

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: **Mandeville**

Overview

Mandeville soils occupy about 2300 ha on undulating to steep slopes on the north side of the Hokonui Hills between Clinton and Mossburn. They also occur as bedrock outcrops within the downlands north of the Hokonui Hills. These soils are formed into thin mixed loess and colluvium, overlying tuffaceous greywacke bedrock. Mandeville soils are well drained, with a shallow rooting depth and moderate water holding capacity that is limited by the graveliness and bedrock that occurs within 45cm depth. Present use is pastoral farming with sheep and beef cattle and some deer. Climate is cool temperate with regular rain. Because of their shallow depth and mainly northerly aspect soils can be seasonally dry in some summers.

Soil classification

NZ Soil Classification (NZSC):

Typic Mafic Melanic; lithic, tuffaceous sandstone; clayey

Previous NZ Genetic Classification:

Weakly to moderately leached lowland yellow-brown earth

Classification explanation

The NZSC of Mandeville soils has been reclassified because the soil properties are more similar to Melanic than to Brown soils. This is reflected in the dark coloured topsoils and moderate to strong structure throughout the profile. They typically have dark brown coloured subsoils, reflecting the influence of the volcanic tuff. Mandeville soils are naturally fertile, with low P-retention, high base saturation and pH values of >5.8 throughout the profile. They typically have bedrock within 45cm depth, and textures are typically silty clay.

Soil phases and variants

Identified units in the Mandeville soils are:

- Mandeville rolling shallow (MeR3): has bedrock within 45cm depth, occurs on slopes of 7–15°
- Mandeville undulating shallow (MeU3): has bedrock within 45cm depth; occurs on slopes of 0–7°
- Mandeville hilly shallow (MeH3): has bedrock within 45cm depth; occurs on slopes of 15–25°
- Mandeville steep shallow (MeS3): has bedrock within 45cm depth; occurs on slopes of >25°

The soil properties described in this Technical Data Sheet are based on the most common phase, Mandeville rolling shallow (MeR3). 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., Mandeville hilly shallow (MeH3).

Associated soils

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

- Stonycreek: imperfect to poorly drained soil, formed in gravelly tuffaceous greywacke colluvium
- Hokonui: poorly drained, deep to moderately deep soil, formed in mixed loess and fine colluvium; has clayey textures
- Pukemutu: poorly drained deep soil, formed in loess; has a fragipan and clayey subsoil textures
- Waikoikoi: poorly drained deep soil, formed in loess; has a fragipan and silty textures


Similar soils

Some soils that have similar properties to Mandeville soils are:

- Kaihiku: formed predominantly in gravelly colluvium; bedrock may occur at 45–90cm depth
- Tyneholm: moderately leached Brown soil formed on tuffaceous greywacke bedrock within 45cm depth
- Wendon: moderately leached Brown soil formed on greywacke bedrock and colluvium; has acidic subsoils with pH of <5.5
- Taringatura: moderately leached Brown soil formed on mixed greywacke and tuffaceous greywacke bedrock and colluvium of the Taringatura Hills; has acidic subsoils with pH of <5.5

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.

Mandeville profile	Horizon	Depth (cm)	Description
	Ah	0–27	Black moderately gravelly clay loam; weak soil strength; moderately developed very fine to fine polyhedral structure; gravels fresh and angular; abundant roots
	Ah/Bw	27–40	Dark brown moderately gravelly silty clay; few worm casts; weak soil strength; moderately developed very fine to fine polyhedral structure; gravels slightly weathered and angular; abundant roots
	R	40+	Slightly weathered tuffaceous sandstone
	R	40+	Slightly weathered tuffaceous sandstone

Key profile features

Mandeville soils have a 15–30cm deep topsoil that has a moderate to strong structure. Subsoils also have moderately developed structure to the bedrock. Both the topsoils and subsoils have dark colours, reflecting the influence of volcanic tuff in the parent material.

