

# DUD Dudley Land System

Mostly a highly dissected plateau area, consisting of plateau surfaces and adjacent slopes, drainage depressions and creek gullies, coastal slopes and gullies, coastal cliffs, a few outwash plains, and a few coastal swamps and dunes. Areas of calcreted calcarenite occur, particularly in the southeast of the system.

**Area:** 184.8 km<sup>2</sup>

**Annual rainfall:** 510 – 640 mm average

**Geology:** Plateau surfaces are mostly underlain by deeply weathered clayey sediments with a loamy or sandy topsoil covering. The clay is often capped by a thin to medium thickness layer with small-sized ironstone nodules; the ironstone often does not constitute 20% of the layer volume. (There is little ironstone on Dudley Peninsula plateau surfaces compared with the plateau surfaces of the main Kangaroo Island Plateau.) Some clayey subsoils exhibit shrink/swell characteristics. Below the deeply weathered clay are early Cambrian age Kanmantoo Group rocks. These rocks have near surface to surface exposure on many slopes adjacent to plateau surfaces, creek gullies, coastal slopes and gullies, and on some plateau surfaces. The main formation is Tapanappa Formation: slightly metamorphosed sandstones and siltstones. The harder Middleton Sandstone, a medium grained meta-sandstone, forms the basement rock of an isolated high plateau area in the southeast of the system, where bedrock is close to the land surface even on plateau surfaces (resulting in stony soils). A small stretch of coastal slopes on the northeast coast has exposures of a series of older rock formations which are also found in the eastern Mount Lofty Ranges.

Most soils are formed from sandstones which give rise to sandy loam or loamy sand topsoils and texture contrast soil profiles. However, some soils are formed over finer grained rocks, principally siltstones and finer-grained dirty sandstones, which give rise to smooth loam, silty loam and clay loam topsoils and gradational to texture contrast soil profiles. The latter is particularly the case on the slopes in the northwest corner of the system (to the west and south-west of Penneshaw).

The short peninsula upon which Cape Willoughby is situated is underlain by middle Cambrian age granite. Granitic outcrops are common. This granite is of similar age and origin to that found at Remarkable Rocks.

The much younger Pleistocene age Bridgewater Formation occurs as the remnant calcreted cores of former shell sand deposits. These patches of calcreted calcarenite overlie older sediments. These areas were formerly more extensive. Some stranded relict coastal dunes, parallel to the present-day coastline, occur on the low lying plain adjacent to Antechamber Bay.

Outwash sediments occur in a few areas. A small area just south and south-west of Penneshaw, and parts of the low lying area and river valleys adjacent to Antechamber Bay. (The short valley adjacent to Antechamber Bay may have been formed by glacial action).

Recent coastal sediments occur as shelly flats and swamps adjacent to Antechamber Bay, usually overlain by a shallow layer of clay loamy outwash. Shell sands also form coastal dunes and beaches on the shores of Antechamber Bay, and over small area on the coast just southeast of Penneshaw. Some of these sands have been blown inland in very recent geological times, and now overlie slopes and plateau surface areas inland from Antechamber Bay.



- Topography:** A highly dissected plateau dominated by plateau surfaces, slopes and drainage areas. Some areas on the plateau surface exhibit gilgai microrelief with an intricate pattern of flats, mounds and hollows.
- The system has a general decline from north to south. An anomaly to this is a relatively high isolated remnant plateau which occurs in the southeast of the system. The coastal slopes in the north rise to 100 to 170 m above sea level. Slopes vary from 0% to over 100% on some coastal cliffs and gullies. Plateau surface slopes range from 0 - 2%. The arable slopes between plateau surfaces and drainage depressions and creek gullies typically have slopes between 2 - 12%.
- Drainage areas vary from sluggishly drained drainage depressions to steeply-sided creek gullies. Four main catchment areas occur. The north eastern slopes are drained via numerous short creek gullies into Nepean Bay and Backstairs Passage. The eastern part of the system is drained via Gum Gully, Mopewhawk Gully, and other creek lines into Deep Creek which drains into Eastern Cove. The northern, central and southern parts of the system drain southward into the Willson River and from there into the Southern Ocean. The western side of the system drains south eastward into the Chapman River valley and then into Antechamber Bay.
- Arable land below the level of the plateau and associated slopes occurs as a low lying plain adjacent to Antechamber Bay and as outwash slopes near Penneshaw.
- Elevation:** The highest parts are just over 170 m above sea level on plateau surfaces in the north of the system. Plateau surface heights are typically greater than 150 m in the north, but under 100 m in the south.
- Relief:** Relief ranges from 170 m on some northern coastal slopes to less than 10 m on some broader plateau surfaces and plains. Over arable areas relief commonly ranges from 10 m to 40 m.
- Major soils:**
- |                    |   |
|--------------------|---|
| <b>F2-G4-G3</b>    | Deep texture contrast soil              |
| <b>J2-J1</b>       | Ironstone soil                          |
| <b>K4-D7-K3-G4</b> | Texture contrast soil on weathered rock |
- Other soils:**
- |              |   |
|--------------|---|
| <b>L1</b>    | Shallow soil on rock                                    |
| <b>B2-B3</b> | Shallow soil on calcrete                                |
| <b>C2-K1</b> | Smooth textured gradational soil on weathered rock      |
| <b>K2-D1</b> | Smooth textured texture contrast soil on weathered rock |
| <b>M4</b>    | Deep poorly structured gradational soil                 |
- Minor soils:**
- |                 |   |
|-----------------|---|
| <b>H1-A1</b>    | Shelly or highly calcareous soil          |
| <b>A2</b>       | Calcareous soil on rock                   |
| <b>A3-A4-A6</b> | Calcareous loams and clay loams           |
| <b>B6</b>       | Shallow texture contrast soil on calcrete |
- Main features:** By far the main soils found have sandy loam to loamy sand topsoils over brown sodic clayey subsoils. Sodic/dispersive subsoils limit water infiltration and hence exacerbate waterlogging. Seasonal waterlogging is the main limitation to production over this land system. The hollows of plateau areas with gilgai microrelief (an intricate pattern of flats, mounds and hollows) are typically seasonally flooded and constitute around 10 - 20% of these areas.
- Saline seepage is a common feature of drainage depressions, with many patches of highly saline land. Adjoining land often has raised subsoil salinity levels. Dead trees in some drainage depressions are probably an indication of rising saline groundwater levels, but also seem to occur where drainage has been slowed by earthworks/engineering works where roads cross waterways.



Many topsoils, particularly sands, are water repellent. Sandy soils have low fertility and are at risk of wind erosion when bare. Ironstone gravel 'fixes' phosphorus and so reduces fertility. Acidic conditions occur in many soils, particularly topsoils. A number of areas have shallow soils, either on rock or calcrete, which have limited waterholding capacity. Some soils are calcareous throughout with the resultant nutritional problems: reduced availability of phosphorus, zinc, manganese and iron. Some soils have a fine carbonate accumulation in the lower subsoil. Water erosion can be an issue on sloping land.

