

# LEN Lenswood Land System

Moderately steep low hills in the Kenton Valley - Forest Range - Balhannah district

**Area:** 66.6 km<sup>2</sup>

**Annual rainfall:** 780 - 995 mm average

**Geology:** The land is underlain by shales, siltstones, fine sandstones and minor quartzites and dolomites of the Balhannah, Saddleworth, Auburn and Bethel (carbonaceous shale) Formations. Valley floors are covered by mainly fine grained unconsolidated alluvium derived from these rocks.

**Topography:** The landscape is mainly rolling low hills, with slopes almost entirely < 30%. Watercourses occupy mainly narrow well defined valley flats, which account for about 15% of the total land area. These drain in an overall southerly direction and flow into the Onkaparinga River.

**Elevation:** 320 m in the south to 587 m in the north

**Relief:** Up to 80 m

**Soils:** The System is dominated by loamy soils, most of which have well structured clayey subsoils grading to weathering rock. Shallow soils on basement rock are common on steeper slopes, while sandy loam soils (with or without clayey subsoils) are typical of slopes formed on coarser grained rocks. Deep soils occur in valleys and on lower slopes. These have sandy, loamy or sometimes clayey surfaces with a variety of subsoils.

## Main soils

### *Soils formed in weathering basement rock*

**K1** Acidic gradational brown (**K1a**) or red (**K1b**)

**K2** Acidic loam over red clay (**K2b**) or red and brown mottled clay (**K2c**)

**L1a** Shallow stony loam

### *Soils formed in deeply weathered basement rock*

**F1a** Loam over brown clay

## Minor soils

### *Soils formed in weathering basement rock*

**K2** Acid loam over brown clay (**K2a**) or black clay (**K2d**)

**K3** Acidic sandy loam over red clay – mottled (**K3a**) or non mottled (**K3b**)

**K4** Acidic sandy loam over brown clay – mottled (**K4a**) or non mottled (**K4b**)

**K5** Acidic gradational sandy loam

**L1b** Shallow stony sandy loam

### *Soils formed in deeply weathered basement rock*

**F1b** Sandy loam over brown clay

### *Soils formed in alluvial outwash sediments*

**F1** Sandy loam to loam over brown sandy clay loam to clay – over fine grained alluvium (**F1c**), or coarse grained alluvium (**F1d**)

**H3** Bleached siliceous sand

**M1** Deep sandy loam

**M2** Deep black clay loam



**Main features:** The Lenswood Land System is characterized by moderately steep low hills separated by narrow creek flats. The soils of the hills are mainly loamy with clayey subsoils. They are inherently fertile although acidic, and well drained, and are consequently well suited to perennial horticulture. Significant areas of undulating to gently rolling slopes with similar soils are semi arable, and have some potential for annual crops, although the risk of erosion is high. Sandier soils are predominant on some slopes occupying 12% of the area. These are less fertile and more erodible, making them less attractive. The soils of the creek flats and lower slopes are deep and generally fertile, but are commonly susceptible to waterlogging, flooding and frost. However, being flat, they provide scope for more intensive uses.

