

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:** Otama

## Overview

Otama soils occupy about 1700ha as isolated areas on terraces in the Mataura valley between Garston and Mataura Island and near Clydevale in the Clutha valley. They are formed into near-source wind-deposited loess, and in some locations they occur as dunes. Otama soils are well to imperfectly drained, have a deep rooting depth, high water holding capacity, and loamy silt textures. Present use is pastoral farming with sheep, dairy and beef cattle with some cropping. They have a cool temperate climate and receive regular rain over the year. Soils located further inland can be dry over the summer.

## Soil classification

**NZ Soil Classification (NZSC):**

Typic Laminar Pallic; stoneless; silty

**Previous NZ Genetic Classification:**

Intergrade yellow-grey / yellow brown earth.

### Classification explanation

The NZSC of the Otama soil is consistent with the previous classification. The soils are only weakly weathered, with pale colours (hue 2.5Y to 5Y) and P-retention values of <30%. A key characteristic is that they have a subsoil horizon that has accumulated translocated clay in laminar bands. Otama soils are typically moderately well drained, with a subsoil horizon that is structureless and compacted to the extent that it may limit root penetration and permeability. The soils are typically stone free and have loamy silt textures to 90cm depth.

## Soil phases and variants

Identified units in the Otama soils are:

- Otama rolling deep (OmR1): has no gravel within 90cm depth; occurs on slopes of 7–15°
- Otama hilly deep (OmH1): has no gravel within 90cm depth; occurs on slopes of 15–25°
- Otama steep deep (OmS1): has no gravel within 90cm depth; occurs on slopes >25°
- Otama undulating deep (OmU1): 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, Otama rolling deep (OmR1). 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., Otama hilly deep (OmH1).

## Associated soils

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

- Clydevale: imperfectly drained soil formed in silty near-source loess with a subsoil fragipan
- Arthurton: imperfectly drained deep Brown soil; has intergrade properties between Pallic to Brown soils; has dominantly silt loam textures
- Oreti: shallow, stony soil of the intermediate terraces.

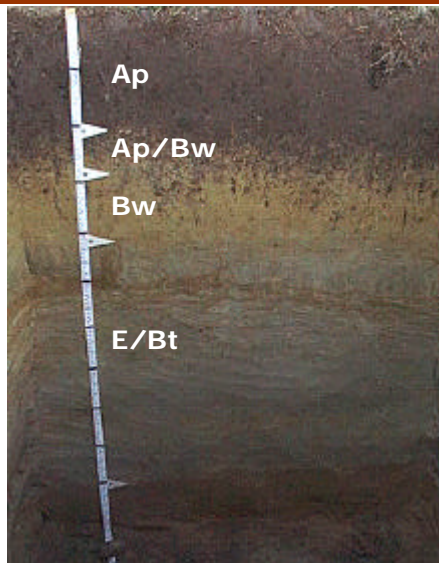
## Similar soils

Some soils that have similar properties to Otama soils are:

- Nokomai: very similar, but does not have bands of accumulated clay in the subsoil
- Tuturaui: formed in near-source loamy silt loess from the Mataura river, south of Gore; is a Brown soil because it occurs in a moister environment
- Crookston: well drained deep Brown soil; has intergrade properties between Pallic and Brown soils; has dominantly silt 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.

Otama profile	Horizon	Depth (cm)	Description
	Ap	0–21	Very dark greyish brown loamy silt; slightly firm soil strength; moderately developed fine polyhedral structure; many roots
	Ap/Bw	21–29	Light yellowish brown loamy silt; slightly firm soil strength; moderately developed medium polyhedral and fine blocky structure; many roots
	Bw	29–42	Light yellowish brown loamy silt; few Mn/Fe concretions; slightly firm soil strength; weakly developed medium blocky and fine polyhedral structure; few roots
	E/Bt	42–90+	Pale olive loamy silt; common white sand coats (many below 60cm), and common yellowish brown clay lamellae; firm soil strength; weakly developed coarse blocky structure; no roots.
	E/Bt	42–90+	

## Key profile features

Otama soils have topsoils 15–35cm deep, with weak to moderately developed structure. Subsoils also have weakly developed structure that becomes more compact and structureless below 50cm depth. The weak weathering of the soils is reflected in the pale olive colour that becomes paler with depth. The yellow-brown bands in the lower subsoil are accumulated clay the is a characteristic feature of this soil.

## Typical physical properties

Note: values in *Italics* are estimates

Horizon	Depth (cm)	Bulk density	Permeability	Texture	Gravel content
Ap	0–21	Moderate – High	<i>Moderate</i>	Loamy silt	Gravel free
Ap/Bw	21–29	Moderate – High	<i>Moderate</i>	Loamy silt	Gravel free
Bw	29–42	High	<i>Slow</i>	Loamy silt	Gravel free
E/Bt	42–90+	High	<i>Slow</i>	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

Otama soils have a deep rooting depth and high plant available water, although the firm lower subsoil may limit root growth. The soils are moderately well to imperfectly drained, with a compact subsoil which is slowly permeable and may cause short-term waterlogging after heavy rainfall. Texture is loamy silt throughout, although sandy loam may occur in some soils. The topsoil clay content is 20–25%.

