

YAC Yacka Land System

Strongly undulating and dissected low hills from the Yacka - Koolunga area north to Yackamoorundie Creek

Area: 200.4 km²

Annual rainfall: 375 – 475 mm average

Geology: Complex of deeply weathered basement sandstones, siltstones and quartzites, largely covered by a veneer of Tertiary age sands, sandy clays and clays (Hindmarsh Clay equivalent). There has been considerable alteration of these sediments by:

- Cementation, to form massive sandstones;
- Silicification, in which there has been silica enrichment and recrystallization resulting in an extremely hard silcrete capping;
- Calcification, in which windblown carbonates have been leached into the soil and upper parts of the underlying sediments. Alteration of the carbonates in the soil has resulted in the formation of soft or rubbly calcareous segregations.
- Lower slope and valley fill sediments derived from local wash are associated with the upland deposits. The outwash sediments are mainly fine to medium grained and are also capped by calcareous materials.

Topography: The land is typically strongly undulating with slopes in the range 4 - 12% with some steeper slopes. A characteristic feature is the degree of dissection of the landscape, slopes having a higher gradient: length ratio than most other arable land in the northern agricultural region. A significant proportion of valleys is severely eroded, with gullies to five metres deep being common in watercourses. In places there are rocky outcrops, principally of relict silcrete. Breakaway slopes where the old Tertiary age land surface is being eroded away, are also characteristic.

Elevation: 140 m on the western side to 320 m at the highest points on the eastern side

Relief: 10 - 50 m

Soils: There is a range of soils, either moderately deep over Tertiary sediments or shallow over weathering basement rock on rises, or deep over alluvium on lower slopes and flats. Sandy loam texture contrast soils with red clayey subsoils are characteristic of the landscape, but there are significant areas of calcareous sandy loams to loams, shallow sandy loams (often calcareous), and cracking clays.

Main soils: *Soils formed on Tertiary sediments*

- D2b** Hard sandy loam over red clay
- D3b** Hard sandy loam over dispersive red clay
- C3b** Gradational clay loam
- A4** Calcareous sandy loam

Minor soils: *Soils formed on alluvium*

- A3/A4** Deep calcareous loam
- A6** Deep calcareous clay loam
- C3a** Gradational clay loam
- D2a** Hard sandy loam over red clay
- D3a** Hard sandy loam over dispersive red clay
- D5** Hard loamy sand over red clay
- M4/C1** Deep gradational sandy loam



*Soils formed on Tertiary sediments***A2b** Shallow calcareous sandy loam**A5** Deep calcareous loam on clay**E2/E1** Red (E2) or black (E1) cracking clay*Soils formed on rock***A2a** Shallow calcareous loam - over basement rock or calcreted rock**D1** Hard sandy loam over red clay on rock**L1/B3** Shallow stony sandy loam - over basement rock / silcrete (L1) or calcrete (B3)

Main features: The Yacka Land System consists of mostly arable land, but is characterized by poorly structured sandy surfaced soils. These soils tend to seal over causing excessive runoff with associated potential for erosion. The land generally appears to have suffered substantial erosion in the past - gullied watercourses and bright soil colours (indicating exposed subsoil) being common. Patchy emergence and poor root growth are also likely consequences of poorly structured surfaces. However, there is a variety of other types of country, including small areas of steep rocky land which are not arable, gentle slopes with highly fertile clayey soils and slopes with well structured calcareous soils.

Soil Landscape Unit summary: 20 Soil Landscape Units (SLUs) mapped in the Yacka Land System