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

SLU	% of area	Main features #
AbC AbD	50.0 0.1	<p>Moderately steep to steep hills formed on shales, siltstones, fine sandstones and minor quartzites and dolomites of the Balhannah, Saddleworth, Auburn and Bethel Formations. Slopes range from 18% to 90%, but are usually less than 75%. Relief varies from about 30 metres on some low hills to 80 metres. Crests and drainage depressions are narrow in the steeper country, but are broader where the slopes and relief are more subdued.</p> <p><b>AbC</b> Rolling low hills and moderate hillslopes with relief to 80 m and slopes of 18-30%.  <b>AbD</b> Steep rocky hillslopes with relief to 60 m and slopes of 30-50%.</p> <p>Soils predominantly loamy with brown to yellow subsoil clays forming in weathering rock. On steeper slopes, soils shallow on rock, while on lower slopes, clay subsoils thick with rock deeper than a metre.</p> <p>Main soils: <u>Acidic gradational brown loam</u> - <b>K1a</b> (E)  <u>Acidic loam over red / red and brown clay</u> - <b>K2b/K2c</b> (C)  <u>Shallow stony loam</u> - <b>L1a</b> (L) on steeper slopes  <u>Acidic gradational red loam</u> - <b>K1b</b> (L) on upper slopes  <u>Loam over brown clay on deeply weathered rock</u> - <b>F1a</b> (L) on lower slopes  <u>Acidic loam over black clay</u> - <b>K2d</b> (M) on carbonaceous shale strata</p> <p>This land is moderately steep and non arable, but its moderately deep, well drained and reasonably fertile soils are ideal for perennial horticulture. Main limitations are potential for erosion during establishment, and soil acidity.</p>
AqC	9.1	<p>Moderately inclined strike ridges formed on metamorphosed sandstones and quartzites of the Stonyfell Quartzite Formations. Slopes are 15% to 30% and relief is up to 40 metres. Rocky outcrop and surface stone are common. There is a range of soils, usually with gravelly sandy loam to sandy clay loam surfaces and variably coloured and structured clay subsoils, formed on fresh weathering or deeply weathered and kaolinitic micaceous sandstones. Shallow stony soils are common on steeper or rocky slopes. Deeper texture contrast soils occur on lower slopes.</p> <p>Main soils: <u>Acidic sandy loam over brown clay</u> - <b>K4a</b> (E)  <u>Shallow sandy loam on rock</u> - <b>L1b</b> (C) on steeper rocky slopes  <u>Acidic sandy loam over red clay</u> - <b>K3b</b> (L)  <u>Acidic gradational sandy loam</u> - <b>K5</b> (L) on upper slopes  <u>Sandy loam over brown clay on deeply weathered rock</u> - <b>F1b</b> (L) on lower slopes</p> <p>The land is non arable, although most is suitable for perennial crops provided erosion is controlled. Despite the rocky reefs, most soils are moderately deep, moderately well drained and have adequate water holding capacities. Natural fertility is low, and all soils are prone to acidification. Most soils have poor surface structure, and are highly erodible.</p>
AwC	2.8	<p>Low ridges of Stonyfell Quartzite up to 20 m high with slopes 15-30%. Up to 20% surface stone and minor outcrop. Soils have sandy loam surfaces and are shallow to moderately deep over rock.</p> <p>Main soils: <u>Acidic sandy loam over brown clay on rock</u> - <b>K4b</b> (E)  <u>Shallow sandy loam on rock</u> - <b>L1b</b> (E)</p> <p>These isolated ridges are moderately steep and stony soils of variable depth, low fertility, and prone to acidification.</p>



