

# PEL Pelican Lagoon Land System

This system forms the land bridge between the Dudley Peninsula and the main part of Kangaroo Island, and is dominated by old calcreted jumbled dunes. Plains, flats and depressions also occur, many of which are calcreted. Coastal sand dunes occur; and tidal flats are widespread.

**Area:** 53.1 km<sup>2</sup>

**Annual rainfall:** 500 – 545 mm average

**Geology:** The land system is dominated by an old calcreted dune topography overlain by shallow sandy soil (Pleistocene age Bridgewater Formation). These are remnant dune cores which have been largely stripped of their former deep sandy coverings. Calcreted layers are also found on plains, flats and depressions. Recently deposited carbonate or siliceous sand overlies parts of the calcreted dune core topography, and some low lying areas. Recently deposited sands also form coastal dunes and beaches. Calcareous loamy sediments occur on some flats, depressions and slopes where the former calcrete covering has been 'dissolved'. Tidal sediments range from olive grey mottled clays outwashed from higher ground to the west, to inundated calcrete around Pelican Lagoon, to more recently deposited shelly sediments (cockle shells, etc) and loamy to clay loamy sediments, to sandy sediments in Nepean Bay.

**Topography:** A jumbled dune topography dominates this system. Dune heights typically range from less than 5 m to 20 m high, however, a few dunes reach over 30m high in the centre of the system. Flats and depressions, acting as vague drainage areas, occur between the areas of jumbled dune topography. Coastal dunes line the coast facing Nepean Bay; while low cliffs topped with low dunes face the Southern Ocean. Rises, largely covered by old calcreted dunes, occur in the south of the system. An ancient tidal area in the north east of the system is now a calcreted plain. Former tidal areas in the north west of the system now form sandy plains. Tidal flats are extensive within Pelican Lagoon, and also occur elsewhere. The system includes a couple of lagoonal basins isolated from Pelican Lagoon itself. Slopes typically range between 0 and 8%; however, they are over 20% on the steepest dune slopes.

**Elevation:** From sea level to over 70 m on the rises in the south of the system, and on the very high dune topography in the centre of the system.

**Relief:** Relief ranges from less than 10 - 60 m, but is typically between 10 - 30 m

**Soils:**

- B2** Shallow calcareous loamy sand to sandy loam on calcrete
- B1** Shallow highly calcareous to shelly loamy sand to light sandy loam on calcrete
- B3** Shallow non-calcareous loamy sand to sandy loam on calcrete
- H1** Shell sand
- B8** Very shallow calcareous to non-calcareous sandy soil on calcrete
- A4** Calcareous loam
- A1** Highly calcareous to shelly sandy loam
- H2** Siliceous sand
- N2a** Wet saline loamy to clay loamy soil
- N2b** Wet saline shallow soil on calcrete



**Main features:** A significant proportion of the land system is covered by native scrub: nature conservation is the main priority in these areas. The majority of soils are shallow and sandy. Shallow soils have low water holding capacities; and sandy soils are inherently infertile. Surface hard carbonate fragments interfere with many farming practices. Non-arable areas with very shallow soils on calcrete are common. Many soils are calcareous – reduced nutrient availabilities occur in calcareous soils, the extent of which depends on the calcium carbonate content – phosphorus and zinc are typically the nutrient elements most affected. Many low lying areas are affected by saline seepage. Saline watertables underlie flats and plains, and are within the top metre on old tidal flats.