SLU	% of area	Main features #
AXH AXh	0.3 0.1	Rocky slopes of 20-30% with severely eroded creeks, formed on basement rocks, often deeply weathered and partly capped by Tertiary sands and silcrete. AXH Slopes without significant scalding AXh Slopes with significant scalding. Main soils: <u>shallow stony sandy loam</u> - L1/B3 (V) with <u>hard sandy loam over red clay on rock</u> - D1 (L), <u>shallow calcareous loam</u> - A2a (L) and <u>shallow calcareous sandy loam</u> - A2b (L). The slopes are non arable because of their sharp gradients, severe watercourse erosion, extensive rockiness and shallow, low fertility soils.
DJD	0.7	Stony rises with slopes of 8-20% formed on basement rock, deeply weathered in places and partially overlain by Tertiary sandstone and silcrete. Main soils: <u>hard sandy loam over red clay on rock</u> - D1 (E) and <u>shallow calcareous loam</u> - A2a (C), with <u>hard sandy loam over red clay</u> - D2b (C) and <u>shallow calcareous sandy loam</u> - A2b (L). The land is marginal for cropping due to the potential for erosion. Soils are mostly shallow and often poorly structured at the surface, leading to poor infiltration, difficult working and patchy emergence. Surface stones are common; quartzite and ironstone are highly abrasive.
EQD EQI	1.3 0.8	Stony rises formed on Tertiary sediments or deeply weathered basement rocks. EQD Slopes of 8-20%. EQI Slopes of 10-30% with eroded creeks. Main soils: <u>hard sandy loam over red clay</u> - D2b (E) and <u>shallow calcareous loam</u> - A2b (E), with <u>hard sandy loam over red clay on rock</u> - D1 (L) and <u>shallow stony sandy loam</u> - L1 (L). Use of these isolated rises is primarily limited by the extensive outcrops of silcrete and associated shallow stony soils. The remainder of the land is arable but with limitations due to erosion potential, shallow soils, fertility and highly abrasive surface stones.
HJC HJH HJI HJm	26.2 23.7 2.1 0.4	Rises and low hills formed on Tertiary sandstones, deeply weathered basement rocks and unconsolidated deposits derived from them. HJC Rises and low hills with slopes of 4-12%, silcrete outcrop and surface ironstone. HJH Rises and low hills with slopes of 4-12% and eroded watercourses. HJI Slopes of 10-25% with eroded watercourses, silcrete outcrop and ironstone. HJm Short moderately steep scalded and eroded slopes of up to 20%. Main soils: <u>hard sandy loam over red clay</u> - D2b (E) and <u>hard sandy loam over dispersive red clay</u> - D3b (C), with <u>calcareous sandy loam</u> - A4 (L), <u>hard loamy sand over red clay</u> - D5 (L), <u>deep calcareous loam on clay</u> - A5 (L), <u>gradational clay loam</u> - C3b (L) and occasional deep sands. These slopes are highly erodible due to their predominantly poorly structured soils and sandy textured



		surfaces. Eroded watercourses indicate substantial historic erosion. The hard setting surfaces shed water, reducing profile water storage, are difficult to work and may cause patchy emergence. Sub-optimal fertility and abrasive soils are additional limitations.
IWC	10.2	Rises and low hills with slopes of 3-10% formed on sandy Tertiary sediments or Hindmarsh Clay equivalent, capped by soft to rubbly carbonate. Main soils: <u>deep calcareous loam on clay</u> - A5 (E) and <u>calcareous sandy loam</u> - A4 (E), with <u>hard sandy loam over dispersive red clay</u> - D3b (L), <u>gradational clay loam</u> - C3b (L) and <u>hard loamy sand over red clay</u> - D5 (M). The rises are arable and potentially productive but the mixture of soils has a variety of slight limitations including poor structure, shallow root zone depth, moderate fertility (sandy and calcareous soils), waterlogging, boron toxicity and salinity (heavier soils).
JJA JJB JJG JJH JJJ	2.3 5.3 1.5 1.5 2.0	Flats, outwash fans and drainage depressions formed on alluvium. JJA Flats with slopes of less than 1%. JJB Fans with slopes of 1-3%. JJG Eroded fans of 1-3% slope. JJH Eroded fans of 3-8% slope. JJJ Eroded drainage depressions. Main soils: deep <u>hard sandy loam over red clay</u> - D2a (E), with <u>hard sandy loam over dispersive red clay</u> - D3a (C), <u>gradational clay loam</u> - C3a (L) and <u>deep calcareous clay loam</u> - A6 (L). The slopes are fully arable; the main limitation is the poor structure of the main soils. Hard setting surfaces and dispersive subsoils cause excessive runoff, restrict workability and impede emergence. Soil fertility is sub-optimal because of the generally sandy nature of the topsoil.
KCB	8.6	Outwash fans with slopes of 2-4% formed on outwash sediments. Main soils: <u>deep gradational sandy loam</u> - M4/C1 (C), <u>hard loamy sand over red clay</u> - D5 (C) and <u>deep calcareous loam</u> - A3/A4 (C), with <u>hard sandy loam over red clay</u> - D2a (L), <u>deep calcareous clay loam</u> - A6 (L) and <u>hard sandy loam over dispersive red clay</u> - D3a (M). These slopes are fully arable, the main limitation being the relatively sandy surfaced soils which have a reduced capacity to store moisture and are liable to blow if not well protected. Soil fertility is sub-optimal because of the generally sandy nature of the topsoil.
TAC TAZ	0.8 11.1	Rises formed on clayey sediments or deeply weathered fine grained rocks. TAC Rises with slopes of 4-8%. TAZ Broad crests with slopes of less than 4%. Main soils: clayey variants of <u>gradational clay loam</u> - C3b (E), <u>red or black cracking clay</u> - E2/E1 (E) and <u>deep calcareous loam on clay</u> - A5 (E). This land has few limitations, with chiefly deep, fertile, well drained soils and minimal erosion potential.
XAL XAR	0.8 0.3	River flats with reedy swamps (XAL) or extensive quarrying (XAR). The main soils are deep alluvial silts. These narrow flats are prone to flooding and erosion of banks.

