

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: **Nithdale**

Overview

Nithdale soils occupy about 900 ha from the Kaiweras in eastern Southland to Waikawa in southern Southland. They occur on floodplains and low terraces adjacent to minor streams. They are formed in deep to moderately deep fine alluvium from tuffaceous greywacke. Nithdale soils are well drained soils with deep rooting depth, moderately high plant available water, and silt loam to clay loam textures. Present use is pastoral grazing with sheep, beef cattle and some deer. Climate is cool temperate with regular rain.

Soil classification

NZ Soil Classification (NZSC):

Acidic Orthic Brown; stoneless; silty

Previous NZ Genetic Classification:

Moderately leached yellow-brown earth.

Classification explanation

The NZSC of Nithdale soils is consistent with the previous classification. They are well drained soils, with no major rooting barrier in the subsoil, and are acidic with pH of <5.5. The soils are typically stonefree, with dominantly silty texture.

Soil phases and variants

Identified units in the Nithdale soils are:

- Nithdale undulating deep (NtU1): has no gravel within 90cm depth; occurs on slopes of 0–7°
- Nithdale undulating deep imperfectly drained variant (NtU1v): has imperfect drainage; has no gravel within 90cm depth; occurs on slopes of 0–7°
- Nithdale rolling deep (NtR1): has no gravel within 90cm depth; occurs on slopes of 7–15°

The soil properties described in this Technical Data Sheet are based on the most common phase, Nithdale undulating deep (NtU1). 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., Nithdale rolling deep (NtR1).

Associated soils

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

- Jacobstown: poorly drained Gley soils due to a high groundwater table; slowly accumulating, with a structured subsoil
- Dacre: poorly drained Gley soils due to a high groundwater table; moderately accumulating with little structural development in the subsoil
- Otanomomo: very poorly drained soil formed into peat

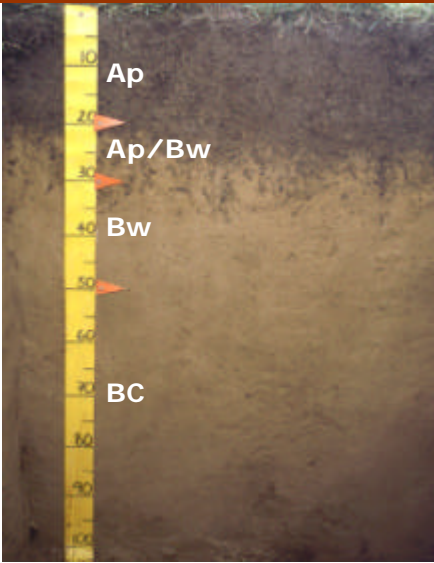
Similar soils

Some soils that have similar properties to Nithdale soils are:

- Niagara: imperfectly drained equivalent of the Nithdale soil
- Hedgehope: occurs as levees on the Hedgehope, Makarewa and Otapiri streams; typically has silty textures with no clayey horizons
- Ardlussa: occurs on floodplains and low terraces of streams and rivers in northern Southland and west Otago; not as strongly weathered as the Nithdale, with Pallic to Brown intergrade properties
- Tokanui: formed in loess on rolling downlands and hilly land; has a firm subsoil

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.

Nithdale profile	Horizon	Depth (cm)	Description
	Ap	0–20	Greyish yellow-brown silt loam; weak soil strength; strongly developed very fine to medium and coarse polyhedral structure; abundant roots
	Ap/Bw	20–30	Dull yellow-orange silt loam; common worm casts; weak soil strength; strongly developed coarse prismatic breaking to very fine to medium polyhedral structure; abundant roots
	Bw	30–50	Dull yellow-orange silt loam; few worm casts; slightly firm soil strength; moderately developed coarse to very coarse prismatic structure; common roots
	BC	50–90+	Dull yellow-orange silt loam; weak soil strength; massive structure; few roots
	BC	50–90+	Dull yellow-orange silt loam; weak soil strength; massive structure; few roots

Key profile features

Nithdale soils have a 17–25cm deep topsoil, with moderate to strongly developed structure. Subsoil structure is also moderately developed. The moderate or only weakly compacted subsoil structure results in good root distribution. The yellow-brown colours of the subsoil reflect the weathered B horizon that is typical of these soils.

