

CAL Callawonga Land System

Moderate to steep slopes flanking the Parawa Plateau

Area: 161.6 km²

Annual rainfall: 555 – 890 mm average

Geology: The land is underlain by basement rocks of several formations of the Kanmantoo Group. These include metasandstones of the Backstairs Passage Formation, metasiltsstones, phyllites and low grade schists of the Strangway Hill Formation, and metasiltsstones and phyllites of the Tappanappa Formation. At the upslope margins of the system (adjacent to the Parawa Land System), the rocks become increasingly deeply weathered, and grade on isolated summit surfaces to lateritic materials. There are minor deposits of locally derived alluvium, and at least one remnant deposit of sandy clay typical of the glacial valleys to the north.

Topography: The Land System includes the moderately steep to steep slopes surrounding the Parawa Plateau. To the north and east, the slopes of the System are the sides of an ancient glacial valley. To the south, the slopes drop away even more steeply to the frontal slopes of the Deep Creek Land System. On the western end, the boundary is marked by the transition to the different geological materials of the Delamere Land System. The slopes of the Callawonga Land System are moderately steep to steep (90% of the land is steeper than 18% slope). The slopes are deeply dissected by water courses flowing away from the plateau surface. These drainage depressions are often swampy.

Elevation: 100 - 340 m

Relief: Up to 120 m

Soils: The majority of soils are moderately deep over weathering basement rock. Surface textures vary from sandy loams to clay loams, depending on the coarseness of the parent rock. Subsoils are usually clayey and friable, but some are hard and coarsely structured. Shallow stony soils are common on steep rocky slopes. Deep soils over highly weathered rocks are common on upper slopes and crests. Deep soils over younger unconsolidated alluvial sediments are minor.

Main soils

Soils formed on fresh weathering basement rock

- K4** Sandy loam over brown clay
- L1a** Shallow stony loam
- L1b** Shallow stony sandy loam
- K2a** Loam over brown clay
- K1a** Gradational loam

Minor soils

Soils formed on fresh weathering basement rock

- K2b** Loam over red clay
- K3** Sandy loam over red clay
- L1c** Shallow stony loam or sandy loam (Tappanappa rocks)

Soils formed on deeply weathered basement rock

- J2** Ironstone soil
- K1b** Gradational loam



- K4/J2** Sandy loam over brown clay
Soils formed on glacial valley sediments
- F1b** Sandy loam over brown clay
- G3** Thick sand over clay
Soils formed on alluvial sediments
- F1a** Sandy loam to clay loam over brown clay
- N3** Dark wet clay loam
- N1** Peat

Main features: The Callawonga Land System is an "apron" of moderately steep to steep slopes surrounding the Parawa Plateau (Parawa Land System). The underlying rocks vary from metamorphosed sandstones to metamorphosed siltstones, so the soils have surface textures ranging from sandy loams to clay loams. Most have friable to firm yellowish brown to red clayey subsoils. Natural fertility is moderately low to moderately high, and all soils are acidic. Drainage is generally good, but some slightly sodic soils have impeded drainage. 90% of the land is too steep for cultivation, but there is scope for perennial horticulture and viticulture, where water is available and exposure is not a problem. Most of the cleared land is presently used for grazing. Salinity is a potential problem in the east, where the underlying Tappanappa rocks often carry saline ground water.

Soil Landscape Unit summary: 15 Soil Landscape Units (SLUs) mapped in the Callawonga Land System:

SLU	% of area	Main features #
AiD	4.4	<p>Steep rocky valleys cut back into the more moderate south facing slopes of the System. These valleys are upslope extensions of the adjacent Deep Creek Land System. Parent rocks are metasandstones of the Backstairs Passage Formation and metasiltsstones of the Tappanappa Formation. The slopes are rounded at the tops with gradients of about 15%, but become very steep on mid and lower slopes (up to 100%). Rock outcrop is extensive. The soils are generally shallow and stony with sandy or loamy textures, depending on the grain size of their parent rocks. Subsoil clays may occur in places, the colour and structure varying according to rock type.</p> <p>Main soils: <u>Shallow stony sandy loam - L1b</u> (E) <u>Shallow stony loam - L1c</u> (C) <u>Sandy loam over brown clay - K4</u> (L) <u>Loam over red clay - K2b</u> (L)</p> <p>This land is too steep and rocky, and the soils too shallow, for any uses other than light grazing.</p>
AjC AjD	11.7 4.8	<p>Moderately steep to steep escarpment slopes bordering ancient glacial valleys, and rolling low hills in the Delamere - Silverton area with steeper slopes associated with incised drainage systems. Parent rocks are metasiltsstones, phyllites and low grade schists of the Strangway Hill Formation. Slopes range from 18% to 50% and relief is between 50 m and 100 m.</p> <p>AjC Rolling low hills and moderately inclined slopes with relief to 100 m and slopes of 18-30%.</p> <p>AjD Steep escarpment or dissection slopes with relief to 120 m and slopes of 30-50%. The soils are shallow to moderately deep and are almost always formed in weathering rock at depths of 150 cm and shallower. Surfaces are usually loams overlying red or mottled brown clay subsoils. Subsoils may be absent from soils on steeper slopes, where the loamy surface grades directly to rock.</p> <p>Main soils: <u>Loam over brown clay - K2a</u> (E) <u>Loam over red clay - K2b</u> (E) <u>Shallow stony loam - L1a</u> (L) on steeper slopes</p> <p>These soils are moderately deep and inherently fertile. Drainage may be impeded by heavy clay subsoils and most soils are acidic, but they are potentially productive. The gentler slopes of AjC have some horticultural potential, provided that they are not excessively exposed.</p>
AkC	57.3	Moderately steep to steep escarpment slopes bounding the Parawa Plateau and the



