Soil name: Waiarikiki

Overview

Waiarikiki soils occur on rolling to steep slopes of the Hokonui Hills and the Kaiwera district, in upland areas above 300m altitude. These soils also occur on areas of south Otago outside the Topoclimate survey area. They are formed into mixed loess and weathered tuffaceous greywacke colluvium. Soils are well drained, moderately deep, with moderately high plant available water, and colluvial gravels occur throughout the soil, but are generally only moderately gravelly (<35%) above 45cm depth. Waiarikiki soils are strongly leached, with P-retention of >85% and pH of <5.5 typical in the subsoil. Present use is pastoral grazing with sheep and beef cattle. Climate is cool temperate with soils exposed to prevailing southerly winds. Regular rain occurs and soils rarely dry out.

Soil classification

NZ Soil Classification (NZSC):	Acidic Allophanic Brown; soils with stones; silty.
Previous NZ Genetic Classification:	Very strongly leached upland yellow-brown earth.

Classification explanation

The NZSC of Waiarikiki soils is consistent with the previous classification. They are strongly leached soils with yellow-brown colours, P-retention of >85% and pH of less than 5.5 in the subsoil. Waiarikiki soils have gravels throughout the profile, but there is typically no horizon with >35% gravel within 45cm depth, and textures are typically silt loam.

Soil phases and variants

Identified units in the Waiarikiki soils are:

- Waiarikiki rolling moderately deep (YrR2): has gravel between 45 and 90cm depth; occurs on slopes of 7–15°
- Waiarikiki hilly moderately deep (YrH2): has gravel between 45 and 90cm depth; occurs on slopes of 15–25°

The soil properties described in this Technical Data Sheet are based on the most common phase, Waiarikiki rolling moderately deep (YrR2). 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., Waiarikiki hilly moderately deep (YrH2).

Associated soils

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

- Otaraia: moderately leached Brown soil formed in deep loess
- Rosemarkie: strongly leached upland Brown soil formed in deep loess
- Pukerau: strongly leached shallow soil onto tuffaceous greywacke bedrock within 45cm depth

Similar soils

Some soils that have similar properties to Waiarikiki soils are:

- Fortification: moderately deep soil with tuffaceous greywacke bedrock between 45 and 90cm depth
- Kaiwera: strongly leached shallow Brown soil with >35% gravels within 45cm depth
- Venlaw: strongly leached Allophanic soil; upland equivalent of the Kaiwera soil

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.

Waiarikiki profile	Horizon	Depth (cm)	Description
No profile photo available	Ap	0–20	Dark brown silt loam; weak soil strength; strongly developed fine polyhedral structure; many roots.
	Ap/Bw	20–27	Yellowish brown slightly gravelly silt loam; many wormcasts; weak soil strength; moderately developed fine blocky and polyhedral structure; many roots.
	Bw	27–38	Yellowish brown moderately gravelly clay loam; weak soil strength; weakly developed medium blocky breaking to fine blocky structure; gravels are angular and moderately weathered; few roots.
	BC1	38–60	Light olive-brown moderately gravelly silt loam; weak soil strength; weakly developed fine blocky structure; gravels are angular and moderately weathered; few roots.
	BC2	60–90+	Olive-yellow moderately gravelly clay loam; weak soil strength; weakly developed fine to medium blocky structure; gravels are angular and moderately weathered; no roots.

Key profile features

Waiarikiki topsoils are 15–25cm deep with a strongly developed structure. Subsoil structure is weakly developed.

Typical physical properties

Note: values in Italics are estimates

Horizon	Depth (cm)	Bulk density	Permeability	Texture	Gravel content
Ap	0–20	Low – Moderate	*Moderate*	Silt loam	Gravel free
Ap/Bw	20–27	Low – Moderate	*Moderate*	Silt loam	Slightly gravelly
Bw	27–38	Moderate	*Moderate*	Clay loam	Moderately gravelly
BC1	38–60	Moderate	*Moderate*	Silt loam	Moderately gravelly
BC2	60–90+	Moderate – High	*Moderate*	Clay loam	Moderately gravelly

Profile drainage: Well
Plant readily available water: *Moderately high*
Potential rooting depth: Moderately deep
Rooting restriction: Subsoil gravels in some soils

Key physical properties

Waiarikiki soils have a moderately deep to deep (60–90cm) rooting depth, with moderately high plant available water, depending on the amount of gravels present. The soils are well drained, with moderate permeability, and aeration should be good. Textures are typically silt loams to clay loams, through some soils are more clayey with silty clay texture. Topsoil clay content is about 30–40%. Gravel occurs throughout the soil, but they are generally only moderately gravelly (<35%) above 45cm depth. Bedrock generally occurs below 90cm depth.

Typical chemical properties

Horizon	Depth (cm)	pH	P retention	CEC	BS	Ca	Mg	K	Na
Ap	0–20	Moderate	High	High	Very low	Very low	Low	Low	Low
Ap/Bw	20–27	Low	High	Moderate	Very low	Very low	Very low	Very low	Low
Bw	27–38	Low	High	Moderate	Very low	Very low	Very low	Very low	Very low
BC1	38–60	Moderate	High	Moderate	Very low	Very low	Very low	Very low	Very low
BC2	60–90+	Moderate	High	Moderate	Very low	Very low	Very low	Very low	Very low

Additional chemical properties (as a profile average)
Reserve potassium (Kc) values are low and sulphate sulphur levels high in the sub soil.

Key chemical properties

Topsoil organic matter content is 9–12%; P-retention above 80% and pH moderate (low–mid 5s). Cation exchange values are high to moderate and base saturation levels very low. Available calcium, magnesium and potassium levels are low to very low. Reserve phosphorus levels are low. Micronutrient 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	minimal	These soils have a minimal vulnerability to structural degradation by long-term cultivation, or compaction by heavy stocking and vehicles. This rating reflects the well drained nature of the soil and the moderate to high clay content, organic matter and high P-retention.
Nutrient leaching	severe	These soils have a severe vulnerability to leaching to groundwater. This rating reflects the well drained nature of the soil and moderate permeability.
Topsoil erodibility by water	minimal	Due to the moderate to high clay and 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	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 well drained nature of the soil and moderate permeability.

General landuse versatility ratings for Waiarikiki 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.

YrR2 (Waiarikiki rolling moderately deep)

Versatility evaluation for soil YrR2		
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.

YrH2 (Waiarikiki hilly moderately deep)

Versatility evaluation for soil YrH2		
Landuse	**Versatility rating**	**Main limitation**
Non-arable horticulture	Unsuitable	Hilly slopes
Arable	Unsuitable	Hilly slopes
Intensive pasture	Limited	Hilly slopes
Forestry	Moderate	Hilly slopes; 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 should be minimal during these periods.
- Carefully management of nutrient applications to minimise leaching

Soil profiles available for Waiarikiki soils

Soil symbol	Profile ID	Topoclimate map sheet	Profile description available	Physical data available	Chemical data available	Profile photo available
YrU2	K1122R	42	☒	☒	☒	☐
YrR2	K1114	42	☒	☒	☒	☐

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Crops for Southland
PO Box 1306, Invercargill. New Zealand

www.cropssouthland.co.nz