

GLW Gleeson Well Land System

Gentle slopes, flats and dunefields on the eastern edge of the Condowie and Everard plains

Area: 151.2 km²

Annual rainfall 370 – 440 mm average

Geology: There are five geological materials. Basement rocks do not outcrop, but probably underlie some rises. Hindmarsh Clay underlies most of the area and is exposed in low lying flats. This has been covered by highly calcareous deposits (Woorinen Formation) which vary from soft amorphous materials through to rubble and stones. This is overlain by Molineaux Sand, which has been reworked by wind into parallel low dunes. Recent alluvial deposits are associated with two watercourses which cut through the system.

Topography: The sand system is essentially a very gently inclined outwash fan (1 - 2% slope, but up to 4% in the north), interrupted in places by isolated rises. Aeolian activity, associated with the older highly calcareous deposits and the younger sands, has remodelled parts of the land surface into low undulations and parallel dune fields.

Elevation: 90 to 190 m

Relief: Maximum relief is 30 m (basement rock? highs). In the north is a gentle grade also with relief of 30 m. Maximum relief in the dune fields is 15 m.

Soils: Deep calcareous sandy loams to clay loams dominate the landscape. Associated soils include loamy red texture contrast soils, shallow sandy loams over calcrete and deep sands.

Main soils

A4a Rubbly calcareous sandy loam - throughout

A6 Calcareous clay loam - throughout

A4b Calcareous sandy loam - dunes and rises

D2 Loam over red clay - drainage depressions

Minor soils

C3 Gradational clay loam - flats

B2 Rubbly calcareous sandy loam over calcrete - stony flats

H2 Deep sand - dunes

G1 Sand over red sandy clay loam - dunes and rises

D3 Loam over dispersive red clay - drainage depressions

B3 Sandy loam over calcrete - stony flats

E2 Red cracking clay - flats

Main features: The Gleeson Well Land System includes three distinctive classes of land:

- Flats and fans have mostly deep, medium to fine textured soils with high productive capacity. Main limitations are poor structure in texture contrast soils, and high subsoil pH, boron and salt levels.
- Stony flats and rises are dominated by calcareous soils which are well structured, but only moderately fertile and often with limited moisture holding capacities due to rubble content or shallow depth to calcrete.
- Sand hill country is dominated by low fertility, erosion prone deep sands on dunes, mixed with loamier and more fertile calcareous soils on the flats.



Soil Landscape Unit summary: 14 Soil Landscape Units (SLUs) mapped in the Gleeson Well Land System:

SLU	% of area	Main features #
IAA IAE	0.5 2.1	Flats (IAA) and drainage depressions (IAE) formed on Hindmarsh Clay. Main soils: <u>calcareous clay loam</u> - A6 (E), with <u>rubbly calcareous sandy loam</u> - A4a (C), <u>loam over dispersive red clay</u> - D3 (L) and <u>gradational clay loam</u> - C3 (L). Where clay is shallow, waterlogging and reduced waterholding capacity are limitations. Subsoil boron levels are marginally toxic and are associated with moderate salinity, high sodicity and pH. The soils have high productive potential, provided that these limitations are deeper than about 75 cm. Flooding and associated siltation are periodic problems in IAE .
JFE	4.2	Drainage depressions and creek flats formed on clayey alluvium. Main soils: <u>loam over dispersive red clay</u> - D3 (E), with <u>calcareous clay loam</u> - A6 (C), <u>loam over red clay</u> - D2 (L), <u>gradational clay loam</u> - C3 (L) and <u>rubbly calcareous sandy loam</u> - A4a (M). The land is potentially productive with limitations due to the poor structure of the main soil. Hard setting surfaces and dispersive clay subsoils cause reduced infiltration, temporary waterlogging, restricted workability and patchy emergence. Subsoil salinity, alkalinity and boron toxicity occur throughout to some degree. Occasional flooding causes problems of siltation and weed seed dispersal.
KRA	2.1	Very gently inclined plain of 1-2% slope formed on clayey sediments. Main soils: <u>calcareous clay loam</u> - A6 (E) and <u>red cracking clay</u> - E2 (E). The soils are deep, fertile and well structured but generally clayey, which may cause workability problems and some waterlogging in wet years. Subsoil alkalinity, boron toxicity and salinity are likely throughout.
QVA	11.0	Stony plain with less than 1% slope. Main soils: <u>rubbly calcareous sandy loam over calcrete</u> - B2 (E) and <u>rubbly calcareous sandy loam</u> - A4a (E), with <u>sandy loam over calcrete</u> - B3 (L). The soils are well structured and moderately fertile, but productivity is permanently limited by the shallowness of the soils over calcrete or rubble and the stoniness. However this limitation is not uniform across the landscape as the calcrete is discontinuous and fractured, allowing roots to exploit deeper subsoil moisture reserves.
SiA SiB SiG	49.2 3.5 11.2	Plains and rises formed on soft or rubbly carbonate deposits overlying Hindmarsh Clay. SiA Plains with 1-2% slope. SiB Rises with 2-4% slope. SiG Slopes of 1-4% with watercourses. Main soils: <u>rubbly calcareous sandy loam</u> - A4a (E), with <u>calcareous clay loam</u> - A6 (C), <u>calcareous sandy loam</u> - A4b (L), <u>loam over red clay</u> - D2 (L); <u>gradational clay loam</u> - C3 (L). Land dominated by calcareous soils. Effects on productivity are mainly due to moderately shallow potential rooting depth (caused by high subsoil pH and boron) and some fertility problems (caused by the relatively low clay content of many soils, and alkalinity). Boron concentrations toxic in lower subsoil. Stoniness is a slight limitation in places, as is water and wind erosion potential on sloping and sandier areas respectively.
U-C U-D	0.3 0.2	Moderate (U-C) and low (U-D) isolated sand dunes. Main soils: <u>deep sand</u> - H2 (E), <u>sand over red sandy clay loam</u> - G1 (E); <u>calcareous sandy loam</u> - A4b (E). Land consists of deep, low fertility sands on exposed rises which are susceptible to wind erosion, and shallow calcareous soils. Low waterholding capacities affect all soils.
UFF UFG UFI UFJ	4.6 0.5 3.1 7.5	Dunefields with variable coverage and size of dunes. UFF 60-90% moderate sand hills. UFG 60-90% low sandhills UFI 30-60% moderate sandhills. UFJ 30-60% low sandhills. Main soils: <u>deep sand</u> - H2 (E-C) with <u>sand over red sandy clay loam</u> - G1 (C) both on sandhills, and <u>calcareous clay loam</u> - A6 (L-C), with <u>calcareous sandy loam</u> - A4b (M-L) and <u>rubbly calcareous sandy loam</u> - A4a (M-L) on flats. This is a typical dune-swale landscape with the inherent problem of frequent changes in soil types across the landscape. Control of wind erosion is the main concern on the sandy rises, along with fertility maintenance and the need to encourage deep root growth to maximize water use efficiency. On the heavier swales, lower slopes and low rises there is a range of minor limitations associated with the shallow depth to highly alkaline subsoils. These include reduced waterholding capacity, fertility problems, boron toxicity and salinity. All soils are susceptible to wind erosion, although not to the same extent as the sandhill soils.



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:

- A4a** Rubbly calcareous sandy loam (Regolithic, Supracalcic / Lithocalcic Calcarosol)
Calcareous sandy loam to clay loam grading to Class III B / C rubble.
- A4b** Calcareous sandy loam (Regolithic, Hypercalcic Calcarosol)
Calcareous sandy loam to clay loam grading to Class III A carbonate with minor rubble.
- A6** Calcareous clay loam (Pedal, Hypercalcic / Calcic Calcarosol)
Calcareous loam to light clay with a well structured clay subsoil over Class I carbonate.
- B2** Rubbly calcareous sandy loam over calcrete (Petrocalcic, Lithocalcic Calcarosol)
Calcareous sandy loam shallow over sheet (Class II) calcrete.
- B3** Sandy loam over calcrete (Petrocalcic, Leptic, Tenosol OR Petrocalcic, Red Kandosol)
Medium thickness non calcareous sandy loam, either directly overlying calcrete, or grading to a red sandy clay loam over calcrete.
- C3** Gradational clay loam (Hypercalcic, Red Dermosol)
Clay loam grading to a well structured red clay on Class I carbonate.
- D2** Loam over red clay (Hypercalcic, Red Chromosol)
Sandy loam to clay loam abruptly overlying a well structured red clay underlain by Class I carbonate.
- D3** Loam over dispersive red clay (Calcic / Hypercalcic, Red Sodosol)
Hard sandy loam to clay loam sharply overlying a poorly structured dispersive red clay grading to Class I carbonate.
- E2** Red cracking clay (Epipedal, Red Vertosol)
Red cracking clay with Class I carbonate at depth.
- G1** Sand over red sandy clay loam (Hypercalcic / Supracalcic, Red Chromosol)
Loamy sand abruptly overlying a massive sandy clay loam grading to Class III A / B carbonate.
- H2** Deep sand (Calcic Calcarosol)
Very thick calcareous sand grading to highly calcareous clayey sand.

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

