Soil name: Fairfax

Overview

Fairfax soils occupy about 2300 ha on the lower northern and eastern flanks of the Longwood Range in western Southland. These soils also occur on adjacent hilly areas to those included in the Topoclimate survey. They are formed in moderately deep to deep loess over tuffaceous greywacke and, in parts, basic volcanic rock. Fairfax soils are moderately well to well drained, with heavy silt loam to silty clay textures. Present use is pastoral grazing with sheep and some beef cattle. The climate is cool temperate with regular rainfall throughout the year.

Soil classification

NZ Soil Classification (NZSC): Acidic Firm Brown; stoneless, clayey.
Previous NZ Genetic Classification: Moderate to strongly leached yellow-brown earth.

Classification explanation

The NZSC of the Fairfax soils is consistent with the previous classification. Fairfax soils are well-drained soils with yellow-brown subsoils, and rarely suffer from drought. There is a subsoil horizon that is structureless, with slightly firm or greater soil strength that may limit root penetration, and has slow permeability that may cause waterlogging during wet periods. The soils have P-retention of 40–65%, have acidic subsoil (pH of <5.5), are typically stone free and have silty clay textures.

Soil phases and variants

Identified units in the Fairfax soils are:

- Fairfax rolling deep (FfR1): has no gravel within 90cm depth; occurs on slopes of 7–15°
- Fairfax hilly moderately deep (FfH2): has gravel or bedrock between 45 and 90cm depth; occurs on slopes of 15–25°
- Fairfax steep moderately deep (FfS2): has gravel or bedrock between 45 and 90 cm depth; occurs on slopes >25°
- Fairfax undulating deep (FfU1): has no gravel within 90cm depth; occurs on slopesof 0–7°
- Fairfax undulating moderately deep (FfU2): has gravel or bedrock 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, Fairfax rolling deep (FfR1). 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., Fairfax hilly moderately deep (FfH2).

Associated soils

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

- Pourakino: well drained, deep Brown soils with silty textures and P-retention of >80%.
- Pukemutu: poorly drained soils with a fragipan.
- Woodlands : imperfectly drained, deep Brown soil

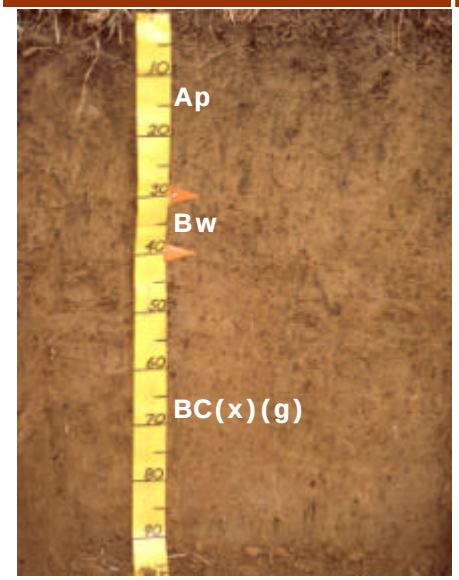
Similar soils

Some soils that have similar properties to Fairfax soils are:

- Woodlaw: formed from colluvium and weathered tuffaceous greywacke and basic volcanic rocks, with little loess influence
- Orawia: formed from loess and partly calcareous siltstones and sandstone

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.

Fairfax profile	Horizon	Depth (cm)	Description
	Ap	0–30	Greyish yellow brown silty clay; weak soil strength; strongly developed very fine to medium polyhedral structure; abundant roots
	Bw	30–40	Dull yellowish brown silty clay; few worm casts; weak soil strength; moderately developed very fine to medium polyhedral structure; abundant roots
	BC(x)(g)	40–90+	Dull brown silty clay; common dull yellow orange mottles and veins; few bright brown mottles; few worm casts; very firm soil strength; weakly developed coarse prismatic and coarse blocky structure; few roots between peds

Key profile features

Fairfax soils have a 18–30cm deep topsoil that has moderate to strongly developed structure. Subsoil structural development is moderate, grading to weakly developed with depth. Mottles can occur in the subsoil.

Typical physical properties

Note: values in Italics are estimates

Horizon	Depth (cm)	Bulk density	Permeability	Texture	Gravel content
Ap	0–30	Moderate – High	Moderate	Silty clay	Gravel free
Bw	30–40	Moderate – High	Moderate	Silty clay	Gravel free
BC(x)(g)	40–90	Moderate – High	Slow	Silty clay	Gravel free

Profile drainage: Moderately well

Plant readily available water: *Moderately high*

Potential rooting depth: Deep

Rooting restriction: Bedrock and gravel below 45cm in moderately deep phases.

