

PIR Piggot Range Land System

Moderately steep to steep range of low hills between Hackham and Clarendon

Area: 29.8 km²

Annual rainfall: 565 – 865 mm average

Geology: The land is underlain by a mixture of basement rocks, including sandstones, siltstones, tillites, shales and quartzites of the Sturt Tillite, Belair Subgroup, Tapley Hill Formation and Mitcham Quartzite. These are generally within a metre or so of the surface, except on flat topped crests where they are deeply weathered and buried under kaolinized or lateritized weathering material, typically soft silty clay loam to silty clay. On some summit surfaces, these deep weathering materials are in turn overlain by remnant deposits of Tertiary sands or clays. The clays are morphologically similar to Hindmarsh Clay.

Topography: The land system is a range of moderately steep low hills on the western edge of the Mount Lofty Range. It includes part of the western escarpment and is bounded by the Gulf Plains on the west, and the Onkaparinga River on the east and south. The Onkaparinga has cut a deep gorge along the southern edge of the System. Most of the rest of the landscape is dissected by watercourses flowing westwards to the plains. On the eastern side, drainage is in a general southerly direction to the Onkaparinga. Dissection has been extensive, and more than a quarter of the land is steeper than 30%. This includes the precipitous slopes of the Onkaparinga Gorge. Almost half the land has slopes in the 18-30% range. Notable features are the isolated flat-topped crests (summit surfaces), which are remnants of an ancient land surface. All but about 15% of this surface was eroded away following the uplift of the ranges and consequent down cutting by streams.

Elevation: 40 m where the Onkaparinga River flows out in the south east, to 360 m on a summit surface in the northeast.

Relief: Up to 140 m in the Onkaparinga Gorge, but elsewhere, less than 90 m

Soils: Most of the soils are moderately deep over basement rocks. Surface textures are generally sandy loams to light clay loams, depending on the grain size of the parent rock. There is usually a clayey subsoil, but on steeper slopes, the surface soil is formed directly in the rock. On broader crests, the soils are commonly deep over highly weathered (kaolinized and / or lateritized) rocks. On other crests there are mixed sandy and clayey soils on remnant Tertiary deposits.

Main soils

Soils formed in weathering basement rock

- K2a** Acidic loam over red clay
- K2b** Acidic loam over brown clay
- K4** Acidic sandy loam over brown clay
- L1a** Shallow stony loam
- L1b** Shallow stony sandy loam
- K1** Acidic gradational red loam

Soils formed on deeply weathered and / or lateritized rocks

- J2** Acidic gradational ironstone soil
- K4/J2** Acidic sandy loam over brown clay on kaolinized rock



Minor soils

Soils formed on heavy clay sediments

- E1** Black cracking clay
- F2** Sandy loam over poorly structured brown clay
- M2** Dark gradational clay loam

Soils formed on Tertiary sandy clays and sandstones

- G2** Bleached sand over light sandy clay loam
- G3** Thick sand over clay

Main features: The Piggot Range Land System is characterized by moderately steep to steep low hills with generally moderately deep sandy loam to loam soils over clayey subsoils. These are moderately fertile and mostly well drained, but susceptible to acidification, poor surface structure and erosion. Over three quarters of the land is too steep for uses involving regular cultivation, but a significant proportion is suitable for perennial horticulture (where water is available) and grazing. There are significant areas of steep slopes with shallow stony soils. These have limited grazing value, and some are contained within conservation or recreation reserves. Flat-topped crests are topographically suitable for more intensive development. Some have similar, although deeper, soils to the hillslopes, but others are characterized by either very infertile sands, or heavy intractable clays. Exposure may also be a problem in these areas.

