

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: **Ferndale**

### Overview

Ferndale soils occupy about 1550 ha on rolling land in the Kaiwera district of eastern Southland. They are formed in deep loess derived from greywacke, tuffaceous greywacke and schist rocks. Ferndale soils are imperfectly drained, have a deep rooting depth, high water-holding capacity, and have heavy silt loam textures with P-retention of 40–65%. They are primarily used for pastoral farming with sheep and beef cattle. Climate is cool temperate with regular rain throughout the year.

### Soil classification

#### NZ Soil Classification (NZSC):

Mottled-acidic Firm Brown; stoneless, silty

#### Previous NZ Genetic Classification:

Strongly leached yellow-brown earth

### Classification explanation

The NZSC of the Ferndale soils is consistent with the previous classification. Ferndale soils are imperfectly drained soils with yellow-brown subsoils, and rarely suffer from drought. They have a subsoil horizon that is structureless, with slightly firm or greater soil strength, that may limit root penetration. This horizon has slow permeability that causes waterlogging during wet periods, which is reflected in the imperfect drainage. The upper subsoil typically has pH of <5.5.

### Soil phases and variants

Identified units in the Ferndale soils are:

- Ferndale rolling deep (FrR1): has no gravel within 90cm depth; occurs on slopes of 7–15°
- Ferndale undulating deep (FrU1): has no gravel within 90cm depth; occurs on slopes of 0–7°
- Ferndale hilly deep (FrH1): has no gravel within 90cm depth; occurs on slopes of 15–25°

The soil properties described in this Technical Data Sheet are based on the most common phase, Ferndale rolling deep (FrR1). 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., Ferndale hilly deep (FrH1).

### Associated soils

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

- Kaiwera: shallow, well drained strongly leached soil forming into stony colluvium or bedrock; has P-retention of >85%
- Kuriwao: moderately leached equivalent of the Kaiwera series; has P-retention of 60–80% and pH of less than 5.5
- Craigdale: moderately leached soil formed in moderately deep loess overlying tuffaceous greywacke bedrock
- McNab: formed in moderately deep loess overlying weathered tuffaceous greywacke bedrock with a strongly acid subsoil (pH <4.9)

## Similar soils

Some soils that have similar properties to Ferndale soils are:

- Otarua: well drained equivalent of the Ferndale soil
- Chaslands: occurs on hilly land south-east of Mataura; typically does not have acidic subsoils
- Woodlands: occurs on terraces on the Southland plains; typically does not have acidic subsoils
- Arthurton: occurs on downlands in west Otago; has intergrade soil properties between Brown and Pallic soils

## 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.

| Ferndale profile | Horizon  | Depth (cm) | Description  |
|------------------|----------|------------|--|
|                  | Ap       | 0–20       | Brownish black silt loam; few bright yellowish brown mottles; weak soil strength; strongly developed very fine to fine polyhedral structure; abundant roots  |
|                  | Ap/Bw(g) | 20–30      | Bright yellowish brown silt loam; few greyish yellow and bright brown mottles; many worm casts; weak soil strength; strongly developed very fine to fine polyhedral structure; abundant roots            |
|                  | Bw(g)    | 30–57      | Bright yellowish brown silt loam; common greyish yellow and few bright brown mottles; few worm casts; slightly firm soil strength; strongly developed very fine to fine polyhedral structure; many roots |
|                  | BC(g)    | 57–90      | Dull yellowish brown silt loam; common greyish yellow and common bright brown mottles; slightly firm soil strength; massive structure; common roots  |
|                  | BC(g)    | 57–90      | Dull yellowish brown silt loam; common greyish yellow and common bright brown mottles; slightly firm soil strength; massive structure; common roots  |

## Key profile features

Ferndale topsoils have a 18–25cm deep topsoil that has strongly developed structure. Subsoils have moderate to strong structure that becomes compact and structureless below 50cm depth. This compact horizon causes the imperfect drainage of the soil that is reflected in the typical mottling of the subsoil. The moderate weathering of the soils is reflected in the yellowish brown colour.

## Typical physical properties

Note: values in *Italics* are estimates

| Horizon  | Depth (cm) | Bulk density    | Permeability    | Texture   | Gravel content |
|----------|------------|-----------------|-----------------|-----------|----------------|
| Ap       | 0–20       | Moderate        | <i>Moderate</i> | Silt loam | Gravel free    |
| Ap/Bw(f) | 20–30      | Moderate        | <i>Moderate</i> | Silt loam | Gravel free    |
| Bw(g)    | 30–57      | Moderate – High | <i>Moderate</i> | Silt loam | Gravel free    |
| BC(g)    | 57–90      | Moderate – High | <i>Slow</i>     | Silt loam | Gravel free    |

|                                       |                        |
|---------------------------------------|------------------------|
| <b>Profile drainage:</b>              | Imperfect              |
| <b>Plant readily available water:</b> | <i>Moderately high</i> |
| <b>Potential rooting depth:</b>       | Deep                   |
| <b>Rooting restriction:</b>           | No major restriction   |

## Key physical properties

Ferndale soils have a deep rooting depth and moderately high plant available water, meaning there is no major physical barrier to root growth. The compact subsoil is slowly permeable, and may cause short-term waterlogging and limit aeration after heavy rainfall. Texture is heavy silt loam in all horizons, with topsoil clay content of 25–30%, and the soils are typically stone free.