**Soil Landscape Unit summary:** Pelican Lagoon Land System (PEL)

SLU	% of area	Main features #
MgYA MgYB Mga	0.4 0.6 4.2	<p>Calcreted flats and coastal dunes with mostly non calcareous soils.</p> <p>Main soils: shallow sandy soil on calcrete <b>B3</b> (<i>Petrocalcic Tenosol-Sodosol-Chromosol</i>). With some areas of calcareous sandy loam to loamy sand over sandy clay loam on calcrete at shallow depth <b>B2</b> (<i>Petrocalcic Calcarosol-Sodosol-Chromosol</i>). Shallow calcareous sandy soil on calcrete <b>B2-B8</b> (<i>Petrocalcic Calcarosol-Rudosol</i>) may occur on dune cores areas.</p> <p><i>Old coastal dune core topography:</i>  <b>MgYA</b> – low old coastal dune core topography (dunes cores mostly around 5m high, 2-1y)  <b>MgYB</b> – old coastal dune core topography (dunes cores mostly 5-15m with some &lt;5m high, 2-3y)</p> <p><i>Flats:</i>  <b>Mga</b> – flats with minor marginally saline areas (slopes &lt;1%, 3-2s with minor 4s)</p> <p>Summary: shallow rubbly sandy soils with low water holding capacity and low fertility.</p>
MeYA MeYB MeYC MeYD MeYd MeYe MeYG MeYg MeYh MeYi MeYx Mea Mek Mem Mew	6.9 6.2 15.9 2.4 0.6 1.0 0.1 0.9 0.9 2.0 0.2 1.8 3.5 3.4 1.3	<p>Calcreted dunes and flats with mostly calcareous soils.</p> <p>Main soils: shallow calcareous to highly calcareous sandy soil on calcrete <b>B2-B1-B8</b> (<i>Petrocalcic Calcarosol-Rudosol</i>) especially on dune cores and in some swales. These soils are more often calcareous sandy loam to loamy sand over sandy clay loam on calcrete at shallow depth <b>B2</b> (<i>Petrocalcic Calcarosol-Sodosol-Chromosol</i>) in lower lying flats and depressions. Some non calcareous sandy soil on calcrete <b>B3-B8</b> (<i>Petrocalcic Tenosol</i>) can occur, especially in the south of the system on jumbled dune core topography. Some areas have overlying deposits of siliceous sand <b>H2</b> (<i>sandy Tenosol-Calcarosol</i>), especially on high dune topography, or shell sand <b>H1</b> (<i>Shelly Calcarosol</i>) on various topographies. Highly calcareous sandy loam <b>A1</b> (<i>Shelly-Supravescant Calcarosol</i>) occur in some depressions; can occur on dune topography.</p> <p><i>Old jumbled dune core topography:</i>  <b>MeYA</b> – low old jumbled dune core topography (dune cores mostly &lt;5m, 1-2e, 1-2y)  <b>MeYB</b> – calcreted old jumbled dune core topography (dune cores mostly 5-15m, 2e, 1-2y)  <b>MeYC</b> – high old jumbled dune core topography (dune cores mostly around 15m high, slopes 1-8%, 3-2e, 2y)</p> <p><i>Old jumbled dune core topography overlying sloping land:</i>  <b>MeYD</b> – low jumbled dune core topography overlying slopes (dune cores &lt;5m high, slopes 2-8%, 3-2e, 1-2y)  <b>MeYd</b> – exposed low jumbled dune core topography overlying slopes (dune cores &lt;5m high, slopes 3-8%, 3-2e, 3y)  <b>MeYe</b> – exposed high jumbled dune core topography overlying rises (dune cores mostly 5-15m high, slopes 3-8%, 3e, 3y)</p> <p><i>Exposed jumbled dune core topography:</i>  <b>MeYG</b> – exposed low jumbled dune core topography overlying a summit surface (dune cores &lt;5m high, 1-2e, 3y)  <b>MeYg</b> – exposed low jumbled dune core topography (dune cores mostly &lt;5m high, slopes 1-3%, 1-2e, 2-3y)</p>



