

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: McNab

Overview

McNab soils occupy about 950ha on rolling downlands in the McNab and Kaiwera districts of eastern Southland. They are formed into moderately deep loess overlying highly weathered tuffaceous greywacke bedrock. McNab soils are moderately well to imperfectly drained, with a slightly deep rooting depth, and moderately high plant available water, that is limited by the graveliness and bedrock that commonly occurs within in the lower subsoil. Present use is pastoral grazing with sheep and beef cattle. Climate is cool temperate with regular rainfall throughout the year.

Soil classification

NZ Soil Classification (NZSC):

Typic Acid Brown; moderately deep; tuffaceous mudstone; silty

Previous NZ Genetic Classification:

Strongly leached yellow-brown earth.

Classification explanation

The NZSC of McNab soils is consistent with the previous classification. They are strongly leached soils with yellow-brown colours, P-retention of 40–50% and subsoil pH of less than 4.8. McNab soils have silt loam textures, and weathered tuffaceous greywacke bedrock typically occurs at 45–90cm depth.

Soil phases and variants

Identified units in the McNab soils are:

- McNab rolling moderately deep (MjR2): has gravel between 45 and 90cm depth; occurs on slopes of 7–15°
- McNab undulating moderately deep (MjU2): 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, McNab rolling moderately deep (MjR2). 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., McNab undulating moderately deep (MjU2).

Associated soils

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

- Kaiwera: shallow, well drained strongly leached soil forming into stony stony colluvium or bedrock; has P-retention of >85%
- Otarua: well drained soil formed in deep loess
- Ferndale: imperfectly drained soil formed in deep loess

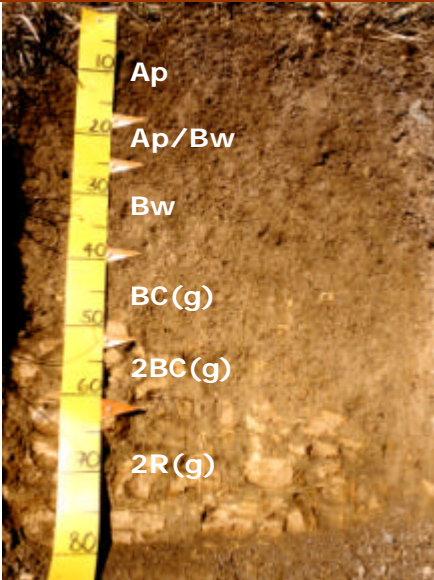
Similar soils

Some soils that have similar properties to McNab soils are:

- Craigdale: moderately weathered Brown soil; bedrock is not typically as weathered, and has subsoil pH between 4.8 and 5.5
- Fortification: strongly leached Allophanic soil, with P-retention of >85%
- Waiarikiki: strongly leached Brown soil, with P-retention of >85%; formed in gravelly colluvium
- Pukerau: strongly leached Allophanic soil, with P-retention of >85%; bedrock occurs within 45cm depth

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.

McNab profile	Horizon	Depth (cm)	Description	
	Ap	0–17	Dark brown slightly gravelly silt loam; weak soil strength; strongly developed fine polyhedral structure; gravels are highly weathered; many roots	
	Ap/Bw	17–25	Yellowish brown slightly gravelly silt loam; abundant worm casts; weak soil strength; moderately developed fine blocky and polyhedral structure; gravels are highly weathered; many roots	
	Bw	25–39	Yellowish brown slightly gravelly silt loam; many worm casts; weak soil strength; moderately developed coarse blocky breaking to fine blocky structure; gravels are highly weathered; few roots	
	BC(g)	39–52	Yellowish brown moderately gravelly silt loam; many bright brown and dull yellowish brown mottles; weak soil strength; weakly developed fine blocky structure; gravels are highly weathered; few roots	
	2BC(g)	52–64	Dull yellow orange very gravelly silt loam; abundant bright yellowish brown mottles; firm soil strength; weakly developed coarse blocky structure; gravels are highly weathered; no roots	
	2R(g)	64–84	Orange highly weathered tuffaceous greywacke bedrock; many light brownish grey mottles; firm soil strength; no roots	

Key profile features

McNab topsoils are 17–20cm deep with a strongly developed structure. Subsoil structure is moderately developed and grades to coarse gravelly colluvium and bedrock below 45cm. Mottles occur in the subsoil. The gravels and bedrock are typically strongly weathered, and can be slowly permeable, causing mottling in the horizon above.

