

BOT Bob Tiers Land System

Discontinuous belt of low hills and hills between Kuitpo and Yankalilla

Area: 124.5 km²

Annual rainfall: 595 – 960 mm average

Geology: Most of the land is underlain by schists and gneisses of the Barossa Complex. There are isolated beds of Aldgate Sandstone on the margins, mainly the western side. These rocks are near the surface on moderately steep to steep slopes, but where dissection has been less intense, they are deeply weathered and kaolinized. Remnants of an old deep weathering land surface occur as flat topped ridges (summit surfaces) across the highest parts of the landscape. These surfaces are characterized by laterites. There are minor lower slope and valley floor deposits of locally derived alluvium, including clays, silts, sands and gravels.

Topography: The landscape is a strongly dissected north - south range of low hills to hills. Dissection by glaciers during the Permian Period was substantial. A 15 km wide swath was eroded from the middle of the range, cutting it into two sections. Three isolated hills - Mount Compass, Mount Moon and Mount Effie - are the only remains of the original range in this section. The rocks and surrounding glacial valley sediments were evidently lateritized at some time, as indicated by lateritic profiles on flat topped crests (summit surfaces). These are the last remnants of an ancient land surface, now largely eroded away following uplift of the ranges and subsequent activation of streams. These streams flow away from the central summit surfaces in all directions.

Elevation: 80 m in the south west to 389 m in the northern section (Burma Road ridge), 376 m in the central section (Mount Compass) and 440 m in the southern section (Myponga Hill).

Relief: Up to 175 m

Soils: The majority of the soils are sandy loam surfaced texture contrast soils with friable brown to red clayey subsoils forming in freshly weathered or kaolinitic weathered basement rock. There are shallow stony soils on steeper rocky slopes, and sandy loam ironstone soils on flat topped crests. Deep sandy loam texture contrast soils dominate valley flats, associated with deep gradational sandy loams and dark clay loams.

Main soils

Soils formed in weathering basement rock on hillslopes

K4 Acidic sandy loam over brown clay - on schist (**K4a**), on kaolinized schist (**K4b**), on sandstone (**K4c**) or on kaolinized sandstone (**K4/J2**)

L1 Shallow stony sandy loam

Soils formed in alluvium or deeply weathered rock on lower slopes or flats

F1 Sandy loam over brown clay – with medium textured subsoil (**F1a**), with fine textured subsoil (**F1b**) or over deeply weathered rock (**F1c**)

Minor soils

Soils formed in weathering basement rock on hillslopes

K1 Acidic gradational loam

Ironstone soils of flat topped crests

J2 Deep acidic ironstone soil – on schist (**J2a**) or on sandstone (**J2b**)



Soils formed in alluvium or deeply weathered rock on lower slopes or flats

- M1** Gradational loamy sand – red (**M1a**) or grey (**M1b**)
- M2** Deep dark gradational clay loam
- N3** Swamp soil
- N1** Peat

Main features: The Bob Tiers Land System is a moderately steep to steep range of hills characterized by sandy loam texture contrast soils with friable clayey subsoils forming in weathering schists and gneisses of the Barossa Complex. Except on the steeper slopes where there are significant areas of shallow stony soils, profiles are generally moderately deep and adequately drained. Inherent fertility is low and the soils are susceptible to acidification. They are also highly erodible, so even relatively gentle slopes are at risk of erosion if cultivated or over grazed. With careful management, all but the steep slopes are suitable for perennial crops and pastures, although water availability for irrigation is limiting. Deep ironstone soils on gentle upper slopes and flat topped crests are infertile and susceptible to phosphorus deficiency. Lower slopes and valley flats are minor overall.

Soil Landscape Unit summary: 19 Soil Landscape Units (SLUs) mapped in the Bob Tiers Land System:

