

WAR Warren Land System

Moderately steep to steep rocky hills between Williamstown and Forreston

Area: 29.2 km²

Annual rainfall: 675 – 750 mm average

Geology: The land system is formed on strongly metamorphosed coarse grained basement rocks. The predominant rocks are coarse grained schists and gneisses of the Warren Inlier, a formation of the Barossa Complex, and coarse grained highly micaceous sandstones of the Aldgate Sandstone Formation. Minor granite intrusions occur throughout. Locally derived medium to coarse grained alluvium is a minor component overall, occupying <10% of the area.

Topography: The land system is a moderately steep to steep rugged ridge with a north - south orientation. The spine of the ridge is near the eastern side, so most of the drainage is to the west. The South Para River cuts across the middle of the ridge, but all other watercourses arise from within. They have dissected the ridge to produce slopes as steep as 75%. 30% of the land has slopes steeper than 30%. Rocky outcrops are common. The watercourses flow in narrow drainage depressions which occupy less than 10% of the total area.

Elevation: 270 m where the South Para River flows out, to 530 m

Relief: Up to 140 m

Soils: The soils are typically coarse textured, usually with more clayey subsoils, but shallow stony soils with little or no subsoil development are common. Weathering micaceous rock is usually evident within 100 cm. On lower slopes and valley flats, soils are deeper, but surface soils are sandy, usually overlying more clayey subsoils. There are minor deep dark clay loams, unrelated to the basement geology of the Land System.

Main soils: *Soils formed in weathering basement rock*

- K4a** Acidic loamy sand over yellow mottled clay on highly micaceous rock
- K5a** Acidic gradational silty sand on highly micaceous rock
- L1** Shallow stony sandy loam

Minor soils: *Soils formed in weathering basement rock*

- K3a** Acidic sandy loam over red clay (on schist)
- K3b** Acidic loamy sand over red clay (on granite)
- K4b** Acidic sandy loam over brown clay on sandstone
- K5b** Acidic gradational loamy sand on sandstone or schist

Soils formed in alluvial outwash sediments

- F1** Sandy loam over brown clay over fine grained alluvium
- F1/F2** Sandy loam over brown sandy clay over coarse grained alluvium
- M1** Deep sandy loam
- M2** Deep black clay loam

Main features: The Warren Land System is rough hill country. Over 80% of the land is non arable due to moderate to steep slopes, rock outcrop and shallow stony soils. On the rest, low fertility, and often shallow stony soils, limit potential productivity. Most of the land is in conservation parks and forest reserves, some of which have been planted to radiata pine.



