Soil name: Josephville

Overview

Josephville soils occupy about 1400 ha on hilly landforms on the northwest end of the Hokonui Hills and North Range in the Lumsden district. They are formed in dominantly wind deposited loess overlying greywacke and tuffaceous greywacke rocks. Soils are silty textured, well drained, with moderately deep to deep rooting depth, and moderate to moderately high plant available water. Present use is pastoral grazing with sheep and beef cattle. Climate is cool temperate with cold winters and warm summers. Soils may be seasonally dry in some years.

Soil classification

NZ Soil Classification (NZSC): Pallic Orthic Brown; soils with stones; silty
Previous NZ Genetic Classification: Yellow-brown earth.

Classification explanation

The NZSC of the Josephville soils is consistent with the previous classification. Josephville soils are well-drained Brown soils that have properties intergrading with Pallic soils, reflected in the pale yellow-brown colours (hue 2.5Y). The subsoil is well structured throughout, with no major barrier to root growth. Colluvial gravels commonly occur in the subsoil, but typically less than 35% abundance, and the texture is silt loam.

Soil phases and variants

Identified units in the Josephville soils are:

- Josephville hilly deep (JvH1): has no gravel within 90cm depth; occurs on slopes of 15–25°
- Josephville hilly moderately deep (JvH2): has gravel between 45 and 90cm depth; occurs on slopes of 15–25°
- Josephville rolling deep (JvR1): has no gravel within 90cm depth; occurs on slopes of 7–15°
- Josephville rolling moderately deep (JvR2): has gravel between 45 and 90cm depth; occurs on slopes of 7–15°
- Josephville undulating deep (JvU1): has no gravel within 90cm depth; occurs on slopes of 0–7°
- Josephville undulating moderately deep (JvU2): has gravel between 45 and 90 cm depth; occurs on slopes of 0–7°

The soil properties described in this Technical Data Sheet are based on the most common phase, Josephville hilly deep (JvH1). 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., Josephville undulating deep (JvU1).

Associated soils

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

- Mandeville: shallow soil on tuffaceous greywacke bedrock
- Wendon: shallow soil on greywacke bedrock
- Kaihiku: shallow soil forming into gravelly tuffaceous greywacke colluvium

Similar soils

Some soils that have similar properties to Josephville soils are:

- Waikaka: occurs on rolling and hilly land grading between the downlands and the hill country in eastern Southland and west Otago
- Crookston: occurs on terraces and fans from northern Southland to west Otago
- Tuturau: similar soil but has loamy silt subsoil textures; formed in near-source loess adjacent to the Mataura River, between Mataura and Waimahaka

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.

Josephville profile	Horizon	Depth (cm)	Description
No profile photo available	Ap	0–21	Dark greyish brown slightly gravelly silt loam; weak soil strength; strongly developed very fine to fine polyhedral structure; gravels angular; abundant roots
	Ap/Bw	21–32	Dull yellowish brown slightly gravelly silt loam; many worm casts; weak soil strength; strongly developed very fine to fine polyhedral structure; gravels angular; many roots
	Bw	32–58	Dull yellowish brown slightly gravelly silt loam; weak soil strength; strongly developed very fine to fine blocky structure; gravels angular; common roots
	BCt	58–90	Dull yellowish brown slightly gravelly silt loam; weak soil strength; weakly developed medium to coarse blocky structure; many clay coats; gravels angular; few roots

Key profile features

Josephville topsoils are 20–25cm deep with a strong structure. Subsoils have a moderate structure which grades to weak with depth. Subsoils commonly show accumulation of clay as coatings in the lower subsoil.

