

# PAL Pallamana Land System

Slopes and flats adjoining the eastern edge of the Mt. Lofty Ranges from near Murray Bridge to Summerfield

**Area:** 59.4 km<sup>2</sup>

**Annual rainfall:** 330 – 440 mm average

**Geology:** The land is mainly underlain by clayey sand to sandy clay outwash sediments derived from the coarse grained granite based rocks of the escarpment to the west. Reworking of the sandy surface soils formed from these sediments has resulted in reddish coloured sand spreads being deposited on the alluvium. In the south, the underlying sediments bear more resemblance to Tertiary clayey sands and sandy clays, as they give rise to bleached sandy soils. Reworking of these sands has produced low sand dunes. Minor geological components include remnant calcrete rises and tongues of gneissic basement rock projecting on to the footslopes.

**Topography:** The landscape is essentially an east facing outwash fan, abutting the eastern escarpment of the Mount Lofty Ranges, and grading away towards the River Murray. Slopes adjacent to the escarpment are up to 6%, and these decrease in an easterly direction to less than 1%. Reworking of sandy surface soils has resulted in low sand spreads or low east - west oriented sandhills superimposed on the land surface. These have been dissected by the most recent alluvial activity. Watercourses emanating from the ranges are ephemeral, and rarely reach the Murray, with the exception of Preamimma Creek, the largest of the streams. On upper fan slopes, watercourses are sometimes eroded.

**Elevation:** 20 m where Preamimma Creek leaves the system, to 140 m in the north west.

**Relief:** Less than 5 m

**Soils:** Thick loamy sand to sandy loam soils with more clayey subsoils are characteristic. Associated with them are calcareous sandy loams and deep sands.

## Main soils

### *Outwash fans and flats*

- G1a** Thick loamy sand over red sandy clay
- C1** Gradational loamy sand
- H2a** Deep sand
- A4a** Calcareous sandy loam
- M1** Deep sandy loam

## Minor soils

### *Sandy footslopes and sandhills*

- G4** Sand over dispersive clay
- H3** Deep bleached sand

### *Sandy rises*

- H2b** Deep sand
- G1b** Sand over sandy clay loam

### *Stony rises (calcrete or gneiss)*

- G1c** Sand over weathering basement rock
- L1** Shallow stony loamy sand
- A4b** Rubbly calcareous sandy loam



**Main features:** The Pallamana Land System comprises gentle slopes and flats characterized by sandy soils. Dominant are soils with thick loamy sand surfaces and red sandy clay loam subsoils. These are deep but of moderately low fertility, due to lack of clay. Deep sandy soils and sand over dispersive clays are subdominant. These are lower in fertility while the dispersive subsoils adversely affect root growth and drainage. Deep sandy soils superimposed on the flats and slopes are highly infertile and susceptible to wind erosion and sometimes water repellence. Watercourse erosion is a problem in places.

**Soil Landscape Unit summary:** 14 Soil Landscape Units (SLUs) mapped in the Pallamana Land System:

SLU	% of area	Main features #
DgC	0.5	Lower slopes of the Narrinyeri Hills, underlain by weathered gneissic rocks. Main soil: <u>sand over weathering basement rock</u> - <b>G1c</b> (E) with <u>shallow stony loamy sand</u> - <b>L1</b> (E). These soils are moderately deep, but of low fertility. Because of their position on footslopes, they are highly susceptible to water erosion.
GCC GCE	7.4 1.0	Footslopes and drainage depressions underlain by Tertiary clayey sands to sandy clays. <b>GCC</b> Footslopes with gradients of 3-6% and 10-20% low sandhills. <b>GCE</b> Drainage depressions with slopes of 2-4%. Main soils: <u>sand over dispersive clay</u> - <b>G4</b> (V) with <u>deep bleached sand</u> - <b>H3</b> (L) on sandhills. These soils are infertile and prone to wind and water erosion and water repellence. Subsurface waterlogging can be expected in wet seasons.
JUA JUB JUE JUI	11.3 6.0 8.4 0.2	Outwash fans, flats and drainage depressions formed on clayey sand to sandy clay outwash sediments. <b>JUA</b> Flats with slopes of less than 2%. <b>JUB</b> Fans with slopes of 2-5%. <b>JUE</b> Drainage depressions and creek flats. <b>JUI</b> Eroded drainage depressions. Main soils: <u>thick loamy sand over red sandy clay</u> - <b>G1a</b> (E) and <u>deep sandy loam</u> - <b>M1</b> (E), with <u>deep sand</u> <b>H2a</b> (L) adjacent to escarpment to the west and along watercourses. These soils are moderately deep and marginally fertile (low clay content surfaces). The loamy sands are prone to compaction and dispersive subsoils will perch water in wet seasons. Watercourse erosion is locally a problem.
KXA KXB KXC KXE	30.8 21.6 1.5 1.3	Outwash fans, flats and drainage depressions formed on coarse to medium grained alluvium. <b>KXA</b> Flats with slopes of less than 2%. <b>KXB</b> Fans with slopes of 2-4%. <b>KXC</b> Slopes of 3-6% <b>KXE</b> Depressions containing short eroded water courses from the escarpment. Main soils: <u>gradational loamy sand</u> - <b>C1</b> (E) and <u>thick loamy sand over red sandy clay</u> - <b>G1a</b> (E), with <u>calcareous sandy loam</u> - <b>A4a</b> (C) and <u>deep sandy loam</u> - <b>M1</b> (L). Deep sands are dominant in KXE. The texture contrast soils tend to be concentrated in KXA. The soils generally are deep but coarse textured, so natural fertility is low, as is waterholding capacity on the deeper sands. Apart from erosion potential in KXC and KXE, there are no other significant limitations.
QVB	0.3	Low stony rises formed on calcrete. Main soil: <u>rubbly calcareous sandy loam</u> - <b>A4b</b> (D). These small isolated rises are residual features of little agricultural value. Soils are shallow and stony.
UBJ	0.7	Gently undulating rises with low parallel east - west oriented sandhills. Main soils: <u>deep sand</u> - <b>H2b</b> (E) on sandhills, with <u>calcareous sandy loam</u> - <b>A4a</b> (E) in swales. Sandhill soils are infertile and susceptible to wind erosion and water repellence in some seasons. Swale soils are heavier, but low fertility is a limitation, along with sub-optimal waterholding capacity.
UWK	9.0	Low sandy rises superimposed on alluvial flats. Main soils: <u>deep sand</u> - <b>H2b</b> (E) and <u>sand over sandy clay loam</u> - <b>G1b</b> (E). These soils are deep and well drained, but have low inherent fertility and are prone to wind erosion. Water repellence may be a problem in some seasons.