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

SLU	% of area	Main features #
AeC AeD	16.7 5.1	<p>Rolling to steep rocky hills formed on coarse grained schists and gneisses of the Warren Inlier, a formation of the Barossa Complex.</p> <p>AeC Moderately steep upper slopes, with minor to moderate rock and stone and slopes of 18-30%.</p> <p>AeD Steep, rocky to very rocky hillslopes with steep sided valleys and narrow watercourses; relief is 60-120 m, and slopes are 30-50%.</p> <p>The main soil features are shallowness, stoniness, and often high mica content. All soils are formed on fresh weathering rock.</p> <p>Main soils: <u>Acidic gradational silty sand or loamy sand</u> - K5a / K5b (E) <u>Shallow stony sandy loam</u> - L1 (E) <u>Acidic sandy loam over red clay</u> - K3a (L) <u>Acidic loamy sand over yellow mottled clay</u> - K4a (L)</p> <p>As well as being shallow and stony, these soils are highly infertile and occur on moderately steep to steep slopes. Consequently productive potential is low. The land is used either for light grazing or is in forest or conservation reserve.</p>
AqC	0.7	<p>Low rocky ridges with relief to 30 m and slopes of 15-30% formed on metamorphosed sandstones and quartzites. There is a range of soils, usually with gravelly sandy to sandy clay loam surfaces and variably coloured and structured clay subsoils, formed on fresh weathering or deeply weathered and kaolinitic micaceous sandstones.</p> <p>Main soils: <u>Acidic sandy loam over brown clay</u> - K4b (E) <u>Shallow stony sandy loam</u> - L1a (C) <u>Acidic sandy loam over red clay</u> - K3a (L) <u>Acidic gradational sandy loam</u> - K1a (L)</p> <p>This land is characterized by variable depth soils which are generally low in natural fertility, imperfectly drained, prone to acidification and highly erodible, on moderately steep and often rocky slopes. Productive potential is consequently low - most of the land is used for grazing.</p>
AtC AtD	35.9 25.1	<p>Rolling low hills and steep north-south ridges formed on coarse grained highly micaceous sandstones of the Aldgate Sandstone Formation. Watercourses are narrow and well defined, and commonly gullied. Minor granite intrusions occur throughout.</p> <p>AtC Rolling low hills with relief of up to 70 m and slopes of 15-30%.</p> <p>AtD Steep ridges with relief of up to 140 m and slopes of 30-75%.</p> <p>The soils have mainly gravelly sandy to sandy loam surfaces, generally with clayey subsoils, grading to highly micaceous rock, or alluvium on lower slopes. Some soils are shallow directly overlying rock.</p> <p>Main soils: <u>Acidic loamy sand over yellow mottled clay</u> - K4a (C) <u>Acidic sandy loam over brown clay</u> - K4b (L) <u>Acidic gradational silty sand</u> - K5a (C) <u>Shallow stony sandy loam</u> - L1 (C) <u>Sandy loam over brown sandy clay</u> - F1/F2 (L-M) in drainage depressions, mainly in AtC <u>Acidic loamy sand over red sandy clay</u> - K3b (M) on granitic outcrops</p> <p>These soils are generally moderately deep, but inherent fertility is very low, and commonly there are drainage problems. Productive potential is very low and most of the land is contained within conservation parks or forest reserves.</p>
CeD	10.4	<p>Undulating to gently rolling rises with relief of up to 30 m and slopes of 5-15% formed on coarse grained highly micaceous sandstones of the Aldgate Sandstone Formation. Watercourses are narrow and well defined, and commonly gullied. Minor granite intrusions occur throughout. The soils have mainly gravelly sandy to sandy loam surfaces, with clayey subsoils, grading to highly micaceous rock, or alluvium on lower slopes. Some soils are shallow over weathering rock.</p> <p>Main soils: <u>Acidic gradational silty sand</u> - K5a (E) <u>Shallow stony sandy loam</u> - L1 (C) <u>Acidic loamy sand over yellow mottled clay</u> - K4a (L) <u>Acidic sandy loam over brown clay</u> - K4b (L) <u>Sandy loam over brown sandy clay</u> - F1/F2 (M) in drainage depressions</p>



		<u>Acidic loamy sand over red sandy clay - K3b</u> (M) on granitic outcrops These soils are generally moderately deep, but inherent fertility is very low, and commonly there are drainage problems. The land is semi arable, but extreme soil erodibility effectively precludes cultivated land uses. Most of the land is in forest reserves with some Pinus plantations.
LDE	4.5	Narrow creek flats underlain by coarse grained alluvial deposits derived from sandstones and sandy schists. Most soils have sandy and often gritty and stony surfaces over more clayey subsoils. There are also deep coarse textured alluvial soils. Main soils: <u>Sandy loam over brown sandy clay - F1/F2</u> (E) <u>Deep sandy loam - M1</u> (E) These soils are deep but fertility is low and waterlogging is a common problem in F1/F2 profiles. Erosion and occasional flooding are additional management issues.
LdJ	0.2	Flats of Victoria Creek formed on clayey alluvium. Main soils: <u>Deep black clay loam - M2</u> (E) <u>Sandy loam over brown clay - F1</u> (E) These soils are deep and fertile, but imperfectly drained. Productive potential is high although over-irrigation can cause waterlogging. Sporadic salinity and stream bank erosion are other management issues.
LtE	1.4	Narrow valleys and drainage depressions formed on mixed alluvium. Main soils: <u>Deep sandy loam - M1</u> (E) <u>Sandy loam over brown sandy clay - F1/F2</u> (E) <u>Sandy loam over brown clay - F1</u> (C) <u>Deep black clay loam - M2</u> (M) These soils are deep with moderate to moderately low fertility. Waterlogging is common, caused by the low lying topography and the impeding clayey subsurface layers in many soils. Watercourse erosion and saline seepages are sporadic problems.

