

# BUN Bundaleer Land System

Campbell Range and Bundaleer Hills rising four km south east of Jamestown and extending to the Broughton River west of Spalding.

**Area:** 121.4 km<sup>2</sup>

**Annual rainfall** 410 – 600 mm average

**Geology:** Tillites and siltstones of the Appila and Saddleworth Formations respectively, interbedded with Leasingham, Gilbert Range, Undalya and Watervale quartzites and quartzitic sandstones. The rocks are largely exposed at or near the surface due to the generally steep terrain, and are partially mantled by fine aeolian carbonates. Rainfall is sufficiently high that these materials have been leached out over substantial areas. Alluvial deposition is relatively minor - most outwash materials have been carried out of the system.

**Topography:** The Land System essentially consists of two parallel north - south trending ranges. Campbell Range on the western side is formed on the tillite and consists of a high relief spine with lateral spurs dropping into drainage systems either side (Bundaleer Creek on the west and Never Never Creek on the east). The eastern range consists of a series of north south ridges of siltstone interbedded with quartzites, dissected by east west streams at regular 400 - 500 m intervals, creating a characteristic "lattice" pattern. Slopes are in the range 15-50%. At the northern and southern ends the relief is more subdued with low hills up to 60 m high. Slopes are 5 - 20%. The main drainage system is Never Never Creek which flows in a southerly direction through the middle of the system, and is joined by Bundaleer Creek half way along its length. Drainage in the northern part is via several smaller streams flowing east to Baderloo Creek or north west towards Caltowie.

**Elevation:** 710 m on New Campbell Hill to 220 m where Bundaleer Creek enters the Broughton River

**Relief:** Between 30 and 200 m

**Soils:** The soils are typically loamy over basement rock within a metre. Some soils are shallow and stony, others have reddish clayey subsoils. There is variable fine carbonate in subsoils. Deep uniform or gradational sandy loams to clay loams and texture contrast soils occur on flats.

## Main soils

- L1** Shallow stony loam - steeper rocky slopes
- K2** Loam over red or brown clay on rock - hillslopes
- A2** Calcareous loam - drier slopes or calcareous basement rocks

## Minor soils

- D1** Loam over red or brown clay on calcareous rock - hillslopes
- C2/K1** Shallow gradational loam - slopes
- D7/D3** Sandy loam over dispersive clay - quartzite reefs and adjacent outwash deposits
- M1/M4** Alluvial soil - creek flats
- D2** Loam over red clay - lower slopes and flats



**Main features:** The Bundaleer Land System comprises mainly non arable hills characterized by moderate to high rainfall and potentially productive soils. However the western side particularly is highly exposed. Grazing is the predominant land use - erosion control is probably the main management issue. A significant area in the north is under pine plantations where fertility maintenance and measures to minimize soil compaction rank with erosion control as the main soil management concerns.

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

SLU	% of area	Main features #
ABC ABD ABI ABJ	16.9 1.9 2.1 2.3	<p>Rocky low hills formed on mainly fine grained rocks interbedded with quartzite reefs.</p> <p><b>ABC</b> Low hills with slopes of 15-30%.</p> <p><b>ABD</b> Steep rocky ridges and dissected low hills with slopes of 30-50%.</p> <p><b>ABI</b> Eroded slopes of 20-30% with gullied watercourses.</p> <p><b>ABJ</b> Steep slopes of 30-50% with gullied water courses.</p> <p>Main soils: <u>shallow stony loam - L1</u> (E) and <u>loam over red or brown clay on (calcareous) rock - K2/D1</u> (E), with <u>calcareous loam - A2</u> (L), and <u>shallow gradational loam - C2/K1</u> (L). The hills are non arable due to the roughness of the terrain, moderate slopes and shallow stony soils. Rocky outcrops limit accessibility in places. Runoff is rapid and exposure is high, so a significant proportion of rainfall does not infiltrate the soil. Watercourses are particularly susceptible to erosion. However areas of deeper soils are potentially productive for grazing.</p>
AHC AHE	1.8 20.8	<p>Steep north - south ridges formed on Saddleworth Formation siltstones with interbedded Undalya Quartzites and Watervale Sandstones. The ridges are dissected in an east - west direction by evenly spaced watercourses producing a striking latticed drainage network.</p> <p><b>AHC</b> Low ridges with slopes of 15-30% and relief to 50 m.</p> <p><b>AHE</b> Steep slopes of 30-50% with relief to 150 m.</p> <p>Main soils: <u>loam over red or brown clay on rock - K2</u> (E) and <u>shallow stony loam - L1</u> (E), with <u>sandy loam over dispersive clay - D7</u> (L). Much of the area is too steep for general access, and rocky areas are common. However, the land has a relatively high proportion of moderately deep and fertile soils which are potentially productive for grazing. Erosion is always a risk on these slopes if overgrazed, and steep slopes are prone to landslip.</p>
AIC AIE	3.7 16.5	<p>Steep north - south ridges of the Campbell Range formed on Appila Tillite with interbedded quartzites.</p> <p><b>AIE</b> Ridges with slopes of 30-50% and relief of up to 150 m.</p> <p><b>AIC</b> Footslopes with slopes of 15-30% and relief to 40 m.</p> <p>Main soils: <u>shallow stony loam - L1</u> (E) with <u>loam over red or brown clay on (calcareous) rock - K2/D1</u> (E) and <u>calcareous loam - A2</u> (L). These slopes are high and exposed with mainly shallow stony soils. Most of the land is only accessible along ridges, spurs and watercourses, making management difficult. Erosion potential is high due to the combined effects of slope, high runoff and harsh climate (highly exposed). Watercourses are especially at risk.</p>
DSC DSD	2.1 4.2	<p>Slopes formed on tillites and interbedded quartzites as rocky reefs.</p> <p><b>DSC</b> Gentle to moderate slopes of 4-10%</p> <p><b>DSD</b> Slopes of 10-25%.</p> <p>Main soils: shallow <u>loam over red or brown clay on (calcareous) rock - K2/D1</u> (E) and <u>shallow stony loam - L1</u> (C), with shallow <u>calcareous loam - A2</u> (L). The deeper soils are moderately fertile and well drained, but the slopes are only semi-arable due to their gradients and position below steeper slopes generating significant runoff. Erosion potential is therefore high. Rocky reefs also limit cropping potential. Pine forestry is common on the deeper soils between the reefs.</p>
DUC DUD	1.3 2.1	<p>Slopes formed on partially calcified siltstones at Bundaleer Gardens.</p> <p><b>DUC</b> Gentle to moderate slopes of 4-10%.</p> <p><b>DUD</b> Slopes of 10-20%.</p> <p>Main soils: <u>loam over red or brown clay on (calcareous) rock - D1/K2</u> (V) with <u>shallow stony loam - L1</u> (L) and <u>calcareous loam - A2</u> (L). These are small pockets of arable land between the predominantly steeper slopes of the Land System. The soils are potentially productive, most of them being moderately deep, well drained and inherently fertile. Erosion potential and surface structural problems are the main limitations. Much of this land is used for pine forestry.</p>
EGC	3.1	Rises and low hills with relief of 20-50 m formed on fine grained calcified rocks.



