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: Mararoa

Overview

Mararoa soils occupy about 1100 ha on intermediate terraces and low fans in the Mararoa and upper Waiau valleys. They are formed into moderately deep to deep loess over alluvial greywacke and basic volcanic gravels. Mararoa soils are well drained, moderately deep to deep soils, with moderate plant available water and silt loam to silty clay textures. They are currently used for pastoral grazing with sheep and beef cattle. Climate is cool temperate with cold winters and occasional dry summers.

Soil classification

NZ Soil Classification (NZSC): Typic Orthic Brown; with stones; silty over skeletal
Previous NZ Genetic Classification: Moderately to strongly leached yellow-brown earth.

Classification explanation

The NZSC of the Mararoa soils is consistent with the previous classification. Mararoa soils are well-drained soils with yellow-brown subsoils, and rarely suffer from drought. The subsoil is well structured to 90cm depth, providing good rooting volume. The soils have P-retention of 60–70%, with gravels between 45 and 90cm depth, and typically have silt loam textures.

Soil phases and variants

Identified units in the Mararoa soils are:

- Mararoa undulating moderately deep (MrU2): has gravel between 45 and 90cm depth; occurs on slopes of 0–7°
- Mararoa undulating moderately deep clayey variant (MrU2vc): has clayey subsoils; has gravel between 45 and 90cm depth; occurs on slopes of 0–7°
- Mararoa undulating deep (MrU1): has no gravel within 90cm depth; occurs on slopes of 0–7°
- Mararoa undulating deep clayey variant (MrU1vc): has clayey subsoils; has no gravel within 90cm depth; occurs on slopesof 0–7°
- Mararoa undulating deep imperfectly drained variant (MrU1vi): has imperfect drainage; has no gravel within 90cm depth; occurson slopes of 0–7°

The soil properties described in this Technical Data Sheet are based on the most common phase, Mararoa undulating moderately deep (MrU2). 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., Mararoa undulating deep (MrU1).

Associated soils

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

- Monowai: shallow, stony soil formed on glacial outwash terraces; strongly leached, with P-retention consistently above 85%
- Glenelg: shallow, stony soil formed on alluvial terraces from the Takitimu Mountains; moderately to strongly leached, with P-retention between 30 and 85%
- Waituna: shallow, stony soil formed on young fans from the Takitimu Mountains

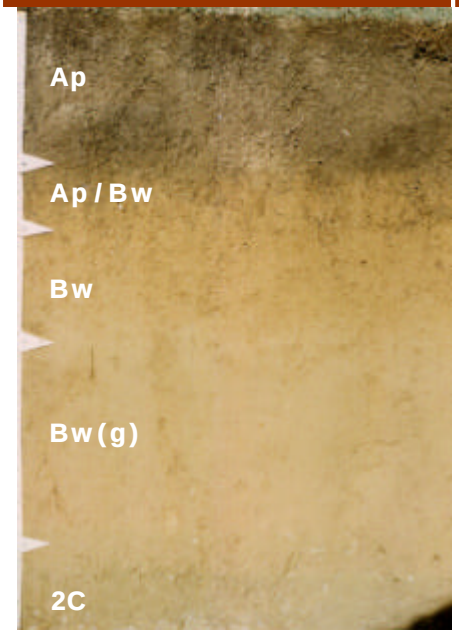
Similar soils

Some soils that have similar properties to Mararoa soils are:

- Princhester: has higher P-retentions (above 85%).
- Excelsior: has higher P-retentions (above 85%); also has a fragipan
- Freestone: similar profile but has sandy loam 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.

Mararoa profile	Horizon	Depth (cm)	Description
	Ap	0–21	Greyish yellow brown silt loam; weak soil strength; strongly developed very fine to fine polyhedral structure; abundant roots
	Ap/Bw	21–31	Dull yellowish brown silt loam; common worm casts; weak soil strength; strongly developed very fine to medium polyhedral structure; many roots
	Bw	31–47	Dull yellowish brown silt loam; weak soil strength; moderately developed very fine to medium polyhedral and very fine blocky structure; many roots
	Bw(g)	47–78	Dull yellowish brown silt loam; few dull brown and greyish olive mottles; firm soil strength; moderately developed medium to coarse blocky structure; many roots
	2C	78–90+	Yellowish brown extremely gravelly silt loam; firm soil strength; massive structure; gravels rounded and slightly weathered; no roots

Key profile features

Mararoa soils have 18–25cm deep topsoils and have a moderate to strongly developed structure. The subsoil also has moderately developed structure to the underlying gravels. The good structure is reflected in the good root distribution throughout the profile.

