

STR Strangways Land System

Low hills extending from Macclesfield in the north to the Inman Valley - Victor Harbor area in the south

Area: 273.8 km²

Annual rainfall: 575 – 900 mm average

Geology: The land system is underlain by basement rocks, predominantly of the Kanmantoo Group, although there are strata of older Precambrian rocks along the western margins. The Kanmantoo rocks are typically strongly metamorphosed sedimentary, including phyllites, schists, metasandstones and metasiltsstones of the Backstairs Passage, Tappanappa, Carrickalinga Head and Tunkalilla Formations. The Precambrian rocks include quartzites, slates, quartzitic shales, sandstones and siltstones of various formations. The belt of hills formed on these rocks was strongly dissected by glaciation during the region was a peneplain of low relief, on which extensive deep weathering and lateritization occurred. Following renewed uplift of the ranges in the late Tertiary most of this deep weathering surface was eroded away, but small remnants persist as plateaux or summit surfaces. Localized deposits of unconsolidated alluvium derived from erosion of higher ground occur throughout as valley fill.

Topography: The land system is a discontinuous belt of low hills, formed by the extensive dissection of a tableland. The gaps between the blocks of hills are old glacial valleys. Over half of the landscape is moderately steep to steep (more than 15% slope), with a further 30% of the land comprising undulating to gently rolling slopes. Only about 5% of the old peneplain surface remains intact as summit surfaces, and less than 10% of the land area is depositional (ie outwash fan, drainage depression or valley flat).

Elevation: 70 m near Port Elliot to 420 m at Springmount

Relief: 30 m to 120 m

Soils: Soils on hillslopes are moderately deep to shallow over basement rock, with sandy loam to loam surfaces and generally with clayey subsoils. Ironstone soils occur on some upper slopes and crests. Deep texture contrast soils dominate lower slopes and flats. Surfaces vary from sandy to loamy. Deep sands and sandy loams also occur.

Main soils: *Moderately deep soils formed on weathering basement rock*

- K3** Acidic sandy loam over red clay on metagreywacke / sandstone
- K2b** Acidic loam over red clay on schist
- K4a** Acidic sandy loam over brown clay on metasandstone
- K1b** Acidic gradational brown loam on siltstone or phyllite

Minor soils: *Moderately deep soils formed on weathering basement rock*

- K1a** Acidic gradational red loam
 - K2** Acidic loam over clay - brown (**K2a**) or brown sodic (**K2c**)
 - K4b** Acidic sandy loam over brown clay on fine sandstone
- Shallow soils formed on basement rock*
- L1** Shallow sandy soil – sandy loam (**L1a**), loam (**L1b**) or clay loam (**L1c**)



*Deep soils formed on highly weathered basement rock***F1** Loam over brown clay - on soft rock (**K2/F1**) or kaolinitic rock (**J2/F1**)**F2a** Sandy loam over poorly structured brown clay**J2** Ironstone soil - red (**J2a**) or brown (**J2b**)*Deep soils formed on outwash sediments***D5** Hard loamy sand over red clay**F1** Loam over brown clay - loamy surface (**F1a**), sandy loam surface (**F1b**) or gravelly sandy loam surface (**F1c**)**F2b** Sandy loam over poorly structured brown clay**G3** Thick sand over sandy clay**H3** Bleached siliceous sand**M1** Deep sandy loam - red brown (**M1a**) or grey brown (**M1b**)**Main features:**

The Strangways Land System is characteristically rolling to steep hill country. About 55% of the land area is too steep for cultivated agriculture. The soils on this land vary from shallow stony sandy loams on basement rock to deeper sandy loam to loam texture contrast types with moderately low to moderate fertility and generally favourable conditions for plant growth. Variable soil depth causes uneven pasture growth, indicated by patchy haying off in spring time. All soils are susceptible to acidification, and nutrition is a major management consideration. Similar soils occur on the 30% of land that is undulating to gently rolling and potentially arable. Shallow stony soils are less common on these gentler slopes, so productive potential is relatively high. Many of the soils, particularly the sandy loam over clay types, are highly erodible, so erosion control is paramount where soil is disturbed. Deep variable soils, usually with sandy to sandy loam surfaces, occur on lower slopes and flats. Impeded drainage is a common problem in these areas, related to topographic position as much as to restrictive subsoil clay layers. Water course erosion is an issue in places.

