

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: **Arthurton**

Overview

Arthurton soils occupy about 12,100 ha on terraces and downlands of northern Southland and west Otago. They are formed in wind deposited loess derived from greywacke and schist rocks. Arthurton soils are imperfectly drained and have a deep rooting depth, high water holding capacity, and have light silt loam textures with P-retention between 20 and 40%. They are used for pastoral grazing with limited cropping. They are high producing soils currently used for intensive sheep and dairy production with some cropping. Rainfall is evenly spread, although these soils can be seasonally dry over the summer.

Soil classification

NZ Soil Classification (NZSC):

Mottled-pallic Firm Brown; stoneless; silty

Previous NZ Genetic Classification:

Intergrade between yellow-grey and yellow-brown earth

Classification explanation

The NZSC of the Arthurton soils is consistent with the previous classification. Arthurton soils are imperfectly drained Brown soils that have properties intergrading with Pallic soils, reflected in the pale yellow brown colours (hue 2.5Y) and P-retention values of 20–40%. There is a subsoil horizon that is structureless, with slightly firm or greater soil strength that may limit root penetration, and has slow permeability that may cause waterlogging during wet periods. The soils are typically stone-free and have silt loam textures to 90cm depth.

Soil phases and variants

Identified units in the Arthurton soils are:

- Arthurton undulating deep (ArU1): has no gravel within 90cm depth; occurs on slopes 0–7°
- Arthurton rolling deep (ArR1): has no gravel within 90cm depth; occurs on slopes 7–15°
- Arthurton hilly deep (ArH1): has no gravel within 90cm depth; occurs on slopes 15–25°
- Arthurton undulating moderately deep (ArU2): has gravel between 45 and 90cm depth; occurs on slopes 0–7°

The soil properties described in this Technical Data Sheet are based on the most common phase, Arthurton undulating deep (ArU1). 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., Arthurton hilly deep (ArH1).

Associated soils

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

- Waikoikoi: moderately deep to deep; poorly drained due to fragipan
- Crookston: well drained equivalent of the Arthurton soil
- Jacobstown: poorly drained floodplain soil due to a high groundwater table

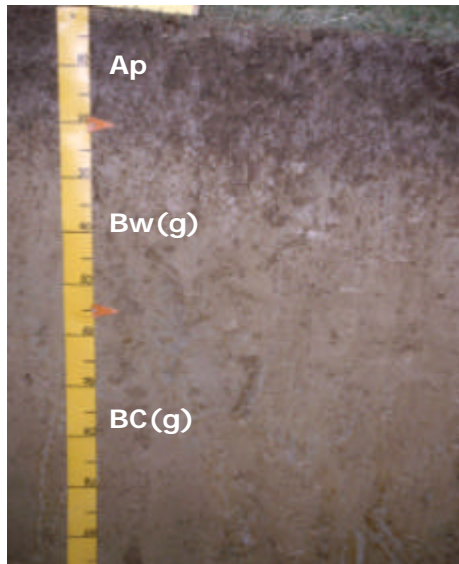
Similar soils

Some soils that have similar properties to Arthurton soils are:

- Wyndham: similar soil but has loamy silt subsoil textures; formed in near-source loess adjacent to the Mataura river, between Gore and Waimahaka
- Woodlands: imperfectly drained Brown soil of the Southland plains; has P-retentions of 30–80% and yellow-brown colours throughout the profile
- Aparima: imperfectly drained Brown soil with a fragipan, associated with Pallic soils (Pukemutu series) on the Southland plains, west of the Oreti River

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.

| Arthurton profile | Horizon | Depth (cm) | Description |
|---|---------|------------|--|
|  | Ap | 0–20 | Greyish yellow-brown silt loam; weak soil strength; strongly developed fine polyhedral structure; abundant roots |
| | Bw(g) | 20–55 | Pale yellowish-brown silt loam; common greyish-yellow and bright brown mottles; few wormcasts; slightly firm soil strength; moderately developed fine to medium polyhedral structure; many roots |
| | BC(g) | 55–90 | Pale yellowish-brown silt loam; many light grey and bright brown mottles; slightly firm soil structure; massive structure; few roots |

Key profile features

Arthurton soils have topsoils 20–30cm deep, with moderately to strongly developed structure. Subsoils have moderate structure that becomes more compact and structureless below 50cm depth. The weak weathering of the soils is reflected in the pale yellowish-brown colour that becomes paler with depth. The presence of mottling reflects the imperfect drainage of the soil.

