

KNG Koonunga Land System

Undulating rises with some steeper slopes in the Koonunga - Moppa area

Area: 30.6 km²

Annual rainfall: 445 – 570 mm average

Geology: The land is underlain by a range of basement rock formations including Appila and Pepuerta Tillites, Tapley Hill Slates, Ulupa Siltstones, and some minor Cambrian rocks of the Hawker Group, including a band of Angaston Marble and Koonunga Phosphorite. These rocks are generally metamorphosed to metasandstones, phyllites and low grade schists. Extensive deposits of locally derived alluvium form valley infill between the basement rock highs. These sediments are silty and sandy clay loams to clays, with gritty beds. Most rocks and sediments are mantled by secondary carbonates as soft (sometimes rubbly) segregations in the lower soil profile.

Topography: The Koonunga Land System consists of several subcatchments of the lower St. Kitts Creek watershed. The western subcatchment includes a range of moderately steep low hills grading to undulating rises surrounding an extensive alluvial flat. The eastern subcatchment includes undulating basement rock rises, some lower slopes of the steep range to the east, and alluvial flats. The central/northern section surrounds St. Kitts Creek and the River Light around the confluence of the two watercourses. Here, downcutting by the Light has formed moderately steep and rocky dissection slopes.

Elevation: 395 m on the watershed in the south west to 230 m in the Light River bed

Relief: Maximum relief is 80 m

Soils: The predominant soils are sandy loams to clay loams with dispersive red clayey subsoils. Shallow loamy to sandy soils over basement rock are limited.

Main soils

- D7a** Sandy loam over red clay on rock - slopes
- D3** Sandy loam over dispersive red clay over alluvium - creek flats and fans
- D7b** Clay loam over dispersive red clay on rock - slopes in the west
- L1** Shallow stony loamy sand to loam - steeper rocky slopes

Minor soils

- D1** Loam over red friable clay on rock - slopes
- A2** Calcareous loam - rocky slopes
- B4** Gradational loam over calcreted basement rock - slopes

Main features: The Koonunga Land System is characterized by poorly structured, hard setting sandy loam texture contrast soils. Although moderately deep and fertile, these soils need careful management; otherwise a range of problems is likely. These include excessive runoff and associated erosion, workability restrictions and patchy emergence / early growth. Conservation tillage practices and appropriate use of gypsum are required. Many soils have dispersive subsoils which restrict drainage. These are particularly common on lower slopes and flats, where they are associated with sporadic saline seepage.