Soil Landscape Unit summary: 7 Soil Landscape Units (SLUs) mapped in the Piggot Range Land System:

SLU	% of area	Main features #
AwC AwD AwF	48.3 23.9 4.5	<p>Rolling to steep low hills with some precipitous slopes in river gorges. Underlying rocks are sandstones, siltstones, tillites, shales and quartzites of the Sturt Tillite, Belair Sub-group, Tapley Hill Formation and Mitcham Quartzite. Slopes are generally more than 18%, but crests are often broad and relatively flat, with slopes as low as 5%. Watercourses are well defined in narrow depressions. Rock outcrop is common on steeper slopes, particularly where the Onkaparinga River has cut its gorge through the landscape.</p> <p>AwC Rolling low hills with relief to 90 m and slopes of 18-30%. AwD Steep, rocky hillslopes with relief to 100 m and slopes of 30-75%. AwF Precipitous, very rocky hillslopes with relief to 140 m and slopes of 80-150%, in the Onkaparinga Gorge.</p> <p>There is a wide variation in soil profiles due to the diversity of rock types. Shallow soils on rock are common. Most other soils have sandy to loamy surface soils and variably structured and coloured clayey subsoils.</p> <p>Main soils: <u>Acidic loam over red or brown clay</u> - K2a / K2b (E) <u>Acidic sandy loam over brown clay</u> - K4 (C) <u>Sallow stony loam or sandy loam</u> - L1a / L1b (L) on steeper slopes <u>Acidic gradational ironstone soil</u> - J2 (L) } on upper slopes and crests <u>Acidic sandy loam over brown clay on kaolin rock</u> - K4/J2 (L) }</p> <p>These soils are moderately deep. They have moderate to moderately low natural fertility and are susceptible to acidification. They generally have hard setting surfaces which are prone to erosion if disturbed. Drainage is generally satisfactory. There is potential for horticultural development on AwC where water is available, but the rest of the land is too steep and / or rocky.</p>
BiD	7.7	<p>Gently rolling rises and low hills with relief to 50 m and slopes of 8-18% formed on sandstones, siltstones, tillites, shales and quartzites of the Sturt Tillite, Belair Subgroup and Saddleworth Formations. The soils are similar to those for AwC, except that the shallow stony types (L1a/L1b) are minor. This land is suited to perennial horticulture, but the risk of erosion is generally too great for cultivated agriculture to be sustainable.</p>



FgZ	9.3	<p>Undulating upper slopes and crests (summit surfaces) of rolling low hills. They generally occur as strips running along ridges. Slopes range from 2% on crests to 10% on the margins grading to the steeper slopes below. The underlying rocks are deeply weathered, kaolinized siltstones and sandstones. Occasionally there is a veneer of Tertiary sediment overlying the basement rock. The soils are deep over kaolinized and / or lateritized rock. Surfaces are sandy to loamy with variable ironstone gravel. Subsoils are clayey and red or yellow brown.</p> <p>Main soils: <u>Acidic gradational ironstone soil</u> - J2 (E) <u>Acidic sandy loam over brown clay on kaolinized rock</u> - K4/J2 (C) <u>Acidic gradational red loam</u> - K1 (L) <u>Thick sand over clay</u> - G3 (L)</p> <p>These soils are deep and moderately well drained but low in natural fertility. Exposure may be a problem for some activities.</p>
GAZ	2.4	<p>Gently sloping rounded crests with remnant Tertiary sandstones and sandy clays. The soils are generally sandy.</p> <p>Main soils: <u>Bleached sand over light sandy clay loam</u> - G2 (E) <u>Thick sand over clay</u> - G3 (E)</p> <p>These soils are very infertile, and susceptible to water repellence and wind erosion. Although exposed, they have some potential for floriculture.</p>
TAZ	3.9	<p>Gently undulating crests or summit surfaces with slopes to 5% and no defined surface drainage pattern. Underlying sediments are Hindmarsh Clays. Weak gilgai development is apparent. The soils vary from black cracking clays, through gradational clay loams to sandy loam over brown mottled clay profiles. All soils are calcareous with depth (Class I carbonate) and overlie heavy grey clay with coarse blocky structure within 100 cm of the surface.</p> <p>Main soils: <u>Dark gradational clay loam</u> - M2 (E) <u>Black cracking clay</u> - E1 (E) <u>Sandy loam over poorly structured brown clay</u> - F2 (L)</p> <p>Heavier soils are inherently fertile. All subject to waterlogging and poor deep drainage due to the effects of the Hindmarsh Clay. Structural problems may occur as a result of seasonal shrinking and swelling of the heavy clays. Although potentially productive, soils not well suited to irrigated uses.</p>

