

# SUB Sunnybrae Land System

Undulating rises and rocky ridges south east of Yongala

**Area:** 83.1 km<sup>2</sup>

**Annual rainfall:** 350 – 425 mm average

**Geology:** Most of the land system is formed on siltstones and slates of the Tapley Hill and Saddleworth Formations, with harder bands of Appila Tillite, Undalya Quartzite and Grampus Quartzite. There are extensive areas of locally derived sediments deposited in valleys between the basement rock highs. Both rocks and sediments are mantled by aeolian carbonates which occur as fine or rubbly segregations in the lower soil profile.

**Topography:** Undulating rises formed mainly on the softer, fine grained rocks, interspersed with rocky moderately steep ridges formed mainly on the more resistant tillites and quartzites. The rises and ridges grade to gently inclined outwash fans and valley flats formed on alluvium. Slopes range from 20-30% on the steeper ridges and 3-20% on the rises, to less than 3% on fans and flats.

**Elevation:** 645 m to 550 m

**Relief:** Maximum relief is 50 m, but 10 - 30 m is more usual

**Soils:** Most soils are shallow to moderately deep over weathering basement rock. Some merge directly with the rock, others have a well developed subsurface calcareous layer, and others have red clayey subsoils. On lower slopes and fans, soils are deeper, usually with loamy surfaces and red clayey subsoils.

**Main soils:** *Moderately deep to shallow soils on basement rock rises*

- A2** Shallow calcareous loam - calcareous rocks
  - D1** Hard loam over red clay on rock - throughout
  - C2** Shallow gradational loam – throughout
- Deep soils formed over alluvium on outwash fans*
- D2** Hard sandy loam over well structured red clay
  - D3** Hard sandy loam over dispersive red clay

**Minor soils:** *Moderately deep to shallow soils on basement rock rises*

- L1** Shallow stony loam - steeper, rockier slopes
  - D7** Hard sandy loam over dispersive red clay on rock - coarser grained rocks
- Deep soils formed over alluvium on outwash fans*
- C3** Gradational red loam

**Main features:** The Sunnybrae Land System has a high proportion of arable land, but moderately low rainfall sets limits on productivity. On rising ground, the main soil limitations are shallowness (low waterholding capacity), and poor surface structure. Improving surface structure will help reduce run off and erosion, as well as increasing plant available water in the soil. Better water use on higher ground through fertility maintenance and surface condition improvements will also help alleviate salinity on lower lying land. Soils on lower slopes are deeper and more fertile, but often have poor surface and sometimes subsurface structure. This reduces water infiltration and increases erosion potential, and affects emergence, root growth and workability.



**Soil Landscape Unit summary:** 19 Soil Landscape Units (SLUs) mapped in the Sunnybrae Land System

SLU	% of area	Main features
AAC	1.7	Rocky low hills up to 40 m high with slopes of 10-25%, formed on Appila Tillite. Main soils: <u>shallow stony loam</u> - <b>L1</b> (E) and <u>shallow calcareous loam</u> - <b>A2</b> (C) with <u>hard loam over red clay on rock</u> - <b>D1</b> (L) and <u>shallow gradational loam</u> - <b>C2</b> (L). This land is largely inaccessible, due to steep slopes and rockiness. Pasture productivity is limited mainly by shallow soils and the difficulty in undertaking improvements (sowing, fertilizing etc). There is considerable potential for erosion. Watercourses are generally stable.
ABB ABC	2.7 0.8	Rocky quartzite ridges. <b>ABB</b> Up to 20 m high, with slopes of 10-25%. <b>ABC</b> Up to 50 m high with slopes of 15-30%. Main soils: <u>shallow stony loam</u> - <b>L1</b> (V) with <u>shallow calcareous loam</u> - <b>A2</b> (C). Extensive linear outcrops of quartzite are a feature of this land, together with shallow stony soils. The ridges are largely inaccessible
DCB DCC	4.3 10.4	Rises formed on Saddleworth and Tapley Hill Formation rocks. There are minor linear rock outcrops. <b>DCB</b> Very gently undulating rises to 10 m high with slopes of 2-4%. <b>DCC</b> Undulating rises to 20 m high with slopes of 3-10%. Main soils: <u>hard loam over red clay on rock</u> - <b>D1</b> (E), <u>shallow gradational loam</u> - <b>C2</b> (E) and <u>shallow calcareous loam</u> - <b>A2</b> (E) over weathering rock. Rock is commonly less than 50 cm deep, but usually has moisture storage capacity in its vertical fissures, thus overcoming an apparent limitation. Natural fertility is moderate to high, but hard setting and sealing surfaces are a problem - erosion potential is therefore significant.
DKB DKC	1.8 5.6	Rises formed on quartzitic sandstones of the Undalya Formation. <b>DKB</b> Low rises less than 10 m high with slopes of 1-3%. <b>DKC</b> Rises to 20 m high with slopes of 3-8%. Main soils: <u>hard sandy loam over dispersive red clay on rock</u> - <b>D7</b> (E), with <u>hard loam over red clay on rock</u> - <b>D1</b> (C), <u>shallow gradational loam</u> - <b>C2</b> (L), and <u>shallow calcareous loam</u> - <b>A2</b> (L). Poor soil structure leading to excessive runoff, reduced waterholding capacity, patchy emergence and erosion is a feature of the common soils in this landscape. Sandy and quartzitic surfaces cause accelerated implement abrasion. The A2 and C2 soils are more favourable.
DSC DSH	10.9 1.4	Rises formed on basement rocks with quartzitic beds forming characteristic "tiger-stripe" patterns of rock outcrop. <b>DSC</b> Undulating rises to 30 m high with slopes of 4-12% <b>DSH</b> Gentle slopes of 2-5% with eroded water courses. Main soils: shallow <u>hard loam over red clay on rock</u> - <b>D1</b> (E) with <u>hard sandy loam over dispersive red clay on rock</u> - <b>D7</b> (L) between the reefs, and <u>shallow stony loam</u> - <b>L1</b> (C) and <u>shallow calcareous loam</u> - <b>A2</b> (L) on rockier areas. These rises are semi-arable due to the amount of rock and the potential for erosion. Poor structure in the main soil types exacerbates the erosion potential, and causes emergence and root growth problems.
EGB EGC	3.0 13.8	Rises formed on basement rock. <b>EGB</b> Very gently undulating rises less than 10 m high with slopes of 1-3%. <b>EGC</b> Gently undulating rises, 20 m high with slopes of 4-12%. Main soils: <u>shallow calcareous loam</u> - <b>A2</b> (V), with <u>hard loam over red clay</u> - <b>D1</b> (L) and <u>shallow gradational loam</u> - <b>C2</b> (L). The land is mostly arable (except for minor outcrop), but because most of the soils are relatively shallow, moisture shortages may limit crops in dry finishes. Reduction of water loss and erosion through runoff is the main management issue, together with fertility maintenance.