SLU	% of area	Main features #
AeC AeD	38.1 32.2	<p>Rolling to very steep low hills and hills formed on schists of the Barossa Complex. Surface rock and stone are variable, with very rocky patches occurring most commonly on steepest slopes.</p> <p>AeC Rolling low hills with minor to moderate rock and stone, and well defined, narrow drainage depressions; relief is up to 100 m and slopes are 18-30%.</p> <p>AeD Steep to very steep and very rocky hillslopes with very narrow crests and drainage depressions; relief is up to 175 m and slopes are 30-80%.</p> <p>Most soils have texture contrast profiles with sandy loam surfaces overlying friable clayey subsoils forming in fresh weathering rock. On upper slopes where rocks are deeply weathered and kaolinized, soils are similar but deeper. Shallow stony soils are common on rocky and steep slopes. Deeper texture contrast and stony soils on local alluvium and colluvium occur on lower slopes and drainage depressions.</p> <p>Main soils: <u>Acidic sandy loam over brown clay on schist</u> - K4a (E) on hillslopes <u>Acidic sandy loam over brown clay on kaolinized schist</u> - K4b (L) on upper slopes <u>Shallow stony sandy loam</u> - L1 (E) on steeper rocky slopes <u>Sandy loam over brown or red clay</u> - F1c (L) on deeply weathered rock on lower slopes <u>Sandy loam over brown mottled clay</u> - F1a (M) in drainage depressions <u>Gradational red loamy sand</u> - M1a (M) in drainage depressions</p> <p>The main soils are moderately deep and moderately to well drained. Inherent fertility is relatively low, and soils are highly susceptible to acidification. The land is too steep for uses involving regular cultivation, but there is some potential for perennial horticultural and floricultural crops where water is available.</p>
AuC AuD	2.7 0.7	<p>Moderately steep to steep slopes formed on medium to coarse grained Aldgate Sandstone, with minor siltstones. Rock outcrop is limited to steeper slopes with up to 20% coverage. Overall, there is less than 2% outcropping rock. Surface stone coverage of quartz and sandstone is up to 20%.</p> <p>AuC Moderately steep slightly rocky low hills with relief of up to 40 m and slopes of 16-30%. Drainage depressions are narrow with well defined watercourses.</p> <p>AuD Steep rocky slopes with relief to 60 m and slopes of 30-60%. Drainage depressions are narrow and well defined.</p> <p>The majority of soils are shallow to moderately deep over bedrock. Surface soils are mostly greyish sands to sandy loams, with variable and often abundant stone. Loamy surface soils occur on finer grained rocks. Subsoils are usually friable brown sandy clay loams to light clays, sometimes very stony. On steeper and / or rocky slopes, there is no subsoil, and profiles are very shallow.</p> <p>Main soils: <u>Acidic sandy loam over brown clay</u> - K4c (E) throughout <u>Shallow stony sandy loam</u> - L1 (E) on steeper slopes</p>



