SHE Sherlock Land System

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

Flat stony plain between Netherton and Tailem Bend

Area: 923.3 km^2

Annual rainfall: 350 - 425 mm average

Geology: The land system is underlain at depth by calcareous clayey sands to sandy clays, limestones and sandstones of the Coomandook Formation. Overlying these sediments is a sheet of Bungunnia Limestone, a consolidated carbonate rich sediment deposited in an ancient lake. The thickness of the limestone varies from 250 cm to 1000 cm (average 500 cm). Remnants of older coastal ridges projected above lake level and persist today as isolated rises of Bridgewater calcarenite. The calcarenite is less than 500 cm thick, and directly overlies Coomandook Formation sediments. The flats and rises have both been calcreted in more recent times, so that a more or less continuous layer of sheet or boulder calcrete blankets the landscape. "Holes" in this calcrete cap are significant from a soil formation point of view. Sporadic sandhills and small dunefields of Molineaux Sand deposits are superimposed on both flats and rises. The thickness of sand rarely exceeds 300 cm.

Topography: The landscape is characteristically flat and stony. Stony rises and low sandhills provide some relief, but they are limited in overall extent. In the lower elevation areas to the west, saline groundwater tables are near the surface, so depressions here are saline.

Elevation: 5 - 35 m

Relief: 3 - 8 m

Soils: Shallow coarse to medium textured soils over calcrete or calcreted limestone are characteristic - however there are several significantly different forms.

Main soils:

Flats formed on Bungunnia Limestone equivalent

B3a	Red sandy loam
B3b	Brown sandy loam
A4/C1	Shallow brown calcareous sandy loam
B1	Grey calcareous sandy loam
B2a	Grey calcareous sandy loam on calcrete
A1	Deep very highly calcareous loam

Rises formed on calcreted Bridgewater Formation

B2b	Shallow calcareous sandy loam

Minor soils:

Rises formed on calcreted Bridgewater Formation

B2/A4	Calcareous sandy loam

Sandhills

H2	Deep sand
G3	Thick bleached sand over clay

Main features: The Sherlock Land System is a flat stony plain with limited areas of sandhills and stony rises. Soils are generally shallow over calcrete. Much of the area, particularly in the west is effectively non arable due to shallow soils and sheet calcrete. Elsewhere on the plains and stony rises, insufficient moisture holding capacity, stoniness and marginal fertility restrict productivity. Infertile sands prone to water repellence and wind erosion on the sandhills preclude regular cropping.

Soil Landscape Unit summary: 16 Soil Landscape Units (SLUs) mapped in the Sherlock Land System

SLU	% of area	Main features #
MxB MyB	6.5 2.0	Rises less than 10 m high formed on calcreted Bridgewater Formation calcarenites. There is variable surface calcrete stone, often extensive and with sheet rock at the surface. Low sandhills cover up to 30% of the land surface. **MxB** Rises with less than 10% low sandhills. **MyB** Rises with 10-30% low sandhills. Main soils: calcareous sandy loam - **B2/A4** (E) and shallow calcareous sandy loam - **B2b** (E), with deep sand - **H2** (M-C) and thick bleached sand over clay - **G3** (M-L) on sandhills. These rises have moderately shallow to shallow calcareous sandy loams which are generally arable, but productivity is invariably limited by one or more of insufficient waterholding capacity, low fertility or stoniness. Limited sandhills have deeper soils but very low fertility and susceptibility to water repellence and wind erosion limit their usefulness.
MzB	0.1	Rises less than 10 m high formed on calcreted Bridgewater Formation calcarenites. There is extensive surface calcrete stone and sheet rock at the surface. Main soils: shallow calcareous sandy loam - **B2b** (V), with calcareous sandy loam - **B2/A4** (C). These rises are dominated by very shallow stony soils which are essentially non arable.
NbA NbM NbP	23.0 0.2 1.0	Very stony flats formed on calcreted Bungunnia Limestone equivalent. There are limited sandy and stony rises. **NbA** Flats with less than 10% rises. **NbM** Flats with up to 30% low stony rises. **NbP** Flats with 10-30% low sandy rises. Main soils: brown / grey shallow calcareous sandy loam - **A4/C1, B2a, B2b** (E), brown sandy loam - **B3b** (C) and red sandy loam - **B3a** (L) on flats and stony rises, with deep sand - **H2** (M-C) on sandhills. The flats have moderately shallow to shallow calcareous sandy loams which are only semi arable due to extensive stoniness, shallow soils and marginal fertility. The sandhills have deeper soils but very low fertility and susceptibility to water repellence and wind erosion limit their usefulness.
NdA Nda NdO NdP	42.3 1.1 1.6 9.3	Flats formed on Bungunnia Limestone equivalent. There is extensive surface calcrete and up to 30% coverage of low sandhills. There are small areas of saline depressions adjacent to the highly saline Blind Creek Land System. **NdA** Flats with less than 10% stony or sandy rises. **Nda** Flats with up to 10% marginally saline depressions. **NdO** Flats with up to 30% stony and sandy rises. **NdP** Flats with 10-30% low sandhills. Main soils: brown sandy loam - **B3b** (E) and red sandy loam - **B3a** (C), with grey calcareous sandy loam on calcrete - **B1** (L) and grey calcareous sandy loam on calcrete - **B2a** (M) on calcreted flats. Shallow brown calcareous sandy loam - **A4/C1** (C) and deep very highly calcareous loam - **A1** (M) occur on flats where the underlying limestone has not been calcreted. Deep sand - **H2** (M-C) occurs on low sandhills, and shallow calcareous sandy loam - **B2b** (M-L) occurs on stony rises. The soils are generally shallow although predominantly arable. Restricted waterholding capacity is widespread and the most significant limitation to crop production. Stone is continually brought to the surface by cultivation and causes excessive wear on machinery. Fertility is sub optimal. Apart for nitrogen and phosphorus, copper and zinc are commonly deficient. There are occasional magnesia patches associated with remnants of eroded lunettes.

