

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: **Craigdale**

### Overview

Craigdale soils occupy 650 ha on rolling downlands in the Kaiwera district of eastern Southland. They are formed in moderately deep loess overlying tuffaceous greywacke bedrock. Craigdale soils are well drained, with a slightly deep rooting depth and moderate water-holding capacity that is limited by the gravelliness and bedrock that commonly occurs in the lower subsoil. Present use is pastoral grazing with sheep and beef cattle. Climate is cool temperate with regular rain during the year.

### Soil classification

#### NZ Soil Classification (NZSC):

Acidic Orthic Brown; moderately deep on rock; tuffaceous sandstone; silty

#### Previous NZ Genetic Classification:

Strongly leached yellow-brown earth

### Classification explanation

The NZSC of Craigdale soils is consistent with the previous classification. They are moderately leached soils with yellow-brown colours, P-retention of 45–60% and subsoil pH of less than 5.5. Craigdale soils have silt loam textures, and tuffaceous greywacke bedrock typically occurs at 45–90cm depth.

### Soil phases and variants

Identified units in the Craigdale soils are:

- Craigdale rolling moderately deep (CrR2): has gravel between 45 and 90cm depth; occurs on slopes of 7–15°
- Craigdale undulating moderately deep (CrU2): has gravel between 45 and 90 cm depth; occurs on slopes of 7–15°
- Craigdale hilly moderately deep (CrH2): has gravel between 45 and 90cm; occurs on slopes of 15–25°
- Craigdale steep moderstely deep (CrS2): has gravel between 45 and 90cm depth; occurs on slopes >25°

The soil properties described in this Technical Data Sheet are based on the most common phase, Craigdale rolling moderately deep (CrR2). 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., Craigdale hilly moderately deep (CrH2).

## Associated soils

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

- Tokonui: well drained, deep Brown soil, with no bedrock within 90cm depth.
- Chaslands: imperfectly drained, deep Brown soil, with no bedrock within 90cm depth
- Kaiwera: shallow, well drained strongly leached soil forming into stony colluvium or bedrock; has P-retention of >85%

## Similar soils

Some soils that have similar properties to Craigdale soils are:

- McNab: Brown soil that has a strongly acid subsoil (pH <4.9); bedrock is more weathered.
- Fortification: Allophanic soil that is strongly leached, with P-retention of >85%
- Waiarikiki: Brown soil that is strongly leached, with P-retention of >85%; formed in gravelly colluvium
- Josephville: Brown soil formed into moderately deep and deep loess overlying tuffaceous greywacke bedrock and stony colluvium; the soils are only weakly leached, with P-retention of 20–40%.

## 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.

Craigdale profile	Horizon	Depth (cm)	Description
	Ap	0–18	Greyish yellow very slightly gravelly silt loam; weak soil strength; strongly developed very fine to coarse polyhedral structure; gravels very highly weathered and subangular; abundant roots
	Ap/Bw	18–30	Dull brown very slightly gravelly silt loam; many worm casts; weak soil strength; strongly developed coarse prismatic and very fine to medium polyhedral structure; gravels slightly weathered and subangular; abundant roots
	Bw/R	30–55	Dull brown moderately gravelly silt loam; few worm casts; slightly firm soil strength; moderately developed medium to coarse prismatic and very fine to fine polyhedral structure; gravels slightly weathered and angular; many roots
	R	55–90	Dull yellow slightly weathered tuffaceous greywacke bedrock; very firm soil strength; structureless; no roots

## Key profile features

Craigdale topsoils are 17–25cm deep with a strongly developed structure. Subsoil structure is moderately developed and grades to coarse gravelly colluvium and bedrock below 45cm.