		<p><u>Acidic gradational loam - K1 (L)</u> on finer grained rocks These soils are well drained, but have variable depth and are inherently infertile and acidic. The land is too steep for cultivation, but there is some potential for perennial crops on AuC. AuD is only suitable for grazing.</p>
CjD	2.6	<p>Gently rolling low hills and upper slopes formed on schists of the Barossa Complex. There is little or no rock and stone. Drainage depressions are broad and concave. Relief is up to 50 m and slopes are 10-18%. Soils are as for AeC/AeD, except that shallow stony profiles (L1) are very minor. The main soils are moderately deep and moderately to well drained. Inherent fertility is relatively low, and soils are highly susceptible to acidification. The land is semi arable, but soils are highly erodible, so uses involving regular cultivation are risky. There is potential for perennial horticultural and floricultural crops where water is available.</p>
CIC CID	0.8 9.7	<p>Rounded upper slopes formed on highly weathered and frequently kaolinized fine grained schists of the Barossa Complex. The landscape lies in elevation between the steeper hillslopes of soil landscapes AeC and AeD and the lateritic crests of soil landscape FfZ.</p> <p>CIC Rounded gently inclined upper slopes of 5-10%. Drainage depressions are shallow and not well defined.</p> <p>CID Gently rolling upper slopes of 10-20% and relief to 40 m. Drainage depressions are shallow and not well defined.</p> <p>The characteristic feature of the soils is their highly weathered and usually kaolinitic parent materials. Profiles are deep, with sandy to loamy surfaces, often ironstone gravelly, overlying variable gravelly clay subsoils.</p> <p>Main soils: <u>Acidic sandy loam over brown clay - K4b (E)</u> on kaolinized rock <u>Deep acidic ironstone soil - J2b (E)</u> on lateritized rock <u>Acidic sandy loam over brown clay - K4a (L)</u> on fresh weathering rock.</p> <p>This land is topographically more favourable than most of the rest of the Land System. The soils are less well drained and more prone to nutrient deficiencies (especially phosphate fixation), than most of the other soils. However, where water is available, there are no serious limitations to most horticulture, viticulture or floriculture.</p>
CrD	1.3	<p>Rolling low hills and gently to moderately inclined upper slopes formed on medium to coarse grained Aldgate Sandstone, with minor siltstones. Relief is up to 50 m and slopes are 8-16%. There is minor surface stone and negligible outcrop. The majority of soils are moderately deep over bedrock. Surface soils are mostly greyish sands to sandy loams, with variable and often abundant stone. Loamy surface soils occur on finer grained rocks. Subsoils are usually friable brown sandy clay loams to light clays, sometimes very stony.</p> <p>Main soils: <u>Acidic sandy loam over brown clay - K4c (V)</u> <u>Acidic gradational loam - K1 (L)</u> on finer grained rocks</p> <p>These soils are well drained and usually deep enough to store water, but are inherently infertile and acidic. The land is too steep for regular cultivation, as the soils are highly erodible, but there is potential for perennial crops.</p>
FbZ FfZ	4.8 2.6	<p>Flat topped summit surfaces formed on deeply weathered kaolinized basement rocks. The surfaces characteristically slope away at their margins, where gradients may reach 20%, but most slopes are less than 5%. There is a surface cover of ironstone gravel.</p> <p>FbZ Summit surfaces in the northern part of the Land System. FfZ Summit surfaces in the southern part of the Land System.</p> <p>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. Ironstone rocks and boulders occur sporadically. Variations in texture, profile differentiation and nature of the subsoil are due to differences in the parent rocks.</p> <p>In FbZ, the soils are mainly formed over kaolinized schists.</p> <p>Main soils: <u>Deep acidic ironstone soil - J2a (E)</u> <u>Acidic sandy loam over brown clay - K4b (E)</u></p> <p>In FfZ, the soils are mainly formed over kaolinized metasandstones.</p> <p>Main soils: <u>Deep acidic ironstone soil - J2b (E)</u> <u>Acidic sandy loam over brown clay - K4/J2 (E)</u>.</p> <p>These soils are very old and dominated by kaolinite clays and iron oxides They are inherently infertile, susceptible to phosphate fixation and prone to acidification. They are also imperfectly drained. The soils in the southern areas (ie in FfZ) tend to be more fertile and better drained than those in FbZ. Productive pastures can be grown with correct fertilizer management, and with adequate drainage, there is potential for horticultural crops, although water supply is a problem. These deep weathering profiles commonly</p>