Soil Landscape Unit summary: 54 Soil Landscape Units (SLUs) mapped in the Strangways Land System

SLU	% of area	Main features #
A**	55.0	Moderately steep to steep low hills and hills formed on basement rock. These landscapes include most of the land which is too steep for cultivated agriculture. Soils are commonly moderately deep with loamy sand to loam surfaces (depending on parent rock type) and clayey subsoils. On steeper or rocky slopes, shallow stony soils are more extensive. Waterholding capacities vary with depth, but most soils are well to moderately well drained. Sandier surfaced soils have lower fertility than the loamier types. All soils are susceptible to acidification. The variety of landscapes reflects differences in underlying geology and slope class. The landscapes of this group are subdivided according to geology, as follows:
AbC	0.3	Geology: Siltstones and shales of the Tapley Hill and Balhannah Formations.
AbD	0.1	AbC Rolling low hills with relief to 50 m and slopes of 18-30%. AbD Steep moderately rocky hillslopes with relief to 80 m and slopes of 30-50%. Main soils: <u>Acidic gradational red loam on rock - K1a</u> (E) <u>Acidic loam over brown clay on rock - K2a</u> (E) <u>Shallow loam on rock - L1b</u> (E)
AdC	0.4	Geology: Quartzitic shales of the Brachina Formation. AdC Moderately inclined hillslopes with relief to 80 m and slopes of 12-30%. Main soils: <u>Acidic loam over brown sodic clay on rock - K2c</u> (E) <u>Shallow clay loam on rock - L1c</u> (E)



AhC AhD AhY	22.4 8.6 0.4	<p>Geology: Metasandstones, metasiltstones and phyllites of the Backstairs Passage, Tappanappa and Carrickalinga Head Formations.</p> <p>AhC Rolling low hills with relief of 50-100 m and slopes of 16-30%. AhD Steep rocky hillslopes with relief of up to 100 m and slopes of 30-75%. AhY Broad rounded crests with minor rock outcrop. Slopes to 12% (on margins). Main soils: <u>Acidic sandy loam over red clay on rock</u> - K3 (E) <u>Acidic loam over red clay on rock</u> - K2b (C) <u>Acidic gradational brown loam on rock</u> - K1b (C) <u>Shallow loam on rock</u> - L1b (M) } on steeper and rocky slopes <u>Shallow sandy loam on rock</u> - L1a (M) }</p>
AiC AiD	7.0 9.2	<p>Geology: 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%. AiD Steep to very steep rocky hillslopes of 80-200 m relief and slopes of 30-80%. Main soils: <u>Acidic sandy loam over brown clay on rock</u> - K4a (E) <u>Acidic sandy loam over red clay on rock</u> - K3 (E) <u>Shallow sandy loam on rock</u> - L1a (L) on steeper and rocky slopes <u>Deep loam over brown clay</u> - K2/F1 (M) on lower slopes</p>
AqC AqD	1.9 < 0.1	<p>Geology: Metasandstones and quartzites of the Stonyfell Formation.</p> <p>AqC Moderately steep hillslopes with relief to 80 m and slopes of 15-30%. AqD Steep rocky ridges up to 100 m high with slopes of 30-75%. Main soils: <u>Shallow sandy loam</u> - L1a (E) <u>Acidic sandy loam over red clay</u> - K3 (E) <u>Loam over brown clay</u> - K2/F1 (L)</p>
AvC AvD	2.7 2.0	<p>Geology: Sandstones and siltstones of the Stonyfell and Balhannah Formations.</p> <p>AvC Rolling low hills with relief to 80 m and slopes of 16-30%. AvD Steep rocky hills with relief to 120 m and slopes of 30-75%. Main soils: <u>Acidic loam over brown clay on rock</u> - K2a (E) <u>Acidic sandy loam over brown clay on rock</u> - K4b (C) <u>Acidic gradational red loam on rock</u> - K1a (C) <u>Shallow loam on rock</u> - L1b (M) } on steeper and rocky slopes <u>Shallow sandy loam on rock</u> - L1a (M) }</p>
B**	14.0	<p>Undulating to gently rolling low hills formed on fine grained basement rock. This land is generally rock free, and is mostly arable, although steep enough for erosion to be a significant potential problem. The soils are predominantly texture contrast or gradational types with well structured clayey subsoils over weathering rock. Surface soils vary from sandy loams to clay loams depending on the nature of the parent rock. The loamier types are more fertile, but all are prone to acidification. Shallow soils (where underlying rock is harder or exposed) cause early maturation of pastures. The variety of landscapes reflects differences in underlying geology and slope class. The landscapes of this group are subdivided according to geology, as follows:</p>
BhC BhD	0.4 0.2	<p>Geology: Interbedded sandstones and siltstones of the Stonyfell and Balhannah Formations.</p> <p>BhC Undulating rises and gentle slopes with relief to 30 m and slopes of 4-10%. BhD Gently rolling low hills with relief of 40-60 m and slopes of 10-18%. Main soils: <u>Acidic loam over brown clay on rock</u> - K2a (E) <u>Acidic sandy loam over brown clay on rock</u> - K4b (E) <u>Acidic gradational red loam on rock</u> - K1a (E)</p>
BIC BID	3.6 9.3	<p>Geology: Metasandstones and metasiltstones of the Backstairs Passage, Tappanappa and Carrickalinga Head Formations.</p> <p>BIC Undulating upper slopes with relief to 30 m and slopes of 3-10%. BID Gently rolling low hills with relief of 30-80 m and slopes of 10-18%. Main soils: <u>Acidic loam over red clay on rock</u> - K2b (E) <u>Acidic sandy loam over red clay on rock</u> - K3 (E) <u>Shallow loam on rock</u> - L1b (L) } on some steeper and rocky slopes <u>Shallow sandy loam on rock</u> - L1a (L) }</p>



