

HAY Hay Valley Land System

Undulating to rolling low hills between Littlehampton and Inverbrackie

Area: 27.7 km²

Annual rainfall: 760 – 875 mm average

Geology: The system is underlain by a complex array of basement rock types. These include:

- Fine grained schists and metasandstones of the Barossa Complex, with quartzite beds and granitic and gneissic intrusions.
- Metamorphosed Aldgate Sandstone.
- Phyllites, fine grained schists, micaceous sandstones and slates (commonly kaolinized) of the Saddleworth, Woolshed Flat, and Stonyfell / Mitcham / Gilbert Range Quartzite Formations.
- Deeply weathered, kaolinized and lateritized basement rocks.
- Alluvium derived from the localized erosion and redeposition of medium to fine grained sediments.

Topography: The landscape includes areas of rolling low hills and undulating to gently rolling rises. There are some minor flat topped hills representing the last remnants of an old lateritic land surface. Low ridges running north and south impart a weak grain to the country. Drainage depressions are well defined, and in some cases (eg Hay Valley itself) occupy broad valleys. In the north, most of the land drains west to the Onkaparinga, but in the south, water flows to the west, south and east in all directions.

Elevation: 340 - 470 m

Relief: Up to 60 m

Soils: Most soils are moderately deep to shallow over weathering rock. Variations in rock type are responsible for a range of profile properties, including surface texture ranges of loamy sand to clay loam, and subsoil structure and colour (friable to hard and dispersive, and brown to red). Shallow stony soils are limited to steeper slopes, and ironstone soils to upper slopes. Deep profiles on alluvium are predominant on lower slopes and flats.

Main soils

- K4** Acidic sandy loam over brown clay on weathering basement rock
- F1c** Sandy loam over brown clay on fine grained alluvium
- K3a** Acidic sandy loam over red clay on weathering rock

Minor soils

Soils formed in weathering basement rock

- K1** Acidic gradational red loam (**K1a**) to sandy loam (**K1b**)
- K2** Acidic loam over red (**K2a**) or brown (**K2b**) clay
- K3b** Acidic sandy loam over sodic red clay
- K5** Acidic gradational sandy loam
- L1** Shallow sandy loam

Soils formed in deeply weathered basement rock

- F1** Loam to sandy loam over brown clay – on fine grained rock (**F1a**) or coarse grained rock (**F1b**)
- F2** Sandy loam over brown poorly structured clay



Soils formed on lateritized basement rock

J2 Ironstone soil – sandy (**J2a**) or loamy (**J2b**)

Soils formed in alluvial outwash sediments

F1d Sandy loam over brown clay on coarse grained alluvium

Main features:

The Hay Valley Land System consists of undulating to rolling rises and low hills characterized by deep sandy loam texture contrast and gradational soils. Subsoils are clayey and often impede water movement leading to temporary waterlogging. Many soils are formed on deeply weathered rocks, so natural fertility is usually low, although about 20% of the System (underlain by fine grained rocks) comprises fertile loamy soils. Deep texture contrast soils with sandy loam to loam surfaces dominate valley floors and drainage depressions which also occupy about 20% of the land. All soils are susceptible to acidification. Sandy loams are highly erodible, so most of the land is at risk of erosion if surface cover is inadequate.

Soil Landscape Unit summary: 14 Soil Landscape Units (SLUs) mapped in the Hay Valley Land System:

SLU	% of area	Main features #
AeC AqC AvC	10.5 2.9 2.1	<p>Rolling low hills formed on a variety of basement rock types.</p> <p>AeC Low hills with relief to 50 m and slopes of 16-25% formed on fine grained schists and metasandstones (Barossa Complex), with granitic / gneissic intrusions. Main soils: <u>Acidic sandy loam over brown clay on rock</u> - K4 (E) <u>Acidic gradational sandy loam on rock</u> - K5 (C) <u>Sandy loam over poorly structured brown clay</u> - F2 (L) <u>Acidic sandy loam over sodic red clay on rock</u> - K3b (L) on gneiss</p> <p>AqC Ridges up to 50 m high with slopes of 15-25% formed on quartzites within the Barossa Complex. Main soils: <u>Shallow sandy loam on rock</u> - L1 (E) <u>Acidic sandy loam over brown clay on rock</u> - K4 (E)</p> <p>AvC Ridges up to 30 m high with slopes of 18-30% formed on metamorphosed Aldgate Sandstone. Main soils: <u>Acidic sandy loam over brown clay on rock</u> - K4 (E) <u>Acidic gradational sandy loam</u> - K1b (E) <u>Shallow sandy loam on rock</u> - L1 (L)</p> <p>These landscapes are similar from a land use potential point of view in that all are too steep for annual cropping, but are suitable for perennial crops and grazing. Soil depth is variable, often shallow. Subsoil structure is commonly unfavourable for adequate water penetration and root growth. Inherent fertility is low.</p>
BdC BdD	15.7 1.6	<p>Undulating rises, gentle slopes and gently rolling low hills formed on phyllites, fine grained schists and slates of the Saddleworth, Woolshed Flat, and Stonyfell Formations. Slopes range from 4% to 18%, and relief varies from 20 to 50 m. Water courses are well defined and too narrow in their upper reaches to be mappable. Minor granitic outcrops occur in places.</p> <p>BdC Undulating rises and gentle slopes with relief to 20 m and slopes of 4-10%. BdD Gently rolling low hills with relief to 50 m and slopes of 10-18%.</p> <p>Soils are mostly moderately deep, overlying fine grained metamorphic rocks. They have loamy surfaces and variably coloured and structured subsoil clays. Deeper texture contrast soils occur on lower slopes and minor flats. Less well developed medium to fine grained soils on deeply weathered rocks occur on upper slopes.</p> <p>Main soils: <u>Acidic loam over brown to red clay on rock</u> - K2b / K2a (E) on fine grained rocks <u>Acidic sandy loam over brown or red clay on rock</u> - K4 / K3a (E) on quartzitic and coarser grained rocks <u>Loam over brown clay</u> - F1a (L) on lower slopes <u>Acidic gradational loam</u> - K1a (L) on upper slopes <u>Sandy loam over brown clay</u> - F1c (M) on unmappable creek flats</p> <p>This land is arable with mostly deep, naturally fertile and moderately well drained soils. Slight limitations are caused by poorly structured hard setting surface soils, and</p>



