

# PUN Punthari Land System

**Area:** 78.2 km<sup>2</sup>

**Annual rainfall:** 300 – 400 mm average

**Geology:** The land system is underlain at depth by a massive granite dome which presumably gives the land its relief. However, the granite only outcrops very occasionally. Overlying the granite are clayey sands to sandy clays which may be weathering products, or Tertiary sediments. These in turn are overlain by more recent highly calcareous Woorinen Formation deposits, and windblown Molineaux Sand. The carbonates were apparently much thicker in the past and may have formed an extensive capping across the landscape, as evidenced by flat topped calcrete benches scattered throughout the system. This surface has been largely eroded away, but sheet and rubbly calcrete remain important features of the landscape, along with the sand spreads.

**Topography:** The landscape is undulating, with slopes typically in the range 2 - 8%. This topography is primarily the result of dissection by short streams flowing across the landscape from the Mount Lofty Ranges to the River Murray. These ephemeral streams occupy narrow depressions. On upper slopes, remnants of the old calcreted land surface occur, as flat topped benches or irregular stony slopes. Although sand deposits are extensive, most of the sand is in spreads rather than dunes.

**Elevation:** 20 m adjacent to the River Murray to 160 m at Pfeiffer Hill.

**Relief:** 20 - 50 m

**Soils:** The soils are characteristically sandy, including deep sand and sand over clay. Calcareous soils, some shallow, are sub-dominant.

#### Main soils

##### *Soils on rises*

- H2** Deep sand
- D2** Sandy loam over red clay
- A4a** Rubbly calcareous sandy loam
- A4b** Calcareous sandy loam

#### Minor soils

##### *Soils on rises*

- G1** Sand over red sandy clay
- C1** Gradational sandy loam
- B2** Shallow stony calcareous sandy loam

##### *Soils in alluvial depressions*

- D5/M4** Loamy sand over red sandy clay loam
- A3** Deep calcareous sandy loam
- M1** Deep coarse textured alluvium

**Main features:** The Punthari Land System is characterized by undulating rises and low hills. The soils fall into three categories, reflecting their underlying geology. Deep sands or sand over clay soils are most common. They are infertile and susceptible to water repellence and wind erosion. Calcareous sandy loams, often with rubble or sheet calcrete, are also extensive. These are



often shallow with restricted moisture holding capacities and workability, but are more fertile than the sands. The third most common category is sandy loam over clay soils. These are moderately deep and fertile, but prone to soil structure problems and associated emergence, workability and runoff/erosion problems.