Typical physical properties

Note: values in Italics are estimates

Horizon	Depth (cm)	Bulk density	Permeability	Texture	Gravel content
Ap	0–21	Moderate	*Moderate*	Silt loam	Slightly gravelly
Ap/Bw	21–32	Moderate	*Moderate*	Silt loam	Slightly gravelly
Bw	32–58	Moderate – High	*Moderate*	Silt loam	Slightly gravelly
BCt	58–90	Moderate – High	*Moderate*	Silt loam	Slightly gravelly

Profile drainage: Well

Plant readily available water: *Moderately high*

Potential rooting depth: Deep

Rooting restriction: No major restriction

Key physical properties

Josephville soils have a deep rooting depth and moderately high plant available water. The soils have good aeration and permeability throughout the profile. Textures are heavy silt loam in all horizons, with a topsoil clay content of 30–35%. Colluvial gravel is present in all horizons to varying levels, but is generally less than 35%, except in the moderately deep phases that are either very gravelly or have bedrock between 45 and 90cm depth. The moderately deep phases will have moderate to slightly deep rooting depth, and moderate plant available water.

Typical chemical properties

Horizon	Depth (cm)	pH	P retention	CEC	BS	Ca	Mg	K	Na
Ap	0–21	Moderate	Moderate	High	Low	Moderate	Moderate	Very high	Low
Ap/Bw	21–32	Moderate	High	High	Low	Low	Moderate	Moderate	Low
Bw	32–58	Moderate	Moderate	Moderate	Low	Moderate	Moderate	Very low	Low
BCt	58–90	Moderate	Moderate	High	Moderate	High	High	Very low	Moderate

Key chemical properties

Topsoil organic matter content is about 8%; P-retention 50% and pH levels moderate (mid 5s). Cation exchange values are high and base saturation low. Available calcium, magnesium and potassium levels are moderate. Reserve phosphorus and sulphur levels are low. Micronurient 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	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 good drainage, and moderate clay and P-retention levels.
Nutrient leaching	moderate	These soils have a moderate vulnerability to leaching to groundwater. This rating reflects the good drainage, offset by the moderately high water-holding capacity. The moderately deep phases are likely to have severe vulnerability.
Topsoil erodibility by water	slight	Due to the moderate clay content, topsoil erodibility in these soils is slight. 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. The hilly to steep phases will have a nil vulnerability.

General landuse versatility ratings for Josephville 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.

JvH1 (Josephville hilly deep)
JvH2 (Josephville hilly moderately deep)

Versatility evaluation for soil JvU1, JvH2		
Landuse	**Versatility rating**	**Main limitation**
Non-arable horticulture	Unsuitable	Hilly slopes
Arable	Unsuitable	Hilly slopes
Intensive pasture	Limited	Hilly slopes
Forestry	Moderate	Hilly slopes; moderately deep soils also have restricted rooting depth.

JvU1 (Josephville undulating deep)

Versatility evaluation for soil JvU1		
Landuse	**Versatility rating**	**Main limitation**
Non-arable horticulture	High	No significant limitation
Arable	High	No significant limitation
Intensive pasture	Moderate	Vulnerability to leaching to groundwater
Forestry	High	No significant limitation

JvU2 (Josephville undulating moderately deep)

Versatility evaluation for soil JvU2		
Landuse	**Versatility rating**	**Main limitation**
Non-arable horticulture	Limited	Restricted rooting depth.
Arable	Moderate	Vulnerability to leaching to groundwater; restricted rooting depth
Intensive pasture	Moderate	Vulnerability to leaching to groundwater
Forestry	Limited	Restricted rooting depth

JvR2 (Josephville rolling moderately deep)

Versatility evaluation for soil JvR2		
Landuse	**Versatility rating**	**Main limitation**
Non-arable horticulture	Moderate	Vulnerability to leaching to groundwater; restricted rooting depth.
Arable	Limited	Rolling slopes
Intensive pasture	Moderate	Vulnerability to leaching to groundwater; rolling slopes
Forestry	Moderate	Restricted rooting depth

JvR1 (Josephville rolling deep)

Versatility evaluation for soil JvR1		
Landuse	**Versatility rating**	**Main limitation**
Non-arable horticulture	Moderate	Rolling slopes
Arable	Limited	Rolling slopes
Intensive pasture	Moderate	Vulnerability to leaching to groundwater.
Forestry	High	No significant limitation

Management practices that may improve soil versatility

- Management of nutrient applications that minimise leaching losses.

Soil profiles available for Josephville soils

Soil symbol	Profile ID	Topoclimate map sheet	Profile description available	Physical data available	Chemical data available	Profile photo available
JvH1	LP1	12	✓	✓	✓	

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