

# JUP Jupiter Creek Land System

Undulating rises and low hills of sandy loam and ironstone soils in the Echunga - Biggs Flat - Dashwood Gully area

**Area:** 47.4 km<sup>2</sup>

**Annual rainfall:** 755 – 885 mm average

**Geology:** The System is underlain by basement rocks of the Aldgate Sandstone and Balhannah Shale Formations. However, these rocks are only near the surface over about 30% of the land area. Elsewhere, the rocks are deeply weathered and lateritized, and mantled by kaolinitic clay and ferruginous segregations. The lateritization occurred during Tertiary times when the landscape was a vast plain. The Jupiter Creek area was apparently not subjected to extensive uplift following the period of deep weathering, so much of the mantle remains intact. Clayey sediments infill broad shallow valleys between the basement rock or lateritic high ground.

**Topography:** The northern part of the Jupiter Creek Land System comprises undulating to rolling rises and low hills with a repeating landform pattern of summit surface (plateau) - hillslope or undulating rise - creek flat. This land drains mostly into the Onkaparinga catchment. In the south are extensive areas of very gently undulating elevated plains alternating with broad shallow valleys draining into Meadows Creek.

**Elevation:** 300 - 370 m

**Relief:** Up to 50 m

**Soils:** The soils fall into three main groups according to underlying geological materials. Shallow to moderately deep soils, with sandy loam surfaces over clayey subsoils forming in weathering rock are predominant on slopes and low hills. Deep ironstone gravelly soils characterize the highly weathered and lateritized slopes and plateaux. Deep texture contrast soils formed on alluvium are the main soils on flats and gentle lower slopes, associated with a range of deep uniform and gradational soils with sandy to clay loamy surface soils.

## Main soils

- J2** Deep acidic loamy (**J2a**) to sandy loam (**J2b**) ironstone soil
- F1b** Sandy loam to loam over thick brown clay on fine grained alluvium
- K1b** Acidic gradational sandy loam on rock
- K4** Acidic sandy loam over brown clay on rock

## Minor soils

### *Soils formed on weathering basement rock*

- K1a** Acidic gradational loam over deeply weathered rock
- K1c** Acidic gradational brown loam over fresh weathering rock
- K1d** Acidic gradational red loam over fresh weathering rock
- K2** Acidic loam over red mottled clay
- K5** Acidic gradational sandy loam
- L1** Shallow sandy loam

### *Deep soils formed on alluvium*

- F1** Sandy loam to loam over thick brown clay - over deeply weathered rock (**F1a**) or over coarse grained alluvium (**F1c**)
- F2** Sandy loam over poorly structured brown clay



- M1a** Deep sandy loam  
**M1b** Deep gradational sandy loam  
**M2** Deep grey clay loam

**Main features:** The Jupiter Creek Land System is characterized by four landscape features. Moderately steep non arable slopes with shallow to moderately deep sandy loam soils occupy 10% of the area. Moderate slopes formed on basement rock account for 20% of the land. Soils are sandy to loamy, moderately deep, moderately well drained and acidic, with marginal fertility. They have good horticultural potential. Rises with broad flat to undulating crests occupy 40% of the Land System. The characteristic ironstone soils are infertile and subject to waterlogging. They have limited potential for intensive development. Land use on the creek flats and broad valleys (30% of the area) with deep sandy loam to clay loam soils, is principally limited by impeded drainage.