Key physical properties

Fairfax soils have moderately high plant available water and a deep rooting depth, which would be restricted by bedrock in the moderately deep soils. The soils are moderately well drained, but are slowly permeable in the firm lower subsoil. Textures are silty clay, but heavy silt loams are also common. Topsoil clay content is 30–40%. Deeper soils are stone free, but the hilly land is commonly moderately deep, with bedrock between 45–90cm depth.

Typical chemical properties

Horizon	Depth (cm)	PH	P retention	CEC	BS	Ca	Mg	K	Na
Ap	0–30	Moderate	Moderate	High	Low	Low	High	Very low	Moderate
Bw	30–40	Moderate	High	Moderate	Very low	Very low	Moderate	Very low	Moderate
BC(x)(g)	40–90	Moderate	Moderate	Moderate	Very low	Very low	Moderate	Very low	Moderate

Key chemical properties

Topsoil organic matter levels are 5–7%; P-retention values 40–65% and pH moderate (mid5s). Cation exchange values are moderate to high and base saturation low. Available calcium and potassium are low and magnesium levels high. Reserves of phosphorus are also 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 good drainage and high clay content.
Nutrient leaching	moderate	These soils have a moderate vulnerability to leaching to groundwater. This rating reflects the moderately high water holding capacity, offset by the good drainage.
Topsoil erodibility by water	minimal	Due to the high clay content the topsoil erodibility of 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	slight	These soils have a slight vulnerability to waterlogging during wet periods. This rating reflects the moderate to good drainage, but slow permeability. The rolling and steep phases will have minimal vulnerability because of the slope.

General landuse versatility ratings for Fairfax 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.

FfR1 (Fairfax rolling deep)

Versatility evaluation for soil FfR1		
Landuse	**Versatility rating**	**Main limitation**
Non-arable horticulture	Moderate	Vulnerability to leaching to groundwater; risk of short-term waterlogging after heavy rain
Arable	Limited	Rolling slopes
Intensive pasture	Moderate	Vulnerability to leaching to groundwater; risk of short-term waterlogging after heavy rain.
Forestry	High	Few limitations

FfU1 (Fairfax undulating deep)

Versatility evaluation for soil FfU1		
Landuse	**Versatility rating**	**Main limitation**
Non-arable horticulture	Moderate	Vulnerability to leaching to groundwater; risk of short-term waterlogging after heavy rain.
Arable	Moderate	Vulnerability to leaching to groundwater; risk of short-term waterlogging after heavy rain.
Intensive pasture	Moderate	Vulnerability to leaching to groundwater; risk of short-term waterlogging after heavy rain.
Forestry	High	few limitations

FfU2 (Fairfax undulating moderately deep)

Versatility evaluation for soil FfU2		
Landuse	**Versatility rating**	**Main limitation**
Non-arable horticulture	Limited	Restricted rooting depth
Arable	Moderate	Vulnerability to leaching to groundwater; risk of short-term waterlogging after heavy rain
Intensive pasture	Moderate	Vulnerability to leaching to groundwater; risk of short-term waterlogging after heavy rain.
Forestry	Limited	Restricted rooting depth

FfR2 (Fairfax rolling moderately deep)

Versatility evaluation for soil FfR2		
Landuse	**Versatility rating**	**Main limitation**
Non-arable horticulture	Limited	Restricted rooting depth
Arable	Limited	Rolling slopes
Intensive pasture	Moderate	Vulnerability to leaching to groundwater
Forestry	Limited	Restricted rooting depth

FfS2 (Fairfax steep moderately deep)

Versatility evaluation for soil FfS2		
Landuse	**Versatility rating**	**Main limitation**
Non-arable horticulture	Unsuitable	Steep slopes
Arable	Unsuitable	Steep slopes
Intensive pasture	Limited	Steep slopes
Forestry	Limited	Steep slopes; restricted rooting depth

Management practices that may improve soil versatility

- Installation and maintenance of subsurface mole and tile drains on flatter terrain will reduce the risk of short-term waterlogging
- Management of nutrient applications so as to minimise leaching losses

Soil profiles available for Fairfax soils

Soil symbol	Profile ID	Topoclimate map sheet	Profile description available	Physical data available	Chemical data available	Profile photo available
FfU1	ONT8	25	✓	✓	✓	✓
FfU1	ONT4	25	✓	✓	✓	✓
FfU2	ONT9	25	✓	✓	✓	✓
FfR1	178/71/10	25	✓			
FfH2	168/75/23	8	✓			
FfU1	168/75/34	25	✓			

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