Soil name: Tuturau

Overview

Tuturau soils occupy about 11,500 ha on terraces and downland mainly on the east of the lower Mataura valley between Gore and Waimahaka. They are formed in near-source wind-deposited loess derived from greywacke and schist rock. Tuturau soils are well drained, have a deep rooting depth, high water holding capacity, and loamy silt textures with P-retention between 25 and 60%. They are high producing soils currently used for intensive sheep and dairy production, with some cropping. Climate is cool temperate with regular summer rain, so soils seldom drying out.

Soil classification

NZ Soil Classification (NZSC):	Pallic Orthic Brown; stoneless; silty
Previous NZ Genetic Classification:	Southern lowland yellow-brown earth

Classification explanation

The NZSC of the Tuturau soil differs from the previous classification. The soils are now recognised as having properties intergrading with Pallic soils, reflected in the lower subsoil having pale yellow-brown colours (hue 2.5Y) and P-retention values of 20–40%. The subsoil is structureless, but shows only weak compaction, and has no limitation to root penetration. The soils are typically stone free and have loamy silt textures to 90cm depth.

Soil phases and variants

Identified units in the Tuturau soils are:

- Tuturau undulating deep (TuU1): has no gravel within 90cm depth; occurs on slopes 0–7°
- Tuturau rolling deep (TuR1): has no gravel within 90cm depth; occurs on slopes 7–15°
- Tuturau hilly deep (TuH1): has no gravels within 90cm depth; occurs on slopes 15–25°
- Tuturau steep deep (TuS1): has no gravel within 90cm depth; occurs on slopes >25°
- Tuturau hilly moderately deep (TuH2):has gravel between 45 and 90cm depth; occurs on slopes 15–25°
- Tuturau steep moderately deep (TuS2):has gravels between 45 and 90cm:occurs on slopes >25°

The soil properties described in this Technical Data Sheet are based on the most common phase, Tuturau undulating deep (TuU1). 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., Tuturau hilly deep (TuH1).

Associated soils

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

- Wyndham: imperfectly drained equivalent of the Tuturau soil
- Jacobstown: poorly drained floodplain soil, due to a high groundwater table

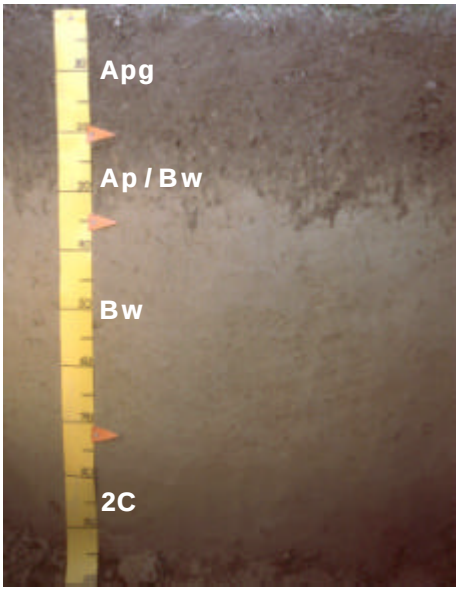
Similar soils

Some soils that have similar properties to Tuturau soils are:

- Waimahaka: similar soil south of Waimahaka; shows greater weathering, with higher P-retention, and found in complexes with soils that show podzolised properties.
- Crookston: occurs in northern Southland and west Otago; has silt loam textures
- Tokanui: occurs on rolling to hilly land in more distal source loess; has heavy silt loam texture and is more weathered, with yellow-brown colours and P-retention of 60–80% throughout the profile.
- Edendale: occurs on intermediate terraces; has heavy silt loam texture and is more weathered, with yellow-brown colours and P-retention of 60–80% throughout the 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.