## Typical chemical properties

Horizon	Depth (cm)	pH	P retention	CEC	BS	Ca	Mg	K	Na
Ap	0–21	Moderate	Low	Low	Very high	Moderate	Low	Very low	Low
Ap/Bw	21–29	Moderate	Low	Low	High	Moderate	Very low	Very low	Very low
Bw	29–42	Moderate	Low	Low	Moderate	Low	Very low	Very low	Very low
E/Bt	42–90+	Moderate	Very low	Very low	High	Very low	Very low	Very low	Very low

### Additional chemical properties (as a profile average)

Subsoil sulphate sulphur levels are low.

## Key chemical properties

Topsoil organic matter levels are 4–6.5%; P-retention 15–34% and pH moderate (high 5s). Soil pH tends to increase with depth. Cation exchange is low and base saturation low to moderate. Available calcium, magnesium and potassium are generally low. Reserve phosphorus levels are low. Micronutrient levels are generally adequate, although molybdenum responses in legumes and boron responses in brassicas can occur.

## 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
<b>Structural compaction</b>	severe	These soils have a severe vulnerability to structural degradation by long-term cultivation, or compaction by heavy stocking and vehicles. This rating reflects the low clay, P-retention and organic matter content.
<b>Nutrient leaching</b>	moderate	These soils have a moderate vulnerability to leaching to groundwater. This rating reflects the good drainage, offset by the slow subsoil permeability and high water holding capacity.
<b>Topsoil erodibility by water</b>	severe	Due to the low organic matter and clay content, topsoil erodibility in these soils is severe. Erodibility is highly dependent on management, particularly when there is no vegetation cover.
<b>Organic matter loss</b>	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).
<b>Waterlogging</b>	slight	These soils have a slight vulnerability to waterlogging during wet periods. This rating reflects the moderately well drained nature of the soil and the slow permeability.

## General landuse versatility ratings for Otama 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.

### OmR1 (Otama rolling deep)

Versatility evaluation for soil OmR1		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Moderate	Vulnerability of topsoil to structural degradation by cultivation and compaction; rolling slopes
Arable	Limited	Vulnerability of topsoil to erosion by water; rolling slopes
Intensive pasture	Moderate	Vulnerability of topsoil to structural degradation by cultivation and compaction; restricted subsoil root penetrability
Forestry	Limited	Vulnerability of topsoil to erosion by water.

### OmU1 (Otama undulating deep)

Versatility evaluation for soil OmU1		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Moderate	Vulnerability of topsoil to structural degradation by cultivation and compaction; restricted subsoil root penetrability
Arable	Limited	Vulnerability of topsoil to erosion by water.
Intensive pasture	Moderate	Vulnerability of topsoil to structural degradation by cultivation and compaction; restricted subsoil root penetrability
Forestry	Limited	Vulnerability of topsoil to erosion by water.

**OmH1 (Otama hilly deep)**

Versatility evaluation for soil OmH1		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Unsuitable	Hilly slopes
Arable	Unsuitable	Hilly slopes
Intensive pasture	Limited	Hilly slopes
Forestry	Limited	Vulnerability of topsoil to erosion by water.

**OmS1 (Otama steep deep)**

Versatility evaluation for soil OmS1		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Unsuitable	Steep slopes
Arable	Unsuitable	Steep slopes
Intensive pasture	Limited	Steep slopes
Forestry	Limited	Vulnerability of topsoil to erosion by water; steep slopes.

**Management practices that may improve soil versatility**

- Over-cultivation of dry soils may allow erosion by wind and water
- Management of nutrient applications so as to minimise leaching losses, such as avoiding very high rates of fertiliser addition in a single application and not applying very water-soluble fertilisers (i.e., nitrogen) when soils are excessively wet.
- Careful management after heavy rain and wet periods will reduce the impact of short-term water logging and structural compaction. Intensive stocking, cultivation and heavy vehicular traffic use should be minimised during these periods.

**Soil profiles available for Otama soils**

Soil symbol	Profile ID	Topoclimate map sheet	Profile description available	Physical data available	Chemical data available	Profile photo available
OmU1	M3153	1	✓	✓	✓	
OmR1	G3510	4	✓	✓	✓	
OmU1	MWT18	28b	✓	✓	✓	✓
OmU1	PCT11	33	✓	✓	✓	✓
OmU1	SB10048	26	✓	✓	✓	
OmU1	WT4	24	✓	✓	✓	✓
OmS1	GG/GW 42	35	✓	✓		

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