

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: **Clinton**

Overview

Clinton soils occupy about 2,200 ha on gently sloping fans west of Clinton township. They are formed into wind deposited loess derived from greywacke and schist rock. Clinton soils are well drained, have a deep rooting depth, and are silty textured. They are used for intensive pastoral grazing with sheep, dairy and deer with some cropping. The climate is cool temperate with regular rainfall. Soils can occasionally dry out in some summers.

Soil classification

NZ Soil Classification (NZSC):

Typic Firm Brown; stoneless; silty.

Previous NZ Genetic Classification:

Yellow-brown earth

Classification explanation

The NZSC of the Clinton soils is consistent with the previous classification. Clinton soils are well-drained soils with yellow-brown subsoils. There is a subsoil horizon that is structureless, with slightly firm or greater soil strength, that may limit root penetration, and has slow permeability that may cause waterlogging during wet periods. The soils have P-retention of 30–50%, are typically stone free and have silt loam textures to 90cm depth.

Soil phases and variants

Identified units in the Clinton soils are:

- Clinton undulating deep (CnU1): has no stones within 90cm depth; occurs on slopes of 0–7°
- Clinton undulating moderately deep (CnU2): has gravel or bedrock between 45 and 90cm depth; occurs on slopes of 0–7°
- Clinton rolling deep (CnR1): has no gravel within 90cm depth; occurs on slopes of 7–15°
- Clinton rolling moderately deep (CnR2): has gravel or bedrock between 45 and 90 cm depth; occurs on slopes of 7–15°

The soil properties described in this Technical Data Sheet are based on the most common phase, Clinton undulating deep (CnU1). 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., Clinton rolling deep (CnR1).

Associated soils

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

- Arthurton: imperfectly drained Brown soil; has Brown-Pallic intergrade properties
- Warepa: imperfectly drained Pallic soil with a fragipan
- Conical Hill: well drained Melanic soil; formed onto volcanic bedrock

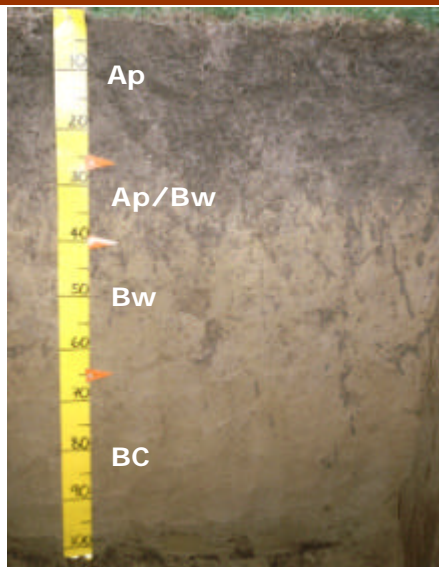
Similar soils

Some soils that have similar properties to Clinton soils are:

- Waikaka: has Brown-Pallic intergrade properties; occurs in rolling and hilly land grading between the downlands and the hill country
- Crookston: has Brown-Pallic intergrade properties, pale yellow-brown colours (hue 2.5Y) and P-retention of 20–40%; occurs on intermediate terraces and fans in northern Southland and west Otago
- Edendale: Brown soil on intermediate terraces of the Southland plain; has P-retention of 60–80%
- Tuturau: has loamy silt subsoil textures; formed in near-source loess adjacent to the Mataura River, between Mataura and Waimahaka

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.

Clinton profile	Horizon	Depth (cm)	Description
	Ap	0–25	Brownish grey silt loam; weak soil strength; strongly developed fine polyhedral structure; abundant roots
	Ap/Bw	25–40	Bright yellowish brown silt loam; many worm casts; slightly firm soil strength; strongly developed fine polyhedral structure; many roots
	Bw	40–65	Bright yellowish brown silt loam; few worm casts; slightly firm soil strength; moderately developed medium polyhedral structure; common roots
	BC	65–90	Bright yellowish brown silt loam; slightly firm soil strength; massive; few roots

Key profile features

Clinton soils have a 20–25cm deep topsoil with moderate to strongly developed structure. Subsoils have moderately developed structure that becomes more compact and structureless below 50cm depth.