		<p><b>MeYh</b> – exposed jumbled dune core topography (dune cores mostly 5-15m high, slopes 2-6%, 2e, 3y)</p> <p><b>MeYi</b> – very high old jumbled dune core topography (dunes cores typically over 20m with many over 30m high, slopes 5-20%, 4-3e, 3-2y)</p> <p><i>Old coastal dune core topography:</i></p> <p><b>MeYx</b> – old coastal dune core topography (dunes cores mostly 5-15m, 2y)</p> <p><i>Flats and depressions:</i></p> <p><b>Mea</b> – flats/depressions with slight to moderate salinity: sometimes including some very low jumbled dune cores (slopes 0-2%, 1-2e, 2-3s, 1-2y)</p> <p><b>Mek</b> – depressions with 10-50% marginal salinity (slopes 0-1.5%, 1e, 3s and 4s)</p> <p><b>Mem</b> – flats/depressions with minor low lying swampy/saline areas (slopes 0-1%, 1e, 3s with minor patches of 5s).</p> <p><b>Mew</b> – depressions/drainage areas with 10-50% saline land (slopes &lt;1%, 4s with some 7s)</p> <p>Summary: mostly shallow rubbly calcareous sandy soils with low water holding capacity and low fertility. Deeper soils occur in depression areas, however, these are typically affected by saline seepage to some extent. In general, soils in these land units have greater soft calcium carbonate contents and lighter textures (sandy compared to sandy loamy) in the north of the system than in the south of the system below Pelican Lagoon.</p>
<p>SVA SVB SVBx SVK SVL SVO SVZ</p>	<p>4.0 0.7 0.3 0.5 0.9 0.2 0.6</p>	<p>Slopes with loamy calcareous soils.</p> <p>Main soils: calcareous loamy soil, often with hard carbonate rubble in the subsoil, and often overlying calcrete at moderate depth <b>A4</b> (<i>Hypercalcic-Lithocalcic Calcarosol</i>). Some shallow calcareous loamy soil on calcrete <b>B2</b> (<i>Petrocalcic Calcarosol</i>) may occur on stony slight rises. Highly calcareous sandy loam <b>A1</b> (<i>Shelly-Supravescant Calcarosol</i>) may occur in some land units.</p> <p><b>SVA</b> – flats/depressions (slopes 0-1%, 2s, 1y)</p> <p><b>SVB</b> – slopes (slopes 1-3%, 2-3e, 1-2y, 2-1s)</p> <p><b>SVBx</b> – exposed slopes (slopes 1-4%, 2-3e, 2-1s, 3-2y)</p> <p><b>SVK</b> – flats/depressions (slopes 0-1%, 1e, 3-4s)</p> <p><b>SVL</b> – slopes with slight depressions/drainage areas (slopes 1-3%, 2-3e, 2w, 3-2s, 1-2g, 1-2y). Water can flow over parts of this area when creek gullies in adjacent land units flood.</p> <p><b>SVO</b> – depression (slopes &lt;1%, 2w, 3s)</p> <p><b>SVZ</b> – exposed summit surface (slopes 0-2%, 1-2e, 1w, 1-2s, 3y)</p> <p>Summary: these areas are the most productive in this land system, with relatively fertile and relatively deep soils. However, calcareous soils result in the reduced availability of certain nutrients, in particular phosphorus and zinc. Raised subsoil salinity levels are common in these areas. Shallow rubbly soils with low water holding capacities are also common.</p>
<p>WDC WDE WDu</p>	<p>0.4 0.2 0.8</p>	<p>Siliceous sand deposits on dunes and flats.</p> <p>Main soils: mostly siliceous sand <b>H2</b> (<i>sandy Tenosol</i>): underlain by calcreted calcarenite on dunes, or shelly deposits on flats.</p> <p><i>Coastal dunes:</i></p> <p><b>WDC</b> – high coastal dunes (dunes &gt;15m, 2y)</p> <p><b>WDE</b> – low coastal back dunes (dunes &lt;5m, 1-2y)</p> <p><i>Flats:</i></p> <p><b>WDu</b> – flats with limited areas of low jumbled dunes and minor to limited swampy patches (dunes &lt;5m, 4s, 1y). An old tidal flat.</p> <p>Summary: siliceous sand deposits on older calcreted dune cores or shelly flats. These are inherently infertile soils.</p>
<p>WFQ</p>	<p>0.4</p>	<p>Shell sand/calcareous siliceous sand deposits on flats.</p> <p>Main soils: to calcareous siliceous sand <b>H2</b> (<i>sandy Calcarosol</i>) or possibly shell sand <b>H1</b> (<i>Shelly Calcarosol</i>). Some shallow calcareous sandy soil on calcrete may occur <b>B2-B1</b> (<i>Petrocalcic Calcarosol</i>).</p> <p><b>WFQ</b> – flats (3s, 1y)</p> <p>Summary: a low lying transition area between shell sand dune deposits to the north and old</p>



		calcreted dune core areas to the south. These are inherently low fertility soils.	
WGE	1.3	Shell sand deposits.	
WGEx	0.7	Main soils: shell sand <b>H1</b> ( <i>Shelly Calcarosol-Rudosol</i> ).	
WGD	2.8	<p><i>Coastal dunes and beaches:</i></p> <p><b>WGE</b> – low coastal dunes and beaches: with bare beaches and often bare foredunes (dunes mostly &lt;5m high, 5a, 2-3y)</p> <p><b>WGEx</b> – exposed low coastal cliff-top dunes, with calcarenite cliffs below (dunes &lt;5m high, 7a, 3y)</p> <p><b>WGD</b> – coastal dunes and beaches: with bare beaches and often bare foredunes (dunes mostly 5-15m high, 7-5a, 2-3y)</p> <p><i>Flats:</i></p> <p><b>WGQ</b> – slight depressions (slopes 0-2%, 2y, 3s, 4-3a)</p> <p><b>WGT</b> – coastal flat with limited areas of low coastal dunes (dunes &lt;5m high, 4a, 1y)</p> <p>Summary: infertile soils; highly erodible by wind action when bare.</p>	
WGQ	0.9		
WGT	1.2		
WO1	3.0		<i>Coastal flats with deep to moderate depth soils.</i>
WO2	2.2		Typically inundated by only very high tides. A saline water table occurs at moderate depth. Main soils: wet saline loamy to clay loamy soils <b>N2a</b> ( <i>Dermosolic Extratidal Hydrosol</i> )
		<p><b>WO1</b> – coastal samphire/melaleuca flats, and depressions.</p> <p><i>Coastal flats with shallow soil on calcrete or exposed sheet calcrete.</i></p> <p>Tidal inundation varies from frequent to infrequent. Main soils: shallow sandy soil on calcrete <b>N2b</b> (<i>Petrocalcic Supratidal Hydrosol</i>)</p> <p><b>WO2</b> – coastal flats with shallow soil on calcrete.</p>	
WP-	0.2	Salt flat/pan. An extremely saline low lying basin.	
WT-	17.6	Tidal flats. Regularly inundated by tidal waters.	
WU1	5.4	Subtidal flats. Typically inundated: only exposed during very low tides.	
WU2	2.4		
WAA	0.1	Unconsolidated low coastal calcarenite cliffs; and a small creek gully cut down into light orange coloured deep highly calcareous/shelly deposits. There are a few very low shell sand coastal dunes on cliff-tops.	
		<b>WAA</b> – low coastal cliffs and a small creek gully (cliffs less than 10m high, slopes 30-100%)	
ZU-	0.7	Lagoons (8w). Brackish, normally water-filled lagoons.	

