

AUB Auburn Land System

Rises and low hills in the Auburn - Watervale - Mintaro area

Area: 109.4 km²

Annual rainfall: 480 – 630 mm average

Geology: Siltstones, calc-siltstones and dolomites of the Saddleworth, Auburn and Mintaro Formations. The striking feature of the geology of this Land System is the high proportion of calcareous rocks. Repeated seasonal solution and recrystallization of this calcareous material has resulted in extensive hard carbonate (calcrete) cappings on the weathering rock. These cappings may be only a few millimetres thick, but have a significant effect on plant root penetration. Elsewhere, the carbonate (some of which is of aeolian origin), occurs as soft or rubbly segregations in the soil profile and upper weathering zone of the rock. There are limited deposits of silty and clayey alluvium, mainly as valley infill.

Topography: The Auburn Land System comprises an extensive area of undulating rises and low hills, generally with slopes of less than 12%. There are some steeper areas, mainly in the north, adjacent to the Mt. Horrocks Range, where slopes reach 25% in places. The land is dissected by a well developed dendritic drainage network, with all water courses eventually flowing into the River Wakefield which passes through the Land System from the north east corner to the southern edge.

Elevation: The highest point is 535 m, immediately south of the Mt. Horrocks Range. The lowest point is 280 m where the River Wakefield flows out.

Relief: Maximum relief is 80 m, but 30 - 50 m is more typical

Soils: Most soils are red, loamy and overlie either basement siltstone, calcrete capped siltstone, or alluvium.

Main soils

Rising ground

- C2** Shallow gradational loam
- B4** Shallow red loam on calcrete
- D1** Hard loam over red clay on calcified rock

Minor soils

Rising ground

- A2/B2** Calcareous loam
- E1** Black cracking clay
- K2** Hard loam over red clay on rock
- L1/B3** Shallow stony loam

Lower slopes and flats

- C3** Deep gradational loam
- C5** Dark gradational loam
- D2** Hard loam over red clay
- D3** Hard loam over dispersive red clay
- M2** Gradational red / dark clay loam
- M4** Gradational silty loam



Main features: The Auburn Land System is characterized by red, loamy well structured, freely draining soils with moderate to high fertility. This is a consequence of the predominantly calcareous parent rocks which underlie the area. The main limitation of these soils is shallow soil depth, as calcrete cappings or basement rocks are commonly within 30 cm of the surface. Nevertheless, productive potential is high given a reasonable rainfall distribution pattern. Horticultural and viticultural potential is very high, provided that irrigation water is available. Other significant soils include dark clays (usually cracking) which are very fertile but difficult to work and irrigate, and prone to waterlogging, and deep loam over red clay soils on lower slopes and flats, usually with poor surface structure and prone to surface sealing, waterlogging and erosion.

Soil Landscape Unit summary: 8 Soil Landscape Units (SLUs) mapped in the Auburn Land System:

SLU	% of area	Main features #
AFC	6.6	Moderately steep low hills formed on siltstones, calc-siltstones and dolomites. Slopes are 15-30% and relief is up to 80 m. There is variable surface stone and rock outcrop which prevent machinery access in places. Main soils: <u>shallow stony loam</u> - L1/B3 (V), with <u>shallow gradational loam</u> - C2 (L), <u>shallow red loam on calcrete</u> - B4 (L) and <u>calcareous loam</u> - A2/B2 (L). This land is generally too steep (and too rocky in places) for cropping, but provides good grazing potential.
ARB	0.8	Low quartzite ridges to 10 m high with slopes of 10-25% and extensive surface quartzite and rocky outcrop. Main soils are stony <u>shallow stony loam</u> - L1 (E) and <u>hard loam over red clay on rock</u> - K2 (E), with <u>calcareous loam</u> - A2/B2 (L). These small rocky reefs have little productive capacity, but provide shelter and windbreaks where timbered.
EKC	5.1	Undulating rises with slopes of 5-12% formed on a complex of Auburn Dolomites and heavy clay sediments. Main soils: <u>black cracking clay</u> - E1 (V), with <u>gradational loam</u> - C2 (L), and <u>deep gradational loam</u> - C3 (L). This land is potentially highly productive, although management problems are likely because of the significant differences between the main soil types. The cracking clays are very fertile soils but are slow to make water available to plants, are difficult to work once wet and are prone to waterlogging. The gradational loams are well drained, easy to work and have better moisture availability characteristics. However, they are often shallow over rock.
EMC EMD	60.5 15.0	Rises and low hills formed on siltstones, calc-siltstones and dolomites. EMC Undulating rises and low hills with slopes of 3-12%, relief of 20-50 m, up to 10% surface calcrete and siltstone fragments, and negligible rock outcrop. EMD Moderate slopes of 10-20% with up to 20% cover of surface calcrete and siltstone fragments, and minor rock outcrop. Main soils: <u>shallow gradational loam</u> - C2 (E), <u>shallow red loam on calcrete</u> - B4 (E), <u>hard loam over red clay on calcified rock</u> - D1 (C), <u>calcareous loam</u> - A2/B2 (C), with <u>gradational red clay loam</u> - M2 (L) on lower slopes, <u>shallow stony loam</u> - L1/B3 (L) on steeper slopes and <u>black cracking clay</u> - E1 (M). Most of the soils are well drained and moderately fertile, but often shallow over calcrete or rock. The mainly calcareous parent rocks are responsible for high levels of calcium saturation in these soils, resulting in very favourable structure. Depending on availability of water, this land generally has very high horticultural, and especially viticultural, potential. Although the soils are relatively resistant to erosion, control measures are necessary throughout due to the slopes. EMD is too steep for regular annual cropping.
JEE	3.6	Minor drainage depressions, including lower slopes and narrow creek flats. Slopes are up to 4%. Main soils: <u>hard loam over red (dispersive) clay</u> - D2/D3 (V) with <u>deep gradational loam</u> - C3 (C) and <u>dark gradational loam</u> - C5 (L). These soils are fertile and deep with high productive potential, although waterlogging is a limitation in places. Surface soils are generally poorly structured, increasing runoff and erosion potential. Gypsum will help to alleviate this condition. Water courses dominate the unit and their protection is an important management factor.
JSE	2.5	Flats of the creek draining the Watervale - Leasingham valley. Main soils: <u>hard loam over (dispersive) red clay</u> - D2/D3 (E), more common in the southern