### Soil Landscape Unit summary: Dudley Land System (DUD)

SLU	% of area	Main features #
ANB AND ANm	0.7 4.0 1.0	<p>Slopes and gullies with mostly shallow to very shallow soils, mostly overlying sandstone.</p> <p>Main soils: sandy loam or possibly some loamy sand, over brown or sometimes red sodic clay to sandy clay loam, mostly on weathered sandstone <b>K4-D7-K3</b> (<i>Brown-Red Sodosol</i>). And shallow sandy loams, mostly on weathered sandstone <b>L1</b> (<i>rocky Tenosol-Rudosol</i>).</p> <p><i>Coastal slopes and gullies:</i>  <b>ANB</b> – upper coastal slopes (relief &lt;30m, slopes 10-30%, 5-4e, 2-3w, 1g, 3y)  <b>AND</b> – coastal slopes and gullies (relief 30-90m, slopes 30-100%, 6e, 1-2w, 2g, 3y). A series of rock formations on the coastal slopes in the northeast of the system includes some finer grained rocks, which give rise to gradational and somewhat deeper soils: smooth loams and clay loams grading to weathered rock <b>C2</b> (<i>Brown-Red Dermosol</i>).</p> <p><i>Inland gullies and slopes:</i>  <b>ANm</b> – gully (relief 30-60m, slopes 10-100% typically 10-30%, 5-6e, 3-2w, 1-2s, 1-2g, 1y).</p> <p>Summary: non-arable steep slopes. Limited areas are used for livestock grazing.</p>
AKDk AKB AKC AKD AKE	0.4 0.3 0.9 0.4 0.1	<p><i>Northern Areas:</i> Coastal gullies with mostly calcareous soils overlying rock.</p> <p>Main soils: grey calcareous, highly calcareous, or fine shelly loams and sandy loams, often with hard carbonate fragments, overlying weathered rock <b>A2-A1</b> (<i>Hypercalcic-Lithocalcic Calcarosol</i>): the weathered rock encountered was a yellow dirty sandstone. There are areas of shallow grey calcareous soil on calcrete <b>B2</b> (<i>Petrocalcic Calcarosol</i>); and some areas of alkaline silty loams overlying weathered rock <b>C2</b> (<i>Brown Dermosol</i>).</p> <p><b>AKDk</b> – coastal gullies and slopes (slopes 20-100%, relief up to 90m, 6e, 1w, 2a, 3-2y).  Summary: non-arable steep gullies and slopes.</p> <p><i>Southern Areas:</i> Slopes and gullies with mostly shallow to very shallow soils on sandstone, or possibly some on granite near Cape Willoughby, and some areas overlain by calcreted calcarenite.</p> <p>Main soils: sandy loam or possibly some loamy sand, over brown or sometimes red, sodic clay to sandy clay loam on weathered sandstone <b>K4-D7-K3</b> (<i>Brown-Red Sodosol</i>). And shallow sandy loams on weathered sandstone <b>L1</b> (<i>rocky Tenosol-Rudosol</i>). And very shallow soil on calcreted calcarenite <b>B3-B2</b> (<i>Petrocalcic Rudosol-Tenosol-Calcarosol</i>). Also some spreads of shell sand can occur on coastal slopes.</p> <p><b>AKB</b> – slopes (relief around 30m, slopes 10-20%, 4e, 3-2y)  <b>AKC</b> – coastal slopes and gullies (relief mostly 30-50m, slopes 10-50%, 5-6e, 3-2y)  <b>AKD</b> – coastal slopes (relief 20-90m, slopes 30-100%, 6e, 3y)  <b>AKE</b> – coastal gullies (relief 30-90m, slopes mostly &gt;100%, 7-6e, 2-3y).</p> <p>Summary: non-arable steep slopes. Limited areas are used for livestock grazing.</p>
AAC AAD AAI	0.4 2.1 0.8	<p>Coastal slopes and gullies with mostly shallow soils on siltstone.</p> <p>Main soils: mostly shallow alkaline silty loams and clay loams overlying weathered yellow or grey siltstone or yellow dirty sandstone <b>C2-L1</b> (<i>Brown Dermosol-Tenosol</i>); minor to limited areas of soil may be calcareous throughout <b>A2</b> (<i>Paralitithic Calcic Calcarosol</i>). Minor to limited areas of smooth loam or silty loam over sodic red clay mostly on weathered siltstone <b>D1</b> (<i>Red Sodosol</i>), can occur on some upper slopes. A few areas of sandy loam over brown or sometimes red, sodic clay to sandy clay loam on weathered sandstone <b>D7</b> (<i>Brown-Red Sodosol</i>) may occur, especially in the more eastern land units.</p> <p><b>AAC</b> – coastal slopes with some drainage lines (slopes 10-30%, relief around 30m, 5-4e, 1w,</p>



		<p>2g, 3y)  <b>AAD</b> – coastal gullies and steep coastal slopes with minor saline seepage (slopes 20-100%, relief between 30 and 90m, 6e, 1w, 2-1s°, 2-3g, 3-2y)  <b>AAI</b> – coastal slopes and eroded drainage lines, with minor saline seepage (slopes 10-30%, relief between 30 and 90m, 5-4e, 1-2w, 2-1s°, 3g, 3y)</p> <p>Summary: these coastal slopes and gullies are generally non-arable due to steepness and/or stoniness. On cleared land drainage lines are generally eroded. The least steep slopes are used to graze livestock.</p>
AgB AgD	0.2 0.1	<p>Coastal slopes and cliffs with granite outcrops and shallow texture contrast soils formed on granite at Cape Willoughby.  Main soils: granitic outcrops; and shallow sandy loams over brown sodic clay on granite: <b>D7</b> (<i>Brown Sodosol</i>). Some calcreted calcarenite may occur.</p> <p><b>AgB</b> – coastal slopes, including some sandy beach areas (relief up to 50m, slopes up to 80% but mostly 10-30%, 5e, 1w, 3y)  <b>AgD</b> – granitic coastal cliffs (cliff heights up to 50m, slopes form 10-&gt;100% mostly &gt;100%, 7-6e, 3y)</p> <p>Summary: non-arable rocky slopes and cliffs.</p>
BkA BkC BkCb	0.03 0.4 0.1	<p>Slopes with mostly smooth loams over brown clay on weathered rock.  Main soils: mostly loam over brown or sometimes red, sodic clay on weathered siltstone and fine grained dirty sandstone <b>K2-K1</b> (<i>Brown Sodosol-Dermosol</i>).</p> <p><i>Northern Areas:</i> With some alkaline loam over red or brown light clay to clay loam on weathered siltstone <b>C2</b> (<i>Brown Dermosol</i>).  <b>BkC</b> – slopes (slopes 2-6%, 3-2e, 3-2w, 2-1y).  <i>Southern Areas:</i> Possibly with some sandy loam to loamy sand over sodic brown clay on weathered coarser-grained sandstone <b>K4-D7</b> (<i>Brown Sodosol</i>).  <b>BkA</b> – mid-level plain (slopes 0-1%, 1e, 3-2w, 1-2y).  <b>BkCb</b> – slopes (slopes 3-8%, 3e, 3-2w, 2-1s, 1y).</p> <p>Summary: arable slopes; relatively fertile soils.</p>
CCO	5.8	<p>Creek gullies: soils mostly formed on weathered sandstone.  Main soils: sandy loam topsoil over brown clay on weathered rock <b>K4-D7</b> (<i>Brown Sodosol</i>): some with smooth loam topsoil (<b>K2-D1</b>). With some smooth loam over clay loam on weathered rock <b>K1-C2</b> (<i>Brown Dermosol</i>) on slopes. Some very shallow soil on rock <b>L1</b> (<i>rocky Tenosol</i>) occurs on steeper slopes. With areas of sandy to clay loamy topsoil over brown or grey clayey subsoil <b>F2-M4</b> (<i>Brown-Grey Sodosol-Dermosol</i>) especially in sloping upper drainage depressions and creek flats. Often with a rocky creek bed.</p> <p><b>CCO</b> – creek gullies: mostly slopes with a few creek flats, and with some saline seepage (slopes 3-40% but mostly between 5-20%, 4-5e, 4-5w, 2-3s°, 1-2g, 1y)</p> <p>Summary: these areas are non-arable due to wetness, flooding, steep slopes and rocky soils.</p>
CEB CEBx CEC CECx CEL CEZ CEM	5.0 0.3 3.9 0.2 3.9 1.2 1.8	<p>Slopes, crests and plateau surfaces with various loamy brown texture contrast soils.  Main soils: sandy loam or sometimes loamy sand over sodic brown clay on weathered rock, mostly sandstone <b>K4-D7</b> (<i>Brown Sodosol</i>): occasionally with red subsoil especially when adjacent to old dune core landscapes. Also deeper sandy loam or sometimes loamy sand over sodic brown clay <b>F2</b> (<i>Brown Sodosol</i>). With some ironstone soil <b>J2-J1</b> (<i>Ferric Brown Sodosol</i>) especially on upper slopes. Some areas may have smooth loams over brown sodic clay on weathered finer-grained rock <b>K2-K1</b> (<i>Brown Sodosol-Dermosol</i>).</p> <p><b>CEB</b> – slopes (slopes 1-4%, 2-1e, 3-4w, 1-2y)  <b>CEBx</b> – exposed upper slopes (slopes 1-4%, 2-3e, 3w, 2-3y)  <b>CEC</b> – slopes, occasionally with drainage lines (slopes 3-10%, 3-2e, 3-2w, 1-2y)  <b>CECx</b> – exposed slopes (slopes 2-8%, 3-2e, 2-3w, 3y)  <b>CEL</b> – slopes or sloping drainage areas with some saline seepage (slopes 1-4%, 2-1e, 4-3w, 2-3s, 1-2y). Minor patches of shallow soil on calcrete <b>B3-B2</b> (<i>Petrocalcic Tenosol-Calcarosol</i>) may occur. <b>CEM</b> – slopes with some saline seepage (3-10%, 3-2e, 3w, 2-3s, 1-2y)  <b>CEZ</b> – exposed crests/plateau surfaces (slopes 0-1.5%, 1e, 2-3w, 3-2y)</p>





