

# WOO Woodchester Land System

Undulating slopes in the Woodchester area

**Area:** 101.1 km<sup>2</sup>

**Annual rainfall:** 375 - 575 mm average

**Geology:** The land is underlain by calcified metasandstones and greywackes, schists and phyllites of the Tappanappa and Tunkalilla Formations of the Kanmantoo Group of rocks. These rocks were overlain by Tertiary sediments including clayey sands, sandy clays and clays during ancient high sea level stands. Most of these sediments have eroded away, but some remain, particularly in the south. They are capped by calcretes in places. Alluvial sediments derived from the erosion of the basement rocks, and the Tertiary sediments to some extent, occur in valleys. These are typically silty and micaceous.

**Topography:** The landscape comprises a broad ridge extending from south of Mount Barker Creek to Woodchester, between Red Creek to the west and the Bremer River to the east. The ridge is characterized by extensive rocky outcrops and moderately steep slopes, particularly on the eastern side. Watercourses flowing off the ridge are well defined and commonly eroded. Red Creek is severely eroded, and characterized by branching gullies. In the south, where Red Creek joins the east flowing Rodwell Creek at Woodchester, the ridge peters out to a gently undulating plain formed on Tertiary sediments. This area includes broad very gentle slopes and low rises on either Tertiary sands, calcrete or basement rock. The latter two types are identified by extensive surface stone.

**Elevation:** 40 - 250 m

**Relief:** 10 - 40 m

**Soils:** There is a variety of soils reflecting the range of geological materials underlying the landscape. Sandy loams with red clayey subsoils are common on all main substrates, as are calcareous sandy loam to clay loam soils. Shallow stony soils are restricted to areas where basement rock or calcrete are close to the surface. Sandy soils occur on Tertiary sediments. Deep sandy loams are common on alluvial flats.

**Main soils:** *Soils formed on basement rock*

- D1/K3** Sandy loam over red clay
- L1a** Shallow stony loamy sand over hard rock
- L1b** Shallow sandy loam over calcified rock
- A2** Calcareous loam

*Soils formed on outwash sediments*

- D2a** Sandy loam over red clay

**Minor soils:** *Soils formed on outwash sediments*

- D5** Loamy sand over dispersive clay
- M4** Gradational loamy sand
- M1** Deep sandy loam



*Soils formed on remnant Tertiary sediments*

- D2b** Sandy loam over hard red clay  
**A4** Calcareous sandy loam  
**A6** Calcareous loam  
**C1** Sandy loam over red sandy clay  
**G1** Sand over red sandy clay  
**G4** Sand over dispersive brown clay

*Soils formed on calcrete*

- B2** Shallow calcareous sandy loam

**Main features:**

The Woodchester Land System is characterized by undulating to rolling low hills in the north and gently undulating rises and flats in the south. The low hills are formed on basement rock, and outcrops are common. The less rocky areas are generally arable, with moderately deep sandy loam over clay soils with hard setting erodible surfaces. Sheet, rill and gully erosion have been a feature of this land in the past. In the south there are extensive areas of gentle slopes and flats with sandy loam over clay soils or calcareous loams. These are deep, fertile and potentially productive. Low rises on either basement rock, calcrete or Tertiary sediments are a feature of the southern areas. These are often too stony for any uses other than grazing.

