ALL Allenby Land System

(Based on the description by A. K. McCord in "A Description of Land in the Southern Mallee of South Australia")

Broad rises, flats and sand ridges south of the highway from Geranium to Pinnaroo.

Area: 506.7 km^2

Annual rainfall: 330 - 415 mm average

Geology: The Land System is underlain predominantly by clays and sandy clays equivalent to the Blanchetown Clay Formation. The clay is up to 15 m thick although typically it becomes sandier with depth. In places however, it is absent, exposing the underlying clayey sands to sandy clays (Loxton/Parilla Sand equivalents) near the surface. The clays, sandy clays and clayey sands are extensively covered by more recent windblown Molineaux Sands.

Topography: The landscape is a gently undulating plain overlain by extensive broad sandy rises and by limited areas of more or less parallel east west sand ridges. Minor wet and marginally saline depressions occur throughout.

Elevation: 90 - 100 m

Relief: Less than 10 m

Soils: The land is characterized by sandy to sandy loam soils with dispersive clay subsoils, associated with gradational sandy soils and deep sands.

Main soils
F2 Sandy loam over brown dispersive clay
G4 Sand over brown dispersive clay
G2 Gradational sandy soil

Minor soil
H3 Deep bleached sand

Main features: The Allenby Land System is characterized by extensive flat to very gently undulating land with sandy loam to sand over clay soils of moderate to moderately low fertility. The main limitations to production are poor subsoil structure, temporary waterlogging and sub-optimal inherent fertility. Moderate boron toxicity and salinity occur in some poorly drained flats and depressions, but the salinity is associated with dune seepage and perched water tables, rather than regional groundwater tables. Almost half of the area is overlain by sandhills with very low fertility soils prone to water repellence and wind erosion.

Soil Landscape Unit summary: 15 Soil Landscape Units (SLUs) mapped in the Allenby Land System:

SLU	% of area	Main features #
GfA GnA	3.4 2.6	Very gently undulating plains formed on Blanchetown Clay with up to 30% low sandy rises. There are minor (less than 2%) poorly drained depressions. **GfA** Plains with less than 10% sandy rises. **GnA** Plains with 10-30% low sandy rises. Main soils: sand over brown dispersive clay - **G4** (E) and sandy loam over brown dispersive clay - **F2** (E) on flats, with gradational sandy soil - **G2** (L) and deep bleached sand - **H3** (L) on sandy rises. Key properties: Drainage: G4 soils are moderately well to well drained, F2 soils are imperfectly drained (due to water perching on top of dispersive clay subsoil), and sandhill soils (G2 and H3) are well drained. Minor wet depressions are imperfectly to poorly drained. Fertility: The sandy loams are moderately fertile, but the sandy G4 and G2 soils and the sandhill soils (H3) have low fertility. Boron toxicity can be expected in the heavier soils, particularly where the Blanchetown Clay is close to the surface (ie within 60 cm). Physical condition: Sandy surfaces are not limiting but the heavier F2 soils often have poorly structured surface soils which affect workability and seedling emergence. Subsoil clays are generally poorly structured and restrict root growth. AWHC: Moderately low to moderate. Salinity: Generally low at the surface, but can be moderate in the calcareous subsoils. Wet depressions are marginally saline. Erosion potential: Water: Low Wind: Low to moderate, depending on surface texture. Water repellence: Nil (sandy loams) to repellent (sands) Rockiness: Nil. Summary: The sandy loams are moderately fertile soils with satisfactory water holding capacity and rooting depth provided that Blanchetown Clay is below 60 cm. Boron toxicity and waterlogging in wet seasons are likely. The sand over clay soils are less fertile, and along with the even more infertile sandhill soils are prone to water repellence and wind erosion.
GmB	3.6	Gently undulating landscape of rises formed on sandy Tertiary sediments and flats formed on Blanchetown Clay. The ratio of rises to flats is about 60:40. Some flats have poorly drained depressions, but these are minor overall. Main soils: gradational sandy soil - **G2** (E) with deep bleached sand - **H3** (M) on rises, and sand over brown dispersive clay - **G4** (C) and sandy loam over brown dispersive clay - **F2** (L) on flats. Key properties: Drainage: Rises are well drained, flats are moderately well to imperfectly drained, due to perching of water on dispersive subsoil clays. Fertility: Moderate in flats, moderately low to low on rises. Boron toxicity can be expected on the flats. Physical condition: Surface soils in flats tend to seal over, but sandier soils on rises are not restrictive. Subsoil clays in the flats impede root growth. AWHC: Moderate (flats) to moderately low (rises). Salinity: Low generally but deeper subsoils in the flats can be moderately saline. Some wetter depressions may be marginally saline throughout. Erosion potential: Water: Low (flats) to moderately low (rises) Wind: Low (flats) to moderate (rises) Water repellence: Sandy soils are repellent. Rockiness: Nil. Summary: The heavier flats are satisfactory cropping soils, despite poor structure and probable boron toxicity. The sandier soils on the rises are less fertile and prone to erosion