		Summary: arable slopes, crests and plateaux.
CIB CIBg CIC CIO CIK CIL	0.6 0.1 0.1 0.1 0.04 1.0	<p>Slopes and crests with mostly loamy to sandy red texture contrast soils on weathered rock, mostly sandstone.</p> <p>Main soils: mostly sandy loam to loamy sand over red or sometimes brown, sodic clay on weathered rock <b>K3-D7</b> (<i>Red-Brown Sodosol</i>).</p> <p><i>Northern Areas:</i> Minor to limited areas of alkaline silty loams and clay loams overlying weathered yellow or grey siltstone <b>C2</b> (<i>Brown Dermosol</i>) may occur.  <b>CIB</b> – upper slopes and crests (slopes 2-5%, 2-3e, 2-3w, 3y)  <b>CIBg</b> – sloping drainage area and lower slopes (slopes 1-3.5%, 2-3e, 3-4w, 2-1g, 1-2y)  <b>CIC</b> – upper slopes (slopes 3-8%, 3e, 2w, 2y)  <b>CIO</b> – upper drainage depressions: mostly lower slopes with drainage lines (slopes 1-8%, 3-2e, 4-3w, 2g, 1-2y, 2-3s)  <i>Southern Areas:</i> Minor areas of shallow soil on calcrete may occur <b>B3-B2</b> (<i>Petrocalcic Tenosol-Calcarosol</i>). Some texture contrast soils contain some ironstone; and minor to limited areas of ironstone soil and shallow soil on ferricrete can occur.  <b>CIK</b> – slightly sloping flat beside drainage depression (slopes 0-2%, 1-2e, 4-3w, 3-2s, 1y)  <b>CIL</b> – slopes with some saline seepage (slopes 1-3%, 2-1e, 3-4w, 2-3s, 1y).</p>
		Summary: mostly arable slopes.
CFB CFBx CFBw CFC CFCg CFCj CFCx CFDx CFZ CFZw CFZx	0.5 0.6 0.04 1.4 0.3 0.2 1.1 0.5 1.1 0.04 0.3	<p>Slopes, gullies and plateau surfaces with mostly loamy to sandy brown texture contrast soils on weathered rock, mostly sandstone.</p> <p>Main soils: mostly sandy loam to loamy sand, over brown sodic clay on weathered rock: <b>K4</b> with a few <b>D7</b> (<i>Brown Sodosol</i>). With minor to limited areas of sandy loam to loamy sand ironstone soil <b>J2-J1</b> (<i>Ferric Brown Sodosol</i>). Minor to limited areas of very shallow soil on rock <b>L1</b> (<i>rocky Tenosol</i>), especially on steeper slopes. Minor areas of shallow soil on calcrete <b>B3-B2</b> (<i>Petrocalcic Sodosol-Tenosol-Calcarosol</i>) can occur on exposed areas adjacent to areas dominated by shallow soils on calcrete.</p> <p><b>CFB</b> – upper slopes (slopes 2-4%, 2e, 3w, 1-2y)  <b>CFBx</b> – exposed crests and upper slopes (slopes 1-4%, 2-1e, 2w, 3y)  <b>CFBw</b> – wetter exposed slopes (slopes 1-3%, 2-1e, 3-4w, 3y)  <b>CFC</b> – slopes (slopes 2-8%, 3-2e, 3-2w, 1y)  <b>CFCg</b> – upper slopes and creek gullies (slopes 2-20% but mostly between 3 and 10%, 3-4e, 3w, 2-1g, 2-1s, 3-2y)  <b>CFCj</b> – exposed lower to mid coastal slope; some with drainage lines (slopes 3-8%, 3e, 2-3w, 1-2s, 1-2g, 3-2y)  <b>CFCx</b> – exposed upper slopes sometimes with drainage lines (slopes 3-10%, 3e, 2w, 1-2g, 3-2y)  <b>CFDx</b> – exposed upper slopes often with drainage lines (slopes 8-10%, 4-3e, 1-2w, 2g, 3y)  <b>CFZ</b> – plateau surfaces (slopes &lt;1%, 1e, 3-4w, 1-2s, 2-3y)  <b>CFZw</b> – mid-level plateau surfaces (slopes &lt;1%, 1e, 4w, 1-2s, 2y)  <b>CFZx</b> – exposed plateau surfaces (slopes 0-1.5%, 1e, 3w, 3y)</p>
		Summary: arable to non-arable slopes, creek gullies and plateau surfaces.
DKB DKC DKD DKe DKZ	0.2 0.3 0.1 0.1 0.01	<p>Slopes and summit surfaces with brown texture contrast soils formed on granite, often with some fine carbonate in the soil.</p> <p>Main soils: sandy loam over brown sodic clay, often with some fine carbonate in the subsoil or topsoil, overlying weathered granite which is sometimes at shallow depth: <b>D7</b> (<i>Brown Sodosol</i>) – possibly a few overlying sandstone on the western-most margins. With minor to common areas of shallow brown loam or sandy loam over clay loamy to loamy subsoil on calcrete <b>B3-B2</b> (<i>Petrocalcic Sodosol-Tenosol-Calcarosol</i>): some of these soils are calcareous throughout. Limited to common areas of granite outcrop occur.</p> <p><b>DKB</b> – slopes (slopes 1-4%, 2e, 3-2w, 3-2y)  <b>DKC</b> – slopes (slopes 4-12%, 3e, 2w, 3-2y)  <b>DKD</b> – slopes (slopes 10-20%, 4e, 1-2w, 3-2y)  <b>DKe</b> – sloping creek gully with some saline seepage and some eroded waterways (slopes 3-12%, 4e, 3-2w, 3-2s, 2g, 2y)  <b>DKZ</b> – summit surface (slopes 0-1%, 1e, 2-1w, 3y)</p>