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:

Soils formed in weathering basement rock

- K1** Acidic gradational red loam (Eutrophic, Red Dermosol)
Medium thickness dark brown loam with a paler coloured clay loamy A2 horizon containing abundant ferruginous rock fragments, overlying a red clay with polyhedral structure and increasing rock fragments with depth, grading to soft weathering siltstone at about 100 cm.
- K2a** Acidic loam over red clay (Eutrophic, Red Chromosol)
Medium thickness loamy surface soil, with a paler coloured and gravelly A2 horizon, overlying a reddish brown to red, well structured clay subsoil with rock fragments, grading to weathering siltstone or slate by 100 cm.
- K2b** Acidic loam over brown clay (Eutrophic, Brown Chromosol)
Medium thickness brown fine sandy loam with a paler gravelly A2 horizon, overlying a yellowish brown, brown and red well structured clay grading to weathering siltstone or fine sandstone by 100 cm.
- K4** Acidic sandy loam over brown clay on 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 weathering medium to fine sandstone by 100 cm.



- L1a** Shallow stony loam (Acidic, Lithic, Leptic Tenosol)
Thick, gravelly and stony brown loam, sometimes grading to a pinkish, very stony clay loam overlying hard siltstone or slate.
- L1b** Shallow stony sandy loam (Acidic, Paralithic, Leptic Tenosol)
Thick, very gravelly loamy sand to sandy loam, overlying a brown, gravelly clayey sand, grading to weathering sandstone by 50 cm.

Soils formed on deeply weathered and / or lateritized rocks

- J2** Acidic gradational ironstone soil (Ferric, Mesotrophic, Red Dermosol)
Medium thickness reddish brown sandy loam to sandy clay loam with a paler coloured and ironstone gravelly A2 horizon, overlying a yellowish red to brown clay loam grading to medium clay with polyhedral structure. The clay grades to a pale grey kaolinitic silty clay loam forming in highly weathered siltstone or sandstone deeper than 200 cm.
- K4/J2** Acidic sandy loam over brown clay on kaolinized 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.

Soils formed on Tertiary sandy clays and sandstones

- G2** Bleached sand over sandy clay loam (Mesotrophic, Brown Chromosol)
Very thick grey sand with a bleached A2 horizon (sometimes containing ironstone and sandstone gravel), overlying a brown, yellow and red clayey sand to sandy clay loam, grading to weakly cemented Tertiary sandstone within 100 cm.
- G3** Thick sand over clay (Eutrophic, Brown Chromosol)
Thick grey sand to loamy sand with a bleached and ironstone gravelly A2 horizon, overlying a yellowish brown and red sandy clay to clay with ironstone gravel, grading to a grey and red mottled sandy clay forming in indurated sandstone deeper than 200 cm.

Soils formed on heavy clay sediments

- E1** Black cracking clay (Epicalcareous-Endohypersodic, Self-mulching, Black Vertosol)
Medium thickness very dark grey moderately calcareous light clay with fine blocky structure, overlying a black to dark grey coarsely prismatic heavy clay becoming paler coloured and more calcareous with depth. Hindmarsh Clay is evident from about 70 cm.
- F2** Sandy loam over poorly structured brown clay (Calcic, Brown Sodosol)
Medium thickness grey brown, massive sandy loam to sandy clay loam with a bleached and sandier A2 horizon, overlying a brown, grey and yellow mottled heavy clay with coarse prismatic structure. There is abundant soft carbonate from 55 cm, grading to Hindmarsh Clay from 70 cm.
- M2** Dark gradational clay loam (Vertic, Calcic, Black Dermosol)
Medium thickness black crumbly clay loam to light clay grading to a dark grey to black coarsely structured heavy clay, yellower and calcareous with depth, grading to Hindmarsh Clay within 100 cm.

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