**Soil Landscape Unit summary:** 12 Soil Landscape Units (SLUs) mapped in the Jupiter Creek Land System:

SLU	% of area	Main features #
AuC	4.7	<p>Rolling low hills up to 40 m high, and short moderately steep slopes to 20 m high, formed on mainly Aldgate Sandstone, with interbedded siltstones and shales. Slopes are 16-30%. Drainage depressions are narrow with well defined watercourses. There is minor rock outcrop and variable surface sandstone and quartzite. Most soils have shallow to moderately deep sandy surfaced profiles over bedrock.</p> <p>Main soils: Acidic sandy loam over brown clay on rock - <b>K4</b> (E)  <u>Shallow sandy loam on rock</u> - <b>L1</b> (C)  <u>Acidic gradational sandy loam on rock</u> - <b>K5</b> (C)  <u>Acidic gradational brown loam</u> - <b>K1c</b> (M) on finer grained rocks  <u>Sandy loam over brown sandy clay loam</u> - <b>F1c</b> (M) } on alluvium  <u>Deep gradational sandy loam</u> - <b>M1b</b> (M) }</p> <p>This land is moderately steep with variable depth infertile, acidic soils. Although unsuitable for annual crops, and with low productive potential for pastures, the soils are generally well drained, and have some potential for perennial horticulture.</p>
AvC	4.7	<p>Rolling low hills up to 50 m high formed on interbedded sandstones and siltstones of the Stonyfell and Balhannah Formations. Slopes are 16-30%. There is minor rock outcrop and limited surface stone.</p> <p>Main soils are loamy texture contrast types: Acidic loam over red mottled clay - <b>K2</b> (E)  <u>Acidic sandy loam over brown clay</u> - <b>K4</b> (C)  <u>Acidic gradational brown / red loam</u> - <b>K1c/K1d</b> (C)  <u>Shallow sandy loam</u> - <b>L1</b> (M) on steeper and rocky slopes  <u>Ironstone soil</u> - <b>J2a/J2b</b> (M) on crests  <u>Loam over thick brown clay</u> - <b>F1a</b> (M) on lower slopes</p> <p>The soils are well drained deep and relatively deep and fertile, but prone to acidification. The land is too steep for cultivation, but is well suited to perennial crops and pastures.</p>
BhD	9.5	<p>Gently rolling low hills with relief of up to 40 m and slopes of 10-18%, formed on siltstones, sandstones and quartzites, deeply weathered in places, of the Saddleworth and Balhannah Formations, the Belair Subgroup and the Stonyfell Quartzite. Rock and stone are only significant on the steeper slopes. Saline seepages occur sporadically on lower slopes and in drainage depressions. Most soils have loamy to sandy surfaces with clayey subsoils grading to weathering rock at about a metre. Variations in surface texture and subsoil structure and colour are related to rock type.</p> <p>Main soils: Acidic loam over red mottled clay on rock - <b>K2</b> (E)  <u>Acidic sandy loam over brown clay on rock</u> - <b>K4</b> (C)  <u>Acidic gradational brown / red loam</u> - <b>K1c/K1d</b> (C)  <u>Sandy loam over brown clay on deeply weathered rock</u> - <b>F1a</b> (M) on lower slopes  <u>Sandy loam over brown clay</u> - <b>F1b</b> (M) in creek flats  <u>Deep acidic sandy loam ironstone soil</u> - <b>J2b</b> (M) on crests</p> <p>These soils are moderately deep to deep with high water holding capacities. Natural fertility is low to moderate and all are susceptible to acidification. Most of the land is well</p>