**Soil Landscape Unit summary:** 22 Soil Landscape Units (SLUs) mapped in the Woodchester Land System

SLU	% of area	Main features #
AKA AKB AKC AKD	6.1 7.7 3.0 1.0	<p>Rocky rises and hillslopes formed on metasandstones and metagreywackes. There is extensive surface stone and rock outcrop.</p> <p><b>AKA</b> Low rises and gentle slopes of up to 10%.  <b>AKB</b> Moderate slopes and low hills to 40 m high with slopes of 10-20%.  <b>AKC</b> Hillslopes with relief to 70 m and slopes of 20-30%.  <b>AKD</b> Steep hillslopes of 30-50%.</p> <p>Main soils: <u>shallow stony loamy sand</u> - <b>L1a</b> (E), <u>shallow sandy loam over calcified rock</u> - <b>L1b</b> (C), <u>sandy loam over red clay</u> - <b>D1/K3</b> (C) and <u>calcareous loam</u> - <b>A2</b> (L). These soils are typically shallow to moderately deep, with sandy loam surfaces. The main variations are the presence and nature of subsoil. The better soils have clayey subsoils which improve waterholding capacity and nutrient retention. However most soils have basement rock within 50 cm, and variations in depth are reflected in differential haying off in spring as the soil dries out. Calcareous loams are often associated with elevated soil salt levels. The land is generally non arable due to the extent of rocky outcrop and surface stone, and due to the slopes in <b>AKC</b> and <b>AKD</b>.</p>
DaB DaC DaD	9.8 38.5 0.6	<p>Undulating to gently rolling low rises and footslopes formed on basement rocks. Slopes are generally less than 10%, but are occasionally steeper to 16%. Relief is invariably less than 30 metres. There is minor to limited rock outcrop. Drainage depressions are shallow and broad and watercourses are moderately well defined and are sometimes gullied.</p> <p><b>DaB</b> Gently undulating low rises with relief to 10 m and slopes of 1-3%.  <b>DaC</b> Undulating rises and gently inclined footslopes with relief to 30 m and slopes of 3-10%.  <b>DaD</b> Gently rolling or moderately inclined slopes with relief to 30 m; slopes 10-16%.</p> <p>Main soils: <u>sandy loam over red clay</u> - <b>D1</b> (E) with <u>shallow loamy sand / sandy loam</u> - <b>L1a/L1b</b> (L) and <u>calcareous loam</u> - <b>A2</b> (L). On lower slope outwash areas, profiles are deeper, the typical soil being <u>sandy loam over red clay</u> - <b>D2a</b> (L) over localized alluvium. These soils are moderately fertile and productivity potential is largely determined by soil depth and water storage capacity. Most have poorly structured hard setting surfaces which shed water and readily erode.</p>