		store large amounts of soluble salts which can be mobilized into ground water systems, affecting downslope water supplies and soils. High water use efficiency is therefore critical in these areas.
LBC LBD LBE	0.3 0.7 0.2	<p>Lower slopes, drainage depressions and creek flats, formed on alluvial clays, sandy clays and minor sands and gravels, derived from the erosion and subsequent deposition of soil and rock material from hillslopes of Barossa Complex rocks.</p> <p>LBC Gently inclined lower slopes; slopes 3-8%. LBD Moderately inclined lower slopes; slopes 8-15%. LBE Drainage depressions, narrow creek flats and water courses; slopes are 0-10%. The soils are deep, and mostly have sandy to loamy surfaces overlying slowly permeable mottled clay subsoils. There are some better drained red gravelly and stony soils formed on colluvium, usually on sloping ground. Main soils: <u>Sandy loam over brown or red clay</u> - F1c (V) on slopes <u>Gradational red loamy sand</u> - M1a (L) on slopes <u>Sandy loam over brown mottled clay</u> - F1a and F1b (L) on creek flats These soils are deep, moderately fertile and imperfectly drained (flats) to moderately well drained (slopes). All are susceptible to acidification and all are erodible. Most of the land is used for grazing. More intensive development requires erosion control (LBC and LBD) or drainage management (LBE).</p>
LDE	0.8	<p>Narrow creek flats formed on medium to coarse grained alluvium. The soils are deep with loamy sand to sandy loam surfaces. Main soils: <u>Sandy loam over brown mottled sandy clay</u> - F1a (E) <u>Gradational grey loamy sand</u> - M1b (E). Low fertility and waterlogging are the main soil limitations.</p>
LKC	0.3	<p>Lower slopes transitional from rising ground to creek flats. Underlying materials are sandy clay to clay outwash sediments derived from upslope glacial valley deposits, mainly Soil Landscapes Ps* and Pt*. Slopes range from 1% to 12%. LKC Slopes 2-6%. The soils are highly variable, reflecting the source areas of the parent sediments. Most soils have sandy to loamy surfaces over mottled clay subsoils. Main soils: <u>Thick sand over sandy clay</u> - G3b (E) <u>Loam over brown clay</u> - F1b (C) <u>Sandy loam over poorly structured brown clay</u> - F2 (L) <u>Deep bleached siliceous sand</u> - H3b (L) <u>Wet highly leached sand</u> - I2b (L) <u>Bleached loamy sand over sandy clay loam</u> - M1 (M) Soils are deep but poorly drained due to tight clayey subsoils and lower slope position. Fertility is moderate to low depending on sandiness of surface soil. Most are acidic.</p>
LIE	1.0	<p>Swamps in narrow drainage depressions. Underlying materials are alluvial silts and clays. The dominant feature of the soils is their wetness. Medium to fine textured surfaces are usual, with mottled heavy clay subsoils. Main soils: <u>Swamp soil</u> - N3 (E) <u>Deep dark gradational clay loam</u> - M2 (E) <u>Peat</u> - N1 (L) Although deep and fertile, these soils have limited productive capacity due to severe waterlogging.</p>
PsD	0.2	<p>Undulating rises to rolling low hills formed on massive sandy till, sandstone, windblown sand and associated outwash sediments. Slopes on rises are as low as 3% with relief of less than 30 metres, and on low hills slopes are up to 25%. The landscapes also include slopes of variable gradient abutting the sides of the ancient glacial valleys. The landscape has a rounded appearance broken by narrow poorly drained water courses, swampy depressions and ferricrete (ironstone) hilltops. PsD Gently rolling rises and low hills with slopes of 8-16%. The soils are almost all very sandy and strongly leached. The most common soils have clayey subsoils forming in soft sandstone. Other types include deep sands and sand over coffee rock, overlying a variety of materials from sands to clays. Main soils: <u>Sand over acid clay</u> - G5 (E) } on slopes <u>Bleached siliceous sand</u> - H3a (L) } <u>Highly leached sand</u> - I1 (L) } <u>Sandy loam over brown clay on weathered rock</u> - F1/K4 (M) } <u>Imperfectly drained highly leached sand</u> - I2a (M) } <u>Thick sand over sandy clay</u> - G3b (L) } on lower slopes and flats</p>



		<p><u>Wet highly leached sand - I2b (M)</u> }</p> <p>These soils are sandy, naturally infertile and highly susceptible to acidification. Water repellence can also be a problem in some seasons. Most of the soils are at least moderately deep and moderately well drained (except on lower slopes), so with adequate nutrition, productive potential is reasonable.</p>
PtD PtF	0.3 0.7	<p>Undulating rises and rolling low hills formed on sandstones and unconsolidated sandy clays. The undulating rises have slopes as low as 2% and relief of 20 metres. The low hills have slopes of up to 30% and relief to 80 m. The landscape is broken by well defined creek-lines and swamps, and by ferricrete (ironstone) rises. Some prominent crests within the other soil landscapes are also mapped as Pt* because of their distinctively sandier soils.</p> <p>PtD Gently rolling low hills with slopes of 8-16%.</p> <p>PtF Rolling low hills and prominent crests with slopes of 16-30%.</p> <p>The soils are predominantly sandy surfaced, with variable subsoils, including firm heavy clays, friable sandy clays, coffee rock and loose sand. The range of soils in these landscapes reflects this subsoil variability.</p> <p>Main soils: <u>Sand over brown clay - G3a (C)</u> } on slopes <u>Sandy loam over brown clay - F1a (C)</u> } <u>Sand over acid clay - G5 (L)</u> } <u>Ironstone soil - J2 (L)</u> } <u>Imperfectly drained highly leached sand - I2a (L)</u> } <u>Sandy loam over brown clay on weathered rock - F1/K4 (M)</u> } <u>Thick sand over sandy clay - G3b (L)</u> on lower slopes</p> <p>These landscapes are similar to those of Ps*, but soils tend to be less sandy and to have more clayey subsoils. This results in better fertility, but poorer drainage conditions. Soils are generally of low to moderately low fertility and prone to acidification. Imperfect drainage is only likely to be a problem in some irrigated situations. Erosion hazard is high where soil is disturbed, especially on steeper slopes.</p>