		<p>Summary: dispersive clayey subsoils limit drainage capacity causing some seasonal waterlogging. Granite outcrops especially occur on steeper slopes.</p>
DQA DQB DQC DQE DQK DQL DQZ	0.3 1.4 0.3 0.1 0.4 0.3 0.4	<p>Slopes and mid-level plateau surfaces with brown texture contrast soils, often with fine carbonate in the subsoil.</p> <p>Main soils: sandy loam to loamy sand over brown or red sodic clay, often with fine carbonate in the subsoil, and most often formed on weathered sandstone <b>D7-G4-K4</b> (<i>Brown-Red Sodosol</i>). With minor to limited areas of shallow brown and red loamy to sandy soil on calcrete <b>B3-B2</b> (<i>Petrocalcic Tenosol-Calcarosol</i>): some calcareous throughout. Some soils with smooth loam over brown sodic clay on weathered finer-grained rock <b>D1-K2-C2-K1</b> (<i>Brown Sodosol-Dermosol</i>) may occur. Some ironstone soil may occur: <b>J1-J2</b> (<i>Ferric Brown Sodosol-Chromosol</i>) especially on upper slopes and plateau surfaces.</p> <p><b>DQA</b> – slight slopes (slopes 1-2.5%, 1-2e, 3-2w, 1y). Typically with weathered rock at greater depths compared to other 'DQ' areas.</p> <p><b>DQB</b> – slopes and low rises (slopes 1-5%, 3-2w, 2e, 1y)</p> <p><b>DQC</b> – slopes (slopes 2-8%, 3-2w, 3-2e, 1y)</p> <p><b>DQE</b> – sloping drainage area (slopes 2-4%, 3-2w, 2-3e, 1y).</p> <p><b>DQK</b> – slightly raised mid-level plains and plateau surfaces with some saline seepage (slopes 0-1.5%, 1-2e, 3-2w, 2-3s°, 2-1y)</p> <p><b>DQL</b> – rises and lower slopes with some saline seepage (slopes 1-3.5%, 2e, 3-2w, 2-3s°, 2-1y)</p> <p><b>DQZ</b> – mid-level plateau surfaces (slopes 0-1%, 1e, 3-2w, 2-1y).</p> <p>Summary: mostly arable areas.</p>
EEB EEC	0.1 0.1	<p>Coastal slopes with mostly rubbly calcareous uniformly textured soils on weathered rock.</p> <p>Main soils: mostly shallow grey calcareous sandy loam over calcrete or calcrete rubble overlying weathered rock <b>B2</b> (<i>Petrocalcic-Lithocalcic Calcarosol</i>): the weathered rock encountered was a yellow dirty sandstone. And some areas of shallow grey calcareous soils on weathered rock <b>A2</b> (<i>Paralithic Calcic-Lithocalcic Calcarosol</i>) on steeper slopes.</p> <p><b>EEB</b> – crests and upper slopes (slopes 1-3%, 2-1e, 1w, 3y)</p> <p><b>EEC</b> – convex coastal slopes (slopes 5-15%, 3-4e, 1w, 3y)</p> <p>Summary: mostly semi-arable to arable slopes and crests.</p>
EFC	0.1	<p>Slopes with drift sand deposits.</p> <p>Main soils: medium thickness to thick calcareous light sandy clay loam overlying siliceous sand which has a calcareous upper layer and a bleached non calcareous lower layer <b>A3</b> (<i>Calcic Calcarosol/bleached sand</i>). Also, related soils occur which have calcareous light sandy clay loam grading to calcareous sandy light clay overlying highly calcareous sandy loam <b>A4</b> (<i>Hypercalcic Calcarosol</i>). Minor to common areas occur of sandy brown texture contrast soil, with a bleached subsurface layer, sodic clay subsoil, and highly calcareous lower subsoil <b>G4</b> (<i>Brown Sodosol</i>): many of these have weathered rock within the top metre.</p> <p><b>EFC</b> – slopes (slopes 4-10%, 3-2e, 2-1w, 2y)</p> <p>Summary: an unusual landscape where it seems coastal sands have been deposited by wind on these hill slopes, which have then been covered by shallow layers of somewhat heavier textured sediments, probably derived from the plateau surface above. Some texture contrast soils occur which have formed in situ, developing in the underlying sandstone, but with topsoils affected by the sand drift deposits.</p>
EJB EJC EJH EJZ	0.6 1.4 0.1 0.1	<p>Coastal slopes and crests with mostly non calcareous uniformly textured soils overlying weathered siltstone, or sometimes fine-grained dirty sandstone.</p> <p>Main soils: alkaline silty loams and clay loams overlying weathered yellow or grey siltstone <b>C2</b> (<i>Brown Dermosol</i>): some areas have variants of these soils which are calcareous throughout <b>A2</b> (<i>Paralithic Calcic Calcarosol</i>), particularly on crests and some lower slopes. Minor areas of loam or silty loam over sodic red clay on weathered rock <b>D1</b> (<i>Red Sodosol</i>) can occur on some upper slopes.</p> <p><b>EJB</b> – coastal slopes and sloping crest areas (slopes 1-4%, 2-1e, 2w, 3y)</p> <p><b>EJC</b> – coastal slopes (slopes 3-12%, 3-2e, 2-1w, 3-2y)</p> <p><b>EJH</b> – coastal slopes with some eroded drainage lines (slopes 2-5%, 3-2e, 1-2w, 2g, 3y)</p> <p><b>EJZ</b> – crests (slopes 0-1.5%, 1-2e, 2-3w, 3y)</p>



		Summary: mostly arable slopes and crests; relatively fertile areas.
FIA FIAw FIB FIK FIL FIZ FIZj FIZw FIZx	0.7 0.1 1.5 0.1 1.6 18.5 1.6 1.2 0.5	<p>Plateau surfaces with various texture contrast soils with brown subsoils; many soils contain ironstone gravel.</p> <p>Main soils: ironstone soil with sandy loam or occasionally loamy sand topsoil over brown clay which is typically sodic <b>J2-J1</b> (<i>Ferric Brown Sodosol-Chromosol</i>). And sandy loam with some loamy sand, over sodic brown clay <b>F2-G4</b> (<i>Brown Sodosol-Chromosol</i>): these are particularly prevalent on slopes and low lying areas, and often contain some ironstone nodules. Some soils have clay subsoils with shrink/swell characteristics, often with the land surface exhibiting slight gilgai microrelief (an intricate pattern of flats, mounds, and hollows). And some soils on sloping land have weathered rock, mostly sandstone, within a metre.</p> <p><b>FIA</b> – mid-level plains and slight slopes (slopes 0-2%, 1-2e, 3-4w, 1-2y). Minor areas of shallow soil on calcrete occur on slightly raised patches <b>B3-B2</b> (<i>Petrocalcic Tenosol-Calcarosol</i>).</p> <p><b>FIAw</b> – low lying slight slopes adjacent to drainage depressions (slopes 1-2%, 1-2e, 4-3w, 2-1s, 1-2y)</p> <p><b>FIB</b> – mostly upper slopes or sloping plateau surfaces (slopes 1-3%, 2-1e, 4-3w, 1-2s, 2-1y). Some areas with raised subsoils salinity levels occur, especially on the lower parts of slopes.</p> <p><b>FIK</b> – mid-level plateau surfaces with some raised subsoil salinity (slopes 0-2%, 1-2e, 4w, 3-2s, 1-2y)</p> <p><b>FIL</b> – slopes typically with raised subsoil salinity levels especially on lower slopes (slopes 1-3%, 2-1e, 4w, 3-2s, 1y)</p> <p><b>FIZ</b> – plateau surfaces (slopes 0-2%, 1-2e, 3-4w, 2y).</p> <p><b>FIZj</b> – mid-level plateau surfaces (slopes 0-2%, 1-2e, 3-4w, 1-2s, 1-2y).</p> <p><b>FIZw</b> – wetter mid-level plateau surfaces/slight depression areas, typically adjacent to upper drainage depressions (slopes 0-2%, 1-2e, 4w, 1-2s, 1-2y)</p> <p><b>FIZx</b> – exposed coastal high plateau surfaces (slopes 0-2%, 1-2e, 2-3w, 3y). Soils with sandy topsoils.</p> <p>Summary: arable plateau surfaces and upper slopes. Seasonal waterlogging is a problem due to slowly permeable shallow and dispersive clay subsoils. Ironstone gravel restricts fertility by 'fixing' phosphorus, making it unavailable for plant use.</p>
HCA HCK HCE HCEs HCO HCT ZA-	0.4 0.3 0.2 0.1 5.9 1.8 0.3	<p>Creeks, creek flats, drainage depressions, and low-lying plains.</p> <p>Main soils: sandy to clay loamy topsoil over brown or grey clay <b>F2-M4</b> (<i>Brown-Grey Sodosol-Dermosol</i>) in creek flats: some subsoils may have shrink/swell characteristics in sluggishly drained upper drainage depressions, and some soils may contain ironstone especially on flats. Loamy topsoil over brown clay on weathered sandstone <b>K4-D7-K2-D1</b> (<i>Brown Sodosol</i>), or smooth loams over clay loam on weathered siltstone or fine grained dirty sandstone <b>K1-C2</b> (<i>Brown Dermosol</i>), occur on gully slopes. And ironstone soil <b>J1-J2</b> (<i>Ferric Brown Sodosol</i>) can occur on flats/plains.</p> <p><b>HCA</b> – flats/plains/slight depressions (slopes 0-2%, 1-2e, 4w, 2s, 1y). Minor areas of shallow soil on calcrete may occur on slightly raised patches: <b>B3</b> (<i>Petrocalcic Tenosol</i>).</p> <p><b>HCK</b> – arable creek flats with some saline seepage and some drainage lines (slopes 0-2%, 1-2e, 4-3w, 3s<sup>o</sup>). Minor patches of highly saline land occur along a drainage line.</p> <p><b>HCE</b> – upper drainage depression areas (slopes 0-2%, 1-2e, 4-5w, 2-1s, 1y)</p> <p><b>HCEs</b> – depressions (slopes 0-1%, 1-2e, 7-5w, 3-2s, 1y)</p> <p><b>HCO</b> – creek flats and slopes with marginal salinity and some eroded drainage lines (slopes 0-20% but mostly creek flats with slopes of 0-5%, 3e with some 2e and some 4-5e land, 5w, 4-3s and up to 10% highly saline land along drainage lines, 3-2g, 1y)</p> <p><b>HCT</b> – creek flats and some slopes with some eroded drainage lines (slopes 0-8%, 3-2e, 5-7w, 4s* with 10 to 50% highly saline land mostly along drainage lines, 3-2g, 1y)</p> <p><b>ZA-</b> – saline creek flat with some eroded drainage lines (slopes 0-4%, 3-2e, 7w, 5s with more than 50% highly saline land, 3-2g, 1y)</p> <p>Summary: wetness, salinity and flooding are the main issues in these areas. Dead and dying eucalypt trees in some creek flats are evidence of rising saline groundwater, however, dead trees also seem to occur where drainage has been slowed by earthworks/engineering works where roads cross waterways.</p>
HKE HKZ	0.4 1.6	<p>Slight depressions and depressions on plateau surfaces with gilgai microrelief (an intricate pattern of flats, mounds and hollows).</p>