BmD	0.5	<p>Geology: Phyllites of the Carrickalinga Head Formation.</p> <p>BmD Moderately inclined slopes with relief to 100 m and slopes of 12-20%.</p> <p>Main soils: <u>acid loam over red clay on rock</u> - K2b (E) <u>Acid gradational brown loam on rock</u> - K1b (E) <u>Shallow loam on rock</u> - L1b (L) } on some steeper and rocky slopes <u>Shallow sandy loam on rock</u> - L1a (L) }</p>
C**	15.0	<p>Undulating to gently rolling low hills formed on medium to coarse grained basement rock. This land is generally rock free, and is mostly arable, although steep enough for erosion to be a significant potential problem, particularly as most soils are sandy surfaced and highly erodible. The soils are predominantly texture contrast or gradational types with loamy sand to sandy clay loam surfaces and clayey subsoils over weathering rock. The soils are generally less fertile than the loamier types in the "B" group (above). All are prone to acidification, and most have low buffering capacities. Shallow soils (where underlying rock is harder or exposed) are common on steeper or rockier slopes. These areas are low in productivity.</p> <p>The variety of landscapes reflects differences in underlying geology and slope class. The landscapes of this group are subdivided according to geology, as follows:</p>
CKC CKD	0.3 4.3	<p>Geology: Metasandstones of the Backstairs Passage Formation.</p> <p>CKC Gently inclined upper slopes with relief to 30 m and slopes of 5-10%.</p> <p>CKD Gently rolling low hills and slopes with relief of 50-100 m and slopes of 8-16%.</p> <p>Main soils: <u>Acidic sandy loam over brown clay on rock</u> - K4a (E) <u>Acidic sandy loam over red clay on rock</u> - K3 (E) <u>Deep loam over brown clay</u> - F1a (L) on lower slopes</p>
CLZ	3.6	<p>Geology: Metasandstones of the Backstairs Passage Formation, deeply weathered in places.</p> <p>CLZ Flat to undulating summit surfaces.</p> <p>Main soils: <u>Acidic sandy loam over brown clay on rock</u> - K4a (E) <u>Loam over brown clay</u> - J2/F1 (C) <u>Acidic sandy loam over red clay on rock</u> - K3 (L) <u>Brown ironstone soil</u> - J2b (L)</p>
CMD	6.1	<p>Geology: Metasandstones and metasilstones of the Backstairs Passage Formation.</p> <p>CMD Gently rolling low hills with relief to 40 m and slopes of 8-16%.</p> <p>Main soils: <u>Acidic sandy loam over red clay on rock</u> - K3 (E) <u>Acidic loam over red clay on rock</u> - K2b (E) <u>Shallow sandy loam on rock</u> - L1a (L)</p>
CbC CbD	0.2 0.6	<p>Geology: Micaceous sandstones of the Stonyfell Formation.</p> <p>CbC Undulating rises with relief to 40 m and slopes of 3-8%.</p> <p>CbD Gently rolling low hills with relief to 60 m and slopes of 8-18%.</p> <p>Main soils: <u>Acidic sandy loam over brown clay on rock</u> - K4a (E) <u>Acidic sandy loam over red clay on rock</u> - K3 (C) <u>Sandy loam over brown clay</u> - K2/F1 (L) } on lower slopes <u>Sandy loam over brown clay</u> - F1b (L) }</p>
FeZ FfZ	1.5 4.1	<p>Gently undulating plateaux (summit surfaces), the last remnants of the old Tertiary deep weathering surface. The land is all potentially arable, but low soil fertility, impeded drainage and often high exposure limit opportunities and restrict productive potential. The predominantly ironstone soils are notorious for locking up phosphate, while the high degree of leaching has resulted in significant losses of a range of nutrient elements. Acidification potential is high, but erosion potential is low.</p> <p>FeZ Underlying rocks are schists of the Kanmantoo Group.</p> <p>Main soil: <u>Red ironstone soils</u> - J2a (D)</p> <p>FfZ Underlying rocks are metasilstones and metasandstones of the Backstairs Passage Formation.</p> <p>Main soil: <u>Brown ironstone soils</u> - J2b (D)</p>