AkD AkF	10.1 0.2	<p>glacial valley to the north. This feature extends from Back Valley through Willow Creek and Mt. Robinson to Baker Knob in the west. The landscape also includes the rolling to steep low hills and dissection slopes of the plateau from Silverton to Deep Creek and Mt Robinson. Parent rocks are metasandstones and metasiltsstones of the Backstairs Passage Formation. Slopes range from 15% to 80% generally, although there are some precipitous slopes on the escarpment west of Hay Flat. Water courses are very well defined in narrow channels. Rock outcrop and surface stone are limited to extensive, depending on slope.</p> <p>AkC Upper escarpment slopes and rolling low hills with relief to 70 m and slopes of 15-30%.</p> <p>AkD Rocky, steep escarpment and stream dissection slopes with relief to 120 m and slopes of 30-80%.</p> <p>AkF Precipitous rocky escarpment slopes to 100 m high with slopes of 80-200%. The soils are mostly shallow and stony, with hard rock at 50 cm or less. However, there are some deeper soils with yellow or orange friable clay subsoils forming from weathering rock. Main soils: <u>Sandy loam over brown clay</u> - K4 (E) <u>Gradational loam</u> - K1a (E) <u>Shallow stony loam</u> - L1a (L) <u>Shallow stony sandy loam</u> - L1b (L)</p> <p>The soils on these slopes are moderately fertile, although acidic, well drained and have reasonable water holding capacity (except the shallower forms on steep slopes). There are minor saline seepages in some water courses. Most of the land is used for grazing, although there are significant pine plantations. Where water is available and exposure is not a problem, horticultural potential is high.</p>
AoC	0.8	<p>Moderately steep slopes formed on metasiltsstones and phyllites of the Tappanappa Formation. Slopes range from 10% on upper slopes to 30%. There is minor rock outcrop and up to 10% surface stone. The predominant soils are loamy with characteristic red clay subsoils. Shallow forms without clay subsoils occur on steeper slopes. Soils typical of adjacent landscapes occur on sandier rock strata.</p> <p>Main soils: <u>Loam over red clay</u> - K2b (V) <u>Shallow stony loam</u> - L1c (C) <u>Gradational loam</u> - K1a (M) <u>Sandy loam over red clay</u> - K3 (M)</p> <p>These soils are fertile and mostly moderately deep. Salinity caused by rising groundwater (saline in this geological formation), may become a problem in creeklines in future.</p>
BoD	1.7	<p>Gently rolling low hills with up to 50 m relief and slopes of 10-18% underlain by metasiltsstones, phyllites and low grade schists of the Strangway Hill Formation. Soils are deep to moderately deep over weathering rock with loamy surfaces.</p> <p>Main soils: <u>Loam over brown clay</u> - K2a (E) <u>Loam over red clay</u> - K2b (E)</p> <p>These soils are moderately deep and inherently fertile. Drainage may be impeded by heavy clay subsoils and most soils are acidic. They are potentially productive, with some horticultural potential, provided that they are not excessively exposed.</p>
BpD	0.8	<p>Moderate slopes formed on metasiltsstones and phyllites of the Tappanappa Formation. Slopes range from 10% to 18%. Outcropping rock is rare and there is up to 5% surface stone in places. The predominant soils are loamy with characteristic red clay subsoils.</p> <p>Main soils: <u>Loam over red clay</u> - K2b (V) <u>Gradational loam</u> - K1a (M) <u>Sandy loam over brown clay</u> - K4 (M) <u>Shallow stony loam</u> - L1c (M)</p> <p>These soils are moderately deep to deep, inherently fertile and moderately well drained. However, saline water tables which are associated with this geological formation should be monitored.</p>
CND	3.2	<p>Gently rolling slopes formed on metasandstones and metasiltsstones, often highly weathered and kaolinized. Slopes range from 10% to 18%. Drainage depressions are well defined and commonly swampy. There is minor rock outcrop and surface stone. The soils are moderately deep to deep. They have sandy loam to clay loam surfaces with variable, and often considerable ironstone gravel. Subsoils are clayey, yellow brown to red in colour, and variably structured. Ironstone may also occur in subsoils.</p> <p>Main soils: <u>Sandy loam over brown clay</u> - K4 & K4/J2 (E) on freshly or highly weathered sandstones <u>Gradational loam</u> - K1a/K1b (E) on freshly or highly weathered metasiltsstones <u>Ironstone soil</u> - J2 (E)</p> <p>These soils have moderately low (sandy types) to moderately high (loamy types) fertility,</p>



