

CLW Callowie Land System

Complex of rises, low hills and valleys in the Callowie Springs area, Southern Flinders Ranges

- Area:** 81.5 km²
- Annual rainfall** 295 – 390 mm average
- Geology:** Tillites and siltstones of the Appila Formation, and associated locally derived medium to fine grained sediments.
- Topography:** Undulating rises and low hills formed on basement rocks, with intervening pediment slopes and valley floors of the upper catchments of the Old Booleroo and Morchard Creeks. Slopes on the rising ground range from 2% to 30% or more on occasional steep low hills. In the valleys and on pediments, slopes vary from 2% to 10%.
- Elevation:** The highest point is 560 m on a basement rock high. The lowest point is 420 m where Old Booleroo Creek leaves the system and discharges on to the Willowie Plains.
- Relief:** Maximum relief is 60 m, from creek flat to hill crest.
- Soils:** The soils lower slopes, pediments and flats are deep with loamy texture contrast profiles. The soils of the rises are loamy, often calcareous throughout, and shallow over weathering rock.

Main soils

Outwash fans and flats

- C3** Deep gradational loam
D2 Hard loam over red clay
D3 Hard sandy loam over dispersive red clay

Rises

- A2** Shallow calcareous loam

Minor soils

Outwash fans and flats

- A5** Deep calcareous loam
C1 Gradational sandy loam
D4 Loam over red friable clay

Rises

- D1** Hard loam over red clay on rock
C2 Shallow gradational loam
L1 Shallow stony loam

- Main features:** The Callowie Land System is undulating to moderately steep land with a minor proportion of non arable rocky slopes. Most land however is arable, although susceptible to erosion. The most common soils on mid to upper slopes are shallow and calcareous. These are relatively resistant to erosion, but shallowness and high pH limit productive potential. On lower slopes and pediments, texture contrast soils are more common. These are deeper and more fertile, but commonly have poor surface structure and sometimes dispersive subsoils. These conditions reduce water infiltration and adversely affect workability, waterholding capacity, emergence and root growth. These soils are highly susceptible to erosion.



Soil Landscape Unit summary: 24 Soil Landscape Units (SLUs) mapped in the Callowie Land System:

