Soil name: Charlton

Overview

Charlton soils occupy about 2300ha on the slowly accumulating floodplains and low terraces in the lower Mataura (south of Gore) and Pomahaka river valley (east of the Blue Mountains). They are formed into moderately deep to deep fine alluvium over gravel. These soils are imperfectly drained, silty textured, and have good rooting depth. At present they are used for intensive sheep, dairy and deer grazing with occasional cropping. Regular rain occurs throughout the year and soils seldom dry out.

Soil classification

NZ Soil Classification (NZSC):	Mottled-pallic Orthic Brown; stoneless, silty
Previous NZ Genetic Classification:	Recent soil

Classification explanation

Charlton soils were previously classified as Recent soils, but were reclassified as Brown soils due to the presence of a weathered and well structured B horizon. Subsoils have no major rooting barrier, and typically have light silt loam textures.

Soil phases and variants

Identified units in the Charlton soils are:

- Charlton undulating deep (CaU1): has no gravel within 90cm depth; occurs on slopes of 0–7°
- Charlton undulating moderately deep (CaU2): has gravel between 45 and 90cm; occurs on slopes of 0–7°

The soil properties described in this Technical Data Sheet are based on the most common phase, Charlton undulating deep (CaU1). Values for other phases and variants can be taken as being similar. Where they differ significantly they are recorded with a separate versatility rating.

Associated soils

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

- Mataura: well drained, deep or moderately deep recent soils found on the accumulating floodplain
- Gore: well drained stony soils found on similar landforms
- Fleming: poorly drained due to water perching on fragipan
- Jacobstown: poorly drained due to high groundwater; silty textures.

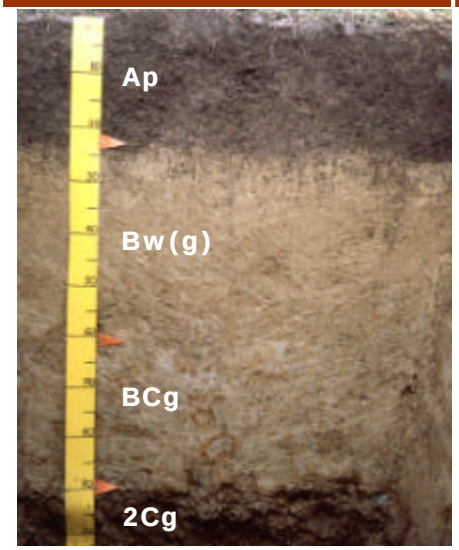
Similar soils

Some soils that have similar properties to Charlton soils are:

- Ardlussa: well drained equivalent of the Charlton soils. Ardlussa imperfectly drained variant should be included in the Charlton series
- Popotunoa: well drained, deep to moderately deep Pallic soil; occurs on equivalent surfaces to the Charlton series in the lower Pomahaka river
- Northhope: imperfectly drained, deep to moderately deep Pallic soil; occurs on equivalent surfaces to the Charlton series in the lower Oreti river; has heavy silt loam texture, and shows more strongly developed subsoil structure

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.

Charlton profile	Horizon	Depth (cm)	Description
	Ap	0–22	Greyish yellow-brown silt loam; weak soil strength; moderately developed very fine to medium polyhedral structure; many roots.
	Bw(g)	22–60	Dull yellow-orange silt loam; many dull yellow and common greyish yellow mottles; few worm casts; slightly firm soil strength; moderately developed medium to coarse prismatic and polyhedral structure; common roots.
	BCg	60–90	Greyish yellow loamy silt; common greyish yellow and common brown mottles; firm soil strength; weakly developed extremely coarse prismatic structure; few roots between prisms.
	2Cg	90+	On very gravelly sand

Key profile features

Charlton soils have a topsoil 20–25 cm deep, with moderately developed structure. Subsoil structural development is also moderate but becomes weak with depth. The presence of mottles in the upper subsoil indicates the imperfect drainage of these soils.

Typical physical properties

Note: values in Italics are estimates

Horizon	Depth (cm)	Bulk density	Permeability	Texture	Gravel content
Ap	0–22	Low – Moderate	Moderate	Silt loam	Gravel free
Bw(g)	22–60	Moderate – High	Moderate	Silt loam	Gravel free
BCg	60–90	High	Slow	Loamy silt	Gravel free
2Cg	90+	—	—	—	—

Profile drainage: Imperfect

Plant readily available water: Moderately high

Potential rooting depth: Deep

Rooting restriction: no major restriction

Key physical properties

Charlton soils have a deep potential rooting depth with high available water. The soils are imperfectly drained, with slowly permeable subsoils that may limit aeration during wet periods. Topsoil textures are light silt loams with loamy silts in the subsoil. Sand layers can also occur at lower depths. Topsoil clay content is 20–25%. The soils are typically stone-free, but the moderately deep phase typically has gravels between 45 and 90cm depth that may reduce the rooting depth and water holding capacity.

Typical chemical properties

Horizon	Depth (cm)	pH	P retention	CEC	BS	Ca	Mg	K	Na
Ap	0–22	Moderate	Moderate	Moderate	High	High	Moderate	Very low	Low
Bw(g)	22–60	Moderate	Moderate	Moderate	Low	Low	Very low	Very low	Low
BCg	60–90	Moderate	Low	Low	Low	Low	Very low	Very low	Low
2Cg	90+	—	—	—	—	—	—	—	—

Key chemical properties

Topsoil organic matter levels are 6–7%; P-retention 20–30%; pH values are moderate (mid–high5s). Cation exchange and base saturation values are moderate to high in the topsoil but low in the subsoil. Available calcium and magnesium levels are moderate to high, but potassium and sodium levels are low. Natural levels of phosphorus and sulphur are 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	severe	These soils have a severe vulnerability to structural degradation by long-term cultivation, or compaction by heavy stocking and vehicles. This rating reflects the imperfect drainage, low P-retention and light silt loam texture.
Nutrient leaching	slight	These soils have a moderate vulnerability to leaching to groundwater. This rating reflects the high water holding capacity and slow subsoil permeability. Moderately deep phases are likely to have a moderate vulnerability.
Topsoil erodibility by water	slight	Due to the good organic matter levels, the topsoil erodibility of these soils is slight. 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	moderate	These soils have a moderate vulnerability to waterlogging during wet periods. This rating reflects the imperfect drainage and slow permeability.

General landuse versatility ratings for Charlton 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.

CaU1 (Charlton undulating deep)
CaU2 (Charlton undulating moderately deep)

Versatility evaluation for soil CaU1, CaU2		
Landuse	**Versatility rating**	**Main limitation**
Non-arable horticulture	Moderate	Inadequate aeration during wet periods; vulnerability to topsoil structural degradation by cultivation and compaction
Arable	Moderate	Inadequate aeration during wet periods; vulnerability to topsoil to structural degradation by cultivation and compaction.
Intensive pasture	Moderate	Inadequate aeration during wet periods: vulnerability to leaching to groundwater
Forestry	Limited	Potential flood risk

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.
- Installation of subsurface mole and tile drains will reduce the risk of short-term waterlogging.

Soil profiles available for Charlton soils

Soil symbol	Profile ID	Topoclimate map sheet	Profile description available	Physical data available	Chemical data available	Profile photo available
CaU1	ET2	28a	✓	✓	✓	✓
CaU1	GMT7	26	✓	✓	✓	✓

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