

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: **Princhester**

### Overview

Princhester soils occupy about 1,300 ha on fans and low terraces in the lower Mararoa Valley, predominantly around The Key. They are formed into fine alluvium derived from greywacke and basic volcanic rocks. Soils are well drained, have moderately deep to deep rooting depth, high water-holding capacity, and high phosphate retention (>85%). They are potentially high producing and are presently used for pastoral farming with sheep, deer and beef cattle. Climate is cold in the winter with warm summers. Regular rain usually occurs though soils can occasionally dry out in the summer.

### Soil classification

#### NZ Soil Classification (NZSC):

Pedal Allophanic Brown; soils with stones; clayey over skeletal.

#### Previous NZ Genetic Classification:

Moderately to strongly leached yellow-brown earth

### Classification explanation

The NZSC of the Princhester soils is consistent with the previous classification. Princhester soils are intergrade between Brown and Allophanic soils. They are well-drained soils with yellow-brown subsoils, and P-retention of >85%. They have moderately structured and weakly compact subsoils, with no physical restriction to rooting depth. Gravels typically occur at 45–90cm depth, with textures varying between silty clay to clay loam.

### Soil phases and variants

Identified units in the Princhester soils are:

- Princhester undulating moderately deep (PjU2): has gravel between 45 and 90cm depth; occurs on slopes of 0–7°
- Princhester undulating deep (PjU1): 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, Princhester undulating moderately deep (PjU2). Values for other phases and variants can be taken as being similar. Where they differ significantly they are recorded with a separate versatility rating.

### Associated soils

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

- Monowai: shallow soil of the stony terraces; strongly leached, with P-retention of >85% and a cemented subsoil pan
- Waiiau: shallow soil of the stony low terraces and floodplains
- Waituna: shallow soil forming into gravelly fan alluvium

## Similar soils

Some soils that have similar properties to Princhester soils are:

- Papatotara: strongly leached Allophanic soil, formed on terraces in mixed alluvium of the lower Waiau valley
- Pourakino: intergrade between Brown and Allophanic soils, with P-retention of 70–85%; formed in consistently silty loess in the Pourakino River valley
- Mararoa: Brown soil with good rooting volume, with P-retention of 60–70%
- Excelsior: intergrade between Brown and Allophanic soils, with P-retention of >85%; formed in consistently silty loess, and has a distinct fragipan

## 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.

Princhester profile	Horizon	Depth (cm)	Description
	Ap	0–26	Dark brown silty clay; weak soil strength; strongly developed very fine polyhedral structure; abundant roots
	Ap/Bw	26–37	Light olive brown clay loam; common earthworm casts; weak soil strength; strongly developed fine blocky structure; abundant roots
	Bw	37–52	Light olive brown clay loam; weak soil strength; moderately developed coarse prismatic structure; many roots
	2BC	52–69	Light olive brown very gravelly sandy loam; very weak soil strength; massive structure; gravels subrounded and moderately weathered; many roots
	BC(g)	69–90+	Light olive brown loamy silt; common pale olive mottles; firm soil strength; weakly developed fine blocky structure; many roots

## Key profile features

Princhester topsoils are 15–25cm deep with a moderate to strongly developed structure. Above the gravels the subsoil structure is also moderately developed, with weak soil strength, resulting in very good rooting volume.

## Typical physical properties

Note: values in *Italics* are estimates

Horizon	Depth (cm)	Bulk density	Permeability	Texture	Gravel content
Ap	0–26	Moderate	<i>Moderate</i>	Silty clay	Gravel free
Ap/Bw	26–37	Moderate	<i>Moderate</i>	Clay loam	Gravel free
Bw	37–52	Moderate – High	<i>Moderate</i>	Clay loam	Very slightly gravelly
2BC	52–69	Moderate – High	<i>Moderate</i>	Sandy loam	Very gravelly
BCg	69–90+	Moderate – High	<i>Slow</i>	Loamy sand	Moderately gravelly

**Profile drainage:** Well

**Plant readily available water:** *High*

**Potential rooting depth:** Deep

**Rooting restriction:** Moderately deep phases may be limited by the subsoil gravels

## Key physical properties

Princhester soils have a deep rooting depth and high plant available water, though the moderately deep phase may be limited by the subsoil gravels. The soils have good aeration and permeability throughout the profile. Topsoils are well aerated with good permeability, which decreases down the profile. Textures are variable with silty clays to clay loams in the upper horizons and sandy loam to loamy silts at depth. Topsoil clay content is 30–40%, and gravels typically occur at 45–90cm depth.

## Typical chemical properties

Horizon	Depth (cm)	pH	P retention	CEC	BS	Ca	Mg	K	Na
Ap	0–26	Moderate	High	High	Low	Moderate	Moderate	Low	Low
Ap/Bw	26–37	Moderate	Very high	Moderate	Very low	Low	Very low	Very low	Very low
Bw	37–52	Moderate	Moderate	Low	Very low	Very low	Very low	Very low	Low
2BC	52–69	Moderate	Moderate	Low	Low	Very low	Very low	Very low	Low
BCg	69–90+	Moderate	High	Low	Low	Very low	Very low	Very low	Low

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

Reserve potassium (kc) values are low, magnesium values high and sulphate sulphur levels moderate.

## Key chemical properties

Topsoil organic matter levels are about 16%; P-retention values >85% and pH moderate (high 5s). Cation exchange values are high with base saturation low. Available calcium and magnesium levels are moderate with potassium levels low. Reserve phosphorus values are very low, reflecting the high P-retention. 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
<b>Structural compaction</b>	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, high P-retention, and moderate to high clay content.
<b>Nutrient leaching</b>	moderate	These soils have a moderate vulnerability to leaching to groundwater. This rating reflects the well drained nature of the soil that is offset by the high water-holding capacity.
<b>Topsoil erodibility by water</b>	minimal	Due to the high organic matter and moderate to high clay content, topsoil erodibility in these soils is minimal. Erodibility is highly dependent on management, particularly when there is no vegetation cover.
<b>Organic matter loss</b>	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).
<b>Waterlogging</b>	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 Princhester 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.

### PjU2 (Princhester undulating moderately deep)

### PjU1 (Princhester undulating deep)

Versatility evaluation for soil PjU2, PjU1		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	High	No major limitation
Arable	High	No major limitation
Intensive pasture	Moderate	Vulnerability to leaching to ground water
Forestry	High	No major limitation

### Management practices that may improve soil versatility

- Management of nutrient applications so as to minimise leaching losses

## Soil profiles available for Princhester soils

Soil symbol	Profile ID	Topoclimate map sheet	Profile description available	Physical data available	Chemical data available	Profile photo available
PjU2	SB10136	5	✓	✓	✓	✓

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