

# HAH Hahndorf Land System

Undulating rises and low hills in the Onkaparinga Valley between Biggs Flat and Oakbank

**Area:** 34.9 km<sup>2</sup>

**Annual rainfall:** 765 – 900 mm average

**Geology:** The land system is underlain by siltstones, shales and minor calcareous beds of the Balhannah Shale Formation. These rocks were deeply weathered and lateritized during Tertiary times, but much of this weathering mantle has been eroded away, exposing relatively fresh rock within a metre or so of the surface. There are limited areas where the lateritic profiles remain intact. There has been extensive deposition of eroded materials on lower slopes and in valley flats. Most of this is fine grained, except for the Onkaparinga flats where sandier material from outside the system has been deposited.

**Topography:** Undulating to rolling rises and low hills in the section of the Onkaparinga catchment abutting the Meadows Escarpment. The rising ground formed on basement rocks is extensively dissected by tributaries of the Onkaparinga - more than a third of the area is lower slope outwash fan or valley flat / drainage depression. Most of the rising ground is undulating to gently rolling, with slopes of 3-18%. Limited areas are moderately steep (up to 30% slope). In the south particularly, are extensive areas of undulating rises formed on deeply weathered and lateritized basement rocks.

**Elevation:** 310 m in the south to 390 m in the north

**Relief:** Up to 60 m

**Soils:** Moderately deep to shallow soils over weathering basement rock dominate the rising ground. The most common types have acidic loamy surfaces with well structured clayey subsoils. Deep ironstone gravelly soils forming on kaolinitic weathered rock are common on weakly dissected rising ground. On lower slopes and valley flats, loamy soils with thick clayey subsoils are most common, with deep coarse textured soils sub-dominant.

## Main soils

**F1c** Sandy loam to loam over brown clay on fine grained alluvium

**K2b** Acidic loam over brown clay on weathering basement rock

**K1b** Acidic gradational loam on weathering basement rock

**F1a** Sandy loam to loam over brown clay on deeply weathered fine grained rock

## Minor soils

### *Soils formed in weathering basement rock*

**K1** Acidic gradational loam – deep on weathered rock (**K1a**), or shallow on hard rock (**K1c**)

**K2a** Acidic loam over red clay

### *Ironstone soils*

**J2** Deep acidic loamy ironstone soil

### *Soils formed on alluvium or deeply weathered rock*

**F1** Sandy loam to loam over brown clay - on deeply weathered coarse grained rock (**F1b**) or on coarse grained alluvium (**F1d**)



*Soils formed in weathering basement rock***C2** Shallow gradational red loam on calcareous rock**K3** Acidic sandy loam over red clay**L1** Shallow stony loam*Soils formed on alluvium***H3** Bleached siliceous sand**M1** Deep sandy loam**Main features:**

The Hahndorf Land System is characterized by undulating to rolling low hills with moderately deep loamy texture contrast soils. They are mostly moderately well drained and inherently fertile, although prone to acidification. Moderately steep, non arable land is limited in area. There are extensive areas of gentle slopes and valley flats with deep soils formed on alluvium. Productive potential overall is high, although there is potential for severe erosion on moderately steep slopes, while the main limitation on the lower lying land is waterlogging.

