

KUN Kunlara Land System

(Based on the description by Potter, Wetherby and Chittleborough (1973) in "A Description of the Land in County Albert, County Alfred and Part of County Eyre, South Australia". Dept. of Agric. S.A. Soil Cons. Branch LD1, and A. K. McCord in "A Description of Land in the Southern Mallee of South Australia").

Undulating dissected plain extending in an arc from Nildottie to Hundred of Chesson and south to Perponda.

Area: 744.5 km²

Annual rainfall: 270 – 350 mm average

Geology: The geology of the System is complicated by the depositional and erosional events which have shaped it. Underlying the entire area are Tertiary sediments of mainly Loxton / Parilla Sands, veneered in places by Blanchetown Clay equivalent. These sediments were apparently completely mantled by calcrete which formed a plain of sheet rock across the landscape. This sheet has subsequently been partly eroded and / or dissolved away, leaving isolated benches of calcrete, separated by flats and depressions underlain by the older Tertiary sediments. More recently there have been aeolian accessions of i) highly calcareous medium textured Woorinen Formation sediments (parts of which have subsequently hardened into rubbly forms), and ii) Molineaux Sand. These two materials are sporadically distributed over the pre-existing landscape.

Topography: The undulating plain which characterizes the Land System is a reflection of the geology. Dish shaped depressions (solution hollows) alternate with flat topped stony rises (remnant calcrete benches), gently undulating rises (Woorinen Formation) and dunefields of low to moderate sandhills (Molineaux Sand). The sandhills are rounded with a general east-west orientation, and are superimposed over all of the other components of the System.

Elevation: 50 - 120 m

Relief: 5 - 40 m

Soils: Calcareous sandy loams over rubble or hard calcrete are the characteristic soils of the System. These are mixed with non calcareous red sandy loams with more clayey subsoils (on flats), and deep sands (on sandhills).

Main soils

Sandhills

H2 Deep sand

Slopes and rises

A4/B2 Rubbly calcareous sandy loam

C1 Gradational sandy loam

Calcrete benches and ridges

B2 Shallow calcareous sandy loam

Minor soils

Flats and depressions

A4 Rubbly calcareous sandy loam

C1 Gradational sandy loam

D2 Sandy loam over red sandy clay

G1 Sand over sandy clay loam



Main features: The Kunlara Land System is a complex landscape comprising several contrasting facets. Gently undulating rises are most common, and consist of mainly moderately shallow to shallow calcareous soils, the productive potential of which is limited mainly by low moisture holding capacity. There are extensive flats and depressions with mainly moderately deep and fertile loamy soils with good productive potential. The less productive areas include large areas of sandhills characterized by deep, infertile, water repellent and erosion prone sands, and stony benches, some of which have soils which are too shallow and rocky for cultivated agriculture.

Soil Landscape Unit summary: 9 Soil Landscape Units (SLUs) mapped in the Kunlara Land System:

SLU	% of area	Main features #
HkA	5.7	Depressions underlain by Parilla/Loxton Sands (often calcreted). These depressions are probably solution features. Main soils: <u>gradational sandy loam</u> - C1 (E) and <u>sandy loam over red sandy clay</u> - D2 (E), with <u>sand over sandy clay loam</u> - G1 (L). These soils have few limitations to cropping. Although some profiles are shallow with limited water holding capacity, they are moderately fertile due to their clay content and have low susceptibility to erosion.
HqA	11.6	Gently undulating flats underlain by Parilla/Loxton Sands, with up to 10% low sandhills. Main soils: <u>gradational sandy loam</u> - C1 (E), <u>rubbly calcareous sandy loam</u> - A4 (C), <u>sandy loam over red sandy clay</u> - D2 (C) and <u>sand over sandy clay loam</u> - G1 (L), with <u>deep sand</u> - H2 (M) on sandhills. The soils are often shallow (particularly the A4 soils), but there are extensive areas of deeper and potentially productive soils. The D2 soils are the most favourable with no significant limitations to agricultural production. The C1soils are often sandier and shallower but are nevertheless productive soils. The minor sandy soils have low potential (see below).
QJZ	6.1	Benches and ridges formed on remnants of the old calcreted land surface. There is extensive surface stone and some sheet calcrete near the surface. Main soil: <u>shallow calcareous sandy loam</u> - B2 (D). These areas are very stony with some sheet rock making cultivation difficult, and shallow soils restricting yield due to lack of moisture holding capacity.
SkB	25.7	Complex of slopes, depressions and low sandhills, generally underlain by highly calcareous and mostly rubbly Woorinen Formation carbonates. Patchy surface stone, depending on depth to calcrete layer. Main soils: <u>rubbly calcareous sandy loam</u> - A4/B2 (E), <u>sand over sandy clay loam</u> - G1 (C) and <u>gradational sandy loam</u> - C1 (C) on slopes, <u>sandy loam over red sandy clay</u> - D2 (L) and <u>gradational sandy loam</u> - C1 (L) in depressions, and <u>deep sand</u> - H2 (C) on sandhills. The slopes are the main component of this landscape unit. The soils are mainly calcareous and shallow over calcrete. They have restricted waterholding capacity (the main limitation) and moderately low fertility. Wind erosion potential is moderately low to low. The depressions are as described for HkA (above) and the sandhills are as described for UMJ (below).
UMF	4.2	Dunefields superimposed over main landscape, and comprising low to moderate east-west sandhills. Main soils: <u>deep sand</u> - H2 (E-V) on sandhills, and <u>rubbly calcareous sandy loam</u> - A4/B2 (L-E), <u>sand over sandy clay loam</u> - G1 (L-C) and <u>gradational sandy loam</u> - C1 (L-M) between the sandhills. The predominant soils are deep water repellent sands of low fertility and often eroded. Although most are arable and do not present a problem if managed properly, the moderate sandhills of UMF and UMI are more susceptible to erosion and may need stabilization. The swales and slopes between the sandhills are similar to the slopes of SkB .
UMG	16.5	
UMI	3.6	
UMJ	12.4	
UUJ	14.2	Low east-west sandhills superimposed over the calcrete benches of QJZ . The sandhills cover 30-60% of the land surface. Main soils: <u>deep sand</u> - H2 (E), and <u>shallow calcareous sandy loam</u> - B2 (E) on the benches. The sandhills are infertile, water repellent and erosion prone. Although arable, they have low productive potential. The overall potential of the landscape is also low as the intervening bench flats are characterized by shallow stony soils, a significant proportion of which are non arable.



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:

Sandhills

H2 Deep sand (Calcareous, Arenic, Brown-Orthic Tenosol)

Brown loose sand becoming orange with depth and weakly calcareous from about 100 cm, continuing below 200 cm.

Calcrete benches and ridges

B2 Shallow calcareous sandy loam (Petrocalcic, Lithocalcic Calcarosol)

Calcareous sandy loam over a highly calcareous light sandy clay loam on rubbly calcrete at about 20 cm. Rubble content decreases with depth to a very highly calcareous sandy clay loam, grading to Blanchetown Clay from about 130 cm.

Slopes and rises

A4/B2 Rubbly calcareous sandy loam (Regolithic/Petrocalcic, Lithocalcic Calcarosol)

Thin calcareous sandy loam over sheet or rubbly calcrete, grading to a very highly calcareous sandy clay to sandy clay loam with decreasing calcrete fragments, over Loxton/Parilla Sand from about 100 cm.

C1 Gradational sandy loam (Lithocalcic, Red Kandosol)

Medium thickness sandy loam grading to a red massive sandy clay loam over Class III C carbonate rubble at about 40 cm. Rubble content decreases with depth - the very highly calcareous sandy clay loam grades to Loxton/Parilla Sand from about 100 cm.

Flats and depressions

A4 Rubbly calcareous sandy loam (Regolithic, Supracalcic/Lithocalcic Calcarosol)

Calcareous sandy loam over a very highly calcareous sandy clay loam with more than 50% carbonate nodules (indurated to a rubbly pan in places), grading to sandy loam to sandy clay loam sediments below 100 cm.

C1 Gradational sandy loam (Lithocalcic, Red Kandosol)

As for *slopes and rises* (above).

D2 Sandy loam over red sandy clay (Calcic, Red Chromosol)

Medium thickness sandy loam abruptly overlying a red sandy clay, calcareous from about 50 cm, and grading to Loxton/Parilla Sand at about 100 cm.

G1 Sand over sandy clay loam (Calcic, Brown Sodosol)

Medium thickness sand to loamy sand with a pale coloured A2 layer, abruptly overlying a brown to red coarsely columnar sandy clay loam, calcareous from about 40 cm, grading to Loxton / Parilla Sand from about 100 cm.

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