		<p>Main soils: typically light sandy loam over brown clay with shrink/swell characteristics <b>F2</b> (<i>Vertic Brown Sodosol-Chromosol</i>). And ironstone soil, typically with light sandy loam topsoil and clayey subsoil with shrink/swell characteristics <b>J2-J1</b> (<i>Vertic Ferric Brown Sodosol-Chromosol</i>). With minor areas of cracking clay soil <b>E3</b> (<i>Brown Vertosol</i>), likely to be found on mounds. Soils in hollows typically have smooth loam or silty loam topsoil.</p> <p><b>HKE</b> – depression area or upper drainage depression (slopes 0-1%, 1-2e, 5-4w, 2s, 1-2y).  <b>HKZ</b> – typically slight depressions on plateau surfaces, occasionally with drainage lines (slopes 0-1.5%, 1e, 4w on flats and 7w in gilgai hollows, 1-2s, 2-1y).</p> <p>Summary: arable to semi-arable plateau surfaces and depressions. Subsoils shrink and swell with drying and wetting, creating gilgai microrelief which has an intricate pattern of flats, mounds, and hollows. Flats typically predominate, while hollows occupy from 10-20% of the landscape. Subsoils are shallow and dispersive, restricting water movement and causing seasonal waterlogging. Hollows are seasonally flooded.</p>
HZB HZZ HZZw	0.2 0.3 0.4	<p>Plateau surfaces and upper slopes with mostly loamy brown texture contrast soils.</p> <p>Main soils: mostly sandy loam over sodic brown or red clay <b>F2</b> (<i>Brown-Red Sodosol</i>): some may have weathered rock, mostly sandstone, within one metre especially on steeper slopes. Minor areas of ironstone soil may occur <b>J1-J2</b> (<i>Ferric Brown Sodosol</i>).</p> <p><b>HZB</b> – upper slopes (slopes 1-3.5%, 2-1e, 3-2w, 2-1y). Alkaline silty loams and clay loams overlying weathered yellow or grey siltstone <b>C2</b> (<i>Brown Dermosol</i>) may occur on some steeper slopes in this land unit.  <b>HZZ</b> – plateau surfaces (slopes &lt;1%, 1e, 3w, 3y)  <b>HZZw</b> – slightly low lying plateau surface with some saline seepage (slopes 0-1%, 1e, 4w, 2-3s, 2-1y).</p> <p>Summary: arable plateau surfaces and upper slopes. Seasonal waterlogging is a problem due to slowly permeable shallow and dispersive clay subsoils.</p>
JXB JXe	0.3 0.1	<p>Outwash areas with mostly loamy red texture contrast soils.</p> <p>Main soils: smooth loam or silty loam over sodic red clay <b>F2</b> (<i>Red Sodosol</i>). Minor to extensive areas have alkaline silty loams, loams or clay loams over clay loam on weathered yellow or grey siltstone <b>C2-A2</b> (<i>Brown Dermosol-Calcarosol</i>) especially on slopes: some may be calcareous throughout.</p> <p><b>JXB</b> – outwash plains and lower slopes with some drainage lines (slopes 0-3%, 2-1e, 3-2w, 2-1s, 2-1g, 3-2y). This unit is likely to have only minor to limited areas with soils formed in situ on weathered rock (<b>C2-A2</b>).</p> <p><b>JXe</b> – low lying drainage depression area: lower slopes and eroded drainage lines, with some saline seepage (slopes 1-5%, 3-2e, 3-4w, 2-3s, 2-3y). This unit is likely to have extensive areas with soils formed in situ on weathered rock (<b>C2-A2</b>).</p> <p>Summary: relatively deep and fertile soils, but with a restrictive sodic clay subsoil. Seasonal waterlogging is a problem due to slowly permeable shallow and dispersive clay subsoils. Saline seepage is a likely issue.</p>
KEO	1.0	<p>Creek flats and creek beds with loamy to clay loamy soils with sodic subsoils.</p> <p>Main soils: gradational soils with loam to clay loam topsoils and sodic clayey to clay loamy subsoil, and often with fine carbonate in the subsoil <b>M4</b> (<i>Brown-Red Dermosol</i>). With common to extensive areas of sandy loam texture contrast soil with sodic clayey subsoil <b>F2</b> (<i>Brown-Red Sodosol</i>) some with fine carbonate in the subsoil. Possibly with some deep sandy loams in creek beds <b>M1</b> (<i>loamy Tenosol</i>). On flats some calcareous soils which have loamy topsoil over loamy to clay loamy subsoil <b>A3</b> (<i>Calcic Calcarosol</i>). Minor to limited areas of shallow loamy to clay loamy soil on calcrete occur: <b>B6-B3-B2</b> (<i>Petrocalcic Dermosol-Sodosol-Tenosol-Calcarosol</i>).</p> <p><b>KEO</b> – creek flats, creek beds and drainage lines – with some saline seepage (slopes 0-1%, 1-2e, 4-5w, 3-2s, 2-1g, 1y).</p> <p>Summary: arable creek flats and non-arable creek beds. Some saline seepage occurs, mostly in the form of raised subsoil salinity levels.</p>
KaO KaT	0.2 0.2	<p>Creek flats and creek beds with deep loams and clay loams.</p> <p>Main soils: dark loam to clay loam topsoil grading to silty loam, silty clay loam or silty light</p>