		and are mostly well to moderately well drained. The ironstone soils are least fertile (with high phosphate fixation capacity), and most susceptible to waterlogging. All soils are prone to acidification. All the land is potentially arable, but little is cropped due to the combination of moderately high erosion potential, high rainfall, cool maturation conditions and exposure. Pasture productivity is potentially high, and there is some scope for irrigated perennial horticulture.
FdD	0.1	Abrupt crest with slopes of 15-25%, formed on a remnant of lateritized siltstone. The soils are formed on deeply weathered and kaolinized rock. Main soils: <u>Sandy loam over brown clay</u> on deeply weathered rock - K4/J2 (E) <u>Ironstone soil</u> - J2 (E) This minor feature is uncleared, and has no agricultural value.
FfZ	1.2	Rounded summit surfaces formed on metasiltsstones and metasandstones. These surfaces are the remnants of an ancient plain, now largely eroded away. The underlying rocks are soft, kaolinized and lateritized, reflecting a long period of weathering. Slopes range from 2% on broader crests to 20% on steeper side slopes, but are usually less than 10%. The landscapes are usually long and narrow as they follow the ridges of the hills. Surface ironstone is common. The soils are deep over soft kaolinized rocks. Surfaces are sandy to loamy with abundant ironstone gravel. Subsoils are clayey, yellow and brown in colour, and poorly structured. Ironstone boulders often occur in soil profiles. Main soils: <u>Ironstone soil</u> - J2 (E) <u>Sandy loam over brown clay</u> - K4/J2 (E) on highly weathered metasandstones <u>Gradational loam</u> - K1b (L) on highly weathered metasiltsstones These soils have moderately low natural fertility (partly due to ironstone induced phosphate fixation and partly due to degree of weathering and leaching). They are deep but often imperfectly drained. All the land is on highly exposed crests. Although productive pasture soils, potential for more intensive uses is limited.
LIE	2.7	Swamps in narrow drainage depressions. Underlying sediments are alluvial silts and clays derived from the localized erosion and redeposition of sediments from adjacent slopes. Medium to fine textured surfaces are usual, with mottled heavy clay subsoils. Most areas have tea tree thickets. Main soils: <u>Dark wet clay loam</u> - N3 (E) <u>Sandy loam to clay loam over brown clay</u> - F1a (E) <u>Peat</u> - N1 (L) These flats are too wet for any uses other than opportunistic grazing. When cleared, water courses are susceptible to erosion.
LsE	0.7	Narrow drainage depressions formed on medium to fine grained sediments. This land is topographically similar to LIE, but less swampy, although still subject to waterlogging. Main soils: <u>Sandy loam to clay loam over brown clay</u> - F1a (V) <u>Dark wet clay loam</u> - N3 (L) Although deep and fertile, these soils are generally too wet for uses other than grazing. Water courses are susceptible to erosion.
PuF	0.3	Moderate slopes formed on a remnant glacial valley deposit of unconsolidated sandy clay. The soils are light textured, with heavy clay subsoils. Main soils: <u>Sandy loam over brown clay</u> - F1b (E) <u>Thick sand over clay</u> - G3 (E) These soils are infertile, acidic and imperfectly drained due to their tight clayey subsoils.