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:

A2a Shallow calcareous loam (Paralithic / Petrocalcic, Calcic / Lithocalcic Calcarosol)

Calcareous sandy loam to clay loam grading to soft or rubbly carbonate in a sandy clay loam to clay matrix over weathering rock or calcreted rock within 50 cm.

A2b Shallow calcareous sandy loam (Lithocalcic / Petrocalcic Calcarosol)

Calcareous sandy loam to sandy clay loam, becoming more clayey, calcareous and rubbly with depth over sheet or rubbly calcrete from about 30 cm. Tertiary sandstone underlies the calcrete within 100 cm.

A3/A4 Deep calcareous loam (Regolithic, Hypercalcic Calcarosol)

Calcareous loam becoming more clayey and calcareous with depth, over a weakly to moderately well structured highly calcareous red brown clayey subsoil, grading to clay loamy to clayey alluvium.



- A4** Calcareous sandy loam (Regolithic, Hypercalcic / Lithocalcic Calcarosol)
Calcareous sandy loam to clay loam grading to soft or rubbly carbonate in a sandy clay loam to clay matrix grading to coarse to medium grained Tertiary sediments or sandstone below 100 cm.
- A5** Deep calcareous loam on clay (Regolithic, Hypercalcic / Lithocalcic Calcarosol)
Calcareous sandy loam to clay loam grading to soft or rubbly carbonate in a sandy clay loam to clay matrix over clayey Tertiary sediments within 100 cm.
- A6** Deep calcareous clay loam (Hypercalcic Calcarosol)
Calcareous clay loam grading to a highly calcareous moderately well structured light clay becoming more clayey and calcareous with depth over fine textured alluvium.
- C3a** Gradational clay loam (Hypercalcic / Hypocalcic, Red Dermosol)
Loam to clay loam grading to a well structured red clay overlying fine carbonate within 50 cm over alluvial sediments from about 100 cm.
- C3b** Gradational clay loam (Calcic / Lithocalcic, Red Dermosol)
Clay loam grading to a well structured red clay with abundant soft or rubbly carbonate at moderately shallow depth, grading to Tertiary clay within 100 cm.
- D1** Hard sandy loam over red clay on rock (Calcic, Red Chromosol)
Hard setting sandy loam to sandy clay loam abruptly overlying a well structured red clay with fine carbonate at depth, grading to weathering basement rock within 100 cm.
- D2a** Hard loam over well structured red clay (Calcic, Red Chromosol)
Medium thickness hard sandy loam to clay loam abruptly overlying a well structured red clay with soft Class I carbonate at about 50 cm, grading to alluvium.
- D2b** Hard sandy loam over red clay (Calcic / Supracalcic, Red Chromosol)
Hard setting sandy loam to sandy clay loam abruptly overlying a well structured red clay with soft (or rubbly) carbonate at depth, grading to Tertiary sandy clay or sandstone.
- D3a** Sandy loam over dispersive red clay (Calcic, Red Sodosol)
Medium to thick hard setting sandy loam to sandy clay loam with a pronounced A2 layer, sharply overlying a coarsely structured dispersive red clay with soft Class I carbonate at between 30 and 60 cm, grading to alluvial clay.
- D3b** Hard sandy loam over dispersive red clay (Calcic / Hypercalcic, Red Sodosol)
Hard setting sandy loam to sandy clay loam sharply overlying a poorly structured dispersive red clay, calcareous with depth, grading to Tertiary sandy clay within 100 cm.
- D5** Hard loamy sand over red clay (Calcic / Hypercalcic, Red Sodosol)
Hard setting loamy sand to sandy loam sharply overlying a poorly structured red clay, calcareous with depth, grading to medium grained alluvium.
- E2/E1** Red or black cracking clay (Epipedal / Self-mulching, Red / Black Vertosol)
Deep cracking red clay with a well structured surface and variable soft carbonate throughout.
- L1/B3** Shallow stony sandy loam (Calcareous, Paralithic, Leptic Tenosol OR Lithic / Petrocalcic / Silpanic, Leptic Rudosol)
Stony loamy sand to loam directly overlying basement rock, silcrete or calcrete, usually with carbonate accumulations.
- M4/C1** Deep gradational sandy loam (Sodic, Hypocalcic / Hypercalcic, Red Kandosol)
Thick dark brown sandy loam grading to a hard massive red or brown sandy clay loam, with variable fine carbonate at depth, overlying medium textured alluvium from about 100 cm.

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

