

BAH Bald Hills Land System

Low hills with mainly clayey soils in the Yankalilla - Torrens Vale area

Area: 28.0 km²

Annual rainfall: 550 – 755 mm average

Geology: Except for a minor outcrop of basement sandstone, the characteristic geological materials of the Land System are clayey sediments deposited in ancient glacial valleys of Permian age. Whether the clays were laid down during the glaciation, or much later, is unclear, but they appear to lie on top of other typical sediments of these valleys (ie they are younger). Many of the clays are morphologically similar to the Hindmarsh Clay of the Adelaide Plains and other coastal embayments adjoining Gulf St. Vincent. They invariably have very coarse lenticular structure and slickensides (ie they are highly reactive, shrinking and swelling with changing moisture content). Associated with the heavy clays are massive sandy clays and calcareous clays which in places have hardened to shales. Secondary carbonates (blown in and leached into the soil) occur sporadically. Clayey and less common clayey sand sediments derived from the erosion of rising ground have accumulated in valley flats.

Topography: The Land System lies within an ancient glacial valley. The landscape is undulating to rolling. Dissection by water courses has carved the present day topography out of the thick sedimentary beds lying within the glacial valley. These watercourses flow to the north west to the Bungala River. There is minor drainage to the north east into the Inman. A characteristic feature of the system is severe gully and landslip erosion. The poorly drained clayey sediments on moderate to steep slopes have insufficient strength to support their weight when wet, and slide down slope. The combination of crumbly, cracking surface soils and dispersive deep subsoils predisposes water courses to gully erosion. Deep active branching gullies are widespread.

Elevation: 40 m - 230 m

Relief: Up to 60 m

Soils: The characteristic feature of the soils is their clayeyness. Cracking clay soils are extensive, while sub dominant soils are often clay loamy, either abruptly overlying brown or grey mottled clay, or grading to black clay.

Main soils

Soils formed on glacial valley sediments

- E3** Grey-brown cracking clay
- F2a** Sandy loam over poorly structured brown clay
- E1** Black cracking clay

Minor soils

Soils formed on glacial valley sediments

- F1a** Sandy loamy over brown clay
- G3** Thick sand over clay

Soils formed on alluvial sediments

- F2b** Sandy loam over brown clay
- F1b** Clay loam over brown clay
- M1** Deep sandy loam
- M2** Deep black clay loam



Main features: The Bald Hills Land System is unique in the Mount Lofty Ranges for the extent of clayey soils. A further distinction is the rolling topography on which they occur, and severe landslip and gully erosion. Although they are associated with sandy loam (and some sandy) texture contrast soils, the clayey soils are predominant. Grey and black forms occur. The greyer types are poorly structured, moderately fertile and generally neutral to slightly acidic. The black types are well structured (self-mulching surfaces), highly fertile, and alkaline. The texture contrast soils are imperfectly drained with low to moderate fertility. The instability of even moderate slopes (slopes as low as 12%), restricts land use options. The gentler slopes are commonly cropped, but the steeper slopes are used mainly for grazing. Horticultural potential is limited.

Soil Landscape Unit summary: 14 Soil Landscape Units (SLUs) are mapped in the Bald Hills Land System:

SLU	% of area	Main features #
AiC AiD	0.7 2.6	<p>Low basement rock hills projecting through the glacial valley sediments.</p> <p><u>Geology:</u> Metasandstones of the Backstairs Passage Formation.</p> <p>AiC Rolling low hills and slopes with relief of 50-100 m and slopes of 16-30%.</p> <p>AiD Steep to very steep rocky hillslopes of 80-200 m relief and slopes of 30-80%.</p> <p>Main soils: <u>Acidic sandy loam over brown clay on rock - K4a</u> (E) <u>Acidic sandy loam over red clay on rock - K3</u> (E) <u>Shallow sandy loam on rock - L1a</u> (L) on steeper and rocky slopes <u>Deep loam over brown clay - K2/F1</u> (M) on lower slopes</p>
HGD	2.1	<p>Strongly undulating rises on calcified sandstones. Gently rolling low hills to 80 m high with slopes of 10-20%.</p> <p>Undulating rises and rolling low hills formed on sandstones and sandy clays of old glacial valleys.</p> <p>There is a variety of soils with surfaces ranging from thick sands, through soft loamy sands or sandy loams, to firm loams.</p> <p>Main soils: <u>Sandy loam over alkaline - neutral brown clay - F1a</u> (C) } on sandy clays <u>Sandy loam over acid - neutral brown clay - F1b</u> (L) } <u>Hard sandy loam over red clay - D3</u> (C) } on sandstones <u>Thick bleached sand over sandy clay loam - G2</u> (C) } <u>Dark gradational loam over thick carbonate - C5</u> (L) } <u>Red brown loam over hard carbonate - B4</u> (M) } <u>Loam over brown clay - F1c</u> (M) on narrow flats between the rising ground</p> <p>These soils are each substantially different from one another. The F1 soils are marginally fertile, prone to acidification, and susceptible to waterlogging due to perching of water on the clayey subsoil. The D3 soils are poorly structured, although moderately fertile. Profiles are relatively shallow, so available water holding capacity is likely to be limiting. They are highly erodible by water. The deep sandy soils (G2) are infertile although well drained. They are susceptible to acidification, water repellence and wind erosion. The dark loams are naturally fertile, although somewhat shallow. All are suitable for irrigation, but there is a moderate to high risk of drainage problems on the sandy loams.</p>
HYII HYJJ HYLL	10.4 5.7 4.3	<p>Eroded land formed on sandy clays and clays of Permian glacial valleys where landslips, gully and / or tunnel erosion are significant features.</p> <p>HYII Moderately steep to steep hillsides of 20% to 30% slope, with stable or unstable branching erosion gullies.</p> <p>HYJJ Individual gullied water courses.</p> <p>HYLL Hillslopes up to 60 metres high with gradients of 20% to 30% (but up to 60% in places), affected by landslips in the past and/or with high potential for future mass movement. Watercourses are usually gullied.</p> <p>There is a mixture of sand to loam over yellow and brown mottled clays, and black and grey clay soils.</p> <p>Main soils: <u>Sandy loam over poorly structured brown clay - F2a</u> (E) <u>Grey-brown cracking clay - E3</u> (C) <u>Sandy loam over brown clay - F1a</u> (L) <u>Black cracking clay - E1</u> (L) <u>Thick sand over clay - G3</u> (M).</p> <p>Although these soils are inherently fertile and deep (although prone to waterlogging), the</p>



		fragility of the land restricts land use options. Even once stabilized, the severely damaged areas are always vulnerable to renewed erosion.
LAD	0.3	Lower slopes of 8-16%. Footslopes associated with the basement rock highs of AiC/AiD. <u>Geology</u> : Sandy clay to clay sediments derived from Kanmantoo Group rocks Main soils: <u>Loam over brown clay</u> - F1a (E) <u>Sandy loam over brown clay</u> - F1b (C) <u>Deep grey brown sandy loam</u> - M1b (L)
LNO LNe	4.3 1.0	Drainage depressions associated with larger water courses. Underlying materials are medium to fine grained alluvial sediments. LNO Drainage depressions with up to 10% saline seepages. LNe Drainage depressions with up to 10% saline seepages and some stream bank erosion. Soils are typically variable, but fall into two main groups: - loam over clay soils <u>sandy loam over brown clay</u> - F2b (C) <u>clay loam over brown clay</u> - F1b (C) - gradational soils <u>deep black clay loam</u> - M2 (E) <u>deep sandy loam</u> - M1 (L) These soils are deep but frequently imperfectly drained due to their clayey subsoils. However, thick surface soils reduce the severity of this problem. The M2 soils are highly fertile, and the F1 and M1 soils are moderately fertile. Salinity, waterlogging, stream bank erosion and occasional flooding are common problems. The land has moderately high pasture production potential, but limited scope for horticulture.
PtF	4.3	Upper slopes and crests formed on glacial valley sediments which are sandier than on other slopes in the Land System. Slopes are 10-25%. Main soil: <u>Thick sand over clay</u> - G3 (D) These soils are deep but infertile and prone to wind erosion and water repellence. They are generally strongly acidic. The thick sandy surfaces provide some scope for irrigation, but the land is mostly on high ground, so exposure may be a problem.
PuF	1.0	Gently rolling to rolling low hills with slopes of 12-30%. Moderately steep slopes formed on clayey sediments. Undulating rises with slopes from 4% and relief of less than 30 metres to rolling low hills with slopes of up to 30% and relief of up to 80 metres formed on sandy clays and calcareous clays, weakly lithified to shales in places. The steeper slopes are subject to landslip and tunnel erosion. Narrow water courses, which are often gullied, dissect the landscape. Most soils have strongly texture contrast profiles with sandy to loamy surfaces and clayey subsoils, which vary in structure, particle size and colour depending on the nature of the parent sediments. There are minor clay soils. Main soils: <u>Sand over clay</u> - G3a (E) <u>Sandy loam over acid-neutral brown clay</u> - F1/F2 (E) } all on slopes <u>Sandy loam over poorly structured brown clay</u> - F2a (L) } <u>Thick sand over acid clay</u> - G5 (L) } <u>Grey-brown cracking clay</u> - E3 (M) } <u>Thick sand over clay</u> - G3b (M) } on lower slopes and <u>Sandy loam over brown clay</u> - F1a (M) } narrow alluvial flats These soils are more susceptible to waterlogging than the related soils of PtF, with their heavier clay subsoils. Apart from high sheet/rill erosion potential, the steeper slopes are prone to landslip and tunnel erosion. Any activities which concentrate or increase subsoil water could activate mass movement, gully or tunnel erosion. Land use options are therefore limited on PuF. Natural fertility is low to moderate, and the soils are highly susceptible to acidification.
TWC TWD TWDD	20.3 36.9 5.6	Undulating rises to rolling low hills formed on heavy clays, morphologically similar to Hindmarsh Clay, deposited in Permian glacial valleys. Slopes range from 2% on rounded crests to 25% on some slopes. Relief is less than 50 metres. Water courses are well defined and often severely gullied. TWC Undulating rises with slopes of 2-10%. TWD Gently rolling low hills with slopes of 10-18%. TWDD Rolling low hills with slopes of 18-25%. The characteristic soils are grey and black clays, with smaller amounts of loamy sand to loam over brown clay profiles. Main soils: <u>Grey-brown cracking clay</u> - E3 (V) <u>Black cracking clay</u> - E1 (C) <u>Sandy loam over poorly structured brown clay</u> - F2a (L)