PROPORTION codes assigned to soils within Soil Landscape Units (SLU):

- (D) Dominant in extent (>90% of SLU)
- (V) Very extensive in extent (60–90% of SLU)
- (E) Extensive in extent (30–60% of SLU)
- (C) Common in extent (20–30% of SLU)
- (L) Limited in extent (10–20% of SLU)
- (M) Minor in extent (<10% of SLU)



Detailed soil profile descriptions:

- F1a** Sandy loam to clay loam over brown clay (Bleached, Eutrophic, Brown Chromosol)
25 - 55 cm hard grey brown loamy sand to sandy clay loam with a strongly bleached A2 horizon, overlying a yellowish brown, grey and red mottled clay with strong coarse blocky structure, grading to fine grained alluvium.
- F1b** Sandy loam over brown clay (Bleached-Mottled, Eutrophic, Brown Kurosol)
20 - 30 cm grey brown loamy sand to light sandy clay loam with a bleached A2 horizon, overlying a yellow brown, grey and red mottled clay with coarse prismatic structure, grading to grey and yellow mottled sandy clay from 100 cm.
- G3** Thick sand over clay (Bleached, Brown Kurosol)
35 - 95 cm soft sand with a bleached A2 layer, over a brown, red and grey mottled medium to heavy acidic clay, continuing below 100 cm.
- J2** Ironstone soil (Ferric, Eutrophic, Brown Kandosol)
10 - 30 cm grey brown sandy loam to sandy clay loam with a paler coloured and ironstone gravelly A2 horizon, overlying an ironstone gravelly yellow sandy clay loam grading to a yellowish brown and red clay with variable ironstone fragments, and becoming red and grey mottled from about 70 cm.
- K1a** Gradational loam (Eutrophic, Brown Dermosol)
15 - 40 cm dark brown loam to clay loam with a paler brown gravelly clay loam A2 horizon, grading to a yellowish red to orange clay with strong polyhedral structure and increasing rock fragments with depth. Weathering metamorphosed siltstone or phyllite occurs at about 100 cm.
- K1b** Gradational loam (Eutrophic, Brown Dermosol)
15 - 40 cm dark brown loam to clay loam with a paler brown gravelly clay loam A2 horizon, grading to a yellowish red to orange clay with strong polyhedral structure over soft kaolinitic highly weathered metamorphosed siltstone or phyllite, continuing below 200 cm.
- K2a** Loam over brown clay (Bleached-Mottled, Eutrophic, Brown Chromosol)
30 - 55 cm dark grey loam to clay loam with a paler and gravelly A2 horizon, overlying a dark brown, yellowish brown and red mottled clay with strong blocky structure, and increasing rock fragments with depth. The clay grades to weathering metasilstone or phyllite at about 100 cm.
- K2b** Loam over red clay (Eutrophic, Red Chromosol)
20 - 50 cm dark brown loam to clay loam with a paler coloured and gravelly A2 horizon, overlying a dark reddish brown to brown heavy clay with strong blocky structure, grading to weathering metamorphosed siltstone or schist, usually deeper than 100 cm.
- K3** Sandy loam over red clay (Eutrophic, Brown Chromosol)
20 - 40 cm brown loamy sand to fine sandy loam with a bleached and gravelly A2 horizon, overlying a reddish brown and brown mottled firm sandy to heavy clay grading to weathering metagreywacke by 100 cm.
- K4** Sandy loam over brown clay (Bleached, Eutrophic, Brown Kurosol)
10 - 35 cm loamy sand to sandy clay loam with a gravelly and bleached A2 horizon, overlying a yellow brown or brown well structured clay grading to weathering metasandstone by 100 cm.
- K4/J2** Sandy loam over brown clay (Bleached, Eutrophic, Brown Kurosol)
15 - 35 cm grey brown loamy sand to sandy clay loam with a gravelly and bleached A2 horizon, overlying a yellow brown or brown well structured clay grading to highly weathered kaolinized metasandstone.



- L1a** Shallow stony loam (Paralithic, Leptic Tenosol)
20 - 45 cm dark brown loam with a paler brown clay loam A2 horizon containing up to 50% rock fragments, grading to metamorphosed siltstone or phyllite by 50 cm.
- L1b** Shallow stony sandy loam (Paralithic, Bleached-Leptic Tenosol)
30 - 55 cm stony sandy loam with a very stony bleached A2 horizon, grading to weathering metasandstone.
- L1c** Shallow stony loam (Paralithic, Leptic Tenosol)
Up to 50 cm dark brown to dark reddish brown weakly granular sandy loam to loam, paler coloured and with increasing gravel with depth, grading to weathering Tappanappa Formation rocks, becoming hard by 60 cm.
- N1** Peat (Acidic, Hemic Organosol)
Deep black rotted organic matter or highly organic loam, seasonally or permanently saturated.
- N3** Dark wet clay loam (Melanic, Dermosolic, Redoxic Hydrosol)
20 - 60 cm dark grey clay loam, with a paler coloured A2 horizon, overlying a grey and dull yellow brown clay with strong blocky structure. The soil is saturated for most of the time.

Further information: [DEWNR Soil and Land Program](#)

