

Soil name: **Waihoaka**

Overview

Waihoaka soils occupy about 3,500 ha on dissected lower slopes of the Longwood Range in western Southland and Bluff Hill and are likely to cover adjacent areas not surveyed by Topoclimate. They are formed into loess. Waihoaka soils are well to imperfectly drained soils, with high available water capacity and silty textures. The soils show strong leaching, with high P-retention and are strongly acidic. The podzol features are likely to be less evident in areas that have significant development inputs. Present use is forestry with pastoral grazing with sheep and beef cattle on cleared areas. Climate is cool, with high rainfall throughout the year. Soils rarely dry out.

Physical properties

Waihoaka soils have a deep rooting depth and very high plant available water, although the subsoil acidity and aluminium toxicity may be limiting (particularly on less developed sites).

Soils are well to imperfectly drained, with slowly permeable subsoils that may cause short-term waterlogging after heavy rain. Textures are silt loams throughout the profile, but topsoil texture may be slightly peaty to peaty where peat is present. Topsoil clay content is about 15–25%. No stones or gravels occur in these soils.



Waihoaka profile

Fertility properties

Topsoil organic matter levels are variable depending on the occurrence of peat and range from 15 to >50%; P-retention values 38–50% and pH low to moderate (mid 4s to mid 5s). Cation exchange values are moderate and base saturation high. Available calcium levels are moderate, magnesium levels high and potassium levels low. Soil reserve phosphorus levels are low. Micronutrient levels are generally adequate.

Associated and similar soils

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

- Orepuki: Shallow soil formed into thin loess overlying norite and tuffaceous greywacke bedrock
- Te Waewae: non-podzolised well to imperfectly drained Brown soil formed on marine terraces between Riverton and Tuatapere
- Colac: very poorly drained soil formed in deep peat

Some soils that have similar properties to Waihoaka soils are:

- Ashers: Podzol soil formed into deep loess on marine terraces of the Southland plain
- Traill: Podzol soil formed in moderately deep mixed loess and weathered colluvium overlying basic plutonic and basic volcanic bedrock

Sustainable management indicators

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 drainage, clay content and P-retention, offset by the high organic matter content. Soils with very high organic matter content will have slight to minimal vulnerability.
Nutrient leaching	moderate	These soils have a moderate vulnerability to leaching to groundwater. This rating reflects the moderate drainage, offset by the very high water-holding capacity and slow subsoil permeability.
Topsoil erodibility by water	minimal	Due to the high organic matter content, topsoil erodibility in these soils is minimal. 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. The hilly and steep phases will have nil vulnerability.

General landuse versatility ratings

Note: The versatility ratings in the table below are indicative of the major limitations for semi-intensive to intensive land use. 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.

WjH1 (Waihoaka hilly deep): hilly slopes make this phase unsuitable for non-arable horticulture and arable landuse, of limited versatility for intensive pasture and moderate versatility for forestry.

WjH2 (Waihoaka hilly moderately deep): as above, but limited versatility for forestry due to restricted rooting depth

WjS1 (Waihoaka steep deep): Unsuitable for non-arable horticulture and arable landuses, and limited versatility for intensive pasture and forestry, due to steep slopes.

WjU1 (Waihoaka undulating deep)

Versatility evaluation for soil WjU1		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Moderate	Risk of short-term waterlogging after heavy rain
Arable	Moderate	Vulnerability to topsoil structural degradation by cultivation and compaction; risk of short-term waterlogging after heavy rain.
Intensive pasture	Moderate	Vulnerability to leaching to ground water; subsoil acidity.
Forestry	High	Few limitations

WjR1 (Waihoaka rolling deep)

Versatility evaluation for soil WjR1		
Landuse	Versatility rating	Main limitation
Non-arable horticulture	Moderate	Rolling slopes; risk of short-term waterlogging after heavy rain
Arable	Limited	Rolling slopes
Intensive pasture	Moderate	Vulnerability to leaching to ground water; subsoil acidity.
Forestry	High	Few limitations

WjR2 (Waihoaka rolling moderately deep): limited versatility for non-arable horticulture due to restricted rooting depth and for arable landuse due to rolling slopes; moderate versatility for intensive pasture (limitations of vulnerability to leaching and subsoil acidity) and forestry (restricted rooting depth).

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 and maintenance of subsurface mole and tile drains will reduce the incidence of short-term waterlogging.
- Management of fertiliser nutrient applications to minimise leaching losses

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