		suited to more intensive development, although salinity should be monitored and erosion control measures are essential wherever soils are disturbed.
CsD	11.7	<p>Rolling rises and low hills with relief of 20 to 40 m and slopes of 8-18%, formed on sandstones and shales of the Aldgate Formation. Water courses are well defined in drainage depressions up to 100 m wide. There is negligible rock outcrop and minor surface stone. Most soils are mostly moderately deep over bedrock, but deeper on lower slopes and creek flats. Surfaces are generally sandy loams to loams, with some sandier types on limited strata of coarse grained rocks. Subsoils are invariably friable yellow, brown or orange clays, but gravelly and sandier subsoils occur on coarser grained rocks.</p> <p>Main soils: <u>Acidic sandy loam over brown clay on rock</u> - <b>K4</b> (E)  <u>Acidic gradational brown loam</u> - <b>K1c</b> (E) on shaly rocks  <u>Acidic gradational sandy loam on rock</u> - <b>K5</b> (L) on coarse sandstones  <u>Sandy loam over brown sandy clay loam</u> - <b>F1c</b> (M) } on alluvium  <u>Deep gradational sandy loam</u> - <b>M1b</b> (M) }</p> <p>These soils are moderately deep and generally well drained, although marginally fertile and prone to acidification. They are highly erodible, so annual cropping is risky on the moderate slopes. The land is ideal for perennial horticulture.</p>
FaZ	27.7	<p>Very gently undulating plateaux (summit surfaces) up to 30 above surrounding plains, with side slopes of up to 7%. They are remnant deeply weathered land surfaces. Underlying materials are kaolinized and lateritized basement rocks.</p> <p>Main soils: <u>Ironstone soils</u> - <b>J2a</b> and <b>J2b</b> (V)  <u>Acidic gradational sandy loam</u> - <b>K1b</b> (L)  <u>Acidic gradational loam</u> - <b>K1a</b> (M)</p> <p>These soils are deep but imperfectly drained due to thick subsoil clays, and infertile due to strong leaching and high concentrations of phosphate fixing ironstone gravel. The land is potentially arable, as slopes are flat to gentle, but susceptibility to waterlogging is a significant limitation to horticultural development. Pasture productivity is potentially high, provided that fertility and acidity are managed. Deeply weathered substrate materials often contain salts which are dissolved and mobilized if watertables rise. Minimization of recharge through increased water use efficiency is critical on this land.</p>
FbC FbZ	10.7 2.3	<p>Flat topped summit surfaces and undulating rises formed on deeply weathered kaolinized sandstones of the Aldgate Sandstone formation. This material represents the last remnants of an ancient lateritic land surface, now largely eroded away leaving a topography of moderately inclined hillslopes below the summit surfaces. The summit surfaces characteristically slope away at their margins (break aways), where gradients may reach 20%, but most slopes are less than 10%. In places, the summit surfaces have been eroded to the point where only the break away slopes remain (as isolated hillocks). Water courses are moderately defined in shallow, wide drainage depressions.</p> <p><b>FbC</b> Undulating rises with slopes of 3-10%.  <b>FbZ</b> Summit surfaces and low, isolated rises with slopes of up to 20%.</p> <p>The soils have ironstone gravelly sandy to sandy loam surfaces, overlying clayey subsoils which are usually yellow or brown becoming grey and silty with depth as they grade to kaolinitic weathering rock. Variations in texture, profile differentiation and nature of the subsoil are due to differences in the parent rocks.</p> <p>Main soils: <u>Deep acidic sandy loam ironstone soil</u> - <b>J2b</b> (E)  <u>Acidic gradational sandy loam on rock</u> - <b>K1b</b> (E)  <u>Acidic sandy loam over brown clay on rock</u> - <b>K4</b> (C)  <u>Sandy loam over brown clay</u> - <b>F1a</b> (M) on lower slopes</p> <p>These soils are deep but imperfectly drained, inherently infertile and acidic. They have limited potential for intensive development.</p>
LDE	1.7	<p>Narrow creek flats formed on coarse grained alluvial deposits derived from the erosion of sandstones. The majority of soils comprise sandy and often gritty and stony surfaces overlying brown, yellow, grey and red sandy clay loam to clay subsoils. There are also deep coarse textured alluvial soils. The differences between the soils largely reflect varying parent sediments and drainage conditions.</p> <p>Main soils: <u>Sandy loam over brown sandy clay loam</u> - <b>F1c</b> (E)  <u>Deep gradational sandy loam</u> - <b>M1b</b> (E)  <u>Sandy loam over brown clay</u> - <b>F1b</b> (C)</p> <p>These soils are deep and imperfectly to moderately well drained. Natural fertility is low and most soils are acidic. Although the soils are potentially productive (provided fertility is maintained), the flats are narrow and dominated by watercourses, which restrict accessibility and require erosion control management.</p>