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	20–30	Moderate	<i>Moderate</i>	Silt loam	Gravel free
Bw	30–50	Moderate – High	<i>Moderate</i>	Silt loam	Gravel free
BC	50–90+	Moderate – High	<i>Slow</i>	Silt loam	Gravel free

Profile drainage:	Well
Plant readily available water:	<i>High</i>
Potential rooting depth:	Deep
Rooting restriction:	No major restriction

Key physical properties

Nithdale soils have a deep rooting depth, high plant available water, and no major restriction to root growth. The soils are well to moderately well aerated, but have slow permeability in the lower subsoil. Horizon texture is typically heavy silt loam, but may contain contrasting layers of silty clay to sandy loam texture. Topsoil clay content is 25–35%. The deep phase soils are stoneless, with the moderately deep phase having gravel below 45cm depth.

Typical chemical properties

Horizon	Depth (cm)	pH	P retention	CEC	BS	Ca	Mg	K	Na
Ap	0–20	Moderate	Moderate	Moderate	Low	Moderate	Low	Very low	Low
Ap/Bw	20–30	Low	High	Moderate	Very low	Low	Very low	Very low	Low
Bw	30–50	Moderate	High	Low	Very low	Very low	Very low	Very low	Low
BC	50–90+	Moderate	Moderate	Moderate	Low	Very low	Very low	Very low	Low

Additional chemical properties (as a profile average)

Sulphate sulphur levels increase to high levels in the subsoil. Topsoil reserve potassium (Kc) levels are low.

Key chemical properties

Topsoil organic matter levels are 9–13%; P-retention values 60–75% and topsoil pH values low to moderate (low–mid 5s). Subsoil pH values are low. Cation exchange values are moderate and base saturation low. Available cations values are mostly low with reserve phosphorus levels low. Micronutrient values are generally adequate although pastures may be deficient in cobalt (for sheep) and in copper (for deer and cattle) in summer.

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	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 moderately well to well drained character of the soil and the moderate to high organic matter content and P-retention.
Nutrient leaching	moderate	These soils have a moderate vulnerability to leaching to groundwater. This rating reflects the moderately well to well drained character of this soil, offset by the high water holding capacity.
Topsoil erodibility by water	minimal	Due to the high organic matter content and moderate to high clay content, topsoil erodibility in these soils is minimal. Erodibility is highly dependent on management, particularly when there is no vegetation cover.
Organic matter loss	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).
Waterlogging	slight	These soils have a slight vulnerability to waterlogging during wet periods. This rating reflects the good drainage, but slow permeability of the subsoil. The imperfectly drained variant has a moderate waterlogging vulnerability because of its poorer drainage status.

General landuse versatility ratings for Nithdale 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.

NtU1 (Nithdale undulating deep)

Versatility evaluation for soil NtU1		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Moderate	Risk of short-term waterlogging after heavy rain; potential flood risk.
Arable	Moderate	Risk of short-term waterlogging after heavy rain.
Intensive pasture	Moderate	Vulnerability of leaching to groundwater; risk of short-term waterlogging after heavy rain.
Forestry	Limited	Potential flood risk

NtU1vi (Nithdale undulating deep imperfectly drained variant)

Versatility evaluation for soil NtU1vi		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Moderate	Inadequate aeration during wet periods; potential flood risk
Arable	Moderate	Inadequate aeration during wet periods; risk of short-term waterlogging after heavy rain.
Intensive pasture	Moderate	Inadequate aeration during wet periods; risk of short-term waterlogging
Forestry	Limited	Potential flood risk

NtR1 (Nithdale rolling deep)

Versatility evaluation for soil NtR1		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Moderate	Rolling slopes; risk of short-term waterlogging after heavy rain.
Arable	Limited	Rolling slopes
Intensive pasture	Moderate	Vulnerability to leaching to ground water; risk of short-term waterlogging after heavy rain.
Forestry	Limited	Potential flood risk

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 use 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 Nithdale soils

Soil symbol	Profile ID	Topoclimate map sheet	Profile description available	Physical data available	Chemical data available	Profile photo available
NtU1	NT8	30	✓	✓	✓	✓
NtU1	K1165	42	✓	✓	✓	
NtU1	GG/GW130	35	✓			

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