AxC	6.0	<p>Rolling slightly rocky low hills with relief to 80 m and slopes of 18-30%. Underlying rocks are phyllites, fine grained schists and slates. Soils are typically moderately deep loams with clayey subsoils over weathering rock.</p> <p>Main soils: <u>Acidic loam over brown / red / red and brown clay</u> - <b>K2a/K2b/K2c</b> (E)  <u>Acidic gradational loam</u> - <b>K1b</b> (E)  <u>Acidic sandy loam over red clay</u> - <b>K3a</b> (L) on coarser grained rocks</p> <p>The moderately steep slopes are non arable, but this land has potential for perennial crops and pastures. The soils are moderately deep and well drained, and inherently fertile, although acidic. Erosion control during establishment phases is essential.</p>
BFD	12.4	<p>Gently rolling rises and low hills with relief to 60 m and slopes of 8-18%, formed on shales, siltstones, fine sandstones and minor quartzites. Crests and drainage depressions are broad. The soils are predominantly loamy with brown to yellow subsoil clays forming in weathering rock. On lower slopes, clay subsoils are thick with rock deeper than a metre.</p> <p>Main soils: <u>Acidic gradational brown loam</u> - <b>K1a</b> (E)  <u>Acidic loam over red / red and brown clay</u> - <b>K2b/K2c</b> (L)  <u>Acidic gradational red loam</u> - <b>K1b</b> (L) on upper slopes  <u>Loam over brown clay on deeply weathered rock</u> - <b>F1a</b> (L) on lower slopes</p> <p>This land is semi arable due to the moderately high potential for erosion, so annual cropping is risky. However the moderately deep, well drained and reasonably fertile soils are ideal for perennial horticulture. Main limitations are potential for erosion during establishment and soil acidity.</p>
BXC	3.4	<p>Undulating rises and lower slopes formed on siltstones and carbonaceous shales, deeply weathered in places, of the Bethel Shale. Slopes are 4% to 10% and relief is up to 20 metres. Watercourses occupy shallow, broad depressions. The soils are loamy with brown and yellow subsoil clays which overlie weathering shale at depths ranging from less than a metre to several metres.</p> <p>Main soils: <u>Acidic gradational brown loam</u> - <b>K1a</b> (E)  <u>Loam over brown clay on deeply weathered rock</u> - <b>F1a</b> (E)  <u>Acidic loam over black clay</u> - <b>K2d</b> (L) on carbonaceous shale strata</p> <p>These soils are moderately deep to deep and inherently fertile, although acidic. Drainage is generally moderate, but waterlogging is likely in places. Slopes are gentle so land use options are greater than in most other parts of the System. Productive potential for a range of annual and perennial crops is high, except on K2d soils which can be poorly structured and sodic.</p>
BdD	2.8	<p>Gently rolling low hills with relief to 40 m and slopes of 10-18% formed on phyllites, fine grained schists and slates. Watercourses are well defined and too narrow in their upper reaches to be mappable. 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 red / brown clay on rock</u> - <b>K2b/K2a/K2c</b> (E) on fine grained rocks  <u>Acidic sandy loam over red clay on rock</u> - <b>K3a</b> (C) } on quartzitic and coarser grained  <u>Acidic sandy loam over brown clay</u> - <b>K4a</b> (L) } rocks  <u>Loam to sandy loam over brown clay</u> - <b>F1a / F1b</b> (L) on lower slopes  <u>Acidic gradational loam</u> - <b>K1a</b> (L) on upper slopes  <u>Sandy loam over brown clay</u> - <b>F1c</b> (M) on unmappable creek flats</p> <p>This land is semi arable with mostly deep, naturally fertile and moderately well drained soils. Slight limitations are caused by poorly structured hard setting surface soils, and susceptibility to acidification and associated manganese toxicity. This land is potentially highly productive. It is well suited to perennial horticulture, but annual cropping is risky because of the erosion hazard.</p>
LHE	3.9	<p>Creek flats formed on medium to coarse grained sediments. Most soils have sandy to loamy surfaces and brown and yellow mottled sandy clay to clay subsoils. Deep alluvial soils occur near watercourses.</p> <p>Main soils: <u>Sandy loam over brown sandy clay</u> - <b>F1d</b> (E)  <u>Sandy loam over brown clay</u> - <b>F1c</b> (C)  <u>Deep sandy loam</u> - <b>M1</b> (L)  <u>Bleached siliceous sand</u> - <b>H3</b> (L)</p> <p>Up to 100 cm of recent (flood deposited) silty to loamy sediments can overlie these soils. The soils are imperfectly to moderately well drained, deep with moderately low to moderate fertility. Being on river flats, productive potential is high, although there is a constant risk of flooding and stream bank erosion. There is minor soil salinity.</p>



LdE	0.8	Creek flats formed on clayey alluvium. Main soils: <u>Deep black clay loam</u> - <b>M2</b> (E) <u>Sandy loam over brown clay</u> - <b>F1c</b> (E) These soils are deep and fertile, but imperfectly drained. Productive potential is high although irrigation must be carefully managed to avoid waterlogging. Sporadic salinity should be monitored.
LeC LeE	7.7 1.0	Broad, shallow drainage depressions, and undulating lower slopes of up to 10% formed on medium to fine grained alluvium derived from the erosion of basement siltstones, shales, phyllites and schists, associated with very deeply weathered medium to fine grained rocks. <b>LeC</b> Lower slopes, 4-8%. <b>LeE</b> Shallow drainage depressions with slopes of 0-10%. All the major soils have texture contrast profiles with sandy to loamy surfaces and mottled brown, yellow and grey clay subsoils. Variations between the different soils are due to drainage conditions, grain size of the parent sediments and ironstone gravel content. Main soils: <u>Sandy loam over brown clay</u> - <b>F1c</b> (E) on alluvium <u>Loam to sandy loam over brown clay</u> - <b>F1a / F1b</b> (E) on deeply weathered rock These soils are deep, fertile and moderately well to imperfectly drained. Productive potential is high provided that temporary waterlogging can be managed.

