

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: **Popotunoa**

Overview

Popotunoa soils occur in association with Charlton soils on infrequently flooded low terraces in the Clydevale district. They are formed into moderately deep to deep fine alluvium over gravel. Soils are well drained, with deep to moderately deep rooting depth, high plant available water, and have loamy silt textures. Present use is pastoral grazing with sheep and dairy cattle and some cropping. Climate is temperate with warm summers. Soils occasionally dry out.

Soil classification

NZ Soil Classification (NZSC): Pedal Immature Pallic; stoneless; silty.

Previous NZ Genetic Classification: Recent

Classification explanation

The NZSC of the Popotunoa soil differs from the previous classification because the soils have significant subsoil structural development that is not typical of Recent soils. The soils are only weakly weathered, with pale colours and P-retention values of <30%. Popotunoa soils typically are structured (pedal) throughout the majority of the subsoil. The soils are typically stone free and have loamy silt textures to 90cm depth.

Soil phases and variants

Identified units in the Popotunoa soils are:

- Popotunoa undulating deep (PnU1): has no gravel within 90cm depth; occurs on slopes of 0–7°
- Popotunoa undulating moderately deep (PnU2): has gravel between 45 and 90cm depth; occurs on slopes of 0–7°

The soil properties described in this Technical Data Sheet are based on the most common phase, Popotunoa undulating deep (PnU1). 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., Popotunoa undulating moderately deep (PnU2).

Associated soils

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

- Charlton: imperfectly drained equivalent of the Popotunoa soil
- Jacobstown: poorly drained floodplain soil
- Mataura: well drained, deep or moderately deep recent soils found on the accumulating floodplain

Similar soils

Some soils that have similar properties to Popotunoa soils are:

- Ardlussa: shows greater weathering, with higher P-retention in subsoil of >30%.
- Winton: occurs on the floodplain and low terraces of the Oret River; has heavy 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.

Popotunoa profile	Horizon	Depth (cm)	Description
	Ap	0–23	Greyish yellow-brown loamy silt; weak soil strength; moderately developed fine polyhedral structure; abundant roots
	Ap/Bw	23–40	Dull yellow-orange loamy silt; many wormcasts; slightly firm soil strength; moderately developed fine polyhedral structure; many roots
	Bw(g)	40–59	Dull yellow-orange loamy silt; few bright brown mottles; few wormcasts; slightly firm soil strength; moderately developed medium polyhedral structure; many roots
	BC	59–90+	Dull yellow-brown loamy silt; slightly firm soil strength; massive structure; few roots

Key profile features

Popotunoa topsoils are 20–25 cm deep and have a moderately developed structure. Subsoil structure is also moderately developed, becoming structureless in the lower subsoil. The yellow-brown colours of the subsoil reflect the weathered B horizon that is typical of these soils.

Typical physical properties

Note: values in *Italics* are estimates

Horizon	Depth (cm)	Bulk density	Permeability	Texture	Gravel content
Ap	0–23	High	<i>Moderate</i>	Loamy silt	Gravel free
Ap/Bw	23–40	High	<i>Moderate</i>	Loamy silt	Gravel free
Bw(g)	40–59	High	<i>Slow</i>	Loamy silt	Gravel free
BC	59–90+	High	<i>Slow</i>	Loamy silt	Gravel free

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

Key physical properties

Popotunoa soils have a deep rooting depth (90–120 cm), with high plant available moisture. Aeration is moderate, but the lower subsoil is slowly permeable and is likely to cause short-term waterlogging after heavy rainfall. The soils have high bulk density throughout the profile. Textures are loamy silt, with a topsoil clay content of 15–18%. Deep soils are stoneless. Moderately deep soils have gravel below 45cm depth, restricting the rooting depth to moderately deep (60–90cm) and moderately high water availability.

Typical chemical properties

Horizon	Depth (cm)	pH	P retention	CEC	BS	Ca	Mg	K	Na
Ap	0–23	Moderate	Low	Moderate	High	Moderate	Very low	Very low	Very low
Ap/Bw	23–40	Low	Low	Low	Low	Low	Very low	Very low	Very low
Bw(g)	40–59	Moderate	Low	Low	Moderate	Low	Very low	Very low	Very low
BC	59–90+	Moderate	Very low	Very low	High	Low	Low	Very low	Very low

Key chemical properties

Topsoil organic matter levels are about 4–5%, P-retention 10–25% and pH moderate (high 5s). Topsoil cation exchange values are moderate, with base saturation high and moderate available calcium levels. Magnesium and potassium levels are low. Subsoil nutrient levels are low. Soil reserve phosphorus and sulphur levels are 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	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 P-retention, clay and organic matter content.
Nutrient leaching	moderate	These soils have a moderate vulnerability to leaching to groundwater. This rating reflects the good drainage and permeability offset by the high water-holding capacity.
Topsoil erodibility by water	severe	Due to the low clay and organic matter content, topsoil erodibility in these soils is severe. 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 moderately well drained nature of the soil, but slow subsoil permeability.

General landuse versatility ratings for Popotunoa 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.

PnU1 (Popotunoa undulating deep)

PnU2 (Popotunoa undulating moderately deep)

Versatility evaluation for soil PnU1, PnU2		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Moderate	Vulnerability to topsoil structural degradation by cultivation and compaction; potential flood risk
Arable	Limited	Vulnerability to topsoil erosion
Intensive pasture	Moderate	Vulnerability to topsoil structural degradation by cultivation and compaction; vulnerability to leaching to groundwater.
Forestry	Limited	Vulnerability to topsoil erosion; potential flood risk.

Management practices that may improve soil versatility

- Cultivation should be carefully managed to minimise structural degradation and topsoil erosion.
- Intensive stocking, cultivation and heavy vehicular traffic use should be minimised during these periods.
- Topsoil organic matter levels should be carefully maintained and enhanced
- Long-term flood protection.
- Management of nutrient applications so as to minimise leaching losses

Soil profiles available for Popotunoa soils

Soil symbol	Profile ID	Topoclimate map sheet	Profile description available	Physical data available	Chemical data available	Profile photo available
Pnu1	PCT4	33	✓	✓	✓	✓

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