**Soil Landscape Unit summary:** 6 Soil Landscape Units (SLUs) mapped in the Punthari Land System:

SLU	% of area	Main features #
GQB GQC	6.6 84.5	<p>Gently undulating to undulating rises underlain by granite capped by Tertiary sediments, Woorinen Formation carbonates and Molineaux Sand. There are occasional granite outcrops and variable surface stone, particularly calcrete where Woorinen Formation carbonates have hardened through near surface exposure.</p> <p><b>GQB</b> Rises to 20 m high with slopes of 2-4%.  <b>GQC</b> Rises and low hills to 50 m high with slopes of 4-15%.            The soils reflect the immediate underlying geology:</p> <p><i>Sandy slopes and rises on Molineaux Sand (50% of area).</i>            Main soils: <u>deep sand</u> - <b>H2</b> (E) and <u>sand over red sandy clay</u> - <b>G1</b> (L). These soils are infertile (especially the deep sands), and are susceptible to water repellence and wind erosion. Productive potential is low.</p> <p><i>Slopes, rises and benches formed on Woorinen carbonates (30% of area).</i>            Main soils: <u>rubbly calcareous sandy loam</u> - <b>A4a</b> (L), <u>calcareous sandy loam</u> - <b>A4b</b> (L) and <u>shallow stony calcareous sandy loam</u> - <b>B2</b> (M). These soils are more fertile than the sands, but are often shallower with resulting reduction in moisture holding capacity. Heavy stone can sometimes be a problem.</p> <p><i>Slopes formed on Tertiary sediments (20% of area).</i>            Main soils: <u>sandy loam over red clay</u> - <b>D2</b> (L) and <u>gradational sandy loam</u> - <b>C1</b> (M). These soils are the most fertile and are generally moderately deep. Provided that surface structure is maintained (to minimize adverse effects on seedling emergence, workability and runoff/erosion), these are potentially productive soils, although they only occupy 20% of the area.</p>
JKE JKJ	3.0 1.9	<p>Narrow drainage depressions formed on alluvium.</p> <p><b>JKE</b> Depressions with well defined but generally uneroded water courses.  <b>JKJ</b> Depressions with well defined water courses which are extensively eroded.            Main soils: <u>loamy sand over red sandy clay loam</u> - <b>D5/M4</b> (E), <u>deep calcareous sandy loam</u> - <b>A3</b> (E), and <u>deep coarse textured alluvium</u> - <b>M1</b> (E). These soils are potentially productive, although the sandy types lack water holding capacity and fertility. However, the depressions are dominated by watercourses which restrict extensive developments. Evidence of past erosion (particularly in JKJ) indicates that protective measures are needed.</p>
QMZ	1.9	<p>Stony benches formed on calcrete. There is extensive surface stone.            Main soil: <u>shallow stony calcareous sandy loam</u> - <b>B2</b> (D). These soils are shallow and stony, and only semi arable.</p>
ULf	2.1	<p>Rises with 30-60% low sandhills.            Main soils: <u>deep sand</u> - <b>H2</b> (E) on sandhills, with soils as for <b>GQB</b> between the sandhills. The sands are infertile and prone to water repellence and wind erosion.</p>

# 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:**

- A3** Deep calcareous sandy loam (Regolithic, Hypercalcic Calcarosol)  
Calcareous sandy loam grading to a highly calcareous light brown sandy clay loam over a Class III A carbonate layer from about 55 cm, with calcareous clay loam to light clay continuing below 100 cm.
- A4a** Rubbly calcareous sandy loam (Regolithic, Supracalcic / Lithocalcic Calcarosol)  
Calcareous sandy loam over Class III B or III C carbonate rubble in a very highly calcareous sandy clay loam matrix, continuing with decreasing rubble below 100 cm.
- A4b** Calcareous sandy loam (Regolithic, Hypercalcic Calcarosol)  
Calcareous loamy sand to sandy loam becoming more clayey and calcareous with depth over a Class III A carbonate layer at about 70 cm, continuing below 100 cm.
- B2** Shallow stony calcareous sandy loam (Petrocalcic Calcarosol)  
Medium thickness calcareous sandy loam with variable carbonate rubble over calcrete within 30 cm.
- C1** Gradational sandy loam (Calcic, Red Kandosol)  
Medium thickness sandy loam grading to a red massive sandy clay loam with soft carbonate from about 35 cm.
- D2** Sandy loam over red clay (Calcic / Supracalcic, Red Chromosol)  
Medium thickness hard sandy loam abruptly overlying a red strongly structured clay with soft to rubbly carbonate from about 40 cm, grading to clayey sediments continuing below 100 cm.
- D5/M4** Loamy sand over red sandy clay loam (Eutrophic / Calcic, Red Kandosol / Chromosol)  
Thick loamy sand grading to sandy loam over a red massive sandy clay loam, calcareous from about 60 cm in a third of profiles over red or brown sandy clay loam to sandy clay continuing below 100 cm.
- G1** Sand over red sandy clay (Calcic, Red Chromosol)  
Medium to thick sand to loamy sand abruptly overlying a red sandy clay loam to sandy clay with soft carbonate from about 50 cm.
- H2** Deep sand (Calcareous, Regolithic, Red-Orthic Tenosol / Hypocalcic Calcarosol)  
Very thick sand (more than 100 cm), usually paler coloured with depth overlying either a more clayey (clayey sand to sandy clay loam) layer, or rubbly carbonate, or continuing sand for more than 150 cm. Sometimes the sand is slightly calcareous.
- M1** Deep coarse textured alluvium (Lutic Rudosol)  
Very thick loamy sand to sandy loam continuing below 100 cm.

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