		<p>clay subsoil <b>M4</b> (<i>Brown Dermosol</i>): limited to common areas have soils which are calcareous throughout <b>A3</b> (<i>Calcic Calcarosol</i>).</p> <p><b>KaO</b> – outwash plains and creek flats with some drainage lines crossing the land unit; with some saline seepage (slopes 0-1%, 1-2e, 4-3w, 3-4s, 1-2g, 1y). With minor to common areas of sandy loam texture contrast soil with sodic clayey subsoil <b>F2</b> (<i>Brown Sodosol</i>).</p> <p><b>KaT</b> – creek flats and creek bed with high to marginal salinity (slopes 0-1%, 1-2e, 5-4w, 5-4s, 1-2g, 1y)</p> <p>Summary: mostly non-arable creek flats and creek beds.</p>
PaZ	0.7	<p>High plateau surfaces with mostly thick sandy brown texture contrast soils.</p> <p>Main soils: mostly very thick or thick sand to loamy sand over brown, or possibly some red, sodic clay <b>G3</b> (<i>Brown Sodosol</i>), often with some ironstone nodules. With limited to extensive areas of sandy ironstone soil <b>J2-J1</b> (<i>Ferric Brown Sodosol</i>).</p> <p><b>PaZ</b> – high plateau surfaces (slopes 0-1.5%, 1e, 2-3w, 3y)</p> <p>Summary: arable plateau surfaces. Seasonal waterlogging is a problem due to slowly permeable and dispersive clay subsoils, however, very thick to thick topsoils help to alleviate the severity of this problem. Sandy surface soils are infertile.</p>
PbU	0.04	<p>Depression with mostly sandy brown texture contrast soils.</p> <p>Main soils: mostly thick sand to loamy sand over brown or possibly some red, sodic clay <b>G3</b> (<i>Brown Sodosol</i>); possibly some soils have some ironstone nodules. With minor patches of shallow soil on calcrete at the margins of the depression.</p> <p><b>PbU</b> – closed depression with marginal to high salinity (slopes 0-1.5%, 1e, 5-4w, 4s*, 1y)</p> <p>Summary: non-arable to semi-arable. Seasonal waterlogging is a problem due to slowly permeable and dispersive clay subsoils, and is exacerbated by the low lying situation. Salinity is an issue, with the bottom of the depression bare and highly saline, and prone to flooding. Sandy surface soils are infertile.</p>
PdZ	0.04	<p>Sand deposit on plateau surface.</p> <p>Main soils: probably very thick sand over sodic brown clay <b>G3</b> (<i>Brown Sodosol</i>) which may be calcareous; and deep sands which are likely to be calcareous <b>H2</b> (<i>sandy Calcarosol-Tenosol</i>).</p> <p><b>PdZ</b> – sand deposit forming a low rise on the plateau surface (slopes 0-2%, 1e, 2w, 4-3a, 3-2y).</p> <p>Summary: fragile and infertile sandy soils.</p>
PkB PkC PkZ PkK PkKw PkZb	0.3 0.05 0.3 0.6 0.3 0.5	<p>Plateau surfaces and upper slopes with mostly sandy brown texture contrast soils.</p> <p>Main soils: mostly loamy sand to light sandy loam over brown sodic clay <b>G4-G3</b> (<i>Brown Sodosol</i>), some with weathered sandstone at less than one metre. With minor to common areas of ironstone soil <b>J2-J1</b> (<i>Ferric Brown Sodosol</i>).</p> <p><b>Northern Areas:</b></p> <p><b>PkB</b> – upper slopes (slopes 1-3%, 2-1e, 3w, 2-1y)</p> <p><b>PkC</b> – slopes with a few drainage lines (slopes 2-5%, 3-2e, 3w, 2-1y)</p> <p><b>PkZ</b> – exposed plateau surfaces (slopes &lt;1%, 3-4w, 1e, 3y)</p> <p><b>Southern Areas:</b> Minor areas of shallow soil on calcrete may occur <b>B3-B2</b> (<i>Petrocalcic Tenosol-Calcarosol</i>).</p> <p><b>PkK</b> – mid-level plains/plateaux with some saline seepage (slopes 0-1.5%, 1e, 3w, 2-3s, 2-1y)</p> <p><b>PkKw</b> – wetter, lower lying to mid-level plains/plateau surfaces with some saline seepage (slopes &lt;1%, 1e, 4w, 3-2s, 2-1y)</p> <p><b>PkZb</b> – plateau surfaces (slopes 0-2%, 1-2e, 3w, 2y)</p> <p>Summary: arable plateau surfaces and upper slopes. Seasonal waterlogging is a problem due to slowly permeable shallow and dispersive clay subsoils. Sandy surface soils typically have low fertility.</p>
MdYA MdYB	0.1 0.5	<p>Calcreted calcarenite areas with mostly shallow calcareous soils on calcrete.</p> <p>Main soils: shallow loamy calcareous soil on calcrete <b>B2</b> (<i>Petrocalcic Calcarosol</i>): some</p>



MdB MdBx MdC MdD MdF MdZ	0.2 0.1 0.3 0.2 0.2 0.2	<p>may be dominated by carbonate grains <b>B1</b> (Petrocalcic Shelly Calcarosol). Minor to limited areas of deeper shelly soils can occur <b>H1</b> (Shelly Rudosol-Calcarosol).</p> <p><i>Old dune cores:</i></p> <p><b>MdYA</b> – old coastal dunes with low dune core topography (height &lt;5m, 3-2a, 3-2y, 2-1s)</p> <p><b>MdYB</b> – old coastal dunes with medium dune core topography (height 5-15m, 3-2a, 2-1s°, 3-2y)</p> <p><i>Plateaux and slopes with calcrete overlying stony and rocky sediments:</i></p> <p>With some shallow texture contrast soil on rock <b>D7</b> (Brown Sodosol) and areas of shallow soil on rock <b>L1</b> (rocky Tenosol) on steep slopes.</p> <p><b>MdB</b> – mostly lower slopes (slopes 2-6%, 2-3e, 1-2w, 2-1y)</p> <p><b>MdBx</b> – exposed upper slopes and plateau surfaces (slopes 1-3.5%, 2-1e, 2-1w, 3y)</p> <p><b>MdC</b> – slopes and some shallow gullies (slopes 3-12%, 3e, 1w, 3y)</p> <p><b>MdD</b> – slopes and some shallow gullies (slopes 10-20%, 4e, 1w, 3-2y)</p> <p><b>MdF</b> – steep slopes with some shallow gullies (relief 30-50m, slopes 20-80%, 6-5e, 1w, 3y)</p> <p><b>MdZ</b> – plateau surfaces (slopes 0-1.5%, 1e, 2-1w, 3y)</p> <p>Summary: mostly shallow soils with low waterholding capacity.</p>
MfB MfC MfD MfZ Mfe	0.04 0.04 0.1 0.4 0.4	<p>Calcreted calcarenite areas with shallow calcareous soil on calcrete and some deeper texture contrast soils.</p> <p>Main soils: mostly shallow loamy sand to sandy loam on calcrete <b>B2-B3</b> (Petrocalcic Calcarosol-Sodosol-Tenosol); often with clay loamy subsoil. With limited to extensive areas of loamy sand over sodic brown clay, often with fine carbonate in the lower subsoil, and some formed over weathered sandstone, especially on sloping land <b>G4-G3</b> (Brown Sodosol) found in slight depressions. These units may include deep calcareous loams and clay loams: <b>A3-A4</b> (Calcic-Hypercalcic Calcarosol) especially in shallow drainage depressions. Patches of deep sand may occur <b>H2</b> (sandy Calcarosol).</p> <p><i>Slopes and plateau surfaces:</i></p> <p><b>MfB</b> – exposed slopes and shallow drainage depression on plateau surface (slopes 1-3%, 2-1e, 3-2w, 3-2y)</p> <p><b>MfC</b> – slopes (slopes 3-8%, 3-2e, 2w, 2-1y)</p> <p><b>MfD</b> – slopes (slopes 8-15%, 4-3e, 2-1w, 2-1y)</p> <p><b>MfZ</b> – plateau surface (slopes 0-2%, 1-2e, 3-2w, 3-2y)</p> <p><i>Drainage depressions:</i></p> <p><b>Mfe</b> – sloping drainage depressions with some saline seepage (slopes 2-10%, 4-3e, 4-3w, 2-3s, 2-1y)</p> <p>Summary: shallow soils with low waterholding capacity, with some deeper soils.</p>
Mnq	1.3	<p>Low lying coastal back plains: with calcreted areas, some outwash deposits, and some shelly sediments.</p> <p>Main soils: shallow calcareous loamy to sandy soil on calcrete, often with a clay loamy subsoil, overlying calcrete <b>B2</b> (Petrocalcic Sodosol-Calcarosol), on slight rises and flats. Also with sandy to loamy texture contrast soil with brown sodic clayey subsoil and fine and rubbly carbonate <b>G4-F2</b> (Brown Sodosol) on flats and slight depressions. With outwash areas of calcareous gradational clay loamy to light clayey soil <b>A6-A3</b> (Pedal Calcic Calcarosol) in drainage depressions. Shallow calcareous loamy and clay loamy outwash deposits overlie shell sand <b>A6/H1</b> (Clay loam/Shelly Rudosol) in low lying areas behind coastal dunes and adjacent to the coastal swamp and inlet at the mouth of the Chapman River.</p> <p><b>Mnq</b> – low lying coastal back plains affected by saline seepage and with up to 10% highly saline land (slopes &lt;1.5%, 1e, 4-3w, 3-4s+, 1y)</p> <p>Summary: low lying areas with many shallow rubbly soils with low waterholding capacity; but with some deeper soils. Saline groundwater occurs close to the surface and most soils are affected by saline seepage; a few highly saline depressions occur.</p>
MgAx MgA MgB MgF	0.1 0.04 0.4 0.2	<p>Calcreted calcarenite areas with shallow soils on calcrete.</p> <p>Main soils: mostly shallow brown and red loamy soil on calcrete <b>B3-B2</b> (Petrocalcic Tenosol); some of these soils may be calcareous throughout.</p> <p><i>Low coastal rises:</i> Minor to limited areas of calcareous loam over silty clay loam <b>A3</b> (Brown Dermosol) may occur in slight depressions.</p>