Typical physical properties

Note: values in *Italics* are estimates

Horizon	Depth (cm)	Bulk density	Permeability	Texture	Gravel content
Ah	0–27	Moderate – High	<i>Rapid</i>	Clay loam	Slightly gravelly
Ah/Bw	27–40	—	<i>Rapid</i>	Silty clay	Moderately gravelly
R	40+	—	—	—	Extremely gravelly

Profile drainage:	Well
Plant readily available water:	<i>Moderate</i>
Potential rooting depth:	Shallow
Rooting restriction:	Subsoil gravelliness and presence of bedrock

Key physical properties

Mandeville soils have a shallow rooting depth, restricted by the gravelliness and bedrock in the subsoil, and moderate available water. These soils are well drained, with good aeration and permeability throughout the soil. Textures are typically clay loam to silty clay, but do vary according to the proportion of loess in the soil. The topsoil has a clay content of 25–40%. The soils are gravelly throughout, and typically have at least 35% gravel and bedrock within 45cm depth.

Typical chemical properties

Horizon	Depth (cm)	pH	P retention	CEC	BS	Ca	Mg	K	Na
Ah	0–27	Moderate	Moderate	High	High	High	High	High	Low
Ah/Bw	27–40	Moderate	Moderate	Moderate	High	Moderate	Moderate	Moderate	Low
R	40+	—	—	—	—	—	—	—	—

Key chemical properties

Topsoil organic matter content is 6.5–8.5%; P-retention 25–40% and pH moderate (high 5s to low 6s). Cation exchange and base saturation are high, indicating good availability of calcium, magnesium and potassium. Phosphate and sulphur reserves are low. Micronutrient levels are generally adequate, although 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
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 good drainage and clay content, offset by the moderate low-moderate organic matter and P-retention.
Nutrient leaching	very severe	These soils have a very severe vulnerability to leaching to groundwater. This rating reflects the rapid permeability, low water holding capacity and shallow soil depth.
Topsoil erodibility by water	minimal	Due to the 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	moderate	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	nil	These soils have a nil vulnerability to waterlogging during wet periods. This rating reflects the good drainage and permeability.

General landuse versatility ratings for Mandeville 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.

MeR3 (Mandeville rolling shallow)

Versatility evaluation for soil MeR3		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Limited	Restricted rooting depth; shallow rock depth.
Arable	Limited	Rolling slopes ; restricted rooting depth
Intensive pasture	Limited	Restricted rooting depth.
Forestry	Unsuitable	Shallow rock depth

MeU3 (Mandeville undulating shallow)

Versatility evaluation for soil MeU3		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Limited	Restricted rooting depth; shallow rock depth.
Arable	Limited	Restricted rooting depth
Intensive pasture	Limited	Restricted rooting depth.
Forestry	Unsuitable	Shallow rock depth

MeH3 (Mandeville hilly shallow)

Versatility evaluation for soil MeH3		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Unsuitable	Hilly slopes
Arable	Unsuitable	Hilly slopes
Intensive pasture	Limited	Hilly slopes; restricted rooting depth.
Forestry	Unsuitable	Shallow rock depth

MeS3 (Mandeville steep shallow)

Versatility evaluation for soil MeS3		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Unsuitable	Steep slopes
Arable	Unsuitable	Steep slopes
Intensive pasture	Limited	Steep slopes; restricted rooting depth.
Forestry	Unsuitable	Shallow rock depth

Management practices that may improve soil versatility

- Management of nutrient applications that minimise leaching losses

Soil profiles available for Mandeville soils

Soil symbol	Profile ID	Topoclimate map sheet	Profile description available	Physical data available	Chemical data available	Profile photo available
MeS3	FT11	15	✓	✓	✓	✓
MeU3	BT8	12	✓	✓	✓	✓
MeU3	RT12	11	✓	✓	✓	✓
MeH3	M20	1	✓	✓	✓	

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