## Typical physical properties

Note: values in *Italics* are estimates

Horizon	Depth (cm)	Bulk density	Permeability	Texture	Gravel content
Ap	0–18	Moderate	<i>Moderate</i>	Silt loam	Very slightly gravelly
Ap/Bw	18–30	Moderate – High	<i>Moderate</i>	Silt loam	Very slightly gravelly
Bw/R	30–55	Moderate – High	<i>Moderate</i>	Silt loam	Moderately gravelly
R	55–90	—	—	—	Extremely gravelly

**Profile drainage:** Well  
**Plant readily available water:** *Moderate*  
**Potential rooting depth:** Slightly deep  
**Rooting restriction:** Subsoil graveliness and/or presence of bedrock

## Key physical properties

Craigdale soils have a slightly deep rooting depth and moderate water-holding capacity, restricted by the gravelliness and bedrock in the subsoil. The soils are moderately well to well drained, with permeability that may be restricted in the subsoil by the bedrock. Textures are silt loams, with topsoil clay content of 30–35%. The soils are gravelly throughout, and typically have extremely gravelly subsoil and bedrock between 45–90cm depth.

## Typical chemical properties

Horizon	Depth (cm)	pH	P retention	CEC	BS	Ca	Mg	K	Na
Ap	0–18	Moderate	Moderate	High	High	High	Moderate	Very high	Low
Ap/Bw	18–30	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	High	Low
Bw/R	30–55	Moderate	Moderate	Moderate	Low	Low	Low	Moderate	Low
R	55–90	—	—	—	—	—	—	—	—

## Key chemical properties

Topsoil organic matter levels are 6–10%; P-retention 45–60%; and pH moderate (low–high 5s); subsoil pH can be low (low 5s). Cation exchange values are high in the topsoil and moderate in the subsoil. Base saturation is moderate. Available calcium, magnesium and potassium are moderate to high but reserves of phosphorus are low. Micro nutrient levels are generally adequate. Strong responses to super and lime 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>	slight	These soils have a slight vulnerability to structural degradation by long-term cultivation, or compaction by heavy stocking and vehicles. This rating reflects the good drainage, with moderate P-retention and clay content.
<b>Nutrient leaching</b>	severe	These soils have a severe vulnerability to leaching to groundwater. This rating reflects the good drainage, with only moderate water holding capacity.
<b>Topsoil erodibility by water</b>	minimal	Due to the moderate 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>	moderate	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.

## General landuse versatility ratings for Craigdale 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.

### CrR2 (Craigdale rolling moderately deep)

Versatility evaluation for soil CrR2		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Limited	Restricted rooting depth
Arable	Limited	Rolling slope
Intensive pasture	Moderate	Restricted subsoil root penetrability; vulnerability to leaching to groundwater
Forestry	Limited	Restricted rooting depth

### CrU2 (Craigdale undulating moderately deep)

Versatility evaluation for soil CrU2		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Limited	Restricted rooting depth
Arable	Moderate	Restricted rooting depth; vulnerability to leaching to groundwater.
Intensive pasture	Moderate	Restricted rooting depth; vulnerability to leaching to groundwater.
Forestry	Limited	Restricted rooting depth

**CrH2 (Craigdale hilly moderately deep)**

Versatility evaluation for soil CrH2		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Unsuitable	Hilly slope
Arable	Unsuitable	Hilly slope
Intensive pasture	Limited	Hilly slope
Forestry	Limited	Restricted rooting depth

**CrS2 (Craigdale steep moderately deep)**

Versatility evaluation for soil CrS2		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Unsuitable	Steep slope
Arable	Unsuitable	Steep slope
Intensive pasture	Limited	Steep slope
Forestry	Limited	Restricted rooting depth; steep slope

**Management practices that may improve soil versatility**

- Management of nutrient applications that minimise leaching losses

**Soil profiles available for Craigdale soils**

Soil symbol	Profile ID	Topoclimate map sheet	Profile description available	Physical data available	Chemical data available	Profile photo available
CrR2	ST4	29	✓	✓	✓	✓
CrR2	QT3	42	✓	✓	✓	✓
CrH2	MWT24	28b	✓	✓	✓	✓

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Crops for Southland  
PO Box 1306, Invercargill. New Zealand



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