

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: **McGaw**

Overview

McGaw soils occupy about 500 ha on low and intermediate terraces in the Isla Bank to Waimatuku area of central Southland. They are formed in moderately deep to deep fine alluvium derived from tuffaceous greywacke and volcanic rocks, with a variable mixture of loess. The soils are imperfectly drained and have deep potential rooting depth, moderately high water capacity and heavy silt loam to silty clay textures. Present use is pastoral farming with sheep and dairy cattle and some cropping. Regular rainfall occurs and soils seldom dry out.

Soil classification

NZ Soil Classification (NZSC):

Mottled Firm Brown; stoneless; clayey over silty.

Previous NZ Genetic Classification:

Yellow-brown earth to brown-granular loam intergrade.

Classification explanation

The NZSC of the McGaw soils is consistent with the previous classification, but the soils have been classified as Firm Brown rather than Mafic Brown (Drummond soils) because there is little evidence of mafic parent material influencing soil properties. There is a subsoil horizon that is structureless, with slightly firm or greater soil strength that may limit root penetration. This horizon has slow permeability that causes waterlogging during wet periods, which is reflected in the imperfect drainage. The soils typically are gravel free, and have silty clay texture grading to silt loam in the subsoil.

Soil phases and variants

Identified units in the McGaw soils are:

- McGaw undulating moderately deep (MwU2): has gravel between 45 and 90cm depth; occurs on slopes of 0–7°
- McGaw undulating deep (MwU1): has no gravel within 90cm depth; occurs on slopes of 0–7°

The soil properties described in this Technical Data Sheet are based on the most common phase, McGaw undulating moderately deep (MwU2). 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., McGaw undulating deep (MwU1).

Associated soils

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

- Braxton: moderately deep to deep, poorly drained soil with no fragipan
- Pukemutu: deep, poorly drained soil due to water perching on a fragipan
- McLeish: shallow, poorly drained soil

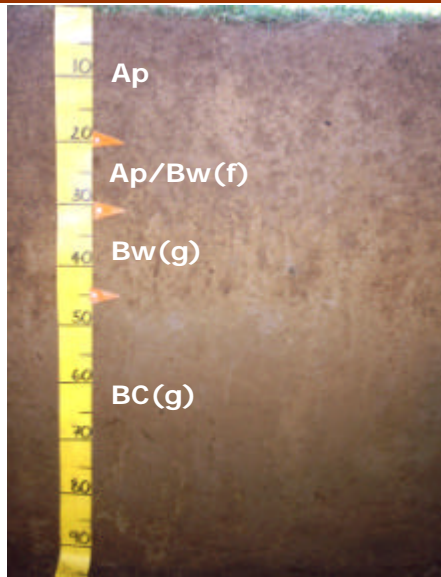
Similar soils

Some soils that have similar properties to McGaw soils are:

- Drummond: well drained soil with soil properties that reflect a significant influence of Mafic parent material
- Otahuti: well drained equivalent of the McGaw soils
- Woodlands: moderately deep to deep soil formed in deep loess on intermediate to high terraces

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.

McGaw profile	Horizon	Depth (cm)	Description
	Ap	0–19	Greyish yellow-brown silty clay; weak soil strength; strongly developed fine to medium polyhedral structure; abundant roots.
	Ap/Bw(f)	19–30	Dull yellowish brown silty clay; few brown mottles; few wormcasts; weak soil strength; strongly developed fine to medium polyhedral structure; abundant roots
	Bw(g)	30–45	Dull yellowish brown silt loam; common greyish yellow and brown mottles; few wormcasts; weak soil strength; strongly developed fine to medium polyhedral structure; many roots.
	BC(g)	45–90+	Dull yellowish brown silt loam; common greyish yellow and brown mottles; slightly firm soil strength; massive structure; few roots.

Key profile features

McGaw topsoils are 20–25cm deep with a moderate to strongly developed structure. Subsoils also have moderate to strong structure, grading to structureless in the lower subsoil. The dull yellow-brown colours of the subsoil reflect the minimal influence that mafic parent materials have on these soils.

Typical physical properties

Note: values in *Italics* are estimates

Horizon	Depth (cm)	Bulk density	Permeability	Texture	Gravel content
Ap	0–19	Low – Moderate	<i>Moderate</i>	Silty clay	Gravel free
Ap/Bw(f)	19–30	Moderate	<i>Moderate</i>	Silty clay	Gravel free
Bw(g)	30–45	Moderate	<i>Moderate</i>	Silt loam	Gravel free
Bc(g)	45–90+	Moderate – High	<i>Slow</i>	Silt loam	Slightly gravelly

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

Key physical properties

McGaw soils have a deep rooting depth and moderately high plant available water, with no major restriction to root growth. They are imperfectly drained, with slow subsoil permeability that may cause aeration limitations during wet periods. Textures are silty clay grading to silt loam in the subsoil, with a topsoil clay content of about 35–40%. Deeper soils contain no stones, with moderately deep soils containing gravel below 45cm, that may limit the rooting depth and water-holding capacity.

Typical chemical properties

Horizon	Depth (cm)	pH	P retention	CEC	BS	Ca	Mg	K	Na
Ap	0–19	Moderate	High	Moderate	High	High	Moderate	Moderate	Moderate
Ap/Bw(f)	19–30	Moderate	High	Moderate	High	Moderate	Low	High	Very high
Bw(g)	30–45	Moderate	High	Moderate	Moderate	Moderate	Low	Low	Moderate
BC(g)	45–90+	Moderate	High	Moderate	Moderate	Low	Very low	Very low	Moderate

Key chemical properties

Topsoil organic matter levels are about 9%. P-retention 60–85% and pH moderate (high 5s) in all horizons. Cation exchange and base saturation values are moderate to high. Available calcium values are high, with magnesium and potassium values moderate, tending to low in the subsoil. Soil reserve phosphorus levels are low. 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	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 moderate to high clay, P-retention and organic matter content.
Nutrient leaching	slight	These soils have a slight vulnerability to leaching to groundwater. This rating reflects the imperfect drainage, slow permeability, and moderately high water-holding capacity.
Topsoil erodibility by water	minimal	Due to the moderate to high clay content and gentle slope, 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 McGaw 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.

MwU2 (McGaw undulating moderately deep)

Versatility evaluation for soil MwU2		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Moderate	Vulnerability to sustained waterlogging; restricted rooting depth.
Arable	Moderate	Inadequate aeration during wet periods; vulnerability to sustained waterlogging.
Intensive pasture	Moderate	Inadequate aeration during wet periods; vulnerability to leaching to groundwater.
Forestry	Moderate	Vulnerability to sustained waterlogging; restricted rooting depth.

MwU1 (McGaw undulating deep)

Versatility evaluation for soil MwU1		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Moderate	Inadequate aeration during wet periods; vulnerability to sustained waterlogging.
Arable	Moderate	Inadequate aeration during wet periods; vulnerability to sustained waterlogging
Intensive pasture	Moderate	Inadequate aeration during wet periods
Forestry	Moderate	Vulnerability to sustained waterlogging.

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 of subsurface mole and tile drains will reduce the risk of short-term waterlogging.
- Management of nutrient applications so as to minimise leaching losses.

Soil profiles available for McGaw soils

Soil symbol	Profile ID	Topoclimate map sheet	Profile description available	Physical data available	Chemical data available	Profile photo available
MwU1	JT&	21	✓	✓	✓	✓

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