

# WCR White Cliff Range Land System

Range of low hills immediately west of Laura in the Southern Flinders Ranges

**Area:** 102.9 km<sup>2</sup>

**Annual rainfall:** 450 - 625 mm average

**Geology:** Sandstones, quartzites and quartzitic siltstones of the Rhynie and Wirrabara Formations, mantled in the lower rainfall eastern parts by aeolian carbonates which occur as fine segregations at the soil - rock interface. Some areas retain remnants of an old deep weathering surface, where the rocks have been kaolinized and ferruginized. There are no extensive areas of alluvium, but locally derived outwash sediments have accumulated on most lower slopes.

**Topography:** The land system comprises a moderately steep to steep range of low hills along its western edge, which grade to rolling and undulating slopes towards the east. Strong dissection by watercourses is a feature of the land; even the gentler slopes have deeply incised streams. The western ranges have slopes as steep as 60%, but usually in the range 20 - 40%. There is some rock outcrop and abundant surface stone (mostly sandstone and quartzite, with ironstone in the areas of deeply weathered rocks). Towards the east and north there is a "transition zone" of moderately steep (15 - 30%) strongly dissected slopes which give way to arable slopes on the eastern and northern margins.

**Elevation:** 270 - 300 m on the eastern edge where the land grades to the alluvial plains of the Laura Land System, to 505 m at the highest point near the western edge.

**Relief:** Maximum relief is 90 m (steeper western ranges), grading to 50 m in the rolling "transition zone" to 20-40 m on the arable rises and low hills of the east and north.

**Soils:** Most soils are moderately deep to shallow over weathering rock, with sandy loam to clay loam surfaces. Red clayey subsoils are common, but many soils are shallow directly over rock. Deep sandy loam over clay soils are characteristic of lower slopes.

**Main soils:**

*Soils formed over basement rock on rises*

**D1** Sandy clay loam over red clay on calcified rock

**D7** Sandy clay loam over dispersive red clay on calcified rock

**L1** Shallow stony sandy loam

**K3** Acidic sandy clay loam over red clay on rock

**K5** Gradational sandy loam on rock

*Soils formed over alluvium on lower slopes*

**F1** Sandy loam over brown clay

**Minor soils:**

*Soils formed over alluvium on lower slopes*

**D2** Sandy loam over red clay

**F2** Sandy loam over dispersive clay

**E1** Black cracking clay

**M1/M3/M4** Alluvial soil



**Main features:** The White Cliff Range Land System is dominantly moderately steep to steep rocky hill country with potential uses restricted to grazing and forestry. The soils are sandy and erodible. The undulating slopes are arable but poor surface soil structure is a major limitation through its adverse effects on infiltration, water storage capacity and emergence / root growth. Fertility is moderate to moderately low. All slopes are highly susceptible to erosion.