FhZ	<0.1	<p>Underlying rocks are kaolinized and indurated glacial sands. Isolated small summit surfaces, upper slopes and crests in an undulating to gently rolling landscape formed on glacial valley deposits. Underlying sediments are deeply weathered kaolinized sands and sandy clays. Slopes range from 2-12%, but where breakaway landforms occur below summit surfaces, slopes may reach 20%. There is usually minor surface ironstone, but in places ferricrete boulders are abundant.</p> <p>Main soils: <u>Ironstone soil</u> - J2 (V) <u>Shallow ironstone soil</u> - J3 (L)</p> <p>These soils are generally deep (J2), but infertile, due to the high degree of leaching and presence of phosphate fixing ironstone. The soils are highly susceptible to acidification (surface and subsurface) and aluminium toxicity.</p>
JUB JUH	0.1 0.3	<p>Outwash fans with sandy loam over red clay soils, formed on sandy clay sediments. Gently inclined outwash fans formed on weakly calcified sandy to silty clay alluvium derived from the erosion of Kanmantoo Group rocks and soils. Slopes are up to 10%. Water courses are well defined and are often severely gullied.</p> <p>JUB Very gently inclined fans with slopes of 1-3%. JUH Gently inclined fans with slopes of 3-10% and eroded water courses.</p> <p>Predominant soils have sandy to loamy surfaces and reddish clay subsoils, some of which are sodic. Main soils: <u>Sandy loam over red clay</u> - D2 (E) <u>Hard loamy sand over red clay</u> - D5 (C) <u>Gradational sandy loam</u> - M4 (C) on alluvial sediments <u>Shallow sandy loam over red clay on highly calc. rock</u> - D1c (M) on basement highs</p> <p>Soils are deep and moderately fertile. Drainage satisfactory, although poorly structured subsoils of D5 perch water. Severely eroded watercourses break up the land to some extent, affecting management operations. Overall productive potential is high once poor surface structure is ameliorated.</p>
L**	7.2	<p>Lower slopes and valley flats underlain by a variety of outwash sediments which reflect their source areas. Materials may be sandy or clayey, and commonly are a mixture of both. These soils are deep, and most commonly are texture contrast types. Clayey subsoils usually perch water, causing seasonal waterlogging. This condition is exacerbated by the additional water in these areas accumulated as run-on from adjacent high ground. The more clayey sediments give rise to loamy surfaced soils which are inherently fertile. Sandier sediments give rise to sandy surfaces which are infertile. All soils are prone to acidification. Water course erosion is common due to the concentration of flow on lower slopes. The range of mapped landscapes reflects the range of geomorphic settings, soil associations and slope classes. Groups of soil landscapes are as follows:</p>
LAB LAC LAD LAE LAI	0.1 1.7 0.8 0.1 0.1	<p><u>Geology</u>: Sandy clay to clay sediments derived from Kanmantoo Group rocks</p> <p>LAB Outwash fans and lower slopes of 2-3%. LAC Lower slopes and fans with slopes of 3-8%. LAD Lower slopes of 8-16%. LAE Drainage depressions with slopes of 2-10%. LAI Lower slopes of 16-25%.</p> <p>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)</p>
LDB LDC	0.7 1.0	<p><u>Geology</u>: Clayey sand to sandy clay alluvium from coarse grained Precambrian rocks</p> <p>LDB Lower slopes with gradients of 1-4%. LDC Lower slopes with gradients of 4-10%.</p> <p>Main soils: <u>Sandy loam over brown clay</u> - F1b / F1c (V) <u>Deep grey brown sandy loam</u> - M1b (L)</p>
LKC	0.3	<p><u>Geology</u>: Sandy clay to clay outwash derived from glacial sediments</p> <p>LKC Lower slopes of 2-6%.</p> <p>Main soils: <u>Thick sand over sandy clay</u> - G3 (E) <u>Sandy loam over brown clay</u> - F1b (E) <u>Sandy loam over poorly structured brown clay</u> - F2b (L)</p>
LLA LLE	0.2 <0.1	<p><u>Geology</u>: Clayey sand outwash derived from glacial sediments</p> <p>LLA Flats with slopes of less than 1%. LLE Drainage depressions and swales with slopes of up to 4%.</p> <p>Main soil: <u>Thick sand over sandy clay</u> - G3 (D)</p>