Typical physical properties

Note: values in *Italics> are estimates*

Horizon	Depth (cm)	Bulk density	Permeability	Texture	Gravel content
Ap	0–25	Moderate	Moderate	Silt loam	Gravel free
Ap/Bw	25–40	Moderate – High	Moderate	Silt loam	Gravel free
Bw	40–65	Moderate – High	Moderate	Silt loam	Gravel free
BC	65–90	High	Slow	Silt loam	Gravel free

Profile drainage: Well
Plant readily available water: *Moderately high*
Potential rooting depth: Deep
Rooting restriction: No major restriction

Key physical properties

Clinton soils have a deep rooting depth and moderately high plant available water, although the high subsoil density may limit root growth. The soils are well drained but the compact subsoil is slowly permeable, and may cause short-term waterlogging after heavy rainfall. Texture is silt loam in all horizons, with topsoil clay content of 20–30%. Clinton soils are typically stone free, although the moderately deep phases have gravels or bedrock between 45 and 90cm depth that may restrict rooting depth and reduce available water status to moderately high.

Typical chemical properties

Horizon	Depth (cm)	pH	P retention	CEC	BS	Ca	Mg	K	Na
Ap	0–25	Moderate	Moderate	Moderate	High	High	Moderate	High	Low
Ap/Bw	25–40	Moderate	Moderate	Moderate	Moderate	Low	Low	High	Low
Bw	40–65	Moderate	Moderate	Low	Moderate	Low	Very low	Moderate	Low
BC	65–90	Moderate	Moderate	Low	Moderate	Low	Low	Very low	Low

Key chemical properties

Topsoil organic matter levels are 6–7%; P-retention values 25–35%; and pH values moderate (high5s). Cation exchange and base saturation values are moderate. Available calcium, magnesium and potassium levels are moderate to high. Reserves of phosphorus and sulphur are low. Micronutrient levels are generally adequate although molybdenum responses in legumes can be expected.

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 good drainage, moderate clay and P-retention values.
Nutrient leaching	moderate	These soils have a moderate vulnerability to leaching to groundwater. This rating reflects the good drainage, but is offset by the moderately high water-holding capacity.
Topsoil erodibility by water	slight	Due to the clay and organic matter content the topsoil erodibility of these soils 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	slight	These soils have a slight vulnerability to waterlogging during wet periods. This rating reflects the good drainage.

General landuse versatility ratings for Clinton 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.

CnU1 (Clinton undulating deep)

Versatility evaluation for soil CnU1		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Moderate	Risk of short-term waterlogging after heavy rain
Arable	Moderate	Restricted subsoil root penetrability; risk of short-term waterlogging after heavy rain.
Intensive pasture	Moderate	Restricted subsoil root penetrability.
Forestry	Moderate	Restricted subsoil root penetrability

CnU2 (Clinton undulating moderately deep)

Versatility evaluation for soil CnU2		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Limited	Restricted rooting depth
Arable	Moderate	Restricted subsoil root penetrability; risk of short-term waterlogging after heavy rain.
Intensive pasture	Moderate	Restricted subsoil root penetrability.
Forestry	Limited	Restricted rooting depth

CnR1 (Clinton rolling deep)

Versatility evaluation for soil CnR1		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Moderate	Rolling slope; risk of short-term waterlogging after heavy rain.
Arable	Limited	Rolling slope
Intensive pasture	Moderate	Restricted subsoil root penetrability
Forestry	Moderate	Restricted subsoil root penetrability

CnR2 (Clinton rolling moderately deep)

Versatility evaluation for soil CnR2		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Limited	Restricted rooting depth
Arable	Limited	Rolling slope
Intensive pasture	Moderate	Restricted subsoil root penetrability
Forestry	Limited	Restricted rooting depth

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 subsurface mole and tile drainage will reduce the risk of short-term waterlogging
- Management of nutrient applications so as to minimise leaching losses

Soil profiles available for Clinton soils

Soil symbol	Profile ID	Topoclimate map sheet	Profile description available	Physical data available	Chemical data available	Profile photo available
CnU1	QT8	42	✓	✓	✓	✓
CnU1	QT6	42	✓	✓	✓	✓

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