CAH Camels Hump Land System

Camels Hump Range and eastern footslopes

Area: 86.3 km^2

Annual rainfall: 440 – 605 mm average

Geology: Gilbert Range Quartzite forms the western edge of the land system. Softer (more easily weatherable) siltstones of the Mintaro and Saddleworth Formations underlie most of land system, with interbedded (but more common along the eastern edge), fine grained calcareous rocks of the Auburn Dolomite. Most of the rocks are mantled by soft aeolian carbonates, although this often forms a hard capping on the calcareous rocks. Outwash fans and drainage depressions are underlain by locally derived fine to medium grained sediments, also mantled by soft carbonates.

Topography: The Land System is bounded on its western side by the Camels' Hump Range, a moderately steep to steep ridge up to 100 m high with slopes varying from 15-75%. There is an abrupt change of slope at the base of the ridge to undulating to gently rolling footslopes with gradients of 3 - 20% and relief to 50 m. Runoff from the range has caused severe erosion on sections of the footslopes in the past. Most of the watercourses draining the footslopes are in narrow valleys, but some valleys are several hundred metres wide. Gently sloping fans grading to the flats of the Booborowie and Farrell Flat Land Systems occur in the north.

Elevation: The highest point is the Camel's Hump (604 m). The lowest point is 340 m adjacent to Gum Creek in the north.

Relief: Maximum relief from the top of the range to the base of the footslope is 200 m

Soils: Most soils are loamy with red clayey subsoils. Profiles are mostly shallow to moderately deep over weathering rock. Deeper soils over alluvium are less common.

Main soils

C2 Gradational loam on rock - slopes
L1/B3 Shallow stony loam - stony slopes
D1 Loam over red clay on rock - slopes
A2 Calcareous loam - slopes

Minor soils

D7 Hard loam over poorly structured red clay on rock - slopes
D2 Hard loam over well structured red clay - fans and flats
D3 Hard loam over poorly structured red clay - fans and flats
F2 Loam over poorly structured brown clay - fans and flats

Main features: The moderately steep to steep rocky range on the western edge of the Land System is non arable and very exposed; suitable for grazing only. High energy runoff water from the range has caused extensive erosion on the footslopes. The footslopes vary from semi arable to fully arable, depending on slope and rockiness. Poor soil structure is the main limitation on arable slopes. This leads to excessive runoff and associated erosion, workability difficulties and emergence problems. Better structured soils are generally shallow calcareous loams over rock. Soils on lower slopes, fans and drainage depressions are deeper, but also poorly structured, with similar problems. Saline seepage associated with water courses is common.

Soil Landscape Unit summary: 13 Soil Landscape Units (SLUs) mapped in the Camels Hump Land System:

