

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: **Woodlands**

Overview

Woodlands soils occupy 24,500 ha on intermediate and high terraces of the lower Southland Plain between the Mataura River and Otautau. They are formed in deep wind-deposited loess derived from greywacke and schist rocks. Woodlands soils are imperfectly 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): Mottled Firm Brown; stoneless; silty

Previous NZ Genetic Classification: Southern yellow-brown earth

Classification explanation

The NZSC of Woodlands soils is consistent with the previous classification. Woodlands soils are imperfectly 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. This horizon has slow permeability that causes waterlogging during wet periods, which is reflected in the imperfect drainage. The soils have a 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 Woodlands soils are:

- Woodlands undulating deep (WdU1): has no gravels within 90cm depth; occurs on slopes 0–7°
- Woodlands rolling deep (WdR1): has no gravels within 90cm depth; occurs on slopes 7–15°
- Woodlands hilly deep (WdH1): has no gravels within 90cm depth; occurs on slopes 15–25°
- Woodlands undulating moderately deep (WdU2): has gravels between 45 and 90cm depth; occurs on slopes 0–7°
- Woodlands rolling moderately deep (WdR2): has gravels between 45 and 90cm depth; occurs on slopes 7–15°
- Woodlands hilly moderately deep (WdH2): has gravels between 45 and 90cm depth; occurs on slopes 15–25°

The soil properties described in this Technical Data Sheet are based on the most common phase, Woodlands undulating deep (WdU1). 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., Woodlands hilly deep (WdH1).

Associated soils

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

- Waikiwi: occurs on the same landforms, but is well drained
- Dacre: poorly drained soil on floodplains of streams and minor drainage channels.
- Oteramika: shallow soil occurring on shoulder and side slopes where loess has been eroded away
- Pukemutu: poorly drained soil, due to water perching on a dense subsoil fragipan.

Similar soils

Some soils that have similar properties to Woodlands soils are:

- Mokotua: occurs on the same landforms, but is more severely mottled, with the imperfect drainage tending towards poorly drained. The soils lack the structureless horizon, having a structured subsoil to 90cm.
- Arthurton: imperfectly drained Brown soil associated with Pallic soils of northern Southland, reflected in P-retentions of 20–40%
- Aparima: imperfectly drained Brown soil with a fragipan, associated with Pallic soils (Pukemutu series) on the Southland Plains, west of the Oreti River
- Fortrose: imperfectly drained soil occurring in near-source loess east of the Matura River, west to south of Fortrose; has pale coloured subsoils with loamy silt textures.

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.

Woodlands profile	Horizon	Depth (cm)	Description
	Ap	0–22	Greyish yellow-brown silt loam; weak soil strength; moderately developed fine to medium polyhedral structure; abundant roots
	Ap/Bw	22–32	Dull yellowish brown silt loam; many worm casts; weak soil strength; moderately developed fine to medium polyhedral structure; many roots
	Bw(g)	32–60	Dull yellowish brown silt loam; common greyish yellow and orange mottles; few worm casts; weak soil strength; moderately developed very fine polyhedral structure; many roots
	BC(g)	60–90	Dull yellowish brown silt loam; common greyish yellow and bright brown mottles; firm soil strength; massive structure; few roots

Key profile features

Woodlands soils have topsoils 20–30cm deep with a moderately developed structured. Subsoils have moderately developed structure that becomes firmly compact and structureless below 50cm depth. This compact horizon causes the imperfect drainage of the soil, that is reflected in the typical mottling of the subsoil. 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	0–22	Moderate	<i>Moderate</i>	Silt loam	Gravel free
Ap/Bw	22–32	Moderate	<i>Moderate</i>	Silt loam	Gravel free
Bw(g)	32–60	Moderate – High	<i>Moderate</i>	Silt loam	Gravel free
BC(g)	60–95+	High	<i>Slow</i>	Silt loam	Gravel free

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

Key physical properties

Woodlands soils have a deep rooting depth and high plant-available water, meaning there is no major physical barrier to root growth, although high bulk density in the lower subsoil may restrict root penetration. The compact subsoil is slowly permeable, and may cause short-term waterlogging and limit aeration after heavy rainfall. Texture is silt loam in all horizons, with topsoil clay content of 20–30%. Woodlands soils are typically stone free, although the moderately deep phases have gravel 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	0–22	Moderate	Moderate	Moderate	Moderate	Moderate	Low	Very low	Low
Ap/Bw	22–32	Moderate	Moderate	Low	High	Moderate	Very low	Very low	Low
Bw(g)	32–60	Moderate	Moderate	Low	Moderate	Low	Very low	Very low	Low
BC(g)	60–95+	Moderate	Moderate	Low	Moderate	Low	Very low	Very low	Low

Additional chemical properties (as a profile average)

Reserve potassium values are low; sulphate sulphur values are high in the subsoil.