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 in weathering basement rock

- K3a** Acidic sandy loam over red clay (Bleached, Mesotrophic, Red Kurosol)
Medium thickness gravelly brown loamy sand to light sandy clay loam, overlying a yellowish red to strong brown strongly structured clay subsoil grading to weathering schist within 100 cm.
- K3b** Acidic loamy sand over red sandy clay (Mesotrophic, Red Chromosol)
Thick gritty and gravelly loamy sand overlying a red or brown gritty sandy clay loam to sandy clay, grading to weathering granite by 70 cm.
- K4a** Acidic loamy sand over yellow mottled clay (Bleached-Mottled, Mesotrophic, Yellow Chromosol)
Thick grey gravelly loamy sand to sandy loam with a bleached A2 horizon, overlying a yellowish red, grey and yellow weakly structured sandy clay to clay grading to highly micaceous sandstone by 100 cm.
- K4b** Acidic sandy loam over brown clay (Bleached-Mottled, Eutrophic, Brown Kurosol)
Thick gravelly sandy loam to sandy clay loam with a bleached A2 horizon, overlying a yellowish brown, red and greyish brown coarsely prismatic clay, grading to weathering metasandstone below 100 cm.
- K5a** Acidic gradational silty sand (Mesotrophic, Grey Kandosol / Basic, Paralithic, Grey-Orthic Tenosol)
Medium thickness very gravelly fine sand to silt, overlying a brown massive silt to silty loam with abundant soft schist fragments, grading to weathering schist at about 50 cm.



- K5b** Acidic gradational loamy sand (Mesotrophic, Grey Kandosol)
Medium thickness grey sand to sandy loam with up to 50% rock fragments, overlying a massive grey brown silty clay loam with abundant rock fragments, grading to weathering schist by 100 cm.
- L1** Shallow stony sandy loam (Acidic, Lithic, Bleached-Leptic Tenosol)
Thick greyish very gravelly loamy sand to sandy loam with a bleached A2 horizon, grading to hard metasandstone by 50 cm.

Soils formed in alluvial outwash sediments

- F1** Sandy loam over brown clay (Bleached-Mottled, Eutrophic, Brown Chromosol)
Thick loamy sand to sandy clay loam with a strongly bleached A2 horizon, sharply overlying a yellowish brown, grey and red mottled clay grading to fine grained alluvium.
- F1/F2** Sandy loam over brown sandy clay (Bleached-Mottled, Mesotrophic, Brown Sodosol/Chromosol)
Thick dark brown loamy sand to light sandy clay loam with a bleached and gravelly A2 horizon, overlying a yellow brown and grey brown sandy clay with coarse prismatic structure, grading to a grey, brown and yellow mottled clayey sand.
- M1** Deep sandy loam (Regolithic, Brown-Orthic Tenosol / Mesotrophic, Brown Kandosol)
Thick greyish brown sandy loam, overlying a grey to brown silty sand to silty clay loam with weak prismatic structure, grading to variable sandy, gritty and clayey alluvial sediments.
- M2** Deep black clay loam (Melanic, Eutrophic, Black Dermosol)
Thick black silty loam to clay loam with strong granular structure, overlying a black to dark brown clay with strong blocky structure, becoming yellow and grey mottled with depth.

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