Typical physical properties

Note: values in *Italics* are estimates

Horizon	Depth (cm)	Bulk density	Permeability	Texture	Gravel content
Ap	0–17	Moderate – High	<i>Moderate</i>	Silt loam	Slightly gravelly
Ap/Bw	17–25	Moderate – High	<i>Moderate</i>	Silt loam	Slightly gravelly
Bw	25–39	Moderate – High	<i>Moderate</i>	Silt loam	Slightly gravelly
BC(g)	39–52	Moderate – High	<i>Moderate</i>	Silt loam	–
2BC(g)	52–64	Moderate – High	<i>Slow</i>	Silt loam	–
2R(g)	64–84	Moderate – High	<i>Slow</i>	Silt loam	–

Profile drainage: Moderately well
Plant readily available water: *Moderately high*
Potential rooting depth: Slightly deep
Rooting restriction: Subsoil gravelliness and/or presence of bedrock

Key physical properties

Mcnab soils have a slightly deep rooting depth that is restricted by bedrock. Plant available water capacity is moderately high, but the subsoil aeration and permeability may be limited by the weathered bedrock. Texture is silt loam in all horizons, with a topsoil clay content of 30–35%. Soils are slightly gravelly in the upper horizons, grading to extremely gravelly subsoil and bedrock between 45–90cm depth.

Typical chemical properties

Horizon	Depth (cm)	pH	P retention	CEC	BS	Ca	Mg	K	Na
Ap	0–17	Moderate	Moderate	Moderate	Moderate	Moderate	High	Very high	Very low
Ap/Bw	17–25	Low	Moderate	Moderate	Low	Low	Moderate	Very high	Low
Bw	25–39	Low	Moderate	Moderate	Low	Low	Moderate	High	Low
BC(g)	39–52	Low	Moderate	Moderate	Low	Low	High	High	Very low
2BC(g)	52–64	Low	Moderate	High	Low	Low	High	High	Low
2R(g)	64–84	Low	Moderate	High	Low	Low	High	Low	Moderate

Additional chemical properties (as a profile average)

Sulphate sulphur levels increase in the subsoil. Reserve potassium (Kc) levels are high.

Key chemical properties

Topsoil organic matter levels are 7–8%; P-retention levels 40–50% and topsoil pH low (low 5s) with subsoil pH values of <5. Cation exchange values are moderate and base saturation low. Available calcium is moderate in the topsoil but low in the subsoil, with magnesium and potassium levels high. Reserve phosphorus levels are low. Micronutrient levels are generally adequate. Pasture may be deficient in cobalt (for sheep) 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	moderate	These soils have a moderate vulnerability to structural degradation by long-term cultivation, or compaction by heavy stocking and vehicles. This rating reflects the moderate P-retention, clay and organic matter content.
Nutrient leaching	moderate	These soils have a moderate vulnerability to leaching to groundwater. This rating reflects the moderately high water-holding capacity and slow permeability.
Topsoil erodibility by water	slight	Due to the moderate clay and organic matter content, topsoil erodibility in these soils is slight. 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	slight	These soils have a slight vulnerability to waterlogging during wet periods. This rating reflects the moderately good drainage, but slow permeability.

General landuse versatility ratings for McNab 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.

McNab rolling moderately deep (MjR2)

Versatility evaluation for soil MjR2		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Limited	Restricted rooting depth
Arable	Limited	Rolling slopes
Intensive pasture	Limited	Subsoil acidity
Forestry	Limited	Restricted rooting depth

McNab undulating moderately deep (MjU2)

Versatility evaluation for soil MjU2		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Limited	Restricted rooting depth
Arable	Moderate	Vulnerability to topsoil structural degradation by cultivation and compaction; restricted rooting depth.
Intensive pasture	Moderate	Vulnerability to topsoil structural degradation by cultivation and compaction; restricted subsoil root penetrability
Forestry	Limited	Restricted rooting depth

Management practices that may improve soil versatility

- Careful management after heavy rain and wet periods will reduce the impact of structural compaction damage. Intensive stocking, cultivation and heavy vehicular traffic use should be minimised during these periods.
- Management of nutrient applications so as to minimise leaching losses

Soil profiles available for McNab soils

Soil symbol	Profile ID	Topoclimate map sheet	Profile description available	Physical data available	Chemical data available	Profile photo available
MjR2	K654R	42	✓	✓	✓	✓
MjU2	GG/GW142	35	✓			

Published by Crops for Southland with financial support from Environment Southland.

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