Soils have varying gravel contents, depending on the pattern of colluvial deposition. The gravelliness of the shallow phases means they are likely to have slightly deep rooting depth and moderate available water.

Typical chemical properties

Horizon	Depth (cm)	pH	P retention	CEC	BS	Ca	Mg	K	Na
Ah	0–18	Moderate	High	High	Moderate	Moderate	Moderate	Moderate	Low
Ah/Bw	18–30	Moderate	High	Moderate	Low	Low	Moderate	Very low	Low
Bw1	30–62	Moderate	High	Moderate	Very low	Very low	Low	Very low	Low
Bw2	62–90	Moderate	High	Moderate	Very low	Very low	Low	Very low	Low

Additional chemical properties (as a profile average)

Reserve potassium (kc) values are low, sulphate sulphur levels increase in the subsoil

Key chemical properties

Topsoil organic matter levels are 10–11%; P-retention values 50–80% and pH moderate (mid–low 5s). Cation exchange and base saturation values are moderate to high in the topsoil but decrease in the subsoil. Available calcium and potassium values are moderate in the topsoil with magnesium levels low. Reserve phosphorus values are also low. Micro nutrient levels are generally adequate although molybdenum responses in legumes can be expected. Copper levels may be low for cattle.

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	minimal	These soils have a minimal 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 and moderate permeability, offset by the moderately high water-holding capacity. The shallow phases are likely to have severe vulnerability.
Topsoil erodibility by water	minimal	Due to the high clay content, topsoil erodibility in these soils is minimal. 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	nil	These soils have a nil vulnerability to waterlogging during wet periods. This rating reflects the good drainage, moderate permeability, and the hilly to steep slopes.

General landuse versatility ratings for Kuriwao 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.

KuH2 (Kuriwao hilly moderately deep)

Versatility evaluation for soil KuH2		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Unsuitable	Hilly slopes
Arable	Unsuitable	Hilly slopes
Intensive pasture	Limited	Hilly slopes
Forestry	Moderate	Hilly slopes; restricted rooting depth

KuH3 (Kuriwao hilly shallow)

KuS3 (Kuriwao steep shallow)

Versatility evaluation for soil KuH3, KuS3		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Unsuitable	Hilly and steep slopes
Arable	Unsuitable	Hilly and steep slopes
Intensive pasture	Limited	Hilly and steep slopes
Forestry	Limited	Steep slopes; restricted rooting depth

Management practices that may improve soil versatility

- Management of nutrient applications so as to minimise leaching losses.

Soil profiles available for Kuriwao soils

Soil symbol	Profile ID	Topoclimate map sheet	Profile description available	Physical data available	Chemical data available	Profile photo available
KuH3	SB09863	42	✓	✓	✓	

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