Key chemical properties

Topsoil organic matter levels are 5–7%; P-retention values 30–60%; pH values are moderate, with some profiles below 5.5. Cation exchange and base saturation values are moderate and available magnesium and potassium low. Soil reserves of phosphorus are low and available sulphate sulphur high in the subsoil. 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 moderate topsoil clay and P-retention values, but is offset by the imperfect drainage.
Nutrient leaching	slight	These soils have a slight vulnerability to leaching to groundwater. This rating reflects the imperfect drainage, high water holding capacity and slow subsoil permeability .
Topsoil erodibility by water	slight	Due to the topsoil clay percentage, the topsoil erodibility 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	moderate	These soils have a moderate vulnerability to waterlogging during wet periods. This rating reflects the imperfect drainage and slowly permeable subsoil.

General landuse versatility ratings for Woodlands 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.

WdU1 (Woodlands undulating deep)

WdU2 (Woodlands undulating moderately deep)

Versatility evaluation for soil WdU1, WdU2		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Moderate	Inadequate aeration during wet periods; risk of short-term waterlogging after heavy rain.
Arable	Moderate	Inadequate aeration during wet periods; risk of short-term waterlogging after heavy rain.
Intensive pasture	Moderate	Inadequate aeration during wet periods; risk of short-term waterlogging after heavy rain.
Forestry	Moderate	Vulnerability to sustained waterlogging.

WdR1 (Woodlands rolling deep)

WdR2 (Woodlands rolling moderately deep)

Versatility evaluation for soil WdR1, WdR2		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Moderate	Inadequate aeration during wet periods; rolling slopes
Arable	Limited	Rolling slopes.
Intensive pasture	Moderate	Inadequate aeration during wet periods; rolling slopes.
Forestry	Moderate	Vulnerability to sustained waterlogging.

WdH1 (Woodlands hilly deep)**WdH2 (Woodlands hilly moderately deep)**

Versatility evaluation for soil WdH1, WdH2		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Unsuitable	Hilly slopes
Arable	Unsuitable	Hilly slopes
Intensive pasture	Limited	Hilly slopes
Forestry	Moderate	Vulnerability to sustained waterlogging; hilly slopes.

Management practices that may improve soil versatility

- Careful management after heavy rainfall and wet periods will reduce the impact of short-term waterlogging. Intensive stocking, cultivation and vehicular traffic should be minimised during these periods.
- Installation and maintenance of sub-surface drainage with moles and tiles may reduce the risk of short-term waterlogging
- If compaction occurs, aerating at the correct depth and moisture content can be of benefit.

Soil profiles available for Woodlands soils

Soil symbol	Profile ID	Topoclimate map sheet	Profile description available	Physical data available	Chemical data available	Profile photo available
WdU1	UT11	14	✓	✓	✓	✓
WdR2	UT10	14	✓	✓	✓	✓
WdU1	UT8	14	✓	✓	✓	✓
WdU1	GMT11	27	✓	✓	✓	✓
WdU1	SB09787	27	✓	✓	✓	
WdR1	ET8	28a	✓	✓	✓	✓
WdU1	ET12	28a	✓	✓	✓	✓
WdU1	ET21	28a	✓	✓	✓	✓
WdU2	ET20	28a	✓	✓		
WdU1	CT1	6	✓	✓	✓	✓
WdR2	GMT3	27	✓	✓	✓	✓
WdU1	176/136167	8	✓	✓		
WdU1	176168201	8	✓	✓		
WdU1	GG/WD11	14	✓	✓		
WdU2	GG/WD21	14	✓	✓		
WdU2	GG/WD24	14	✓	✓		
WdU1	GG/WD32	14	✓	✓		
WdU1	GG/WD/50	14	✓	✓		

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