Tuturau profile	Horizon	Depth (cm)	Description
	Apg	0–20	Greyish yellow-brown silt loam; weak soil strength; moderately developed fine to medium polyhedral structure; abundant roots
	Ap/Bw	20–35	Dull yellow loamy silt; abundant worm casts; weak soil strength; moderately developed fine to medium polyhedral structure; many roots
	Bw	35–72	Dull yellow loamy silt; weak soil strength; weakly developed medium to coarse prismatic structure; few roots
	2C	72–90	Olive yellow loamy silt; weak soil strength; massive structure; no roots

Key profile features

Tuturau soils have topsoils 20–30cm deep, with moderately developed structure. Subsoils have weak structure that becomes structureless below 50cm depth. The weak weathering of the soils 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
Apg	0–20	Moderate – High	*Moderate*	Silt loam	Gravel free
Ap/Bw	20–35	Moderate – High	*Moderate*	Loamy silt	Gravel free
Bw	35–72	High	*Moderate*	Loamy silt	Gravel free
2C	72–90	High	*Moderate*	Loamy silt	Gravel free

Profile drainage: Moderately well

Plant readily available water: *High*

Potential rooting depth: Deep

Rooting restriction: No major restriction

Key physical properties

Tuturau 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 and have good aeration. Texture is light silt loam in the topsoil and loamy silt in the subsoil, with topsoil clay content of 15–25%. Tuturau soils are typically stone free.

Typical chemical properties

Horizon	Depth (cm)	pH	P retention	CEC	BS	Ca	Mg	K	Na
Apg	0–20	Moderate	Low	Moderate	High	Moderate	Low	Very low	Low
Ap/Bw	20–35	Moderate	Moderate	Low	Moderate	Low	Very low	Very low	Low
Bw	35–72	Moderate	Moderate	Very low	Low	Very low	Very low	Very low	Very low
2C	72–90	Moderate	Low	Very low	Low	Very low	Very low	Very low	Very low

Additional chemical properties (as a profile average)
Reserve potassium is low, with sulphate sulphur levels high in the subsoil.

Key chemical properties

Topsoil organic matter content is 5–10% and P-retention 25–50%. Profile pH values are moderate, with some profiles having values below 5.4 in the subsoil. Cation exchange and base saturation values are moderate in upper horizons and low to very low in the subsoil. Natural reserves of phosphorus are low and sulphate sulphur levels high in the subsoil. Micro-nutrient 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 light silt loam texture and low P-retention.
Nutrient leaching	moderate	These soils have a moderate vulnerability to leaching to groundwater. This rating reflects the high water-holding capacity, but is offset by the good profile drainage.
Topsoil erodibility by water	moderate	Due to the light silt loam texture, the topsoil erodibility of these soils is moderate. 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.

General landuse versatility ratings for Tuturau 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.

TuU1 (Tuturau undulating deep)

Versatility evaluation for soil TuU1		
Landuse	**Versatility rating**	**Main limitation**
Non-arable horticulture	High	Few limitations
Arable	High	Few limitations
Intensive pasture	Moderate	Moderate vulnerability of leaching to ground water
Forestry	High	Few limitations

TuR1 (Tuturau rolling deep)

Versatility evaluation for soil TuR1		
Landuse	**Versatility rating**	**Main limitation**
Non-arable horticulture	Moderate	Rolling slopes
Arable	Limited	Rolling slopes
Intensive pasture	Moderate	Moderate vulnerability of leaching to ground water
Forestry	High	Few limitations

TuH1 (Tuturau hilly deep)
TuH2 (Tuturau hilly moderately deep)

Versatility evaluation for soil TuH1; TuH2		
Landuse	**Versatility rating**	**Main limitation**
Non-arable horticulture	Unsuitable	Hilly slopes
Arable	Unsuitable	Hilly slopes
Intensive pasture	Limited	Hilly slopes
Forestry	Limited	Restricted rooting depth

TuS1(Tuturau steep deep)
TuS2 (Tuturau steep moderately deep)

Versatility evaluation for soil TuS1; TuS2		
Landuse	**Versatility rating**	**Main limitation**
Non-arable horticulture	Unsuitable	Steep slopes
Arable	Unsuitable	Steep slopes
Intensive pasture	Limited	Steep slopes
Forestry	Limited	Steep 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.
- Organic matter levels should be carefully maintained and enhanced
- Management of nutrient applications so as to minimise leaching losses

Soil profiles available for Tuturau soils

Soil symbol	Profile ID	Topoclimate map sheet	Profile description available	Physical data available	Chemical data available	Profile photo available
TuU1	MWT17	28B	✓	✓	✓	✓
TuU1	MWT11	28B	✓	✓	✓	✓
TuU1	MWT22	28B	✓	✓	✓	✓
TuU1	MWT14	28B	✓	✓	✓	✓
TuU1	ST8	29	✓	✓	✓	✓
TuR1	K1111	28B	✓	✓	✓	
TuU1	GG/GW87	35	✓			

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