# PROPORTION codes assigned to soils within Soil Landscape Units (SLU):

(D) Dominant in extent (>90% of SLU)

(V) Very extensive in extent (60–90% of SLU)

(E) Extensive in extent (30–60% of SLU)

(C) Common in extent (20–30% of SLU)

(L) Limited in extent (10–20% of SLU)

(M) Minor in extent (<10% of SLU)

### Detailed soil profile descriptions:

*Soils formed in weathering basement rock*

**K1a** 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.

**K1b** Acidic gradational red 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.

**K2a** Acidic loam over brown clay (Eutrophic, Brown Kurosol / Chromosol)

Thick loam with a paler coloured gravelly A2 horizon, overlying a dark brown, yellowish brown and red coarsely structured clay subsoil, grading to weathering metasiltstone or phyllite by about 100 cm.

**K2b** Acidic loam over red clay (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.

**K2c** Acidic loam over red and brown clay (Mottled, Eutrophic, Red/Brown Kurosol)

Thick sandy loam to loam with a paler coloured and gravelly A2 horizon, overlying a yellowish brown, brown and red, well structured clay grading to weathering siltstone or fine sandstone by 100 cm.

**K2d** Acidic loam over black clay (Eutrophic, Black Sodosol)

Medium to thick loam to clay loam over a coarsely structured black heavy clay with grey and yellow mottles, grading to carbonaceous shale from about 100 cm.

**K3a** Acidic sandy loam over red clay (Bleached-Mottled, Eutrophic, Red Chromosol)

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 red clay (Bleached, Eutrophic, Red Kurosol)

Thick, brown loamy sand to sandy loam with a gravelly and bleached A2 horizon, overlying a red coarsely structured clay, stony and browner with depth, grading to weathering metasandstone by 100 cm.



- K4a** Acidic sandy loam over brown clay (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 subsoil, grading to weathering metasandstone below 100 cm.
- K4b** Acidic sandy loam over brown clay (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 (Mesotrophic, Brown Kandosol)  
Medium thickness loamy sand to sandy loam with a pale and gravelly A2 horizon, grading to a yellow and brown sandy clay loam merging with a clay loam or light clay forming in soft weathering sandstone.
- L1a** Shallow stony loam (Acidic, Paralithic, Leptic Tenosol)  
Thick, stony fine sandy loam to loam, forming in weathering siltstone, fine sandstone or phyllite at 50 cm or less.
- L1b** Shallow stony sandy loam (Acidic, Paralithic, 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 deeply weathered basement rock*

- F1a** Loam over brown clay (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 subsoil grading to grey and brown coarsely prismatic clay forming in weathering schist or phyllite, deeper than 150 cm.
- F1b** Sandy loam over brown clay (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 subsoil, becoming siltier and greyer with depth. Soft weathering metasandstone occurs from about 150 cm.

*Soils formed in alluvial outwash sediments*

- F1c** Sandy loam to loam over brown clay (Bleached-Mottled, Hypocalcic, Brown Chromosol)  
Thick loamy sand to 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.
- 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.
- H3** Bleached siliceous sand (Regolithic, Bleached-Orthic Tenosol)  
Very deep greyish brown massive sand, grading to white sand, overlying layers of brown, yellow and grey sand to clayey sand.
- M1** 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.
- M2** Deep black clay loam (Melanic, Eutrophic, Black Dermosol)  
Thick black silt 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](#)