LOB	0.1	Geology: Weakly calcified sandy clays and clays derived from basement rocks
LOE	0.2	LOB Outwash fans with slopes of 1-3%
LOH	0.1	LOE Drainage depressions. LOH Outwash fans with slopes of 3-10% and eroded water courses. Main soils: <u>Hard loamy sand over red clay</u> - D5 (E) <u>Sandy loam over poorly structured brown clay</u> - F2b (E)
LdE	0.1	Narrow drainage valleys consisting of water courses and associated terraces and flats formed on fine grained alluvium derived from the erosion of hillslopes underlain by siltstones, shales and slates. Water courses are commonly eroding. There is usually a very sharp break in slope from the flats to the adjacent hillslopes. The soils are loamy to clay loamy. Main soils: <u>Deep black clay loam</u> - M2 (E) <u>Loam over brown clay</u> - F1a and F1b (E). These soils are deep and inherently fertile, although often with impeded drainage. Productive potential is high, but the narrowness of the flats and the relatively high proportion of land occupied by water courses limits development opportunities.
LmF	0.4	Geology: Miscellaneous sediments LmF River flats formed on gravelly sand alluvium. Main soils: <u>Deep red brown sandy loam</u> - M1a (V) <u>Hard loamy sand over red clay</u> - D5 (L) <u>Bleached siliceous sand</u> - H3 (L)
LtE	1.3	Geology: Miscellaneous Kanmantoo rock sediments LtE Drainage depressions. Main soils: <u>Sandy loam over poorly structured brown clay</u> - F2a (E) <u>Loam over brown clay</u> - F1a (E) <u>Hard loamy sand over red clay</u> - D5 (E)
PsC	0.2	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. PsC Undulating rises with slopes of 3-8%. 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 <u>Wet highly leached sand</u> - I2b (M) } 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.
PsD	0.2	