		<p>susceptibility to acidification and associated manganese toxicity. This is potentially productive land, but more intensive development must be accompanied by appropriate erosion control.</p>
CbC CbD	18.7 11.2	<p>Undulating rises to gently rolling low hills formed on micaceous sandstones, commonly kaolinized, of the less quartzitic strata of the Stonyfell and Mitcham Quartzite Formations. Slopes range from 3% to 18% and relief varies from 20 m on undulating rises to 60 m on low hills. Water courses are well defined in broad drainage depressions.</p> <p>CbC Undulating rises with relief to 40 m and slopes of 3-8%. CbD Gently rolling low hills with relief to 60 m and slopes of 8-18%.</p> <p>The majority of soils have sandy to loamy surfaces overlying brown or red clay subsoils forming in fresh, or more commonly deeply weathered, basement rock. Deeper texture contrast soils on alluvium are common on lower slopes.</p> <p>Main soils: <u>Acidic sandy loam over brown clay on rock</u> - K4 (E) on slopes <u>Sandy loam over brown clay on deeply weathered rock</u> - F1b (C) on slopes <u>Acidic sandy loam over red clay on rock</u> - K3a (E) on slopes <u>Sandy loam over brown clay</u> - F1c (L) on lower slope or creek flat alluvium</p> <p>These soils are deep but imperfectly drained due to the tendency for water to perch on the subsoil. Inherent fertility is low and all soils are susceptible to acidification. Erosion potential is moderately high even on gentler slopes as soils are highly erodible.</p>
CmD	12.3	<p>Undulating rises to 30 m high formed on metasandstones and fine grained schists of the Barossa Complex, with granitic and gneissic intrusions. Slopes are 8-16%. Drainage depressions are shallow, with well defined watercourses.</p> <p>Main soils: <u>Sandy loam over poorly structured brown clay</u> - F2 (E) <u>Acidic sandy loam over brown clay on rock</u> - K4 (C) <u>Acidic gradational sandy loam on rock</u> - K5 (L) <u>Acidic sandy loam over sodic red clay on rock</u> - K3b (L) on gneiss / granite</p> <p>These soils are mostly moderately deep to deep but with low inherent fertility. They are prone to acidification and are highly susceptible to water erosion if unprotected.</p>
FaZ FcC	3.7 1.9	<p>Crests and upper slopes formed on weathered, kaolinized / lateritized basement rocks.</p> <p>FaZ Flat topped plateaux (summit surfaces). FcC Upper slopes of 4-10%.</p> <p>Main soils: <u>Sandy loam ironstone soil</u> - J2a (E) in FaZ, (L) in FcC <u>Loamy ironstone soil</u> - J2b (E) in FcC, (L) in FaZ <u>Sandy loam to loam over brown clay on deeply weathered rock</u> - K1b / K1a (E)</p> <p>These soils are deep but highly weathered, with consequent low natural fertility. Ironstone ties up phosphate, and acidification potential is high, both factors further reducing fertility.</p>
LHA	2.4	<p>Creek flat formed on medium to coarse grained alluvium.</p> <p>Main soils: <u>Sandy loam over brown clay</u> - F1d / F1c (V), with deep coarse textured soils. These soils are deep and moderately fertile but prone to waterlogging.</p>
LeB LeC LeE	3.3 8.3 5.4	<p>Broad, shallow drainage depressions, and gently undulating to undulating lower slopes of up to 10% formed on medium to fine grained alluvium. The alluvium is derived from the erosion of basement siltstones, shales, phyllites and schists, associated with very deeply weathered medium to fine grained rocks.</p> <p>LeB Lower slopes, 1-4%. LeC Lower slopes, 4-8%. LeE Shallow valleys with slopes of 0-10%.</p> <p>The soils are texture contrast types with sandy to loamy surfaces and mottled clayey subsoils. Variations between the different soils are due to drainage conditions, grain size of the parent sediments and ironstone gravel content.</p> <p>Main soils: <u>Sandy loam over brown clay</u> - F1c (E) on alluvium <u>Loam over brown clay</u> - F1a (C) on deeply weathered rock <u>Sandy loam over brown clay</u> - F1b (C) on deeply weathered rock</p> <p>These soils are deep, fertile and moderately well to imperfectly drained. Productive potential is high provided that temporary waterlogging can be managed.</p>