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

SLU	% of area	Main features #
AbC	11.3	<p>Rolling low hills with relief to 60 m and slopes of 18-30%. Water courses occupy narrow drainage depressions. Underlying rocks are siltstones, shales and fine sandstones, with sporadic quartzite reefs. There is up to 10% surface stone and minor rocky outcrop. The soils are mainly loamy, usually with clayey subsoils.</p> <p>Main soils: <u>Acidic loam over brown or red mottled clay</u> - <b>K2b</b> (E)  <u>Acidic gradational loam</u> - <b>K1b</b> (L)  <u>Shallow stony loam</u> - <b>L1</b> (L) on steeper and / or rocky slopes  <u>Shallow acidic gradational loam</u> - <b>K1c</b> (L) on upper slopes  <u>Loam over brown clay on deeply weathered rock</u> - <b>F1a</b> (L) on lower slopes</p> <p>The soils are mostly moderately deep, well drained and inherently fertile, although prone to acidification. The high potential for erosion precludes annual cropping, but the land is well suited to perennial horticulture or improved pastures.</p>
BFC BFD	0.8 5.9	<p>Rises and low hills formed on shales and (calc)-siltstones with minor quartzites.</p> <p><b>BFC</b> Undulating rises and lower slopes with relief to 20 m and slopes of 3-10%.  <b>BFD</b> Gently rolling rises and low hills with relief to 40 m and slopes of 8-18%.</p> <p>The soils are predominantly loamy, usually with clayey subsoils.</p> <p>Main soils: <u>Acidic gradational loam</u> - <b>K1b</b> (C)  <u>Acidic loam over brown or red mottled clay</u> - <b>K2b</b> (C)  <u>Loam over brown clay on deeply weathered rock</u> - <b>F1a</b> (L) on lower slopes  <u>Shallow stony loam</u> - <b>L1</b> (L) on steeper and / or rocky slopes  <u>Shallow acidic gradational loam</u> - <b>K1c</b> (L) on upper slopes  <u>Shallow gradational red loam on calcareous rock</u> - <b>C2</b> (M) on calcareous rocks</p> <p>The soils are mostly moderately deep, moderately well drained and inherently fertile, although prone to acidification. Productive potential is high, although moderate slopes impose an erosion hazard on cultivated land which must be very carefully managed. The land is well suited to perennial horticulture or improved pastures.</p>
BGC BGD	1.9 30.4	<p>Undulating rises and gently rolling low hills with relief to 50 m and slopes of 10-18%. Underlying rocks are siltstones, shales, phyllites and slates. Water courses are well defined in narrow drainage depressions.</p> <p><b>BGC</b> Undulating rises and gentle slopes with relief to 20 m and slopes of 4-10%.  <b>BGD</b> Gently rolling rises and low hills with relief to 30 m and slopes of 10-18%.</p> <p>The soils are predominantly loamy, usually with clayey subsoils.</p> <p>Main soils: <u>Acidic loam over brown or red mottled clay</u> - <b>K2b</b> (C)  <u>Acidic gradational loam</u> - <b>K1b</b> (L)  <u>Acidic sandy loam over red clay</u> - <b>K3</b> (L)  <u>Acidic loam over red clay</u> - <b>K2a</b> (L)  <u>Shallow acidic gradational loam</u> - <b>K1c</b> (L) upper slopes  <u>Loam over brown clay on deeply weathered rock or alluvium</u> - <b>F1a/F1c</b> (L) lower slopes</p> <p>Soils are mostly moderately deep, adequately drained and inherently fertile, although prone to acidification. Productive potential is high, although moderate slopes are prone</p>