PtC PtD PtF	0.2 0.6 0.3	<p>Slopes with sandy surfaced soils formed on glacial sands and sandy clays.</p> <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>PtC Undulating rises and low hills with slopes of 3-8%. PtD Gently rolling low hills with slopes of 8-16%. PtF Rolling low hills and prominent crests with slopes of 16-30%.</p> <p>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</u> - G3a (C) } on slopes <u>Sandy loam over brown clay</u> - F1a (C) } <u>Sand over acid clay</u> - G5 (L) } <u>Ironstone soil</u> - J2 (L) } <u>Imperfectly drained highly leached sand</u> - I2a (L) } <u>Sandy loam over brown clay on weathered rock</u> - F1/K4 (M) } <u>Thick sand over sandy clay</u> - G3b (L) 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>
PuD PuF	0.2 0.5	<p>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.</p> <p>PuC Undulating rises with slopes of 4-6%. PuD Undulating low hills with slopes of 6-12%. PuF Gently rolling to rolling low hills with slopes of 12-30%.</p> <p>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.</p> <p>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 narrow alluvial flats <u>Sandy loam over brown clay</u> - F1a (M) }</p> <p>These soils are more susceptible to waterlogging than the related soils of PtD/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 and to some extent on PuD. Natural fertility is low to moderate, and the soils are highly susceptible to acidification.</p>
PwD	0.1	<p>Low rounded rises with slopes less than 5%, to short steep hillslopes with slopes of up to 40% formed on boulder till. Surface stone is extensive.</p> <p>Main soil: <u>Shallow stony soil</u> - M3 (D)</p> <p>The soils are well drained, but often have restricted waterholding capacities and low natural fertility. The amount of stone and uneven slopes limit many uses.</p>



TWC	0.1	<p>Clay soils formed on glacial sediments. 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.</p> <p>TWC Undulating rises with slopes of 2-10%.</p> <p>The characteristic soils are grey and black clays, with smaller amounts of loamy sand to loam over brown clay profiles.</p> <p>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) <u>Deep black clay loam</u> - M2 (M) 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>
XZJ	0.1	<p>Lower Finniss River flats of modern water courses. These are highly variable areas, split into three groups:</p> <p>XZJ Flats of Finniss River and Giles Creek, usually with sandy and / or gravelly sediments at depth. Main soils have thick sandy loam surfaces overlying brown sandy clay loam to sandy clay subsoils. Although these flats are up to 200 m wide in places with potential for intensive development, they are usually narrow and susceptible to flooding and erosion.</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:

Moderately deep soils formed on weathering basement rock

K1a 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.

K1b Acidic gradational brown loam (Eutrophic, Brown Dermosol)

Medium thickness dark brown loam to clay loam with a paler brown, gravelly clay loam A2 horizon, overlying a brown clay with strong polyhedral structure and increasing rock fragments with depth. Weathering metamorphosed siltstone or phyllite occurs at about 100 cm.

K2a Acidic loam over brown clay (Eutrophic, 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.

K2b Acidic loam over red clay (Eutrophic, Red Chromosol / Kurosol)

Medium thickness hard setting reddish brown sandy loam to loam, with a paler coloured and gravelly A2 horizon, overlying a red strongly polyhedral structured clay grading to weathering schist or micaceous sandstone before 100 cm.

K2c Acidic loam over brown sodic clay (Eutrophic, Brown Sodosol)

Thick, dark clay loam with a bleached quartz gravelly A2 horizon, overlying a brownish yellow and brown coarsely prismatic dispersive heavy clay, grading to weathering quartzitic shale at about 100 cm.



- K3** Acidic sandy loam over red clay (Bleached-Sodic, Eutrophic, Red Chromosol)
Medium thickness brown loamy sand to loam with a bleached and gravelly A2 horizon, overlying a reddish brown and brown mottled, firm sandy to heavy clay grading to weathering metagreywacke by 100 cm.
- K4a** Acidic sandy loam over brown clay on metasandstone (Bleached, Mesotrophic, Brown Kurosol)
Medium thickness 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 micaceous sandstone by 100 cm.
- K4b** Acidic sandy loam over brown clay on fine sandstone (Bleached, Eutrophic, 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.

