

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: **Waimahaka**

### Overview

Waimahaka soils occupy about 1500 ha on rolling hills east of the lower Matakura valley, in the Fortrose/Otara districts of southern Southland. They are formed in near-source wind deposited loess derived from greywacke and schist rock. Waimahaka soils are moderately well drained, have a deep rooting depth and high water-holding capacity, and have light silt loam to loamy silt textures with P-retentions of 60–85%. Present use is pastoral farming with sheep and beef cattle and some dairying. Climate is cool. With exposure to the prevailing south to west wind, regular rainfall occurs and soils seldom dry out.

### Soil classification

**NZ Soil Classification (NZSC):**

Typic Firm Brown; stoneless; silty

**Previous NZ Genetic Classification:**

Stongly leached yellow-brown earth.

### Classification explanation

The NZSC of the Waimahaka soils is consistent with the previous classification. Waimahaka soils are moderately well drained soils with yellow-brown subsoils, and rarely suffer from drought. There is a subsoil horizon that is structureless, with slightly firm or greater soil strength that may limit root penetration.

### Soil phases and variants

Identified units in the Waimahaka soils are:

- Waimahaka undulating deep (YmU1): has no gravel within 90cm depth; occurs on slopes of 0–7°
- Waimahaka rolling deep (YmR1): has no gravel within 90cm depth; occurs on slopes of 7–15°
- Waimahaka hilly deep (YmH1): 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, Waimahaka undulating deep (YmU1). 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., Waimahaka hilly deep (YmH1).

### Associated soils

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

- Fortrose: imperfectly drained equivalent of the Waimahaka
- Waipapa: occurs in a complex with Fortrose series, but is more leached and has podzolised properties, with P-retention of greater than 85% and thin iron pans.
- Chaslands: occurs on hilly to rolling land in more distant source loess; has imperfect drainage and heavy silt loam texture throughout the profile.

## Similar soils

Some soils that have similar properties to Waimahaka soils are:

- Tuturau: occurs on similar landforms north of Waimahaka; is less weathered in subsoil, with P-retention of 25–60%, and is not associated with soils that have podzolised properties
- Tokonui: occurs on hilly to rolling land in more distant source loess; has yellow-brown colours and heavy silt loam texture throughout the profile
- Waikiwi: occurs on high terraces of the Southland plain; has yellow-brown colours and heavy silt loam subsoils throughout the profile

## 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.

| Waimahaka profile                         | Horizon  | Depth (cm) | Description  |
|---|----------|------------|--|
| <b>No<br/>profile photo<br/>available</b> | Ah       | 0–18       | Very dark greyish brown silt loam; very weak soil strength; moderately developed medium crumb structure; abundant roots  |
|   | Ah/Bw(f) | 18–26      | Yellowish brown silt loam; few red Mn/Fe nodules; weak soil strength; strongly developed fine polyhedral structure; many roots                                 |
|   | Bw(f)    | 26–39      | Yellowish brown silt loam; many yellowish red Mn/Fe concretions; weak soil strength; moderately developed fine polyhedral and fine blocky structure; few roots |
|   | Bw       | 39–52      | Light olive brown silt loam; very few dark brown Mn/Fe nodules; firm soil strength; weakly developed medium blocky tending to medium platy structure; no roots |
|   | BC       | 52–70      | Light olive brown silt loam; firm soil strength; massive structure; no roots   |

## Key profile features

Waimahaka soils have a topsoil that is about 20–30cm deep and is strongly structured. Subsoils have moderate structure which grades to structureless below about 50cm. The upper subsoil is moderately weathered, with yellowish brown colour, and the lower subsoil is less weathered with light olive colours.

## Typical physical properties

Note: values in *Italics* are estimates

| Horizon  | Depth (cm) | Bulk density    | Permeability    | Texture    | Gravel content |
|----------|------------|-----------------|-----------------|------------|----------------|
| Ah       | 0–18       | Moderate        | <i>Moderate</i> | Silt loam  | Gravel free    |
| Ah/Bw(f) | 18–26      | Moderate – High | <i>Moderate</i> | Silt loam  | Gravel free    |
| Bw(f)    | 26–39      | Moderate – High | <i>Moderate</i> | Silt loam  | Gravel free    |
| Bw       | 39–52      | Moderate – High | <i>Slow</i>     | Silt loam  | Gravel free    |
| BC       | 52–70      | Moderate – 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

Waimahaka soils have a deep rooting depth and high plant-available water, meaning there is no significant physical barrier to root growth. The soils are moderately well to well drained and have good aeration. The slow permeability of the lower subsoil may cause short-term waterlogging after heavy rainfall. Texture is light silt loam in the topsoil and loamy silt in the subsoil, with topsoil clay content of 20–25%. Waimahaka soils are typically stone free.

