

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: **Niagara**

Overview

Niagara soils occupy about 1700 ha on the floodplains and low terraces of the Waikawa and Tokanui rivers in southern Southland. They are formed in deep to moderately deep fine alluvium from tuffaceous greywacke. Niagara soils are imperfectly drained and have deep rooting depth, moderately high plant available water and heavy silt loam to silty clay texture. They are high-producing soils currently used for intensive sheep, deer and some dairy production. Climate is cool temperate with regular rain. Soils rarely dry out.

Soil classification

NZ Soil Classification (NZSC):

Mottled-acidic Orthic Brown: stoneless, clayey over silty.

Previous NZ Genetic Classification:

Recent

Classification explanation

Niagara soils were previously classified as Recent soils, but were reclassified as Brown soils due to the presence of a weathered and well structured B horizon. They are imperfectly drained soils, with no major rooting barrier in the subsoil, and are acidic with pH of <5.5. The soils are typically stone free, with textural contrasts within the profile, but typically have at least one clayey textured horizon.

Soil phases and variants

Identified units in the Niagara soils are:

- Niagara undulating deep (NgU1): has no gravel within 90cm depth; occurs on slopes of 0–7°
- Niagara undulating moderately deep (NgU2): has gravel between 45 and 90cm depth; occurs on slopes of 0–7°

The soil properties described in this Technical Data Sheet are based on the most common phase, Niagara undulating deep (NgU1). Values for other phases and variants can be taken as being similar. Where they differ significantly they are recorded with a separate versatility rating.

Associated soils

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

- Jacobstown: poorly drained Gley soils due to a high groundwater table; are slowly accumulating with a structured subsoil
- Dacre: poorly drained Gley soils due to a high groundwater table; are 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 Niagara soils are:

- Nithdale : moderately well to well drained equivalent of the Niagara soil;
- Hedgehope: occurs as levees on the Hedgehope, Makarewa and Otapiri streams; typically has silty textures with no clayey horizons
- Oughton: moderately well to imperfectly drained soil occurring on low terraces of the Mataura River between Mataura and Wyndham; has clayey textures throughout the profile
- Chaslands: 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.

Niagara profile	Horizon	Depth (cm)	Description
	Ap	0–20	Greyish yellow-brown silty clay; weak soil strength; moderately developed very fine and medium polyhedral structure; abundant roots
	Ap/Bw	20–28	Dull yellowish brown silty clay; few worm casts; weak soil strength; moderately developed very fine and medium polyhedral structure; abundant roots
	Bw(g)	28–60	Dull yellowish brown silt loam; few greyish yellow and few reddish brown mottles; weak soil strength; moderately developed coarse prismatic breaking to very fine to fine polyhedral structure; common roots
	Bw(g)	28–60	Dull yellowish brown silt loam; few greyish yellow and few reddish brown mottles; weak soil strength; moderately developed coarse prismatic breaking to very fine to fine polyhedral structure; common roots
	BCg	60–90	Light grey silt loam; common dull yellowish brown and common bright brown mottles; weak soil strength; moderately developed coarse prismatic structure; few roots

Key profile features

Niagara soils have a 20–25cm deep topsoil, with moderately developed structure. Subsoil structure is also moderately developed, resulting in good root distribution. The yellow-brown colours of the subsoil reflect the weathered B horizon that is typical of these soils, with the mottling and grey lower subsoil reflecting the characteristic imperfect drainage.

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>	Silty clay	Gravel free
Ap/Bw	20–28	Moderate	<i>Moderate</i>	Silty clay	Gravel free
Bw(g)	28–60	Moderate – High	<i>Moderate</i>	Silt loam	Gravel free
BCg	60–90+	Moderate – High	<i>Slow</i>	Silt loam	Gravel free

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

Key physical properties

Niagara soils have a deep rooting depth, moderately high plant available water, and no major restriction to root growth. Topsoils are moderately well aerated which decreases down the profile, together with the profile permeability. Horizon texture is typically heavy silt loam to silty clay, typically with contrasting layers within the profile. Topsoil clay content is 35–45%. The deep phase 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	Moderate	High	Moderate	Very low	Low
Ap/Bw	20–28	Moderate	High	Moderate	Moderate	Moderate	Low	Very low	Low
Bw(g)	28–60	Moderate	High	Moderate	Low	Low	Low	Very low	Low
BCg	60–90+	Low	Moderate	Moderate	Low	Low	Moderate	Very low	Low

Key chemical properties

Topsoil organic matter levels are 6–10%; P-retention 50–75% and pH moderate (mid to high 5s). Subsoil pH is often < 5.5. Cation exchange and base saturation are moderate, with available calcium and magnesium levels moderate to high. Potassium levels are very low. Soil reserves of phosphorus 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
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 imperfect drainage which is offset by the high clay content and P-retention.
Nutrient leaching	slight	These soils have a slight vulnerability to leaching to groundwater. This rating reflects the moderately high water-holding capacity, imperfect drainage and slow subsoil permeability. Moderately deep phases are likely to have a moderate to severe vulnerability.
Topsoil erodibility by water	minimal	Due to the high clay and organic matter 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	moderate	These soils have a moderate vulnerability to waterlogging during wet periods. This rating reflects the imperfect drainage and slow permeability.

General landuse versatility ratings for Niagara 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.

NgU1 (Niagara undulating deep)

NgU2 (Niagara undulating moderately deep)

Versatility evaluation for soil NgU1, NgU2		
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; vulnerability to leaching to groundwater
Forestry	Limited	Potential flood risk

Management practices that may improve soil versatility

- Careful management after heavy rain or 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 improve aeration and reduce the risk of short-term waterlogging.

Soil profiles available for Niagara soils

Soil symbol	Profile ID	Topoclimate map sheet	Profile description available	Physical data available	Chemical data available	Profile photo available
NgU1	ST5	29	✓	✓	✓	✓
NgU1	NT3	30	✓	✓	✓	✓

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