

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: **Clydevale**

### Overview

Clydevale soils occupy about 970 ha on downlands in the Clydevale district of south Otago. They also occur on a considerable area on the north side of the Clutha river that was outside the Topoclimate survey area. They are formed in near source wind deposited loess derived from schist rock. These soils are deep, silty, imperfectly drained soils with a fragipan in the subsoil. Present use is pastoral grazing with sheep and dairy and some cropping. Regular rain occurs in most years but soil can occasionally dry out in dry summers.

### Soil classification

**NZ Soil Classification (NZSC):**

Mottled Fragic Pallic; stoneless, silty

**Previous NZ Genetic Classification:**

Yellow-grey earth.

### Classification explanation

The NZCS of the Clydevale soil is consistent with the previous classification. Clydevale soils are imperfectly drained, due to perching of water on a dense fragipan. The subsoil above the fragipan also typically has high density, which limits root growth. Clydevale soils also have loamy silt to light silt loam textures and P-retention of <30% throughout the profile, and are typically stonefree.

### Soil phases and variants

Identified units in the Clydevale soils are:

- Clydevale undulating deep (CvU1): has no gravel within 90cm depth; occurs on slopes of 0–7°
- Clydevale rolling deep (CvR1): has no gravel within 90cm depth; occurs on slopes of 7–15°
- Clydevale hilly deep (CvH1): 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, Clydevale undulating deep (CvU1). 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., Clydevale hilly deep (CvH1).

### Associated soils

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

- Pukeawa: shallow soil, with thin loess over greywacke bedrock
- Jacobstown: poorly drained soil formed in alluvium; on floodplains with high groundwater
- Pomahaka: recent soil formed into silty alluvium of the Clutha river

## Similar soils

Some soils that have similar properties to Clydevale soils are:

- Otama: moderately well to imperfectly drained soil formed in near source loess; the fragipan is absent, and clay accumulation is evident in the subsoil
- Nokomai: well drained soil formed in near source loess; fragipan is absent and there is no evidence of clay accumulation
- Warepa: imperfectly drained equivalent of the Waikoikoi soil; formed in distal loess with silt loam textures
- Waikoikoi: poorly drained, with a 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.

Clydevale profile	Horizon	Depth (cm)	Description
	Ap	0–27	Greyish yellow brown loamy silt; slightly firm soil strength; strongly developed very fine to fine polyhedral structure; abundant roots.
	Ap/Bw(g)	27–44	Light yellow silt loam; common bright brown and few light yellow mottles; many worm casts; slightly firm soil strength; moderately developed medium and very fine polyhedral structure; many roots.
	Bg	44–70	Greyish light yellow silt loam; common bright brown and few reddish brown mottles; few worm casts; firm soil strength; moderately developed very coarse to extremely coarse prismatic structure; common roots.
	BCx(g)	70–90	Dull yellowish brown loamy silt; few greyish yellow, few greyish olive and few brown mottles; firm soil strength; massive; few roots.
	BCx(g)	70–90	Dull yellowish brown loamy silt; few greyish yellow, few greyish olive and few brown mottles; firm soil strength; massive; few roots.

## Key profile features

Clydevale soils have a 25–30cm deep topsoil that has strongly developed structure. Subsoil structure is moderately developed above a massive structured fragipan that occurs at 60–70cm depth. The presence of mottles in the upper subsoil indicates the imperfect drainage caused by water perching above the fragipan.

## Typical physical properties

Note: values in *Italics> are estimates*

Horizon	Depth (cm)	Bulk density	Permeability	Texture	Gravel content
Ap	0–27	Moderate – High	Moderate	Silt loam	Gravel free
Ap/Bw(g)	27–44	Moderate – High	Moderate	Silt loam	Gravel free
Bg	44–70	High	Slow	Silt loam	Gravel free
BCx(g)	70–90	High	Slow	Loamy silt	Gravel free

**Profile drainage:** Imperfect  
**Plant readily available water:** *High*  
**Potential rooting depth:** Moderately deep  
**Rooting restriction:** Fragipan

## Key physical properties

Clydevale soils have a moderately deep potential rooting depth that is severely restricted by the fragipan at 60–70cm depth. The soils are imperfectly drained, with slow permeability in the subsoil and limited aeration during wet periods. Textures are mainly light silt loams with loamy silt common in the subsoil. Topsoil clay content is 15–25% and decreases in lower horizons. The soil is stone free.

## Typical chemical properties

Horizon	Depth (cm)	pH	P retention	CEC	BS	Ca	Mg	K	Na
Ap	0–27	Moderate	Low	Moderate	High	High	Low	Very low	Low
Ap/Bw(g)	27–44	Moderate	Low	Low	Low	Low	Low	Very low	Low
Bg	44–70	Moderate	Low	Low	Moderate	Low	Low	Very low	Low
BCx(g)	70–90	Moderate	Low	Low	Moderate	Very low	Moderate	Very low	Moderate

## Key chemical properties

Topsoil organic matter levels are 6–7%; P-retention values 20–30% and pH values moderate (high 5s). Subsoil pH values decrease to low–mid 5 range. Cation exchange values are moderate and base saturation high in the topsoil but both decrease in the subsoil. Available magnesium and potassium values are low. Reserves of phosphorus are low. Micro nutrient levels are generally adequate although boron responses in brassicas and molybdenum responses in legumes 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>	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 and low P-retention and low clay content.
<b>Nutrient leaching</b>	slight	These soils have a moderate vulnerability to leaching to groundwater. This rating reflects the slow permeability and moderately high water-holding capacity.
<b>Topsoil erodibility by water</b>	slight	Due to the organic matter content, the topsoil erodibility of 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 slow permeability of the subsoil fragipan.

## General landuse versatility ratings for Clydevale 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.

### CvU1 (Clydevale undulating deep)

Versatility evaluation for soil CvU1		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Limited	Inadequate aeration during wet periods; restricted rooting depth
Arable	Limited	Inadequate aeration during wet periods; risk of short-term waterlogging after heavy rain.
Intensive pasture	Limited	Risk of short-term waterlogging after heavy rain
Forestry	Moderate	Vulnerability of topsoil to structural degradation; restricted rooting depth

### CvR1 (Clydevale rolling deep)

Versatility evaluation for soil CvR1		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Limited	Inadequate aeration during wet periods; risk of short-term waterlogging after heavy rain.
Arable	Limited	Inadequate aeration during wet periods; rolling slopes
Intensive pasture	Limited	Risk of short-term waterlogging after heavy rain
Forestry	Moderate	Vulnerability of topsoil to structural degradation; restricted rooting depth

**CvH1 (Clydevale hilly deep)**

Versatility evaluation for soil CvH1		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Unsuitable	Hilly slopes
Arable	Unsuitable	Hilly slopes
Intensive pasture	Limited	Hilly slopes
Forestry	Moderate	Vulnerability of topsoil to structural degradation; restricted rooting depth.

**Management practices that may improve soil versatility**

- Careful management after heavy rain and wet conditions 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 risk of short-term waterlogging.
- If compaction occurs, aeration at the correct depth and moisture condition can be of benefit.

**Soil profiles available for Clydevale soils**

Soil symbol	Profile ID	Topoclimate map sheet	Profile description available	Physical data available	Chemical data available	Profile photo available
CvU1	PCT10	33	✓	✓	✓	✓
CvU1	PCT12	33	✓	✓	✓	✓

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