U-B U-D UUF UUI UUJ	0.1 0.4 0.6 2.4 9.3	Areas where sandhills occupy more than 30% of the land surface. Size and frequency vary: **U-B** Individual moderate to high sandhills. **U-D** Individual low sandhills. **UUF** 60-90% moderate sandhills. **UUI** 30-60% moderate sandhills. **UUJ** 30-60% low sandhills. Main soil: deep sand - **H2** (E-V) and thick bleached sand over clay - **G3** (M-L) on sandhills, with soils as for **NdA** on the intervening flats. The sands are infertile and often water repellent. Wind erosion is a problem when soils are exposed. The moderate sandhills are only semi arable due to the hazard and need specialized soil conservation management. The flats have shallow stony soils on which productivity is limited mainly by restricted waterholding capacity.
ZB-	0.1	Moderately to highly saline flats with a range of halophytic vegetation. No soils data. These flats have no cropping potential, but provide some grazing value. Care must be taken to avoid overstocking and consequent destruction of surface cover.

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:

Flats formed on Bungunnia Limestone equivalent

A1 Deep very highly calcareous loam (Hypervescent, Regolithic, Hypercalcic Calcarosol)
Brown very highly calcareous powdery loam becoming more clayey with depth, and with variable gypsum segregations, over interbedded limestone and calcareous clay.

A4/C1 Shallow brown calcareous sandy loam (Petrocalcic, Supracalcic Calcarosol)
Thin calcareous sandy loam grading to a calcareous sandy clay loam overlying calcreted limestone at about 15 cm. The limestone softens at depth to a very highly calcareous sandy clay with abundant limestone fragments.

B1 Grey calcareous sandy loam on calcrete (Hypervescent, Petrocalcic, Supracalcic Calcarosol)
Grey brown very highly calcareous sandy loam to light sandy clay loam, becoming greyer and more calcareous with depth and with increasing calcrete fragments, over calcreted limestone at about 60 cm.

B2a Grey calcareous sandy loam on calcrete (Petrocalcic, Hypercalcic Calcarosol)
Grey brown calcareous sandy loam becoming very highly calcareous at shallow depth, over calcreted limestone or clay within 50 cm.

B3a Red sandy loam (Petrocalcic, Red Kandosol)
Thin sandy loam grading to a red sandy clay loam overlying calcreted limestone at about 20 cm. The limestone softens with depth to a very highly calcareous sandy clay loam with abundant limestone fragments.

B3b Brown sandy loam (Calcareous, Petrocalcic, Leptic Tenosol)
Medium thickness brown sandy loam to light sandy clay loam over calcreted limestone within 25 cm. The limestone softens with depth to a very highly calcareous sandy clay loam to sandy clay with abundant limestone fragments.

Rises formed on calcreted Bridgewater Formation

A4 Calcareous sandy loam (Petrocalcic, Supracalcic Calcarosol)
Calcareous sandy loam becoming more clayey, more calcareous and more rubbly with depth, over calcrete at about 80 cm, softening with depth to a very highly calcareous pale pink sandy clay loam.

B2b Shallow calcareous sandy loam (Petrocalcic, Supracalcic Calcarosol)
Thin calcareous sandy loam grading to a calcareous sandy clay loam overlying calcreted calcarenite at about 15 cm.

Sandhills

H2 Deep sand (Basic, Arenic, Brown-Orthic Tenosol)
Greyish brown loose sand, becoming yellow with depth and continuing below 200 cm.

G3 Thick bleached sand over clay (Hypercalcic, Brown Sodosol)
Thick loose sand, with a paler coloured or bleached A2 layer, abruptly overlying a brown coarsely structured sandy clay, calcareous with depth, grading to Bridgewater Formation calcarenite.

Further information: DEWNR Soil and Land Program