GPB QQB	0.6 3.1	<p>Rises and low hills formed on remnant Tertiary clayey sands and sandy clays capped by soft or rubbly carbonates. There is sporadic ferruginized sandstone on the surface.</p> <p><b>GPB</b> Rises to 10 m high with slopes of 2-5%.  <b>QQB</b> Rises and low hills with slopes of 3-10%.</p> <p>The soils are sandy surfaced over more clayey subsoils with high carbonate contents.  Main soils: <u>sand over red sandy clay</u> - <b>G1</b> (E) and <u>sand over dispersive brown clay</u> - <b>G4</b> (E), with <u>calcareous sandy loam</u> - <b>A4</b> (L) in <b>GPB</b>. The soils are infertile and prone to droughtiness and erosion (both wind and water).</p>
HEA HEB	5.7 2.3	<p>Very gently undulating plains, gently inclined slopes and low rises with slopes ranging from 1% to 5% underlain by Tertiary clays, calcified by aeolian carbonates of the Woorinen Formation.</p> <p><b>HEA</b> Very gently undulating plains and valley floors with slopes of 1-2%.  <b>HEB</b> Gently inclined slopes and low rises with slopes of 2-5%.</p> <p>Soils are deep with sandy loam surfaces. On the plains and flats the soils are mostly <u>sandy loam over hard red clay</u> - <b>D2b</b> (E) and <u>calcareous loam</u> - <b>A6</b> (E). On low rises, soils are typically <u>sandy loam over red sandy clay</u> - <b>C1</b> (C) or <u>calcareous sandy loam</u> - <b>A4</b> (L). These soils are deep and inherently fertile, although dispersive subsoils restrict good root development and may cause waterlogging in wet seasons. Boron toxicity, sodicity and moderate salinity are likely features of the deep subsoils on this land.</p>
JUA JUB JUC JUE JUF JUG JUH JUU	0.2 1.9 1.0 1.2 1.6 4.7 3.4 1.9	<p>Broad shallow drainage depressions, alluvial flats and gently inclined outwash fans formed on weakly calcified sandy to silty clay alluvium derived from the erosion of Kanmantoo Group rocks and soils. Slopes are up to 10%. Watercourses are well defined and are often severely gullied.</p> <p><b>JUA</b> Alluvial flats with slopes of 0-1%.  <b>JUB</b> Very gently inclined fans with slopes of 1-3%.  <b>JUC</b> Gently inclined fans with slopes of 3-10%.  <b>JUE</b> Gently sloping drainage depressions, with steeper margins and slopes of 2-10%.  <b>JUF</b> Flats with eroded watercourses.  <b>JUG</b> Very gently inclined fans with slopes of 1-4% and eroded watercourses.  <b>JUH</b> Gently inclined fans with eroded watercourses and slopes of 3-10%.  <b>JUU</b> Gently sloping drainage depressions with eroded watercourses.</p> <p>Soils are typically deep with sandy loam surfaces and clayey subsoils (<u>sandy loam over red clay</u> - <b>D2a</b> (E) and <u>loamy sand over dispersive clay</u> - <b>D5</b> (E). <u>Gradational sandy loam</u> - <b>M4</b> (L) occurs where sediments are sandier. The soils are deep and fertile. The main limitations are physical, caused by the poorly structured surfaces which affect workability, seedling emergence and increase erodibility. Dispersive subsoils in some profiles further impact on water movement and root growth. Watercourse erosion is significant in parts of the landscape.</p>
KnA	2.4	<p>Flats formed on silty alluvial sediments of broader flood plains of the Angas River. Soils are deep weakly differentiated <u>gradational sandy loam</u> - <b>M4</b> (V) and <u>deep sandy loam</u> - <b>M1</b> (C). They are often very high in silt content, resulting in low water storage capacities and a tendency to compaction. Fertility is moderately low.</p>
QMB	3.1	<p>Low rises and benches formed on sheet or rubbly calcrete capping sandy limestone. There is 20-50% surface calcrete and outcropping sheet rock.</p> <p>Main soils: shallow and very stony - <u>shallow calcareous sandy loam</u> - <b>B2</b> (E) and <u>calcareous sandy loam</u> - <b>A4</b> (E). These soils are generally too shallow and stony for agriculture. The land is well suited to grazing.</p>
VZ-	0.2	Seasonal swamp.

# 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:***Soils formed on basement rock*

- A2** Calcareous loam (Paralithic, Calcic Calcarosol)  
Medium thickness dark brown calcareous loamy sand to loam grading to a dark brown to grey brown massive highly calcareous sandy clay loam to clay loam with variable carbonate nodules, over pale brown clay loamy fine carbonate. Soft highly calcareous weathered mica schist occurs at about 100 cm.
- D1/K3** Sandy loam over red clay (Calcic / Eutrophic, Red / Brown Chromosol)  
Medium thickness stony sandy loam, overlying a red or brown well structured clay grading to weathering sandy schist or metasandstone. In D1 soils there is soft carbonates in fractures. This is absent in K3 soils.
- L1a** Shallow stony loamy sand (Lithic, Leptic Rudosol)  
Medium thickness reddish brown massive loamy sand to sandy loam with abundant rock fragments, overlying hard metamorphosed sandstone.
- L1b** Shallow sandy loam over calcified rock (Calcareous, Paralithic, Leptic/Brown-Orthic Tenosol)  
Medium to thick brown loamy sand to sandy loam with rock fragments throughout, overlying weakly calcified schist or metasandstone, usually within 50 cm, but often deeper on softer schistose rocks.