Typical physical properties

Note: values in Italics are estimates

Horizon	Depth (cm)	Bulk density	Permeability	Texture	Gravel content
Ap	0–21	Moderate	*Moderate*	Silt loam	Gravel free
Ap/Bw	21–31	Moderate	*Moderate*	Silt loam	Gravel free
Bw	31–47	Moderate	*Moderate*	Silt loam	Gravel free
Bw(g)	47–78	Moderate	*Moderate*	Silt loam	Very slightly gravelly
2C	78–90	–	*Moderate*	Silt loam	Extremely gravelly

Profile drainage: Well
Plant readily available water: *Moderate*
Potential rooting depth: Moderately deep
Rooting restriction: Extremely gravelly subsoil

Key physical properties

Mararoa soils have a moderately deep rooting depth and moderate plant available water, that is limited by the graveliness of the lower subsoil. The soils have good aeration and moderate permeability, but the imperfectly drained variant will not have as good properties. Textures are typically silt loams, with a clayey variant occuring in complexes in some locations. Topsoil clay content is 25–40%. Gravels are present below 45cm in moderately deep phases. Deep phases are stonefree, with deep rooting depth and moderately high plant available water.

Typical chemical properties

Horizon	Depth (cm)	pH	P retention	CEC	BS	Ca	Mg	K	Na
Ap	0–21	Moderate	High	Moderate	Moderate	High	Very low	Very low	Very low
Ap/Bw	21–31	Moderate	High	Moderate	Low	Low	Very low	Very low	Very low
Bw	31–47	Moderate	High	Moderate	Very low	Very low	Very low	Very low	Very low
Bw(g)	47–78	Moderate	Moderate	Low	Very low	Very low	Very low	Very low	Very low
2C	78–90	Moderate	High	Low	Very low	Very low	Very low	Very low	Very low

Key chemical properties

Topsoil organic matter levels are 9–11%; P-retention 60–70% and pH moderate (high 5s). Cation exchange is high and base saturation moderate. Available calcium is high with magnesium and potassium levels very low. Reserve phosphorus and sulphur levels are also 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	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, and moderate to high P-retention and organic matter levels.
Nutrient leaching	severe	These soils have a severe vulnerability to leaching to groundwater. This rating reflects the good drainage, moderate water-holding capacity and permeability. The deep phases have moderate vulnerability.
Topsoil erodibility by water	slight	Due to the high organic matter levels and moderate to high clay 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	slight	These soils have a slight vulnerability to waterlogging during wet periods. This rating reflects the good drainage and permeability.

General landuse versatility ratings for Mararoa 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.

MrU2 (Mararoa undulating moderately deep)
MrU2vc (Mararoa undulating moderately deep, clayey variant)

Versatility evaluation for soil MrU2, MrU2vc		
Landuse	**Versatility rating**	**Main limitation**
Non-arable horticulture	Moderate	Vulnerability to nutrient leaching to groundwater; restricted rooting depth
Arable	High	Few limitations
Intensive pasture	Moderate	Vulnerability to nutrient leaching to groundwater
Forestry	Moderate	Restricted rooting depth

MrU1 Mararoa undulating deep)
MrU1vc (Mararoa undulating deep, clayey variant)

Versatility evaluation for soil MrU1, MrU1vc		
Landuse	**Versatility rating**	**Main limitation**
Non-arable horticulture	High	Few limitations
Arable	High	Few limitations
Intensive pasture	Moderate	Vulnerability to nutrient leaching to groundwater
Forestry	High	Few limitations

MrU1vi (Mararoa undulating deep imperfectly drained variant)

Versatility evaluation for soil MrU1vi		
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; vulnerability to sustained waterlogging
Forestry	High	Few limitations

Management practices that may improve soil versatility

- Management of nutrient applications so as to minimise leaching losses

Soil profiles available for Mararoa soils

Soil symbol	Profile ID	Topoclimate map sheet	Profile description available	Physical data available	Chemical data available	Profile photo available
MrU2	KT5	5	✓	✓	✓	✓
MrU1vc	KT2	5	✓	✓	✓	✓
MrU1	MT11	7	✓	✓	✓	✓
MrU1	PT06	38	✓	✓	✓	✓
MrU2	150/73/25	5	✓			

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