Shallow soils formed on basement rock

- L1a** Shallow sandy loam (Acidic, Lithic, Bleached-Leptic Tenosol)
Thick greyish very gravelly loamy sand to sandy loam with a bleached A2 horizon, grading to hard metasandstone by 50 cm.
- L1b** Shallow loam (Acidic, Lithic, Leptic Tenosol)
Thick dark brown loam with a paler brown clay loam A2 horizon containing up to 50% rock fragments, grading to metamorphosed siltstone or phyllite by 50 cm.
- L1c** Shallow clay loam (Submelacic, Paralithic, Leptic Tenosol)
Thick dark clay loam having a paler coloured A2 layer with abundant shaly and quartzite fragments, overlying weathering quartzitic shale before 50 cm.

Deep soils formed on highly weathered basement rock

- K2/F1** Loam over brown clay (Bleached-Mottled, Eutrophic, Brown Kurosol)
Thick grey sandy loam to loam surface soil with a gravelly and bleached A2 horizon, overlying a brown, yellowish brown and red coarsely prismatic sandy clay to clay, becoming siltier and greyer with depth. Soft weathering phyllite or metasandstone occurs from about 150 cm.
- J2/F1** Loam over brown clay (Bleached-Mottled, Mesotrophic, Brown / Red Kurosol)
Loamy sand to sandy clay loam with an ironstone gravelly and bleached A2 horizon, overlying a yellowish brown or yellowish red, well structured clay grading to highly weathered kaolinized metasandstone from about 100 cm.
- F2a** Sandy loam over poorly structured brown clay (Eutrophic, Mottled-Subnatric, Brown Sodosol)
Thick, massive, grey loamy sand to loam with a bleached and gravelly A2 horizon, overlying a grey brown, red and yellow brown mottled clay with prismatic structure, grading to silty alluvium or deeply weathered soft schist.
- J2a** Red ironstone soil (Ferric, Mesotrophic, Red Chromosol)
Medium thickness ironstone gravelly sandy loam with a paler coloured A2 layer, over a red or orange finely structured clay grading to kaolinized basement rock, with soft and hard ironstone segregations from about 90 cm, continuing below 150 cm.
- J2b** Brown ironstone soil (Ferric, Mesotrophic, Brown Kandosol / Chromosol)
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.



Deep soils formed on outwash sediments

- D5** Hard loamy sand over red clay (Hypocalcic, Subnatric, Red Sodosol)
Thick reddish brown loamy sand to sandy loam with a pink and sandier A2 horizon, overlying a red firm sandy clay loam to sandy clay with coarse prismatic structure and minor soft carbonate segregations at depth. The profile is formed in red clayey sand to sandy clay alluvium.
- F1a** Loam over brown clay (Sodic, Hypocalcic, Brown Chromosol)
Thick brown loamy sand to clay loam with a bleached A2 horizon, overlying a dark brown, red and yellowish brown mottled firm heavy clay, grading to clayey alluvium or very highly weathered metagreywacke below 100 cm.
- F1b** 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 medium grained alluvium.
- F1c** Gravelly sandy loam over brown clay (Bleached-Mottled, Eutrophic, Brown Chromosol)
Very thick loamy sand to sandy clay loam, sandier and very gravelly at base, overlying a brown, grey and red mottled, gravelly sandy clay loam to light clay, grading to variable gritty and gravelly alluvium.
- F2b** Sandy loam over poorly structured brown clay (Eutrophic, Mottled-Subnatric, Brown Sodosol)
Thick grey brown hard sandy loam with a bleached A2 horizon, overlying a yellow brown, brown and red massive sandy clay loam to sandy clay with coarse columnar structure.
- G3** Thick sand over sandy clay (Bleached-Mottled, Mesotrophic, Brown / Grey Kurosol)
Thick greyish brown sand to light sandy loam with a bleached A2 horizon, overlying a grey and yellow mottled sandy clay loam, grading to a yellow brown and grey mottled sandy clay to clay with coarse blocky structure.
- H3** Bleached siliceous sand (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.
- M1a** Deep red brown sandy loam (Eutrophic, Red Kandosol)
Very thick brown sandy loam with a sandy and quartz gravelly A2 layer grading to a reddish brown massive sandy clay loam over brown gravelly sand.
- M1b** Deep grey brown sandy loam (Bleached-Acidic, Mesotrophic, Brown 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.

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