SLU	% of area	Main features #
ABC	6.1	Low ranges up to 60 m high formed on mainly fine grained rocks with linear quartzite reefs. Slopes are 15-30% and there is up to 20% surface quartzite and siltstone, and minor water course erosion. Main soils: shallow stony loam - **L1** (E) with calcareous loam - **A2** (C), loam over red clay on rock - **D1** (L) and gradational loam on rock **- C2** (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.
ARD	8.1	Steep ridge, 70-100 m high, formed on Gilbert Range Quartzite. Slopes range from 25-75%. There is up to 20% rock outcrop and up to 50% surface quartzite. Main soils: stony shallow stony sandy loam - **L1** (E), with hard loam over dispersive red clay on rock - **D7** (C), loam over red clay on rock - **D1** (L) and calcareous loam - **A2** (L). This ridge is steep, rocky and very exposed, limiting agricultural use to rough grazing. Care must be taken to maintain surface cover as an erosion control measure. There are sporadic landslips.
DCC DCH	35.7 10.7	Undulating rises formed on siltstones of the Mintaro and Saddleworth Formations and fine grained calcareous rocks of the Auburn Dolomite Formation. **DCC** Undulating rises with slopes of 3-10% and minor water course erosion. **DCH** Undulating rises with slopes of 4-10% and extensive water course erosion. Main soils: loam over red clay on rock - **D1** (E) and gradational loam on rock - **C2** (C) with hard loam over dispersive red clay on rock - **D7** (L) and calcareous loam - **A2** (L) on slopes, hard loam over well or poorly structured red clay - **D2/D3** (M) on lower slopes, and shallow stony loam - **L1** (M) on rocky slopes. The soils are moderately fertile, well drained and have moderately high water holding capacities. The slopes are mostly arable (except for minor rocky outcrops). Gradients are moderate with a consequent potential for water erosion. This is exacerbated by hard setting, poorly structured surface soils (D1, C2, D7 and D3 soils) which tend to seal over and shed water. Other limitations caused by poor structure are difficulty in working and patchy emergence. The calcareous A2 soils are better structured but usually shallow. Control of runoff water from the steep Camel's Hump Range adjoining the western edge of this land is essential to prevent further erosion.
ESD ESI	9.7 11.0	Gently rolling rises and low hills to 40 m high with slopes of 10-20%. The land is characterized by linear rocky reefs and up to 20% surface stone. Water courses are generally stable in **ESD**, but commonly eroded in **ESI**. Main soils are gradational loam on rock - **C2** (E) and calcareous loam - **A2** (E) formed over siltstone basement rock and containing variable amounts of soft and rubbly carbonate. Shallow stony loam - **L1/B3** (E) occurs in stony areas and on harder or calcreted rocks. 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.
JCB JCG JCJ JCb JCe	2.2 4.1 2.4 2.2 2.7	Outwash fans and drainage depressions formed on locally derived alluvium. Erosion and saline seepages are common in the southern areas. **JCB** Gentle slopes of 2-4%. **JCG** Gentle slopes of 2-4% with eroded water courses. **JCJ** Drainage depressions with slopes of 2-5% and eroded water courses. **JCb** Gentle slopes of 2-4% with eroded water courses and saline seepages. **JCe** Drainage depressions with slopes of 2-5%, eroded water courses and saline seepages. Main soils: deep hard loam over well structured red clay - **D2** (E) and hard loam over poorly structured red clay - **D3** (E), with loam over poorly structured brown clay - **F2** (L). These soils have hard sandy loam to clay loam surfaces. They are moderately fertile with high water holding capacities, but have poor surface structure, and in the case of D3 and F2 soils, dispersive subsoils. This causes low water infiltration, waterlogging, susceptibility to erosion, working difficulties and patchy emergence. There is potential for salinity in all these landscapes.
JXB JXC	3.0 2.1	Complex of fans formed on local alluvium, with basement rock rises. **JXB** Slopes of 2-3%

		JXC Slopes of 3-8% Main soils: deep hard loam over well structured red clay - **D2** (C), hard loam over poorly structured red clay - **D3** (L) and loam over poorly structured brown clay - **F2** (L) on fans, and shallow hard loam over red clay on rock - **D1** (C) and calcareous loam - **A2** (C) on rises. The fans are similar to JCB and the rises are similar to DCC.

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, Hypercalcic Calcarosol)
Medium thickness calcareous stony loam grading to a very highly calcareous loamy subsoil, sometimes containing rubbly carbonate. Weathering siltstone commonly occurs within 50 cm of the surface.

C2 Gradational loam on rock (Calcic / Eutrophic, Red Dermosol)
Medium thickness hard fine sandy loam to clay loam grading to a well structured red clay with fine carbonate generally, but not always, present in the lower subsoil. Weathering siltstone underlies the soil within 100 cm. Extensive on rises.

D1 Loam over red clay on rock (Calcic / Eutrophic, Red Chromosol)
Medium thickness hard fine sandy loam to clay loam overlying a well structured red clay with fine carbonate generally, but not always, present in the lower subsoil. Weathering siltstone underlies the soil within 100 cm. Extensive on rises.

D2 Hard loam over well structured red clay (Calcic, Red / Brown Chromosol)
Medium to thick sandy loam to clay loam, often with a paler A2 horizon, abruptly overlying a well structured red (less commonly brown mottled) clay with soft carbonate accumulations at depth. Extensive on fans and flats.

D3 Hard loam over poorly structured red clay on alluvium (Calcic, Red Sodosol)
Medium to thick sandy loam to clay loam, often with a paler or bleached A2 horizon, abruptly overlying a poorly structured dispersive red clay with soft carbonate accumulations at depth. Extensive on fans and flats.

D7 Hard loam over poorly structured red clay on rock (Calcic, Red Sodosol)
Medium thickness hard setting loam to clay loam abruptly overlying a coarsely structured dispersive red clay, with fine carbonate accumulations at depth, grading to weathering quartzitic rock from about 100 cm. Common on rises.

F2 Loam over poorly structured brown clay (Eutrophic / Calcic Brown Sodosol)
Medium to thick fine sandy loam to clay loam with a paler coloured or bleached A2 layer, over a brown mottled coarsely structured dispersive clay.

L1/B3 Shallow stony loam (Paralithic / Petrocalcic, Leptic Tenosol / Rudosol)
Medium thickness stony sandy loam to loam grading directly to moderately hard rock or calcrete capped rock within 50 cm. There may be soft carbonate in the weathering rock material.

Further information: DEWNR Soil and Land Program