## Typical chemical properties

| Horizon  | Depth (cm) | pH  | P retention | CEC      | BS       | Ca       | Mg       | K         | Na       |
|----------|------------|-----|-------------|----------|----------|----------|----------|-----------|----------|
| Ap       | 0–20       | Low | Moderate    | Moderate | Low      | Low      | Low      | Very high | Low      |
| Ap/Bw(f) | 20–30      | Low | Moderate    | Moderate | Very low | Very low | Low      | High      | Very low |
| Bw(g)    | 30–57      | Low | Moderate    | Moderate | Very low | Very low | Low      | High      | Very low |
| BC(g)    | 57–90      | Low | Moderate    | Moderate | Low      | Low      | Moderate | High      | Very low |

## Key chemical properties

Topsoil organic matter levels are about 8%; P-retention 40–65%; soil pH is typically low throughout the profile (low 5s). Cation exchange levels are moderate but base saturation is low. Available calcium and magnesium levels are low, with potassium levels high. Micronutrient levels are generally adequate although molybdenum responses in legumes and boron responses in brassica 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   |
|-------------------------------------|----------|---|
| <b>Structural compaction</b>        | 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 imperfect drainage.                        |
| <b>Nutrient leaching</b>            | slight   | These soils have a slight vulnerability to leaching to groundwater. This rating reflects the imperfect drainage, moderately high water holding capacity, and slow permeability of the subsoil.                  |
| <b>Topsoil erodibility by water</b> | slight   | Due to the moderate clay and organic matter levels, topsoil erodibility in these soils is slight. 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>                 | moderate | These soils have a moderate vulnerability to waterlogging during wet periods. This rating reflects the imperfect drainage and slowly permeable subsoil.   |

## General landuse versatility ratings for Ferndale 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.

### FrR1 (Ferndale rolling deep)

| Versatility evaluation for soil FrR1 |                    |   |
|--------------------------------------|--------------------|---|
| Landuse                              | Versatility rating | Main limitation   |
| Non-arable horticulture              | Moderate           | Inadequate aeration during wet periods; short-term waterlogging after heavy rain                                      |
| Arable                               | Limited            | Rolling slopes  |
| Intensive pasture                    | Moderate           | Inadequate aeration during wet periods; vulnerability to topsoil structural degradation by cultivation and compaction |
| Forestry                             | Moderate           | Vulnerability to sustained waterlogging.  |

## FrU1 (Ferndale undulating deep)

| Versatility evaluation for soil FrU1 |                    |   |
|--------------------------------------|--------------------|---|
| Landuse                              | Versatility rating | Main limitation   |
| Non-arable horticulture              | Moderate           | Inadequate aeration during wet periods; short-term water logging after heavy rain                                     |
| Arable                               | Moderate           | Inadequate aeration during wet periods; vulnerability to topsoil structural degradation by cultivation and compaction |
| Intensive pasture                    | Moderate           | Inadequate aeration during wet periods; vulnerability to topsoil structural degradation by cultivation and compaction |
| Forestry                             | Moderate           | Vulnerability to sustained waterlogging   |

**Management practices that may improve soil versatility**

- Careful management after heavy rain and wet periods will reduce the impact of short-term waterlogging. Intensive stocking, cultivation and heavy vehicular traffic should be minimised during these periods.
- Installation and maintenance of subsurface mole and tile drains will reduce the risk of short-term waterlogging.

**Soil profiles available for Ferndale soils**

| Soil symbol | Profile ID | Topoclimate map sheet | Profile description available | Physical data available | Chemical data available | Profile photo available |
|-------------|------------|-----------------------|-------------------------------|-------------------------|-------------------------|-------------------------|
| FrU1        | QT4        | 42                    | ✓                             | ✓                       | ✓                       | ✓                       |

Published by Crops for Southland with financial support from Environment Southland.

**Copyright © 2002, Crops for Southland**

This Technical Data Sheet may be reproduced in whole or in part and in any form for educational or non-profit purposes without special permission from the copyright holder, provided acknowledgement of the source is made. Crops for Southland and Environment Southland would appreciate receiving a copy of any publication that uses this Technical Data Sheet as a source.

No use of this Technical Data Sheet may be made for resale or for any other commercial purpose whatsoever without prior permission in writing from Crops for Southland.

Crops for Southland  
PO Box 1306, Invercargill. New Zealand



[www.cropssouthland.co.nz](http://www.cropssouthland.co.nz)