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

SLU	% of area	Main features #
ARC	3.6	Moderately steep rocky ridges formed on interbedded quartzites and siltstones. Relief is up to 60 m and slopes are 15-40%. There is up to 50% surface quartzite, with ironstone in places, and sporadic rocky reefs. Main soils: <u>sandy loam over red clay on rock</u> - D7a (E) and <u>shallow stony loamy sand to loam</u> - L1 (E). This land is too steep and rocky for any agricultural uses other than rough grazing.
DHB DHC DHD	8.8 25.4 15.2	Rises formed on mixed metamorphosed tillites, fine sandstones, siltstones and quartzites. There is up to 20% surface quartzite, sandstone and ironstone. DHB Rises to 20 m high with slopes of 2-5%. DHC Rises to 30 m high with slopes of 3-12%. DHD Slopes and low hills to 50 m high with slopes of 8-20%, and up to 10% rocky outcrops. Main soils: <u>sandy loam over red clay on rock</u> - D7a (E) and <u>clay loam over red dispersive clay on rock</u> - D7b (C), with <u>shallow stony loamy sand to loam</u> - L1 (M). Except on steeper rocky rises within DHD (which are unmappable areas of ARC), soils are moderately deep and reasonably fertile, but generally poorly structured. Hard setting surfaces and generally dispersive subsoil clays restrict water entry, affect workability and cause patchy emergence and early growth. Subsurface waterlogging is likely in depressions and lower slopes. These soils are highly erodible, mainly by water, but some sandy types are also prone to wind erosion if left bare.
EMD	3.2	Rocky rises up to 30 m high formed on Angaston Marble and associated Cambrian rocks of the Hawker Group. Slopes are variable, from 5-20%. Main soils: <u>loam over red friable clay on rock</u> - D1 (E), with <u>calcareous loam</u> - A2 (C), <u>shallow stony loam</u> - L1 (C) and <u>gradational loam over calcreted basement rock</u> - B4 (L). These soils are generally well structured, well drained and fertile, but usually very shallow. The land is largely non arable due to shallow, stony soil and moderate slopes.
ETD	12.0	Moderately steep rocky slopes formed on Pepuerta Tillite and Ulupa Siltstone. The slopes rise 50 m either side of the River Light and have gradients of 8-20%. There is extensive rocky outcrop and surface stone, collectively occupying 20-50% of the land surface. Main soils: <u>shallow stony loamy sand to loam</u> - L1 (V) with <u>clay loam over red dispersive clay on rock</u> - D7b (L) and <u>sandy loam over red clay on rock</u> - D7a (L). These slopes are generally too steep and rocky for cropping, although there are arable patches. Shallow stony soils and moderately low fertility limit productivity. Erosion potential is high.
HJC	0.8	Isolated rise formed on remnant Tertiary sandy clays. Slopes are 4-12% with occasional short steeper grades to 20%. Main soil: <u>sandy loam over dispersive red clay</u> - D3 (D). Productivity is limited by sub optimal fertility and poor soil structure, both attributable to the sandy surface soil. Productivity can be improved through modified surface management practices and the appropriate use of gypsum. Erosion potential is moderately high.
JGC JGJ	5.2 25.8	Outwash fans and creek flats formed on medium to fine grained alluvium. JGC Fans with slopes of 3-5%. JGJ Creek flats with slopes of 1-3% and eroded watercourses. Main soil: <u>sandy loam over dispersive red clay on alluvium</u> - D3 (D). These soils are deep and moderately fertile, but have poorly structured surface soils and usually dispersive clayey subsoils which restrict water movement and cause seasonal waterlogging. There are sporadic salinized areas which should be monitored.

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

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| (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:

- A2** Calcareous loam (Paralithic, Calcic / Lithocalcic Calcarosol)
10 - 25 cm calcareous loam overlying calcrete rubble (50%) or very highly calcareous silty clay loam (50%), grading to weathering phyllite or calcareous rock at 55 cm.
- B4** Gradational loam over calcreted basement rock (Petrocalcic, Red Dermosol)
15 - 35 cm loam grading to a red well structured clay loam over sheet calcrete at 40 cm, grading to weathered basement rock within 100 cm.
- D1** Loam over red friable clay on rock (Calcic / Eutrophic, Red Chromosol)
20 - 40 cm hard siltstone gravelly loam abruptly overlying a red well structured clay, calcareous from about 50 cm (25% are non calcareous), grading to siltstone at 75 cm.
- D3** Sandy loam over dispersive red clay over alluvium (Calcic, Red Sodosol)
20 - 60 cm hard sandy loam to loam with a bleached A2 layer, abruptly overlying a coarsely structured dispersive red clay with soft carbonate from 70 cm becoming siltier and sandier with depth.
- D7a** Sandy loam over red clay on rock (Calcic, Red Sodosol / Chromosol)
15 - 40 cm quartz and ironstone gravelly hard massive sandy loam abruptly overlying a red coarsely structured dispersive clay, calcareous from 55 cm (20% are non calcareous), grading to metamorphosed sandy or quartzitic rock at 80 cm. 25% of profiles have well structured, non dispersive clays (Chromosols).
- D7b** Clay loam over dispersive red heavy clay on rock (Calcic, Red Sodosol)
15 - 30 cm hard siltstone gravelly clay loam abruptly overlying a red and brown mottled, coarsely structured heavy clay, calcareous from 55 cm, grading to fine grained rock at 75 cm.
- L1** Shallow stony loamy sand to loam (Lithic, Leptic Tenosol / Rudosol)
Up to 50 cm stony loamy sand to loam directly overlying quartzite, sandstone or siltstone.

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