		<p><b>MgAx</b> – slight coastal rises and slight coastal slopes (slopes 0-2%, 1e, 1-2w, 2a, 3y). <i>Inland areas:</i> minor areas of sandy texture contrast soil with red or brown subsoil can occur in lows.</p> <p><b>MgA</b> – slight rises on mid-level plains/plateaux (slopes 0-1%, 2-3w, 1e, 2-1s, 1y)</p> <p><b>MgB</b> – plateau surface and upper slopes (slopes 0-3%, 2-1e, 1-2w, 2-1y)</p> <p><b>MgF</b> – convex coastal slopes: calcreted calcarenite overlying rocky slopes (slopes 10-30%, 5e, 1w, 3y)</p> <p>Summary: mostly shallow soils with low waterholding capacity.</p>
MmA MmB MmZ Mme	0.3 0.3 0.6 0.9	<p>Calcreted calcarenite areas with shallow soils on calcrete and some deeper texture contrast soil.</p> <p>Main soils: mostly shallow brown and red loamy to sandy soil on calcrete <b>B3-B2</b> (<i>Petrocalcic Tenosol-Calcarosol</i>); some of these are calcareous throughout. With limited to extensive areas of sandy loam to loamy sand over sodic brown or red clay, some with fine carbonate in subsoil, and some formed over weathered sandstone especially on slopes <b>F2-G4</b> (<i>Brown-Red Sodosol</i>) found in slight depressions. Also shallow texture contrast soil with red to brown sandy clay loam to light clay subsoil on calcrete can occur: <b>B2-B6</b> (<i>Petrocalcic Red-Brown Sodosol</i>). These units can include deep calcareous loams and clay loams: <b>A3</b> (<i>Calcic Calcarosol</i>).</p> <p><i>Slopes and plateau surfaces:</i></p> <p><b>MmA</b> – mid-level plains (slopes 0-2%, 2-3w, 1-2e, 2-1s, 1y)</p> <p><b>MmB</b> – slopes (slopes 3-6%, 2-1w, 2-3e, 1-2s, 1-2y).</p> <p><b>MmZ</b> – slight rises on plateau surfaces (slopes 0-2%, 2w, 1-2e, 1-2s, 2-1-3y). Some ironstone soil may occur: <b>J1</b> (<i>Ferric Brown Sodosol-Chromosol</i>).</p> <p><i>Drainage depressions:</i></p> <p><b>Mme</b> – broad drainage depressions and flats (slopes 0-1%, 1e, 4-5w, 2-1s, 1y). With heavier textured surface soils, often clay loamy.</p> <p>Summary: shallow soils with low waterholding capacity; with some deeper soils.</p>
MqC MqZ	0.4 0.2	<p>Calcreted calcarenite areas with shallow soils on calcrete and some deeper soils formed on granite on the Cape Willoughby peninsula.</p> <p>Main soils: mostly shallow brown loam or sandy loam over clay loamy to loamy subsoil on calcrete <b>B3-B2</b> (<i>Petrocalcic Sodosol-Tenosol-Calcarosol</i>): some of these soils are calcareous throughout. With limited to common areas of mostly sandy loam over sodic brown clay overlying weathered granite, which can occur at shallow depth: <b>D7</b> (<i>Brown Sodosol</i>). Minor areas of granite outcrop occur.</p> <p><b>MqC</b> – exposed slopes (slopes 3-12%, 3e, 1-2w, 1s, 3-2y)</p> <p><b>MqZ</b> – crests and slopes (slopes 1-3%, 2-1e, 2w, 1s, 3-2y)</p> <p>Summary: shallow soils with low waterholding capacity; with some deeper soils.</p>
WAB WBA WBB	0.3 0.04 0.2	<p>Coastal cliffs.</p> <p><b>WAB</b> – coastal cliffs: mostly calcreted calcarenite, coating rock faces (slopes mostly &gt;100%, heights mostly 30-50m, 7e, 3y)</p> <p><b>WBA</b> – low coastal cliffs/steep slopes: rocky with some calcreted calcarenite on upper slopes (slopes around 30-100%, height 20-30m, 6e, 3y)</p> <p><b>WBB</b> – coastal cliffs: rocky with some calcreted calcarenite (cliff heights up to 100m, slopes &gt;100%, 7e, 3y)</p>
WGa WGE WGD	0.4 0.1 0.1	<p>Coastal dunes and beaches.</p> <p>Main soils: mostly shell sand <b>H1</b> (<i>Shelly Rudosol-Calcarosol</i>).</p> <p><b>WGa</b> – beach and very low foredunes (5a, 3-2y)</p> <p><b>WGE</b> – low jumbled dunes: overlying slopes of 1-5% with a drainage channel cutting through the dunes (dune heights mostly &lt;5m, 5a, 3y)</p> <p><b>WGD</b> – inland old coastal dunes (dune heights mostly 5-15m, 5a, 3-2y). With some shallow soil on calcrete: <b>B1-B2</b> (<i>Shelly Petrocalcic Calcarosol and/or Petrocalcic Calcarosol</i>).</p> <p>Summary: fragile and infertile soils.</p>
W-E W-N	0.1 0.1	<p>Sand spreads on hill slope.</p> <p>Main soils: mostly deep sands, most probably calcareous siliceous sands <b>H2</b> (<i>sandy Calcarosol</i>), or even shell sand <b>H1</b> (<i>Shelly Calcarosol-Rudosol</i>); with underlying hillside soils</p>



		<p>occurring at depth. Minor to limited areas of sandy texture contrast soil with sodic brown subsoil can occur in concave slopes or lower lying plateau situations <b>G3</b> (<i>Brown Sodosol</i>). Some shallow calcareous loamy sand on calcrete may occur <b>B2</b> (<i>Petrocalcic Calcarosol</i>).</p> <p><b>W-E</b> – sand spread on plateau surface (slopes 0-2%, 1e, 1-2w, 2-3y, 4a)  <b>W-N</b> – sand spreads on hill slope (slopes 8-15%, 3-2e, 1-2w, 2-3y, 4a)</p> <p>Sandy: infertile and fragile sandy soils. Coastal sands have been deposited by wind onto this hillside.</p>
WO-	0.2	<p>Coastal swamps.  Main soils: shell sand deposits: very often with a shallow clay loam over clay outwash deposits overlying shelly sand deposits: <b>F2/H1</b> (<i>Black Sodosol/Shelly Rudosol</i>) and <b>H1</b> (<i>Shelly Rudosol-Calcarosol</i>).</p> <p><b>WO-</b> – samphire and melaleuca swamps with a tidal inlet (2-1f, 7s, 7w)</p> <p>Summary: subject to inundation and very high salinity levels.</p>
WT-	0.01	<b>WT-</b> – tidal flat: frequently inundated.
XI-	0.1	Dams: situated in upper drainage depressions.
ZB- ZD-	0.1 0.3	<p>Highly salinized land and salt lakes.</p> <p><b>ZB-</b> – low lying saline creek flat; with samphire and melaleuca (2-1f, 7-5s, 5-7w). Soils as per 'Ka*' land units: dark loam to clay loam topsoil grading to silty loam, silty clay loam or silty light clay subsoil <b>M4</b> (<i>Brown Dermosol</i>): with some soils calcareous throughout <b>A6-A3</b> (<i>Calcic Calcarosol</i>).</p> <p><b>ZD-</b> – salt or brackish lake: seasonally inundated (2f, 7s, 7-8w).</p>
ZO-	0.01	<p>Small waterlogged depression on plateau surface  Main soils: loamy topsoil over sodic brown clay, possibly with some ironstone and possibly the clayey subsoil has shrink/swell characteristics: <b>F2-G4</b> (<i>Brown Sodosol</i>).</p> <p><b>ZO-</b> – small waterlogged depression on plateau surface, possibly with slightly raised subsoil salinity levels (slopes &lt;1%, 1e, 5-4w, 2-1s, 1-2y).</p> <p>Summary: prone to wetness.</p>