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:

- F1a** Sandy loam over brown mottled sandy clay (Bleached-Mottled, Eutrophic, Brown Chromosol)
Thick loamy sand to light sandy clay loam, with a bleached and gravelly A2 horizon, overlying a yellowish brown, brown and red mottled firm coarsely structured sandy clay loam to sandy clay.
- F1b** Sandy loam over brown mottled clay (Bleached-Mottled, Hypocalcic, Brown Chromosol)
Thick loamy sand to sandy clay loam with a strongly bleached A2 horizon, sharply overlying a yellowish brown, grey and red mottled clay grading to fine grained alluvium.
- F1c** Sandy loam over brown or red clay (Bleached, Eutrophic, Brown / Red Chromosol)
Thick loamy sand to sandy loam, bleached and gravelly at base, overlying a yellowish brown and/or red clay grading to soft highly weathered rock below 100 cm.
- J2a** Deep acidic ironstone soil over kaolinized schist (Ferric, Eutrophic, Brown Kandosol)
Medium thickness loamy sand to sandy loam with abundant ironstone gravel, overlying a brownish yellow and red clay with ironstone fragments, grading to light grey and red kaolinitic clay at about 100 cm.
- J2b** Deep acidic ironstone soil over kaolinized sandstone (Ferric, Eutrophic, Brown Kandosol)
Medium thickness grey brown sandy loam to sandy clay loam, with a paler coloured and ironstone gravelly A2 horizon, overlying an ironstone gravelly yellow sandy clay loam grading to a



yellowish brown and red clay with variable ironstone fragments, and becoming red and grey mottled from about 70 cm.

- K1** Acidic gradational loam (Acidic, Eutrophic, Brown Dermosol)
Medium thickness loamy surface soil, becoming clay loamy and gravelly with depth, overlying an orange friable clay, grading to soft shale or siltstone.
- K4a** Acidic sandy loam over brown clay on schist (Bleached, Mesotrophic, Brown Chromosol)
Medium thickness gravelly brown loamy sand to light sandy clay loam, overlying a yellowish red to strong brown finely structured clay grading to weathering rock within 100 cm.
- K4b** Acidic sandy loam over brown clay on kaolinized schist (Bleached-Mottled, Mesotrophic, Brown Chromosol)
Medium thickness gravelly brown loamy sand to light sandy clay loam, overlying a yellowish red to strong brown finely structured clay grading to soft kaolinitic schist or gneiss continuing below 200 cm.
- K4c** Acidic sandy loam over brown clay on sandstone (Bleached, Mesotrophic, Brown Chromosol)
Loamy sand to sandy clay loam with a gravelly and bleached A2 horizon, overlying a yellow brown or brown well structured clay grading to weathering metasandstone by 100 cm.
- K4/J2** Acidic sandy loam over brown clay on kaolinized sandstone (Bleached-Mottled, Mesotrophic, Brown Kurosol)
Loamy sand to sandy clay loam with a gravelly and bleached A2 horizon, overlying a yellow brown or brown well structured clay grading to soft kaolinitic metasandstone continuing below 200 cm.
- L1** 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 schist, gneiss or metasandstone by 50 cm.
- M1a** Gradational red loamy sand (Eutrophic, Red Kandosol)
Very thick and very gravelly loamy coarse sand to sandy loam, grading to a reddish stony sandy clay loam to light clay.
- M1b** Gradational grey loamy sand (Bleached-Acidic, Mesotrophic, Grey Kandosol)
Very thick sandy loam, with a bleached A2 horizon, overlying a dark grey massive light sandy clay loam to sandy clay, grading to clayey sand alluvium.
- M2** Deep dark gradational clay loam (Melanic, Calcic, Grey Dermosol)
Thick black clay loam with granular structure, overlying a dark grey to black heavy clay with strong blocky structure. The clay is yellower and weakly calcareous with depth.
- N1** Peat (Acidic, Hemic Organosol)
Deep black rotted organic matter or highly organic loam, seasonally or permanently saturated.
- N3** Swamp soil (Melanic, Dermosolic, Redoxic Hydrosol)
Thick dark grey clay loam, with a paler coloured A2 horizon, overlying a grey and dull yellow brown clay with strong blocky structure. The soil is saturated for most of the time.

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