## Typical chemical properties

| Horizon  | Depth (cm) | pH       | P retention | CEC      | BS       | Ca       | Mg       | K        | Na       |
|----------|------------|----------|-------------|----------|----------|----------|----------|----------|----------|
| Ah       | 0–18       | Moderate | High        | Moderate | Low      | Very low | Moderate | Low      | Moderate |
| Ah/Bw(f) | 18–26      | Moderate | High        | Moderate | Low      | Very low | Very low | Very low | Low      |
| Bw(f)    | 26–39      | Moderate | High        | Low      | Very low | Very low | Very low | Very low | Low      |
| Bw       | 39–52      | Moderate | High        | Low      | Very low | Very low | Very low | Very low | Low      |
| BC       | 52–90+     | Moderate | High        | Low      | Very low | Very low | Very low | Very low | Low      |

## Key chemical properties

Topsoil organic matter content is 10–16%; P-retention 60–85% and pH moderate to low (low 5s). Cation exchange is moderate and base saturation low. Available calcium and potassium levels are low with magnesium levels moderate. Soil reserve phosphorus 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   |
|-------------------------------------|----------|---|
| <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 high organic matter and P-retention and well drained nature of the soil. |
| <b>Nutrient leaching</b>            | moderate | These soils have a moderate vulnerability to leaching to groundwater. This rating reflects the high water-holding capacity, but is offset by the good profile drainage.   |
| <b>Topsoil erodibility by water</b> | moderate | Due to the light silt loam texture, topsoil erodibility in these soils is moderate. 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 well drained nature of the soil.   |

## General landuse versatility ratings for Waimahaka 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.

### YmU1 (Waimahaka undulating deep)

| Versatility evaluation for soil YmU1 |                    |   |
|--------------------------------------|--------------------|---|
| Landuse                              | Versatility rating | Main limitation   |
| Non-arable horticulture              | Moderate           | Risk of short-term waterlogging after heavy rain  |
| Arable                               | Moderate           | Risk of short-term waterlogging after heavy rain.   |
| Intensive pasture                    | Moderate           | Vulnerability to leaching to groundwater; risk of short-term waterlogging after heavy rain. |
| Forestry                             | High               | Few limitations   |

### YmR1 (Waimahaka rolling deep)

| Versatility evaluation for soil YmR1 |                    |   |
|--------------------------------------|--------------------|---|
| Landuse                              | Versatility rating | Main limitation   |
| Non-arable horticulture              | Moderate           | Risk of short-term waterlogging after heavy rain  |
| Arable                               | Limited            | Rolling slopes  |
| Intensive pasture                    | Moderate           | Vulnerability to leaching to groundwater; risk of short-term waterlogging after heavy rain. |
| Forestry                             | High               | Few limitations   |

**YmH1 (Waimahaka hilly deep)**

| Versatility evaluation for soil YmH1 |                    |                 |
|--------------------------------------|--------------------|-----------------|
| Landuse                              | Versatility rating | Main limitation |
| Non-arable horticulture              | Unsuitable         | Hilly slopes    |
| Arable                               | Unsuitable         | Hilly slopes    |
| Intensive pasture                    | Limited            | Hilly slopes    |
| Forestry                             | Moderate           | Hilly slopes    |

**Management practices that may improve soil versatility**

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

**Soil profiles available for Waimahaka soils**

| Soil symbol | Profile ID | Topoclimate map sheet | Profile description available | Physical data available | Chemical data available | Profile photo available |
|-------------|------------|-----------------------|-------------------------------|-------------------------|-------------------------|-------------------------|
| YmU1        | SB7689     | 29                    | ✓                             | ✓                       | ✓                       |                         |

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