SLU	% of area	Main features #
AAB	3.8	Rocky low hills with slopes of 10-35%, abundant surface stone and limited rocky outcrop, formed on mainly fine grained rocks. Main soils: <u>shallow calcareous loam</u> - A2 (E), with <u>shallow stony loam</u> - L1 (C), <u>hard loam over red clay on rock</u> - D1 (L) and <u>shallow gradational loam</u> - C2 (L). The slopes are non arable. Productive potential is limited by shallow stony soils (restricted waterholding capacity) and difficulty of access, hindering fertilizer applications, spraying etc. There is a high erosion risk when the soil surface is exposed.
EAB EAC EAD	0.2 2.1 1.0	Stony rises formed on basement rocks. Rocky outcrops occupy about half of these landscapes. EAB Low rises, under 10 m high, with slopes of less than 4%. EAC Undulating rises, 10-20 m high, with slopes of 3-5% EAD Low ridges to 20 m high with slopes of 5-20%. Main soils: <u>shallow calcareous loam</u> - A2 (E) and <u>shallow stony loam</u> - L1 (C), with <u>shallow gradational loam</u> - C2 (C) and <u>hard loam over red clay on rock</u> - D1 (L). These soils are generally shallow, but moderately fertile and well drained. The main limitation to land use is the extensive rocky outcrop which renders much of the land non arable.
EFD	0.7	Basement rock rises separated by narrow valleys with eroded water courses. There is minor stone on the rises which have slopes to 15%. Main soils: <u>shallow calcareous loam</u> - A2 (V) on rises and <u>hard loam over red clay</u> - D2 (C) in valleys. The soils on the rises have limited waterholding capacity – their main limitation. The soils of the valleys are deep and fertile, although they usually have poorly structured surfaces, causing them to be highly erodible.
EGB EGC	1.4 16.6	Rises formed on fine grained rocks with up to 20% surface stone, and minor rock outcrop. EGB Slopes of 2-4%. EGC Slopes of 4-10%. Main soils: <u>shallow calcareous loam</u> - A2 (E), with <u>hard loam over red clay on rock</u> - D1 (C), <u>shallow gradational loam</u> - C2 (L) and <u>shallow stony loam</u> - L1 (L). Slopes are fully arable, the main limitations being shallowness of soils (restricting waterholding capacity) and potential for water erosion. On lower slopes where D1 soils are more common, hard setting surfaces lead to workability, emergence and infiltration problems. Fertility is more of a problem on upper slopes where high pH and lower clay content soils are more prevalent.
JEB JEC JEJ	2.6 5.8 12.1	Outwash slopes (fans) and drainage depressions formed on alluvium. JEB Fans with slopes of 1-3%. JEC Fans with slopes of 3-5%. JEJ Eroded drainage depressions. Main soils: <u>hard loam over red clay</u> - D2 (E) and <u>hard loam over dispersive red clay</u> - D3 (E), with <u>deep gradational loam</u> - C3 (L). Poor soil structure and resulting erosion are the main features of this landscape. Hard setting surfaces (and dispersive subsoils in D3 soils) lead to excessive runoff, restricted workability, patchy emergence and reduced water holding capacity. These limitations have led to erosion of watercourses in the past. The chemical fertility of the land is satisfactory.
JFB	2.0	Outwash fans formed on fine grained alluvium. Slopes are 2-3% and there is minor gully erosion. Main soils: <u>hard loam over red clay</u> - D2 (E) and <u>hard loam over dispersive red clay</u> - D3 (E) with <u>deep calcareous loam</u> - A5 (L). These soils are deep and inherently fertile, but poor surface structure (and subsoil structure in D3 soils) causes excessive runoff leading to potential for erosion.
JKB	5.6	Outwash fans formed on fine grained alluvium. Slopes are 2-3% and there is minor gully erosion. Main soils: <u>hard sandy loam over dispersive red clay</u> - D3 (E) and <u>hard loam over red clay</u> - D2 (E) with <u>deep calcareous loam</u> - A5 (L) and <u>gradational sandy loam</u> - C1 (L). These soils are deep and moderately fertile, but poor surface structure (and subsoil structure in D3 soils) causes excessive runoff leading to potential for erosion. The surface soils are sandier than is typical for most of the System, leading to lower fertility and increased erodibility.