LFB LFC	11.9 2.2	<p>Lower slopes and undulating rises with relief of less than 20 metres and slopes of less than 10%, formed on gravelly clays derived from the erosion of lateritic (ironstone) materials from adjacent rises and hills. Water courses are moderately well defined in broad, shallow depressions.</p> <p><b>LFB</b> Gently undulating lower slopes of 1-3%.</p> <p><b>LFC</b> Lower slopes and undulating rises with slopes of 3-10%.</p> <p>Most soils have texture contrast profiles with sandy to loamy surfaces, often ironstone gravelly, and yellow or brown mottled subsoil clays. Underlying materials are generally alluvium with deeply weathered kaolinitic rock on rises.</p> <p>Main soils: <u>Sandy loam over brown clay - <b>F1b</b> (E)</u>  <u>Sandy loam over poorly structured brown clay - <b>F2</b> (E)</u>  <u>Deep acidic sandy loam ironstone soil - <b>J2b</b> (C)</u> on low rises</p> <p>These soils are deep but imperfectly drained due to slowly permeable subsoil clays, especially the sodic class (F2). They are moderately fertile and most are susceptible to acidification. The more sloping land is prone to erosion when cultivated. There is sporadic saline seepage.</p>
LsA	8.4	<p>Flats formed on fine grained alluvium derived from the erosion of basement rocks. Slopes are less than 1%. The soils are deep with variable sandy to clayey surfaces, but always with clayey subsoils.</p> <p>Main soils: <u>Sandy loam over brown clay - <b>F1b</b> (V)</u>  <u>Deep grey clay loam - <b>M2</b> (L)</u></p> <p>These soils are deep but generally imperfectly to poorly drained due to thick slowly permeable subsoil clays. They are moderately fertile but prone to acidification. Saline seepages occur sporadically.</p>
LtE	4.5	<p>Drainage depressions formed on medium to coarse grained locally derived alluvium. Soils have thick sandy to loamy surfaces with mottled clayey subsoils.</p> <p>Main soils: <u>Sandy loam over brown sandy clay loam to clay - <b>F1c</b> and <b>F1b</b> (V)</u>  <u>Deep sandy loam - <b>M1a</b> (L)</u></p> <p>These soils are deep and moderately fertile, but prone to waterlogging. Water courses are susceptible to erosion if banks are exposed. These areas are more sensitive than the surrounding flats or gentle slopes, with water course protection of prime importance.</p>

# 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:

**F1a** Sandy loam over brown clay on deeply weathered rock (Bleached-Mottled, Mesotrophic, Brown Kurosol)

Thick grey loamy sand to loam with a gravelly and bleached A2 horizon, overlying a brown, yellowish brown and red coarsely prismatic sandy clay to clay, becoming siltier and greyer with depth. Soft weathering metasandstone occurs from about 150 cm.

**F1b** Sandy loam over brown clay (Bleached-Mottled, Hypocalcic, Brown Chromosol)

Thick loamy sand to sandy clay loam with a strongly bleached A2 horizon, overlying a yellowish brown, grey and red mottled clay grading to fine grained alluvium, weakly calcareous at base.

**F1c** Sandy loam over brown sandy clay loam (Bleached-Mottled, Eutrophic, Brown Chromosol)

Thick dark brown loamy sand to light sandy clay loam with a bleached A2 horizon, overlying a yellow brown and grey brown sandy clay loam to light clay with coarse prismatic structure, grading to a grey, brown and yellow mottled clayey sand.

**F2** Sandy loam over poorly structured brown clay (Bleached-Mottled, Natric, Brown Kurosol)

Thick massive grey loamy sand to loam with a bleached and quartz gravelly A2 horizon, overlying a yellow brown and grey brown sandy clay to clay with prismatic structure, grading to coarse, medium or fine textured, micaceous alluvium from about 100 cm.