		<p style="text-align: center;"><u>Deep black clay loam - M2 (M)</u> on lower slopes and minor creek flats.</p> <p>These soils are mostly fertile and deep. Although susceptible to waterlogging, productive potential is high, although there is little opportunity for horticultural development. The gentler slopes are arable, but soil erodibility is high, so soil conservation management techniques are paramount. The steeper slopes are prone to landslip.</p>
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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:

- E1** Black cracking clay (Endohypersodic-Endocalcareous, Self-mulching, Black Vertosol)
Medium thickness black clay, occasionally calcareous, with strong granular structure and a self-mulching, cracking surface, overlying a black to dark grey heavy clay with strong blocky structure and variable amounts of soft calcareous segregations. The soil is formed over a grey strongly slickensided clay (Hindmarsh Clay equivalent), usually deeper than 100 cm.
- E3** Grey-brown cracking clay (Episodic-Endocalcareous, Epipedal, Brown Vertosol)
Medium thickness grey clay with coarse subangular blocky structure and surface cracks, overlying a grey to brown heavy clay with strong coarse prismatic structure. Carbonate is usually absent, but minor segregations may occur at depth. The soil is formed on a grey heavy clay with well developed slickensides (Hindmarsh Clay equivalent), usually shallower than 100 cm.
- F1a** Sandy loam over brown clay (Bleached-Mottled, Eutrophic Brown Kurosol)
Medium thickness grey brown loamy sand to light sandy clay loam with a bleached A2 horizon, overlying a yellow brown, grey and red mottled clay with coarse prismatic structure, grading to grey and yellow mottled sandy clay from 100 cm.
- F1b** Clay loam over brown clay (Bleached-Mottled, Hypocalcic, Brown Chromosol)
Thick greyish brown clay loam with a bleached A2 horizon, overlying a yellowish brown, grey and red heavy clay with strong blocky structure, grading to a grey and yellow clay with occasional fine carbonate.
- F2a** Sandy loam over poorly structured brown clay (Hypocalcic, Subnatric, Brown Sodosol)
Medium thickness dark brown firm to hard sandy loam to sandy clay loam with a bleached and hard A2 horizon, overlying a dark grey brown and yellow brown mottled heavy clay with strong prismatic structure, grading to a grey, yellow and red massive sandy clay to clay with minor fine carbonate from 85 cm.
- F2b** Sandy loam over brown clay (Hypocalcic, Brown Sodosol)
Thick loamy sand to sandy clay loam with a strongly bleached A2 horizon, sharply overlying a yellowish brown, grey and red mottled coarsely structured clay grading to fine grained alluvium.
- G3** Thick sand over clay (Bleached, Brown Kurosol)
Thick to very thick soft sand with a bleached A2 layer, over a brown, red and grey mottled medium to heavy acidic clay, continuing below 100 cm.
- M1** Deep sandy loam (Regolithic, Brown-Orthic Tenosol)
Thick brown sandy loam to loamy sand, overlying a greyish brown clayey coarse sand to silty sand, grading to variable sandy and gritty alluvial sediments.
- M2** Deep black clay loam (Melanic, Calcic, Black Dermosol)
Medium thickness black clay loam to light clay with strong granular structure, overlying a very dark clay with blocky structure and minor soft calcareous segregations at depth.

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