		to erosion. The land is well suited to perennial horticulture or improved pastures.
FcC	12.8	Undulating rises with slopes of 4-10% formed on deeply weathered, kaolinized and lateritized siltstones. The soils are deep and strongly leached. Main soils: <u>Deep acidic loamy ironstone soil - J2</u> (E) <u>Acidic gradational loam over deeply weathered rock - K1a</u> (E) <u>Acidic gradational loam - K1b</u> (L) These soils are deep but of moderately low fertility. Drainage is impeded on the ironstone soils, further reducing their productive potential.
LHA LHE	6.9 2.3	Broad river flats and narrow valleys formed on medium to coarse grained sediments deposited by the larger streams of the Onkaparinga River system. Larger water courses (notably the Onkaparinga) are incised up to 10 metres. <b>LHA</b> Broad river flats with slopes of 0-2%. <b>LHE</b> Narrow drainage valleys with slopes of 0-5%. Most soils have sandy to loamy surfaces and brown and yellow mottled sandy clay to clay subsoils. Deep alluvial soils occur near watercourses. Main soils: <u>Sandy loam over brown sandy clay - F1d</u> (E) <u>Sandy loam over brown clay - F1c</u> (C) <u>Deep sandy loam - M1</u> (L) <u>Bleached siliceous sand - H3</u> (L) 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.
LeB LeC LeE	5.3 13.5 0.5	Broad, shallow drainage depressions, and gently undulating to 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>LeB</b> Lower slopes, 2-4%. <b>LeC</b> Lower slopes, 4-8%. <b>LeE</b> Shallow valleys with slopes of up to 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 - F1c</u> (E) on alluvium <u>Loam over brown clay - F1a</u> (E) on deeply weathered rock <u>Sandy loam over brown clay - F1b</u> (C) 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. Steeper slopes are prone to erosion. There is minor saline seepage on lower slopes.
LtE	8.4	Drainage depressions formed on medium to coarse grained locally derived alluvium. Soils have thick sandy to loamy surfaces over mottled clayey subsoils. Main soils: <u>Sandy loam over brown sandy clay to clay - F1d / F1c</u> (V) <u>Deep sandy loam - M1</u> (L) 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.

# 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*

- C2** Shallow gradational red loam on calcareous rock (Haplic, Hypercalcic, Red Dermosol)  
Medium thickness dark reddish brown loamy surface soil, overlying a reddish well structured loam to clay loam, grading to soft, highly calcareous siltstone, or soft carbonate with siltstone fragments throughout at about 50 cm.
- K1a** Acidic gradational loam over deeply weathered rock (Haplic, Mesotrophic, Red Dermosol)  
Thick loam with minor ironstone, grading to a brownish or 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 loam (Acidic, Eutrophic, Brown / Red Dermosol)  
Medium thickness dark brown loam with a paler coloured clay loamy A2 horizon containing abundant rock fragments, grading to a brown, orange or red clay with polyhedral structure and increasing rock fragments with depth, over to soft shale or siltstone at about 100 cm.
- K1c** Shallow acidic gradational loam (Acidic, Eutrophic, Brown Kandosol)  
Medium to thick loam with a pale coloured and gravelly A2 horizon, grading to a reddish yellow to brown massive clay loam, over a yellow light clay, with abundant rock fragments throughout. Highly weathered siltstone occurs between 50 and 100 cm.
- K2a** Acidic loam over red clay (Haplic, Eutrophic, Red Chromosol / Kurosol)  
Medium thickness, reddish loam to clay loam with a gravelly and paler coloured A2 horizon, overlying a red, very well structured clay subsoil grading to weathering phyllite or siltstone from about 100 cm.
- K2b** Acidic loam over brown or red mottled clay (Mottled, Eutrophic, Brown Chromosol)  
Thick loam with a paler coloured gravelly A2 horizon, overlying a dark brown, yellowish brown and red mottled, coarsely structured clay, grading to weathering metasiltstone or phyllite deeper than 100 cm.
- K3** Acidic sandy loam over red clay (Bleached-Mottled, Eutrophic, Red Chromosol)  
Medium thickness hard 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.
- L1** Shallow stony loam (Acidic, Paralithic, Leptic Tenosol)  
Thick stony loam, sometimes grading to a pink very stony clay loam, overlying siltstone or slate within 50 cm.

*Ironstone soils*

- J2** 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.

*Hard loamy soils with deep brown clayey subsoils formed on alluvium*

- 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 subsoil 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 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, commonly kaolinitic and ironstone gravelly, 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.
- F1d** Sandy loam over brown sandy clay (Bleached-Mottled, Mesotrophic, Brown Kurosol)  
Thick, greyish loamy sand to sandy clay loam with a bleached and ironstone gravelly A2 horizon, overlying a brownish yellow, brown and red sandy clay, grading to coarse to medium grained and variably gravelly alluvium continuing below 200 cm.

*Deep sandy to sandy loam soils formed on alluvium*

- H3** Bleached siliceous sand (Acidic, 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.

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

