

ACH Ackland Hill Land System

Steep rough hills with broad flat crests between Belair Recreation Park and Kangarilla

Area: 25.1 km²

Annual rainfall: 685 - 960 mm average

Geology: The landscape is dominated by medium to coarse grained sandstones and quartzites of the Stonyfell Formation. Interbedded fine sandstones and siltstones occupy limited areas. Lateritic cappings on crests indicate that much of the land was subjected to deep weathering prior to uplift and dissection. Most of the lateritic mantle has been eroded away, but the limited areas which remain are distinctive features of the land. Most of the material eroded during the dissection of the landscape has been removed from the System, but minor deposits of coarse grained alluvium occur in drainage depressions.

Topography: The Ackland Hill Land System is characterized by moderately steep to steep hills with broad flat topped crests (summit surfaces). The land would once have been a flat plain of deeply weathered lateritic material, but uplift initiated a phase of down cutting by streams, creating deep valleys and leaving fragments of the original land surface. Apart from these flat crests, slopes are generally steeper than 30%. Water courses occupy narrow flats between the steep slopes, and there are no other significant depositional areas. The streams flow in a general westerly direction, and include Sturt Creek and the Onkaparinga River.

Elevation: 424 m in the north (summit surface) to 230 m in the south

Relief: Up to 130 m

Soils: The dominant soils are shallow to moderately deep with coarse textured surfaces either forming directly in weathering sandstone, or underlain by a more clayey subsoil. Variations in depth, stoniness and horizon development reflect changing bedrock conditions. Limited beds of fine grained rocks give rise to loamy soils. Ironstone soils and deeper sandy loam over clay soils are typical of deeply weathered rocks on flat topped crests. Deep sandy soils with variable subsoils characterize minor creek flats.

Main soils

Soils formed on coarse grained basement rock

K5 Acidic gradational stony sandy loam

K4 Acidic sandy loam over brown clay

L1a Shallow stony gritty sandy loam

L1b Shallow stony sandy loam

K3 Acidic sandy loam over red clay

Soils formed on deeply weathered or lateritized basement rock

K4/J2 Acidic sandy loam over brown clay on deeply weathered rock

J2 Acidic deep sandy loam ironstone soil



Minor soils

Soils formed on coarse grained basement rock

D1 Shallow sandy loam over red alkaline clay

K4/K5 Acidic gradational sandy loam

Soils formed on fine grained basement rock

K1 Acidic gradational brown loam

K2 Acidic loam over red and brown clay

Soils formed on alluvium

F1 Sandy loam over brown sandy clay loam

M1a Deep uniform sandy loam

M1b Deep gradational sandy loam

Main features:

The Ackland Hill Land System is characterized by moderately steep to steep rocky hillslopes with broad flat topped crests. The soils on the slopes are typically shallow with coarse textured stony surfaces, and friable gritty clayey subsoils, although many are formed directly on rock. They are infertile and acidic, but well drained. The steep topography and poor soil severely restrict land use, and most is either uncleared or grazed. There is some horticulture on minor moderate slopes. The flat crests, underlain by lateritic material have mainly ironstone soils, low in fertility and prone to waterlogging. However, most of this land is used for non agricultural purposes (housing, rural living or recreation). Narrow creek flats occupy less than 5% of the land area.

Soil Landscape Unit summary: 6 Soil Landscape Units (SLUs) mapped in the Ackland Hill Land System:

SLU	% of area	Main features #
AuC AuD	12.7 54.7	<p>Steep low hills and hills developed on medium to coarse grained sandstones and quartzites. Slopes generally range from 12% to 75% and relief is up to 130 metres. The slopes are rough and very rocky.</p> <p>AuC Rolling moderately rocky low hills with relief to 80 m and slopes of 12-30%.</p> <p>AuD Rocky, steep hills with relief to 130 m and slopes of 30-75%. Drainage depressions are narrow and deeply incised.</p> <p>The main soil features are shallow profiles over bedrock and grey, sandy surfaces which are gritty and stony. Subsoils are often not present.</p> <p>Main soils:</p> <p><u>Acidic gradational sandy loam - K5 (E)</u></p> <p><u>Acidic sandy loam over brown clay - K4 (C)</u></p> <p><u>Shallow sandy loam - L1a (L)</u></p> <p><u>Acidic sandy loam over red clay - K3 (L)</u></p> <p><u>Acidic gradational brown loam - K1 (M)</u> on fine grained rocks</p> <p>This land has very limited productive potential due to the combination of steep terrain, rocky land surface and shallow infertile soils. Virtually all the steep slopes are uncleared, while the gentler slopes are usually partially cleared and used for light grazing, often in a rural living situation.</p>
AwC	7.2	<p>Moderately steep slopes and rounded crests formed on medium to coarse grained sandstones with limited interbedded fine sandstones, siltstones and quartzites. Relief is up to 50 m and gradients are 18-25% on side slopes, down to 10% on crests. Rocky outcrops are minor. Most soils are moderately deep to shallow over bedrock. Profiles vary according to the nature of the parent rock. Sandy to sandy loam soils over brown, yellow or red clay subsoils occur on the coarser grained rocks. Loamy soils over orange clays are typical on finer grained rocks. Limited occurrences of coarse grained rocks are characterized by shallow, stony gritty soils.</p> <p>Main soils:</p> <p><u>Acidic sandy loam over brown clay - K4 (E)</u> } sandstones</p> <p><u>Shallow stony sandy loam - L1b (C)</u> }</p> <p><u>Acidic gradational brown loam - K1 (L)</u> } finer grained rocks</p> <p><u>Acidic loam over red and brown clay - K2 (L)</u> }</p> <p><u>Acidic gradational sandy loam - K4/K5 (M)</u> } upper slopes</p> <p><u>Acidic gradational sandy loam - K5 (M)</u> } coarse sandstone strata</p> <p><u>Shallow sandy loam over red clay - D1 (M)</u> } calcified rocks.</p>