*Soils formed on outwash sediments*

- D2a** Sandy loam over red clay (Calcic, Red Chromosol / Sodosol)  
Medium thickness loamy sand to fine sandy loam, with a paler coloured A2 horizon, overlying a dark reddish brown well structured clay, highly calcareous with depth, grading to yellow, red and brown mottled micaceous sandy clay loam to clay alluvium.
- D5** Loamy sand over dispersive clay (Hypocalcic, Red Sodosol)  
Thick reddish brown loamy sand to sandy loam with a pink and sandier A2 horizon, overlying a red firm sandy clay loam to sandy clay with coarse prismatic structure and minor soft carbonate segregations at depth. The profile is formed in red clayey sand to sandy clay alluvium.
- M4** Gradational loamy sand (Hypocalcic, Red Kandosol)  
Thick reddish brown sand to sandy loam, overlying a reddish brown massive light sandy clay loam to sandy clay with occasional carbonate nodules, grading to variable silty, sandy and clayey layered alluvial sediments.
- M1** Deep sandy loam (Calcareous, Regolithic, Brown-Orthic Tenosol)  
Very thick brown loamy sand to light sandy clay loam, lighter coloured, calcareous and with gritty and more clayey lenses at depth. The soil is underlain by micaceous sandy, gritty and clayey alluvial sediments.

*Soils formed on remnant Tertiary sediments*

- D2b** Sandy loam over hard red clay (Sodic, Hypercalcic, Red Chromosol)  
Medium thickness red brown loamy sand to clay loam with weak structure, overlying a dark reddish brown clay with strong blocky structure, highly calcareous from 30 cm with abundant soft Class I carbonate segregations. The carbonate grades to Tertiary clay at 90 cm.
- A6** Calcareous loam (Regolithic, Hypercalcic Calcarosol)  
Medium thickness grey brown or red brown moderately calcareous loamy sand to light sandy clay loam, becoming more clayey and calcareous with depth, overlying a brown to red highly calcareous sandy clay loam to light clay, grading to pale brown Class I carbonate. The carbonate grades to Tertiary clay at 80 cm.



- C1** Sandy loam over red sandy clay (Lithocalcic, Red Kandosol)  
Medium thickness reddish loamy sand to light sandy clay loam, grading to a red brown weakly structured sandy clay loam to light clay, grading to a highly calcareous layer with abundant carbonate nodules from 30 cm (Class III B carbonate). Brown, yellow, red and grey clayey sand to sandy clay underlies the carbonate from 70 cm.
- A4** Calcareous sandy loam (Regolithic, Lithocalcic Calcarosol)  
Medium thickness brown calcareous loamy sand to light sandy clay loam with minor calcrete nodules, overlying a brown highly calcareous massive sandy clay loam, grading to a pale brown very highly calcareous clayey sand to light clay with up to 50% carbonate nodules (Class III B carbonate). The carbonate gradually decreases and grades to a brown, yellow, grey and red sandy clay from 65 cm.
- G1** Sand over red sandy clay (Hypercalcic, Red Sodosol)  
Thick red brown sand with a paler coloured A2 horizon, overlying a red sandy clay with weak coarse columnar structure and up to 50% soft Class III A carbonate from 55 cm. Semi-hard calcrete pans occur in many profiles. Soft sandstone from 80 cm.
- G4** Sand over dispersive brown clay (Supracalcic, Brown Sodosol)  
Medium thickness brown sand with a thin bleached A2 horizon, overlying a brown and red columnar sandy clay becoming more clayey and massive with depth, grading to a very highly calcareous pale brown clayey sand to sandy clay with up to 50% carbonate nodules (Class III A or B carbonate). This is underlain by a brown, yellow, grey and red sandy clay from 70 cm.

*Soils formed on calcrete*

- B2** Shallow calcareous sandy loam (Petrocalcic Calcarosol)  
Medium thickness calcareous loamy sand to light sandy clay loam over sheet or rubbly calcrete, grading to soft very highly calcareous pale brown sandy loam to clay loam with decreasing rubble content.

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