# Classes in the 'Soil Landscape Unit summary' table (eg. 2-1e, 3w, 2y, etc) describe the predominant soil and land conditions, and their range, found in Soil Landscape Units. The number '1' reflects minimal limitation, while increasing numbers reflect increasing limitation. Letters correspond to the type of attribute:

a - wind erosion	e - water erosion	f - flooding	g - gullyng
r - surface rockiness	s - salinity	w - waterlogging	y - exposure

### Detailed soil profile descriptions:

#### Major soils:

**F2-G4-G3** Deep texture contrast soil (*Brown-Grey-Red Sodosol*). Medium thickness to thick, or occasionally very thick, sandy loam or loamy sand, over sodic clay. There is often a bleached subsurface layer, especially when topsoils are sandy and soils are situated on slopes or in drainage depressions. Topsoils are typically water repellent. Clayey subsoils are typically olive brown, yellow brown or grey brown, less often red brown or red (especially if alkaline), or grey to olive in drainage depressions. Subsoils in plateau surface areas with gilgai microrelief (an intricate pattern of flats, mounds, and hollows) have shrink/swell characteristics. Topsoil pHs are typically acidic to neutral, but can be alkaline in some drainage depressions. Subsoil pHs are acidic, neutral or alkaline (a few soils have calcareous lower subsoils, especially in drainage depressions and when situated near sources of fine carbonate, eg, near the coast). Found on plateau surfaces, slopes, and in drainage depressions.

A variant of these soils occurs in gilgai areas on plateau surfaces (in 'HK' land units), especially in hollows, where smooth loam or silty loam topsoils overlie often light coloured





olive to grey sodic clayey subsoils. These soils are often close to having gradational texture profiles.

Another variant occurs on the outwash plains, slopes and depressions (in 'JX' land units) just south and southwest of Penneshaw, where smooth loam or silty loam overlies sodic red clay.

**J2-J1** Ironstone soil (*Ferric Brown Sodosol-Chromosol*). Medium thickness to thick sandy loam or occasionally loamy sand or loam, over mostly sodic clay. Typically there are only moderate amounts of ironstone nodules in the topsoil. The ironstone gravel layer is usually just over 10cm thick, with small-sized nodules occupying 20-50% of the layer volume. Topsoils can be water repellent. Bleached subsurface layers commonly occur. Clayey subsoils are typically olive brown or yellow brown. Subsoils in plateau surface areas with gilgai microrelief (an intricate pattern of flats, mounds, and hollows) have shrink/swell characteristics. Substrates consist of deeply weathered and deeply mottled clays. Topsoil pHs are acidic to neutral. Subsoil pHs are typically acidic, but can be alkaline or even calcareous in the lower subsoil. Found on plateau surfaces.

**K4-D7-K3-G4** Texture contrast soil on weathered rock (*Brown-Red Sodosol*). Medium thickness to thick sandy loam to loamy sand over sodic clay or sometimes clay loam, mostly overlying weathered sandstone, or granite near Cape Willoughby, at shallow to moderate depth. Topsoils are often water repellent. Various amounts of sandstone, quartz and ironstone fragments occur in the topsoil. Bleached subsoil layers are common. Topsoils of shallower soils often contain more than 50% sandstone fragments. Clayey subsoils are typically olive brown. Lower subsoils often have inclusions of weathered rock. Topsoil pHs are acidic to neutral, while subsoil pHs are acidic, neutral, or alkaline. Found on slopes, coastal slopes, creek gullies, steeper slopes in drainage depressions, and on some plateau surfaces.

#### Other soils:

- L1** Shallow soil on rock (*rocky Tenosol-Rudosol*). Shallow to very shallow loamy or sometimes sandy soils, mostly overlying sandstone, sometimes siltstone or other finer grained rocks, or granite near Cape Willoughby. These soils are rocky and are found on steep non-arable slopes.
- B2-B3** Soil on calcrete (*Petrocalcic Calcarosol-Tenosol-Sodosol-Rudosol*). Various soils overlying calcrete at shallow depth. Topsoils are sandy to loamy, while subsoils are sandy, loamy, or clay loamy. Clay loamy subsoils are sodic. Some variants of these soils are very shallow with no subsoil. Soils are often calcareous throughout. Found on remnant calcreted calcarenite areas of slopes, as slight rises on plateau surfaces, in drainage depressions, on flats, or on stranded relict coastal dunes. The texture contrast variants (with clay loamy subsoils) are typically found in lower lying situations.
- C2-K1** Smooth textured gradational soil on weathered rock (*Brown Dermosol*). Medium thickness to thick smooth loams, silty loams or clay loams grading to smooth clay loamy or light clayey subsoil, overlying weathered siltstone, phyllite, or other finer grained rocks. Subsoils are mostly olive brown. Topsoils pHs are typically neutral (but can be alkaline), while subsoils are neutral to alkaline. The upper layer of weathered rock can contain accumulations of fine carbonate. These soils often have native vegetation dominated by tall eucalypts rather than the narrow leaf mallees which dominate the native vegetation over much of the system. Found on slopes, mostly in the northwest corner of the system. Closely related to the smooth loam and silty loam variants of the **A2** calcareous soils on rock.
- K2-D1** Smooth textured texture contrast soil on weathered rock (*Brown Sodosol*). Medium thickness to thick smooth loam or silty loam over sodic silty clay, overlying weathered siltstone or fine-grained dirty sandstone. Subsoils are usually olive brown to brown. Topsoil pHs are typically acidic to neutral, while subsoils are neutral to acidic or sometimes alkaline. These soils often



have native vegetation dominated by tall eucalypts rather than the narrow leaf mallees typically found on other texture contrast soils. Found on slopes.

**M4** Deep poorly structured gradational soil (*Brown-Grey Dermosol*). Smooth dark brown clay loam to loam overlying dark brown to red brown sodic clay, silty clay loam or silty loam. Found in drainage depressions. Topsoil pHs are neutral to alkaline, while subsoil pHs are often alkaline. Sometimes fine carbonate occurs in the subsoil.

**Minor soils:**

**H1-A1** Shelly or highly calcareous soil (*Shelly Calcarosol-Rudosol*). Highly calcareous sands which are dominantly composed of finely divided shell fragments. Found on coastal dunes and sand spreads. Also, coarse sands with larger shell fragments occur on some coastal flats and swamps (often overlain by a shallow layer of clay loamy outwash). In addition, very highly calcareous shelly loams and sandy loams occur in some coastal gullies (as seen in the northwest of the system.)

**A2** Calcareous soil on rock (*Paralithic Calcarosol*). Calcareous silty loams, loams, and sandy loams overlying weathered siltstone or sandstone at shallow or sometimes moderate depth. Found on coastal slopes.

**A3-A4-A6** Calcareous loams and clay loams (*Hypercalcic-Calcic Calcarosol*). Calcareous soils including: moderately to highly calcareous loams over loam or clay loam found on slopes, flats and in drainage depressions; and calcareous clay loams grading to highly calcareous clay found in some drainage depressions.

**B6** Shallow texture contrast soil on calcrete (*Petrocalcic Red-Brown Sodosol*). A few calcreted areas have flats or depressions with loamy topsoil over clayey subsoil, with calcrete at shallow depth (typically at around 50 cm).

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