**Soil Landscape Unit summary:** 10 Soil Landscape Units (SLUs) mapped in the White Cliff Range Land System

SLU	% of area	Main features #
AKC AKD AKZ	31.5 0.4 1.8	<p>Rocky low hills formed on coarse grained rocks, with minor rock outcrop and up to 20% surface sandstone, quartzite and ironstone.</p> <p><b>AKC</b> Strongly dissected rounded low hills with slopes of 15-30% and relief to 50 m.  <b>AKD</b> Short steep rocky slopes of 30-60%.  <b>AKZ</b> Rounded crests with slopes of up to 12%.</p> <p>Main soils: <u>sandy loam over red clay on calcified rock</u> - <b>D1</b> (E) and <u>sandy loam over dispersive red clay on calcified rock</u> - <b>D7</b> (E), with <u>shallow stony sandy loam</u> - <b>L1</b> (L), <u>acidic sandy clay loam over red clay on rock</u> - <b>K3</b> (L) and <u>sandy loam over brown clay</u> - <b>F1</b> (M) on lower slopes. These hills are moderately steep and rocky and have limited accessibility. Although non arable, there is some scope for pasture improvement. The soils are generally poorly structured (tight clay subsoils) or shallow and stony, so water holding capacities are restricted.</p>
ANC AND	11.6 15.5	<p>Rocky low hills formed on coarse grained rocks.</p> <p><b>ANC</b> Low hills with slopes of 15-30% and relief to 70 m. There is minor rock outcrop and 20% or more surface sandstone and quartzite.  <b>AND</b> Steep rocky low hills with slopes of 30-60% and relief to 90 m. There is up to 10% rock outcrop and 20-50% surface sandstone and quartzite.</p> <p>Main soils: <u>gradational sandy loam on rock</u> - <b>K5</b> (E) and <u>shallow stony sandy loam</u> - <b>L1</b> (E) with <u>sandy loam over brown clay</u> - <b>F1</b> (L) on lower slopes. These hills are steep and rocky with limited accessibility, so they are not amenable to pasture improvement to any great extent. Soils are generally shallow, stony and infertile thereby restricting productivity even further, although these disadvantages are partially offset by the high rainfall.</p>
DHC DHD DHH	20.2 15.1 1.2	<p>Rises and low hills formed on coarse grained or quartzitic rocks. There is negligible rock outcrop, but up to 20% surface sandstone and quartzite fragments.</p> <p><b>DHC</b> Footslopes and low hills with slopes of 3-10% and relief to 50 m.  <b>DHD</b> Low hills with slopes of 10-20% and relief to 50 m.  <b>DHH</b> Footslopes with slopes of 3-10%, relief to 30 m and eroded watercourses.</p> <p>Main soils: <u>sandy loam over red clay on calcified rock</u> - <b>D1</b> (E) and <u>sandy loam over dispersive red clay on calcified rock</u> - <b>D7</b> (E), with <u>acidic sandy clay loam over red clay on rock</u> - <b>K3</b> (C) and <u>sandy loam over brown clay</u> - <b>F1</b> (L) on lower slopes. The slopes are arable but are characterized by poorly structured soils associated with excessive runoff (leading to erosion and sub-optimal soil moisture storage), poor workability, waterlogging and patchy emergence. Severe erosion has occurred in the past.</p>
JCC	2.3	<p>Outwash fans with slopes of 3-6% formed on fine grained alluvium. Main soils: <u>sandy loam over red clay</u> - <b>D2</b> (V), with <u>sandy loam over dispersive clay</u> - <b>F2</b> (C) and <u>black cracking clay</u> - <b>E1</b> (L). The fans are fully arable but have poorly structured loam over clay soils which are highly erodible, prone to waterlogging, difficult to work and subject to patchy emergence.</p>
XFS	0.4	<p>Miscellaneous watercourses and associated flats with mixed <u>alluvial soils</u> - <b>M1/M3/M4</b>. The small size of any parcel of land and the proximity to a watercourse limit opportunities for agricultural use, although the soils themselves (except for boulder beds) are likely to be deep and moderately fertile.</p>

# 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:**

- D1** Sandy clay loam over red clay on calcified rock (Calcic / Hypercalcic, Red Chromosol)  
Medium thickness hard sandy loam to clay loam abruptly overlying a firm well structured red clay with fine carbonate between 40 and 80 cm, grading to weathering sandstone or quartzite within 100 cm.
- D2** Sandy loam over red clay (Hypocalcic / Calcic, Red Chromosol)  
Medium to thick hard sandy loam to clay loam abruptly overlying a red well structured clay with minor to moderate soft carbonate below 50 cm over alluvium.
- D7** Sandy clay loam over dispersive red clay on calcified rock (Calcic / Hypercalcic, Red Sodosol)  
Medium thickness hard sandy loam to clay loam abruptly overlying a firm poorly structured red clay with fine carbonate between 40 and 80 cm, grading to weathering sandstone or quartzite within 100 cm.
- E1** Black cracking clay (Epipedal, Black Vertosol)  
Dark brown to black well structured cracking clay, calcareous throughout and becoming more clayey with depth.
- F1** Sandy loam over brown clay (Eutrophic, Brown Chromosol)  
Thick stony sandy loam with a bleached A2 horizon, overlying a brown and red mottled sandy clay to clay, grading to gritty alluvium.
- F2** Sandy loam over dispersive clay (Hypocalcic, Brown Sodosol)  
Thick hard often quartz gravelly sandy loam to sandy clay loam with a bleached A2 horizon sharply overlying a brown, red or black mottled poorly structured clay with minor soft carbonate below 80 cm over alluvium.
- K3** Acidic sandy clay loam over red clay on rock (Eutrophic, Red Chromosol)  
Medium thickness hard sandy loam to clay loam overlying a firm, strongly structured red clay, grading to weathering sandstone or quartzite within 100 cm.
- K5** Gradational sandy loam on rock (Eutrophic, Brown / Red Kandosol)  
Medium thickness stony sandy loam with a bleached A2 horizon grading to a weakly structured red, brown or yellow sandy clay loam to light clay over weathering sandstone between 50 and 100 cm.
- L1** Shallow stony sandy loam (Basic / Calcareous, Paralithic, Leptic Tenosol)  
Shallow stony sandy loam to sandy clay loam overlying weathering sandstone or quartzite sometimes with soft carbonate.
- M1/M3/M4** Alluvial soil  
Complex of deep sandy loam, sandy loam grading to sandy clay and boulder beds.

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