JNA JNB JNU JNo	1.1 1.2 1.0 5.6	<p>Outwash fans and flats formed on fine grained alluvium with slopes of 2-3%.</p> <p>JNA Very gentle slopes (less than 1%). JNB Fans with slopes of 2-3%. JNU Flats with 10-50% of land affected by scalding. JNo Creek flats with severely eroded water courses and 5-10% scalding.</p> <p>Main soils: <u>hard sandy loam over dispersive red clay</u> - D3 (E) and <u>hard loam over red clay</u> - D2 (E), with <u>loam over red friable clay</u> - D4 (L) and <u>deep calcareous loam</u> - A5 (L). These soils are deep but generally poorly structured, at least at the surface. They are moderately fertile, but scalding indicates that erosion is a potential problem. The creek flats are particularly vulnerable to further degradation.</p>
KDB KDC KDJ	6.9 13.2 3.4	<p>Outwash slopes (fans) formed on alluvial deposits.</p> <p>KDB Slopes of 2-5%. KDC Slopes of 3-10%. KDJ Drainage depressions with eroded water courses.</p> <p>Main soils: <u>deep gradational loam</u> - C3 (E), with <u>hard loam over red clay</u> - D2 (C), <u>hard loam over dispersive red clay</u> - D3 (L) and <u>deep calcareous loam</u> - A5 (L). Both rubbly and non rubbly forms of these soils occur. The land is fully arable (except adjacent to eroded watercourses), with the most common soils having favourable physical and chemical properties. Shallowness of soils (reducing water holding capacity) is a minor limitation. Poor soil structure is less of a problem than in JEB / JEC / JEJ due to the smaller proportions of texture contrast D2/D3 soils. Erosion potential is nevertheless a management issue.</p>
KGB KGC KGJ	8.6 2.3 0.9	<p>Outwash slopes (fans) formed on alluvial deposits.</p> <p>KGB Fans with slopes of 2-3%. KGC Fans abutting EAD ridges, with slopes of 3-5%. KGJ Creek flat with an eroded water course.</p> <p>Main soils: <u>gradational sandy loam</u> - C1 (E) and <u>deep gradational loam</u> - C3 (L), with <u>hard sandy loam over dispersive red clay</u> - D3 (L) and <u>deep calcareous loam</u> - A5 (L). These soils are deep and moderately fertile. Some soils have poor structure, especially D3, making them susceptible to erosion.</p>
KIB KIJ	1.1 0.8	<p>Outwash fans and creek flats formed on alluvial deposits.</p> <p>KIB Gentle slopes of less than 2%. KIJ Eroded creek flats.</p> <p>Main soils: <u>deep gradational loam</u> - C3 (V) with <u>gradational sandy loam</u> - C1 (L) and <u>loam over dispersive red clay</u> - D3 (L). These soils are deep and inherently fertile, although some are poorly structured (D3). Potential for erosion is the most serious limitation to cropping.</p>

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:

- A2** Shallow calcareous loam (Paralithic, Calcic / Lithocalcic Calcarosol)
Calcareous loam to clay loam grading to soft or rubbly carbonate over weathering rock at about 50 cm.
- A5** Deep calcareous loam (Regolithic, Lithocalcic / Hypercalcic Calcarosol)
Calcareous loam to clay loam grading to rubbly or soft carbonate at shallow depth, over alluvium below 100 cm.
- C1** Gradational sandy loam (Calcic, Red / Brown Kandosol)
Medium to thick sandy loam grading to a red or brown sandy clay loam to light clay, with moderate carbonate accumulations at depth.
- C2** Shallow gradational loam (Calcic / Lithocalcic, Red Dermosol)
Loam to clay loam grading to a friable red clay with soft or rubbly carbonate at shallow depth over weathering rock at about 50 cm.
- C3** Deep gradational loam (Calcic / Lithocalcic, Red Dermosol)
Loam to clay loam grading to a friable red clay with soft or rubbly carbonate at shallow depth over alluvium deeper than 100 cm.
- D1** Hard loam over red clay (Calcic / Supracalcic, Red Chromosol)
Medium thickness hard loam abruptly overlying a well structured red clay grading to soft or rubbly carbonate over weathering rock within 100 cm.
- D2** Hard loam over red clay (Calcic / Hypercalcic, Red Chromosol)
Medium thickness hard loam abruptly overlying a well structured red clay grading to soft carbonate over alluvium deeper than 100 cm.
- D3** Hard sandy loam to loam over dispersive red clay (Calcic, Red Sodosol)
Hard sandy loam to clay loam sharply overlying a dispersive red clay grading to soft carbonate, deeper than 100 cm over alluvium.
- D4** Loam over red friable clay (Calcic, Pedaric, Red Sodosol)
Thin to medium thickness fine sandy loam to loam over a finely structured friable red clay, calcareous from about 50 cm, grading to fine or medium grained alluvium.
- L1** Shallow stony loam (Calcareous, Paralithic, Leptic Tenosol OR Lithic, Leptic Rudosol)
Non calcareous stony loam over hard rock (Rudosol), or with accumulations of soft carbonate in weathering rock (Tenosol).

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