Typical physical properties

Note: values in *Italics* are estimates

| Horizon | Depth (cm) | Bulk density | Permeability | Texture | Gravel content |
|---------|------------|-----------------|-----------------|-----------|----------------|
| Ap | 0–20 | Moderate – High | <i>Moderate</i> | Silt loam | Gravel free |
| Bw(g) | 20–55 | Moderate – High | <i>Moderate</i> | Silt loam | Gravel free |
| BC(g) | 55–90 | Moderate – High | <i>Slow</i> | Silt loam | Gravel free |

Profile drainage: Imperfect
Plant readily available water: *High*
Potential rooting depth: Deep
Rooting restriction: No major restriction

Key physical properties

Arthurton soils have a deep rooting depth and high plant available water, meaning there is no significant physical barrier to root growth. The soils are imperfectly drained and may have restricted aeration during wet periods. The compact subsoil is slowly permeable, which may cause short-term waterlogging after heavy rainfall. Texture is light silt loam in all horizons, with topsoil clay content of 20–30%. Arthurton soils are typically stone free, although the moderately deep phases have gravel between 45 and 90cm depth that may restrict rooting depth and lower the available water status to moderately high.

Typical chemical properties

| Horizon | Depth (cm) | pH | P retention | CEC | BS | Ca | Mg | K | Na |
|---------|------------|----------|-------------|----------|------|------|----------|----------|-----|
| Ap | 0–20 | Moderate | Moderate | Moderate | High | High | Very low | Moderate | Low |
| Bw(g) | 20–55 | Moderate | Moderate | Low | Low | Low | Very low | Very low | Low |
| BC(g) | 55–90 | Moderate | Moderate | Low | Low | Low | Very low | Very low | Low |

Key chemical properties

Topsoil organic matter levels are 5–7%; P-retention values are 20–40%, pH values are moderate down the profile and mostly above 5.6. Cation exchange values are moderate to low, with similar base saturation values. Available magnesium and potassium and reserve phosphorus are low. Subsoils have moderate levels of sulphate sulphur. Micro-nutrient 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 imperfect drainage, light silt loam texture and low P-retention. |
| Nutrient leaching | slight | These soils have a slight vulnerability to leaching to groundwater. This rating reflects the imperfect drainage, high water-holding capacity and slow subsoil permeability. |
| Topsoil erodibility by water | moderate | Due to the light silt loam texture, the topsoil erodibility of these soils is moderate. 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 | 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 Arthurton soils

Note: The versatility ratings in the table below are indicative of the major limitations for semi-intensive to intensive land use. 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.

ArU1 (Arthurton undulating deep)

ArU2 (Arthurton undulating moderately deep)

| Versatility evaluation for soil ArU1, ArU2 | | |
|--|--------------------|--|
| Landuse | Versatility rating | Main limitation |
| Non-arable horticulture | Moderate | Inadequate aeration during wet periods; vulnerability of topsoil to structural degradation by cultivation or compaction. |
| Arable | Moderate | Inadequate aeration during wet periods; vulnerability of topsoil to structural degradation by cultivation or compaction. |
| Intensive pasture | Moderate | Inadequate aeration during wet periods; vulnerability of topsoil to structural degradation by cultivation or compaction. |
| Forestry | Moderate | Vulnerability of topsoil to structural degradation by compaction; vulnerability to sustained waterlogging. |

ArR1 (Arthurton rolling deep)

| Versatility evaluation for soil ArR1 | | |
|--------------------------------------|--------------------|--|
| Landuse | Versatility rating | Main limitation |
| Non-arable horticulture | Moderate | Inadequate aeration during wet periods; vulnerability of topsoil to structural degradation by cultivation or compaction. |
| Arable | Limited | Rolling slope |
| Intensive pasture | Moderate | Inadequate aeration during wet periods; vulnerability of topsoil to structural degradation by cultivation or compaction. |
| Forestry | Moderate | Vulnerability of topsoil to structural degradation by compaction; vulnerability to sustained waterlogging. |

ArH1 (Arthurton hilly deep)

| Versatility evaluation for soil ArH1 | | |
|--------------------------------------|--------------------|---|
| Landuse | Versatility rating | Main limitation |
| Non-arable horticulture | Unsuitable | Hilly slope |
| Arable | Unsuitable | Hilly slope |
| Intensive pasture | Limited | Hilly slope |
| Forestry | Moderate | Vulnerability of topsoil to structural degradation by compaction; hilly slope |

Management practices that may improve soil versatility

- Careful management after heavy rainfall and wet periods will reduce the impact of short-term waterlogging. Intensive stocking, cultivation and vehicular traffic should be minimised during these periods.
- Installation and maintenance of subsurface mole and tile drainage will reduce the risk of short-term waterlogging
- If compaction occurs, aerating at the correct moisture condition and depth can be of benefit.

Soil profiles available for Arthurton soils

| Soil symbol | Profile ID | Topoclimate map sheet | Profile description available | Physical data available | Chemical data available | Profile photo available |
|-------------|------------|-----------------------|-------------------------------|-------------------------|-------------------------|-------------------------|
| ArU1 | WCT5 | 34 | ✓ | ✓ | ✓ | ✓ |
| ArU1 | H6 | 3 | ✓ | ✓ | ✓ | ✓ |
| ArU1 | G521 | 4 | ✓ | ✓ | | |
| ArU1 | PCT01 | 33 | ✓ | ✓ | ✓ | ✓ |
| ArU1 | VT3 | 2 | ✓ | ✓ | ✓ | ✓ |
| ArU2 | FT1 | 15 | ✓ | ✓ | ✓ | |

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