		areas, with <u>gradational dark clay loam - M2 (C)</u> and <u>gradational silty loam - M4 (L)</u> , in the upper sections. Soils throughout are commonly covered by 50 cm or more of red brown recently deposited silt. These soils are deep and fertile, but with variable drainage.
JUE	5.9	Flats associated with major water courses including the River Wakefield. The flats are narrow, running either side of the watercourses. Main soils: <u>hard loam over dispersive red clay - D3 (E)</u> , <u>gradational silty loam - M4 (E)</u> and <u>dark gradational loam - C5 (E)</u> . These soils are mostly poorly structured and erodible. Natural fertility is moderate, and salinity may be a problem in places, associated with shallow water table. Water course protection should be a major component of management.

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/B2 Calcareous loam (Paralithic / Petrocalcic Calcarosol)

Calcareous loam grading to a pale brown very highly calcareous silty loam over:

- weathering calc-siltstone at about 40 cm (65%).
- hard calcrete at about 30 cm grading to weathering calc-siltstone (35%).

B4 Shallow red loam on calcrete (Petrocalcic, Red Dermosol)

Medium thickness loam to clay loam grading to a well structured red clay over hard calcrete at about 45 cm grading to weathering calc-siltstone.

C2 Shallow gradational loam (Hypercalcic, Red Dermosol)

Medium thickness loam to clay loam grading to a well structured red clay over fine carbonate at about 75 cm grading to weathering siltstone within 100 cm.

C3 Deep gradational loam (Hypercalcic, Red Dermosol)

Medium thickness loam to clay loam grading to a well structured red clay overlying soft carbonate at about 90 cm grading to deeply weathered rock or local wash.

C5 Dark gradational loam (Hypercalcic, Black Dermosol)

Dark loam grading to a well structured dark grey to black clay, highly calcareous with depth, over alluvium.

D1 Hard loam over red clay on calcified rock (Calcic, Red Chromosol)

Medium thickness hard loam abruptly overlying a well structured red clay, grading to fine carbonate at about 50 cm over weathering siltstone at about 80 cm.

D2 Hard loam over red clay (Calcic, Red Chromosol)

Thick silty loam to clay loam, often with a paler A2 layer, abruptly overlying a red well structured clay, calcareous from 80 cm, grading to alluvium.

D3 Hard loam over dispersive red clay (Calcic, Red Sodosol)

Thick silty loam to clay loam, often with a paler A2 layer, abruptly overlying a red (sometimes with brown mottles) coarsely structured dispersive clay, calcareous from 80 cm, grading to alluvium.



- E1** Black cracking clay (Self-mulching, Black Vertosol)
Black self-mulching clay grading to a coarsely structured black or red heavy clay with soft carbonate at about 60 cm, overlying a blocky brown heavy clay at about 80 cm.
- K2** Hard loam over red clay on rock (Eutrophic, Red Chromosol)
Medium thickness hard loam abruptly overlying a red clay, grading to non calcareous siltstone at about 100 cm.
- L1/B3** Shallow stony loam (Lithic / Petrocalcic, Leptic Tenosol / Rudosol)
Medium to thick stony loam overlying sheet calcrete, or non calcareous siltstone at about 35 cm.
- M2** Gradational red / dark clay loam (Calcic, Red / Brown / Black Dermosol)
25 - 50 cm loam to light clay grading to a red to brown (rising ground), or black (flats) well structured clay, usually calcareous from about 60 cm, grading to alluvial sediments or very highly weathered rock.
- M4** Gradational silty loam (Brown Kandosol)
Thick brown silty loam to sandy loam grading to a brown or black weakly structured silty clay loam or clay subsoil formed in alluvium.

Variable thicknesses of recent silty deposits may overlie C5, M2 and M4 soils.

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