# PROPORTION codes assigned to soils within Soil Landscape Units (SLU):

(D)	Dominant in extent (>90% of SLU)	(C)	Common in extent (20–30% of SLU)
(V)	Very extensive in extent (60–90% of SLU)	(L)	Limited in extent (10–20% of SLU)
(E)	Extensive in extent (30–60% of SLU)	(M)	Minor in extent (<10% of SLU)

### Detailed soil profile descriptions:

- A4a** Calcareous sandy loam (Regolithic, Hypercalcic / Supracalcic Calcarosol)  
Calcareous sandy loam becoming more clayey and calcareous with depth over Class III A or III B carbonate from about 30 cm. Rubble content decreases with depth.
- A4b** Rubbly calcareous sandy loam (Regolithic, Supracalcic / Lithocalcic Calcarosol)  
Calcareous sandy loam to loamy sand over Class III B or III C carbonate from about 20 cm. Rubble content decreases with depth, while clay content increases.
- C1** Gradational loamy sand (Hypercalcic, Red Kandosol)  
Thick to very thick loamy sand grading to a red massive sandy clay loam, calcareous from about 90 cm over clayey sand to sandy clay loam alluvium.
- G1a** Thick loamy sand over red sandy clay (Hypercalcic, Red Sodosol)  
Medium to thick loamy sand abruptly overlying a massive red sandy clay loam to sandy clay, calcareous within 20 cm of the top of the clay, grading to clayey sand to sandy clay alluvium.
- G1b** Sand over sandy clay loam (Calcic, Red Chromosol)  
Thick to very thick reddish sand abruptly overlying a red massive sandy clay loam to sandy clay, with soft carbonate at depth.
- G1c** Sand over weathering basement rock (Hypercalcic, Red Sodosol)  
Thick to very thick red loamy coarse sand, with a red sandy loam to sandy clay subsoil, calcareous at depth, grading to weathering gneiss.
- G4** Sand over dispersive clay (Calcic, Brown Sodosol)  
Medium to thick loose grey sand with a bleached A2 layer, sharply overlying a brown mottled columnar structured sandy clay with soft carbonate at depths ranging from 15 to 65 cm.
- H2a** Deep sand (Basic, Arenic, Red-Orthic Tenosol)  
Thick loose red brown sand grading to a massive yellowish red and brown sand, continuing below 150 cm. Minor grit and gravel throughout.
- H2b** Deep sand (Calcareous, Arenic, Red-Orthic Tenosol)  
More than 100 cm red brown sand, often with weak soft carbonate accumulations below 50 cm, continuing below 150 cm.
- H3** Deep bleached sand (Arenic, Bleached-Orthic Tenosol)  
More than 100 cm bleached sand, organically darkened at the surface.
- L1** Shallow stony loamy sand (Paralithic, Leptic Rudosol)  
Medium to thick gravelly gritty sand to sandy loam overlying weathering granite within 40 cm.
- M1** Deep sandy loam (Calcareous, Regolithic, Brown-Orthic Tenosol)  
Very thick brown loamy sand to sandy loam, usually calcareous with depth, continuing below 100 cm.

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