		Soil depth is highly variable, depending on the type of underlying rock. The soils are moderately well to well drained, but most have low natural fertility and are prone to acidification. However, the land is suitable for perennial crops (where water is available) and improved pastures, provided adequate erosion control measures are taken.
CaD	4.7	Moderately inclined hillslopes formed on medium to coarse grained sandstones with limited interbedded fine sandstones, siltstones and quartzites. Slopes are 10-20% and relief is up to 70 m. There is negligible rock outcrop. The soils are similar to those of AwC (above). Land use options are greater due to the gentler slopes, and the land is more intensively developed to horticulture, improved pastures and rural living. The risk of erosion is generally too great for the land to sustain uses requiring regular cultivation.
FbZ	17.8	Flat topped summit surfaces formed on deeply weathered kaolinized sandstones. This material represents the last remnants of an ancient lateritic land surface. The summit surfaces characteristically slope away at their margins (break aways), where gradients may reach 10%, but most slopes are less than 5%. 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. Main soils: <u>Acidic deep sandy loam ironstone soil - J2 (V)</u> <u>Acid gradational sandy loam on rock - K4/K5 (L)</u> <u>Acidic sandy loam over brown clay on deeply weathered rock - K4/J2 (L)</u> These soils are deep but imperfectly drained, inherently infertile and acidic. These areas, being the only flat land in an otherwise steep landscape, are largely developed for urban, rural living and recreational purposes.
LtE	2.9	Narrow drainage depressions formed on medium to coarse grained locally derived alluvium. Soils have thick sandy to loamy surfaces overlying mottled clayey subsoils. Main soils: <u>Sandy loam over brown sandy clay loam - F1 (V)</u> <u>Deep gradational sandy loam - M1b (L)</u> <u>Deep uniform sandy loam - M1a (L)</u> These soils are deep and moderately fertile, but prone to waterlogging. Water courses are susceptible to erosion if banks are exposed. These areas are usually too narrow to allow significant development, particularly in view of the potential for water course degradation.

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:

- D1** Shallow sandy loam over red alkaline clay (Calcic, Red Chromosol)
Medium thickness reddish sandy loam with a pink, gravelly A2 horizon, overlying a red well structured clay with occasional fine calcareous segregations at depth, grading to weathering fine sandstone.
- F1** 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.
- J2** Acidic, deep 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.



- K1** Acidic gradational brown loam (Eutrophic, Brown Dermosol)
Medium thickness loam, becoming clay loamy and gravelly with depth, overlying an orange friable clay subsoil, grading to soft shale or siltstone.
- K2** Acidic loam over red and brown clay on rock (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.
- K3** Acidic sandy loam over red clay (Mesotrophic, Red Chromosol)
Medium thickness loamy sand to sandy loam, with a paler coloured and very gravelly A2 horizon, overlying a red sandy clay subsoil with abundant rock fragments, grading to weathering coarse grained sandstone before 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.
- K4/J2** Acidic sandy loam over brown clay on deeply weathered rock (Bleached, Mesotrophic, Brown Kurosol)
Medium to thick, gravelly loamy sand to sandy loam, with a bleached and very gravelly A2 horizon, overlying a yellowish brown, red and brown sandy clay to clay grading to soft kaolinized sandstone by 100 cm, continuing below 200 cm.
- K4/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.
- K5** Acidic gradational stony 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.
- L1a** Shallow stony gritty sandy loam (Acidic, Inceptic, Bleached-Orthic Tenosol)
Thick loamy coarse sand to coarse sandy loam with abundant sandstone and quartzite fragments, grading to a brown clayey sand forming in hard sandstone.
- L1b** Shallow stony sandy loam (Acidic, Lithic, Bleached-Leptic Tenosol)
Thick greyish very gravelly loamy sand to sandy loam with a bleached A2 horizon, grading to hard sandstone or quartzite by 50 cm.
- M1a** Deep uniform sandy loam (Regolith, Brown-Orthic Tenosol / Eutrophic, Brown Kandosol)
Thick brown sandy loam overlying a grey to brown silty sand to light 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.

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