- J2a** Deep acidic loamy ironstone soil (Ferric, Eutrophic, Red Chromosol)  
Medium thickness dark brown loam with a pink A2 horizon containing abundant fragments of ferruginized siltstone, overlying a red and yellow brown clay with blocky structure, grading to grey mottled kaolinitic silty clay. Hard siltstone is deeper than 200 cm.
- J2b** Deep acidic sandy loam ironstone soil (Ferric, Mesotrophic, Brown Kandosol)  
Medium thickness loamy sand to sandy loam with abundant ironstone gravel, grading to a brownish yellow and red clay with ironstone fragments, over light grey and red kaolinitic clay at about 100 cm.
- K1a** Acidic gradational loam (Mesotrophic, Red Dermosol)  
Thick fine sandy loam to clay loam with minor ironstone grading to a brownish to reddish coarsely blocky clay loam to clay, siltier with depth, grading to kaolinized phyllite or siltstone, continuing to depths of 200 cm or more.
- K1b** Acidic gradational sandy loam on rock (Bleached, Mesotrophic, Brown Dermosol)  
Medium thickness loamy sand to sandy loam surface soil, with a pale and gravelly A2 horizon, overlying a yellow and brown sandy clay loam grading to a clay loam or light clay subsoil forming in soft weathering sandstone.
- K1c** Acidic gradational brown loam (Eutrophic, Brown Dermosol)  
Medium thickness loamy surface soil, becoming clay loamy and gravelly with depth, overlying an orange friable clay subsoil, grading to soft shale or siltstone.
- K1d** Acidic gradational red loam (Eutrophic, Red Dermosol)  
Medium thickness dark brown loam with a paler coloured clay loamy A2 horizon containing abundant ferruginous rock fragments, overlying a red clay with polyhedral structure and increasing rock fragments with depth, grading to soft weathering siltstone at about 100 cm.
- K2** Acidic loam over red mottled clay on rock (Bleached-Mottled Eutrophic, Red Kurosol)  
Thick sandy loam to loam surface soil with a bleached and gravelly A2 horizon, overlying a red, yellowish brown and brown well structured clay grading to weathering siltstone or fine sandstone by 100 cm.
- K4** Acidic sandy loam over brown clay on rock (Bleached, Mesotrophic, Brown Kurosol)  
Medium to thick, gravelly loamy sand to sandy loam surface soil, with a bleached and very gravelly A2 horizon, overlying a yellowish brown, red and brown sandy clay to clay subsoil grading to weathering medium to fine sandstone by 100 cm.
- K5** Acidic gradational sandy loam on rock (Bleached-Acidic, Mesotrophic, Yellow Kandosol)  
Thick, gravelly loamy coarse sand to coarse sandy loam surface soil with a bleached and very gritty and gravelly A2 horizon, overlying a brown or yellow sandy clay loam to sandy clay subsoil with abundant rock fragments, grading to coarse grained sandstone.
- L1** Shallow sandy loam on rock (Acidic, Paralithic, Bleached-Leptic Tenosol)  
Thick very gravelly loamy sand to sandy loam, overlying a brown gravelly clayey sand, grading to weathering sandstone by 50 cm.
- M1a** Deep sandy loam (Regolithic, Brown-Orthic Tenosol / Eutrophic, Brown Kandosol)  
Thick 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.
- M1b** Deep gradational sandy loam (Bleached-Acidic, Mesotrophic, Grey Kandosol)  
Very thick sandy loam surface soil, with a bleached A2 horizon, grading to a dark grey massive light sandy clay loam to sandy clay, overlying clayey sand alluvium.
- M2** Deep grey clay loam (Melanic, Calcic, Grey Dermosol)  
Thick black clay loam with granular structure, overlying a dark grey to black heavy clay with strong blocky structure. The clay is yellower and weakly calcareous with depth.

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