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:**Soils formed in deeply weathered basement rock or alluvial outwash sediments**

- F1a** Loam over brown clay on deeply weathered rock (Eutrophic, Brown Kurosol)
Thick dark brown sandy loam to clay loam with a bleached A2 horizon, overlying a brown, yellowish brown and red, coarsely blocky clay grading to grey and brown coarsely prismatic clay forming in weathering schist or phyllite, deeper than 200 cm.
- F1b** Sandy loam over brown clay on deeply weathered rock (Bleached-Mottled, Mesotrophic, Brown Kurosol)
Thick grey loamy sand to fine sandy 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.
- F1c** Sandy loam over brown clay (Bleached-Mottled, Hypocalcic, Brown Chromosol)
Thick loamy sand to sandy clay loam surface soil with a strongly bleached A2 horizon, sharply overlying a yellowish brown, grey and red mottled clay subsoil grading to fine grained alluvium or kaolinitic and ironstone gravelly clay.
- F1d** Sandy loam over brown clay (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 with coarse prismatic structure, grading to a grey, brown and yellow mottled clayey sand.
- F2** Sandy loam over poorly structured brown clay (Bleached-Mottled, Mesotrophic, Brown Kurosol)
Thick grey brown loamy sand to light sandy clay loam with a bleached and gravelly A2 horizon, overlying a firm coarsely structured brown, yellow and red mottled heavy clay, grading to weathering rock at about 100 cm.

Soils formed on lateritized basement rock

- J2a** Sandy loam ironstone soil (Ferric, Mesotrophic, Brown Kandosol)
Medium thickness loamy sand to sandy loam with abundant ironstone gravel, overlying a brownish yellow and red clay with ironstone fragments, grading to light grey and red kaolinitic clay at about 100 cm.
- J2b** Loamy ironstone soil (Ferric, Eutrophic, Red Kurosol)
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.

Soils formed in weathering basement rock

- K1a** Acidic gradational loam (Mesotrophic, Red Dermosol)
Thick fine sandy loam with minor ironstone grading to a brownish to reddish coarsely blocky clay loamy to clayey subsoil, siltier with depth, grading to kaolinized phyllite or siltstone, continuing to depths of 200 cm or more.
- K1b** Acidic gradational sandy loam (Mesotrophic, Brown Dermosol)
Medium thickness loamy sand to sandy loam with a pale and gravelly A2 horizon, grading to a yellow and brown sandy clay loam grading to a clay loam or light clay subsoil formed in soft weathering sandstone.



- K2a** Acidic loam over red clay on rock (Eutrophic, Red Kurosol)
Medium thickness reddish loam to clay loam with a gravelly and paler coloured A2 horizon, overlying a red very well structured clay grading to weathering phyllite from about 100 cm.
- K2b** Acidic loam over brown clay on rock (Eutrophic, Brown Kurosol)
Thick loam with a paler coloured gravelly A2 layer, overlying a dark brown, yellowish brown and red mottled coarsely structured clay subsoil, grading to weathering metasiltstone or phyllite below 100 cm.
- K3a** Acidic sandy loam over red clay on rock (Bleached-Mottled, Eutrophic, Red Kurosol)
Medium thickness sandy loam with a paler or bleached A2 horizon, overlying a dark red and brown mottled prismatic structured clay, grading to weathering schist or phyllite by 100 cm.
- K3b** Acidic sandy loam over sodic red clay on rock (Eutrophic, Mottled-Subnatric, Red Sodosol)
Thick gritty loamy sand to sandy loam with a bleached A2 horizon, sharply overlying a red, yellow and grey-brown dispersive clay, grading to weathering highly micaceous gneiss at about 100 cm.
- K4** Acidic sandy loam over brown clay on rock (Bleached-Mottled, Eutrophic, Brown Kurosol)
Thick gravelly sandy loam with a bleached and gravelly A2 horizon, overlying a yellowish brown, red and greyish brown coarsely prismatic clay, grading to weathering metasandstone below 100 cm.
- K5** Acidic gradational sandy loam on rock (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 sandy loam on rock (Paralithic, Leptic Tenosol)
Thick stony sandy loam to sandy clay loam, forming in weathering schist or phyllite at 50 cm or less.

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

