

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: **Waipapa**

Overview

Waipapa soils occupy about 800 ha on terraces and downland east of the lower Mataura River valley, south of Fortrose township. They are formed in near-source wind-deposited loess derived from greywacke and schist rock. Soils are imperfectly drained, with a deep potential rooting depth and high plant available water, but are strongly leached with podzolised properties. Present use is pastoral farming with sheep, dairy and beef cattle. Climate is temperate with prevailing southerly winds and regular rainfall and soils rarely dry out.

Soil classification

NZ Soil Classification (NZSC):

Mottled-placic Allophanic Brown; stoneless; silty.

Previous NZ Genetic Classification:

Strongly leached yellow-brown earth.

Classification explanation

The NZSC of the Waipapa soil is consistent with the previous classification. Waipapa soils are strongly leached, with low base saturation, high P-retention, and podzolised properties (evidence of iron/organic matter accumulation in the upper subsoil). The soils are imperfectly drained and often have thin iron pans (placic pans) in the upper subsoils. They are typically stone free and have loamy silt to light silt loam textures.

Soil phases and variants

Identified units in the Waipapa soils are:

- Waipapa rolling deep (YpR1): has no gravel within 90cm depth; occurs on slopes of 7–15°
- Waipapa undulating deep (YpU1): has no gravel within 90cm depth; occurs on slopes of 0–7°

The soil properties described in this Technical Data Sheet are based on the most common phase, Waipapa rolling deep (YpR1). 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., Waipapa undulating deep (YpU1).

Associated soils

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

- Niagara: imperfectly drained brown soil on low terraces and floodplains
- Otatara: formed in stable sand dunes
- Tokanui: well drained soil that occurs on hilly to rolling land in more distant source loess; has yellow-brown colours and heavy silt loam texture throughout the profile
- Chaslands: imperfectly drained equivalent of the Tokanui soil

Similar soils

Some soils that have similar properties to Waipapa soils are:

- Scrubby Hill: equivalent soil that occurs on hilly to rolling land in more distant source loess above 100m altitude; has yellow-brown colours and heavy silt loam texture throughout the profile
- Ashers: very strongly leached podzolised soil formed in deep loess on the Southland plains
- Fortrose: imperfectly drained soil that occurs in complexes with the Waipapa soil, but does not have podzolised features
- Waimahaka: well drained equivalent of the Fortrose soil

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.

Waipapa profile	Horizon	Depth (cm)	Description
	Ap	0–26	Brownish black loamy silt; weak soil strength; strongly developed very fine to fine polyhedral structure; abundant roots.
	Ap/Bw(g)(h)	26–31	Dull yellow-orange loamy silt; common greyish yellow mottles; many dark reddish brown organic coats; many wormcasts; weak soil strength; strongly developed very fine to fine polyhedral structure; abundant roots.
	Bfm	31–33	Dark reddish brown placic pan; very firm soil strength; massive structure; few roots.
	Bw(g)	33–65	Dull yellow orange silt loam; common greyish yellow and bright brown mottles; few dark reddish brown iron and organic matter coats; slightly firm soil strength; moderately developed medium to coarse polyhedral structure; many roots.
	Bfm	31–33	Dark reddish brown placic pan; very firm soil strength; massive structure; few roots.
	BC(g)	65–90+	Dull yellow-orange silt loam; few greyish yellow mottles with bright brown selvedge; firm soil strength; massive structure; few roots.

Key profile features

Waipapa topsoils are 20–26cm deep with a strongly developed structure. Subsoil structure is moderately developed, grading to structureless in the lower subsoil. The upper subsoil has thin iron pans and coatings of translocated iron/organic matter that reflect the strongly leached nature of this soil.

Typical physical properties

Note: values in *Italics* are estimates

Horizon	Depth (cm)	Bulk density	Permeability	Texture	Gravel content
Ap	0–26	Moderate	<i>Moderate</i>	Loamy silt	Gravel free
Ap/Bw(g)(h)	26–31	Moderate	<i>Moderate</i>	Loamy silt	Gravel free
Bfm	31–33	—	—	—	—
Bw(g)	33–65	Moderate – High	<i>Moderate</i>	Silt loam	Gravel free
BC(g)	65–90+	Moderate – High	<i>Slow</i>	Silt loam	Gravel free

Profile drainage: Imperfect

Plant readily available water: *High*

Potential rooting depth: Deep

Rooting restriction: Thin iron pans may be limiting (where they are continuous and not fragmented)

Key physical properties

Waipapa soils have a deep rooting depth and high plant available water, although the thin iron pans may also restrict roots where they are continuous. Soils are imperfectly drained, with slowly permeable subsoils that may cause short-term waterlogging after heavy rain. Textures are loamy silt in the topsoil, grading to silt loams in the subsoil, with a topsoil clay content of 15–18%. No stones or gravels occur in these soils.

Typical chemical properties

Horizon	Depth (cm)	pH	P retention	CEC	BS	Ca	Mg	K	Na
Ap	0–26	Moderate	High	Moderate	Moderate	High	Low	Low	Moderate
Ap/Bw(g)(h)	26–31	Moderate	Very high	High	Low	Moderate	Very high	Very low	Low
Bfm	31–33	—	—	—	—	—	—	—	—
Bw(g)	33–65	Moderate	High	Moderate	Low	Low	Very low	Very low	Low
BC(g)	65–90+	Moderate	Moderate	Low	Very low	Very low	Very low	Very low	Low

Key chemical properties

Topsoils organic matter levels are about 12–18%; P-retention 80–90% in the upper horizons, and pH moderate (high 5s). Less developed sites may have acidity limitations, with pH values of <5.0. Cation exchange is moderate throughout. Base saturation values are moderate in the topsoil but low in the subsoil. Topsoil available calcium values are moderate to high but magnesium and potassium levels low. Available cations in the subsoil are low to very low. Soil reserve phosphorus is 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	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 moderate to low clay content, offset by the high organic matter and P-retention.
Nutrient leaching	slight	These soils have a slight vulnerability to leaching to groundwater. This rating reflects the imperfect drainage, high water-holding capacity and slowly permeable subsoil.
Topsoil erodibility by water	slight	Due to the moderate to low clay, but high 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	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	moderate	These soils have a moderate vulnerability to waterlogging during wet periods. This rating reflects the imperfect drainage and slow permeability.

General landuse versatility ratings for Waipapa 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.

YpR1 (Waipapa rolling deep)

Versatility evaluation for soil YpR1		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Moderate	Inadequate aeration during wet periods; vulnerable to sustained waterlogging.
Arable	Limited	Rolling slopes
Intensive pasture	Moderate	Inadequate aeration during wet periods; vulnerability to short-term waterlogging after heavy rainfall
Forestry	Moderate	Vulnerability to sustained waterlogging.

YpU1 (Waipapa undulating deep)

Versatility evaluation for soil YpU1		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Moderate	Inadequate aeration during wet periods; vulnerable to sustained waterlogging.
Arable	Moderate	Inadequate aeration during wet periods; vulnerability to short-term waterlogging after heavy rainfall
Intensive pasture	Moderate	Inadequate aeration during wet periods; vulnerability to short-term waterlogging after heavy rainfall
Forestry	Moderate	Vulnerability to sustained waterlogging.

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 risk of short-term waterlogging.

Soil profiles available for Waipapa soils

Soil symbol	Profile ID	Topoclimate map sheet	Profile description available	Physical data available	Chemical data available	Profile photo available
YpU1	ST14a	29	✓	✓	✓	✓
YpU1	ST14b	29	✓	✓	✓	✓

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