		and water repellence.
HaA HaK	6.4 13.8	Flat plains formed on Blanchetown Clay, with less than 10% low sandy rises. **HaA** Flats with less than 5% poorly drained depressions. **HaK** Flats with up to 20% poorly drained depressions and weak gilgai microrelief. Main soils: sandy loam over brown dispersive clay - **F2** (V) and sand over brown dispersive clay - **G4** (E) with gradational sandy soil - **G2** (M) on sandy rises. Key properties: Drainage: Moderately well to imperfectly drained due to water perching on the dispersive subsoil. Some depressions are poorly drained. Fertility: Moderate, but boron toxicity is a risk. Physical condition: Surface soils tend to seal over and dispersive subsoils impede root development. AWHC: Moderate. Salinity: Low at surface, but may be moderate at depth in the carbonate layers. Poorly drained depressions may be moderately saline throughout. Erosion potential: Water: Low Wind: Low to moderately low. Water repellence: Nil to slight (sandier soils). Rockiness: Nil Summary: These mainly heavy flats have good cropping soils, although limited areas of wet marginally saline soils and boron toxic soils restrict productivity.
HbA HbK	1.0 4.1	Flat plains formed on Blanchetown Clay, with 10-30% low sandy rises and up to 20% poorly drained depressions with weak gilgai. **HbA** Flats with less than 5% poorly drained depressions. **HbK** Flats with 5-20% poorly drained depressions and weak gilgai microrelief. Main soils: sandy loam over brown dispersive clay - **F2** (E) and sand over brown dispersive clay - **G4** (E) with gradational sandy soil - **G2** (C) on sandy rises. Key properties are as for HaA and HaK (above), with limited areas of sandy infertile soils prone to wind erosion and water repellence.
OUE OUF OUG OUI OUJ OUN OUQ OUX	0.4 5.4 7.2 15.4 25.8 2.9 3.6 4.4	Very gently undulating plains formed on Blanchetown Clay with variable low sandy rises or dunefields, and minor poorly drained and marginally saline flats. **OUE** More than 60% large sand hills. **OUF** More than 60% moderate sand hills. **OUG** More than 60% low sandy rises, with minor wet flats. **OUI** Flats to gently undulating rises with 30-60% more or less parallel moderate to low sand ridges. **OUJ** 30-60% low sandy rises with minor wet flats. **OUN** More than 60% low sandy rises, with up to 10% wet flats. **OUQ** 30-60% low sandy rises, with up to 10% wet flats. **OUX** 30-60% low sandy rises and 10 - 20% wet flats. Main soils: gradational sandy soil - **G2** (E) with deep bleached sand - **H3** (M) on sandy rises and dunes, and sand over brown dispersive clay - **G4** (C) and sandy loam over brown dispersive clay - **F2** (C) on flats. Key properties: Drainage: Sandhills are well to rapidly drained. Flats are moderately well to imperfectly and sometimes poorly drained. Fertility: Very low (sandhills). Moderately low to moderate (flats). Physical condition: No impediments to root growth on sandhills, but heavier flats have poorly structured surface soils and dispersive clay subsoils which restrict root growth. AWHC: Moderately low (sandhills) to moderate (flats). Salinity: Very low (sandhills) to moderately low (subsoils on flats) and moderate (wet flats). Erosion potential: Water: Low Wind: Moderate to high (sandhills). Low (Flats). Water repellence: Sandhills are strongly repellent. Heavier soils are not repellent. Rockiness: Nil. Summary: The landscapes have the usual management difficulties of sandhill-swale country, with low fertility and water repellent and erosion prone sandhills alternating with heavier more fertile swales, with other limitations including dispersive subsoils, patchy waterlogging, and boron toxicity and some salinity.

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:

F2 Sandy loam over brown dispersive clay (Hypercalcic, Brown Sodosol)
Medium thickness firm sandy loam with a bleached A2 layer, sharply overlying a brown columnar structured sandy clay to light clay with abundant soft Class I carbonate from about 35 cm, grading to Blanchetown Clay at about 120 cm. Very extensive on flats.

G2 Gradational sandy soil (Bleached-Mottled, Hypocalcic, Brown Kandosol)
Thick loose sand with a bleached A2 layer over a brown massive light sandy clay loam, gradually becoming more clayey and weakly calcareous with depth, over massive Tertiary sandy clay from about 90 cm. Very extensive on sandy rises and broad sand hills.

G4 Sand over brown dispersive clay (Bleached-Sodic, Hypercalcic, Brown Chromosol)
Medium thickness soft to loose loamy sand to sand with a bleached A2 layer, abruptly overlying a prismatic structured hard brown sandy clay to light clay with abundant soft Class I carbonate from about 35 cm, grading to Blanchetown Clay at about 100 cm. Very extensive on flats.

H3 Deep bleached sand (Calcareous, Arenic, Bleached-Orthic Tenosol)
Very thick bleached loose sand with an organically darkened surface, grading to a reddish sand with gradually increasing clay and soft carbonate content with depth. Limited to higher sand hills.

Further information: DEWNR Soil and Land Program