ESC ESD ESH	6.6 4.4 0.9	Rises and ridges formed on basement rocks with resistant strata producing a pattern of linear rocky outcrops. <b>ESC</b> Rises from 10 to 30 m high with slopes of 3-12%. <b>ESD</b> Slopes and ridges up to 40 m high with slopes of 10-20%. <b>ESH</b> Gentle slopes of 4-8% with eroded water courses. Main soils: <u>shallow calcareous loam</u> - <b>A2</b> (E) and <u>shallow gradational loam</u> - <b>C2</b> (E) with <u>shallow stony loam</u> - <b>L1</b> (L) dominant on rocky areas. Rocky reefs, shallow stony soils and sometimes moderate slopes limit cropping of these areas. The arable land is generally confined to strips between the reefs of rock. Water erosion is a potential problem because of the high runoff from the shallow soils and rocky areas.
JBB	4.1	Outwash fans with slopes of 2-3% formed on alluvial sediments. Main soils: <u>hard sandy loam over dispersive red clay</u> - <b>D3</b> (V) with <u>hard sandy loam over well structured red clay</u> - <b>D2</b> (L) and <u>gradational red loam</u> - <b>C3</b> (L). These soils are deep and moderately fertile, but are characterized by poor structure leading to excessive runoff and erosion, poor water use, and workability and emergence problems.
JEA JEB JEJ JEP	7.1 14.9 4.8 0.8	Outwash fans formed on alluvial sediments. <b>JEA</b> Flats with slopes of about 1%. <b>JEB</b> Very gentle slopes of 1-3%. <b>JEJ</b> Drainage depressions with slopes of 1-2% and eroded water courses. <b>JEP</b> Marginally saline flat. Main soils: <u>hard sandy loam over well structured red clay</u> - <b>D2</b> (E) and <u>hard sandy loam over dispersive red clay</u> - <b>D3</b> (E) with <u>gradational red loam</u> - <b>C3</b> (C) all formed over alluvium. The soils are deep, inherently fertile and generally moderately well drained. The main limitations are poor surface (and subsurface in places) structure. Poor surface structure causes reduced water infiltration, increased erosion potential and surface waterlogging, working difficulty and seedling emergence problems. Dispersive subsoils in the D3 soils cause more prolonged waterlogging. Watercourse erosion is significant in <b>JEJ</b> . Saline seepage is minor, but it is likely that subsoil salinity levels are moderate and that saline water tables occur in places.

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

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



**Detailed soil profile descriptions**

- A2** Shallow calcareous loam (Paralithic Calcarosol)  
Calcareous loam grading to a very highly calcareous clay loam or rubble layer merging with calcareous weathering rock within 100 cm, usually 50 cm.
- C2** Shallow gradational loam (Calcic, Red Dermosol)  
Hard sandy loam to clay loam grading to a well structured red clay with fine carbonate at depth, overlying weathering fine grained rock within 100 cm.
- C3** Gradational red loam (Hypercalcic / Supracalcic, Red Dermosol)  
Loam to clay loam grading to a well structured red clay with fine to rubbly carbonate at depth.
- D1** Hard loam over red clay on rock (Calcic, Red Chromosol)  
Hard sandy loam to clay loam abruptly overlying a well structured red clay with fine carbonate at depth, grading to weathering fine grained rock within 100 cm.
- D2** Hard sandy loam over well structured red clay (Calcic, Red Chromosol)  
Medium thickness hard setting sandy loam to sandy clay loam abruptly overlying a well structured red clay with fine carbonate accumulations at depth grading to alluvium.
- D3** Hard sandy loam over dispersive red clay (Calcic, Red Sodosol)  
Medium thickness hard setting sandy loam to sandy clay loam abruptly overlying a poorly structured dispersive red clay with fine carbonate accumulations at depth grading to alluvium.
- D7** Hard sandy loam over dispersive red clay on rock (Calcic, Red Sodosol)  
Medium thickness hard setting sandy loam to sandy clay loam abruptly overlying a poorly structured dispersive clay with fine carbonate at depth, grading to weathering rock within 100 cm.
- L1** Shallow stony loam (Lithic, Leptic Tenosol / Rudosol)  
Shallow stony loam, sometimes calcareous with depth, overlying basement rock within 50 cm.

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