EGD	7.6	<p><b>EGC</b> Slopes of 5-10%.  <b>EGD</b> Slopes of 10-20%.  Main soils: shallow <u>calcareous loam</u> - <b>A2</b> (V), with <u>loam over red or brown clay on calcareous rock</u> - <b>D1</b> (C) and <u>shallow gradational loam</u> - <b>C2</b> (L). The land is arable (except for minor outcrop), although slopes are at the upper limit for cropping. Although many of the soils are shallow, there is significant moisture storage in the fissures of the underlying rocks. However, 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. "Lime - induced" nutrient deficiencies are possible on calcareous soils. Much of this land is used for pine forestry.</p>
ESC ESD	1.0 7.1	<p>Rocky ridges and rises with relief of up to 60 m. Underlying rocks are mixed siltstones and tillites. There are 10-20% linear rocky outcrops.  <b>ESC</b> Slopes of 6-12%.  <b>ESD</b> Slopes of 10-20%.  Main soils: <u>shallow gradational loam</u> - <b>C2</b> (E) and <u>calcareous loam</u> - <b>A2</b> (E) formed over siltstone basement rock and containing variable amounts of soft and rubbly carbonate. <u>Shallow stony loam</u> - <b>L1</b> (L) occurs in rocky areas on harder rocks. Rocky reefs, shallow stony soils and generally 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.</p>
JEC	0.4	<p>Outwash fans formed on alluvial clays and sandy clays with slopes of 4-8%.  Main soils: <u>loam over red clay</u> - <b>D2</b> (V), with loamy <u>alluvial soil</u> - <b>M4</b> (C) over alluvial sediments. Most of this land has deep moderately well drained fertile soils with only slight limitations. These are caused by surface structural problems which lead to compaction and erosion. The land is exclusively used for pine forestry.</p>
XJJ XJK	1.2 3.9	<p>Narrow flats associated with larger watercourses.  <b>XJJ</b> Flats associated with smaller creeks in the north of the Land System.  <b>XJK</b> Flats associated with Never Never and Bundaleer Creeks. The channels of these creeks have been substantially eroded over time.  Main soils: deep <u>alluvial soil</u> - <b>M1/M4</b> (V), with <u>loam over red clay</u> - <b>D2</b> (C). As most of the land occurs as narrow strips in steep hill country, it is generally used for grazing, with some pines in the north. Watercourse protection is the main management concern.</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** Calcareous loam (Paralithic Calcarosol)

Calcareous loam grading to an accumulation of soft or rubbly carbonate merging with weathering basement rock at between 50 and 100 cm.

##### **C2/K1** Shallow gradational loam (Eutrophic / Calcic Red Dermosol)

Clay loam grading to a well structured red clay forming in weathering rock.

##### **D1** Loam over red or brown clay on calcareous rock (Calcic, Red / Brown Chromosol)

Medium thickness hard loam abruptly overlying a well structured red or brown clay grading to weathering basement rock within 100 cm. Fine carbonate segregations occur in the lower subsoil and weathering rock.

##### **D2** Loam over red clay (Eutrophic / Calcic, Red Chromosol)

Medium to thick hard loam abruptly overlying a well structured red clay with sporadic soft carbonate at depth, grading to clayey alluvium.



- D7/D3** Sandy loam over dispersive clay (Eutrophic, Red Sodosol)  
Hard gravelly sandy loam to sandy clay loam sharply overlying a red poorly structured clay grading to quartzite or quartzitic sediments below 100 cm.
- K2** Loam over red or brown clay on rock (Eutrophic, Red / Brown Chromosol)  
Medium thickness hard loam abruptly overlying a well structured red or brown clay grading to weathering basement rock within 100 cm.
- L1** Shallow stony loam (Paralithic, Leptic Tenosol / Rudosol)  
Medium thickness stony sandy loam to clay loam overlying weathering basement rock, commonly at less than 50 cm. Depending on moisture regime, there may be an accumulation of soft carbonate in the profile.
- M1/M4** Alluvial soil (Tenosol / Kandosol / Dermosol)  
Thick silty loam to clay loam, continuing below 100 cm (M1), or with increasing clay content at depth (M4). Gravelly and sandy lenses are common.

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