# 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:**

**B2** Shallow calcareous loamy sand to sandy loam on calcrete (*Petrocalcic Calcarosol-Sodosol-Chromosol*). Calcareous loamy sand to sandy loam surface soil over loamy sand to sandy clay loam subsoil on calcrete at shallow depth. Subsoils typically contain significant accumulations of soft calcium carbonate. Surface soils are dark brown or very dark brown and are typically water repellent: indicating high organic matter contents. Surface soils can contain significant amounts of calcrete rubble, particularly if under cultivation. Sandy clay loam subsoils are often sodic/dispersive. Soils with sandy clay loam subsoils grade into texture contrast soils and are typically found in low lying situations. Found on old dune core topography, flats and depressions, and plains.



- B1** Shallow highly calcareous to shelly loamy sand to light sandy loam on calcrete (*Shelly-Supravescent Petrocalcic Calcarosol*). Highly calcareous loamy sands to light sandy loams with calcrete at shallow depth. Soft carbonate contents are very high: these soils can be almost wholly composed of finely divided sand to silt sized shell fragments. Surface soils are dark brown to grey brown, and are typically water repellent. Surface soils can contain significant amounts of calcrete rubble, particularly if under cultivation. Found on old dune core topography, and some flats.
- B3** Shallow non-calcareous loamy sand to sandy loam on calcrete (*Petrocalcic Tenosol-Sodosol-Chromosol*). Loamy sand to sandy loam surface soil over loamy sand to sandy clay loam subsoil on calcrete at shallow depth. Surface soils are dark brown or very dark brown and are typically water repellent: indicating high organic matter contents. Surface soils can be slightly calcareous, but are then non calcareous in a sandy to loamy subsoil overlying calcrete. However, subsoils are often calcareous and can have significant accumulations of soft calcium carbonate. Surface soils can contain significant amounts of calcrete rubble, particularly if under cultivation. Sandy clay loam subsoils are often sodic/dispersive. Soils with sandy clay loam subsoils grade into texture contrast soils and are typically found in low lying situations. Found on plains, old dune core topography, and flats.
- H1** Shell sand (*Shelly Calcarosol-Rudosol*). Deep to moderate depth sandy soil: dominantly composed of finely divided sand sized shell fragments. Usually with grey brown to dark grey brown surface soil and lighter coloured subsoil. Typically underlain by calcreted calcarenite. Found on coastal dunes and on some flats.
- B8** Very shallow calcareous to non-calcareous sandy soil on calcrete (*Petrocalcic Rudosol*). Very shallow sandy to light sandy loam soils on calcrete. These soils are non-arable, and are usually associated with outcrops of calcrete. Found on old dune core topography.
- A4** Calcareous loam (*Hypercalcic-Lithocalcic Calcarosol*). Deep to moderate depth calcareous loams, sandy loams, or clay loams. Subsoil colours range from grey brown to red. Underlain by calcrete or calcrete rubble. The soil material is dominated by siliceous grains, but contains significant amounts of soft calcium carbonate. Mostly found in low lying situations, but also found on slopes and a summit surface area.
- A1** Highly calcareous to shelly sandy loam (*Shelly-Supravescent Calcarosol*). Deep to moderate depth highly calcareous sandy loams; typically containing significant amounts hard carbonate rubble throughout the soil profile. The soil material is dominated by calcium carbonate grains. Found in low lying situations.
- H2** Siliceous sand (*sandy Tenosol-Calcarosol*). Deep to moderate depth calcareous to non-calcareous siliceous sand. Bleached subsoils occur in non-calcareous sands. Found on patches of dune core topography, and on some flats. Typically underlain by calcrete on dune core topography and on some flats, and by shelly sediments containing cockle shells etc. on old tidal flats.
- N2a** Wet saline loamy to clay loamy soil (*Dermosolic Extratidal Hydrosol*). Loams and clay loams, with calcareous layers containing shell fragments, overlying olive grey mottled clay. Surface soils are dark olive brown and highly organic, while subsurface layers are olive grey to grey. Adjacent to Pelican Lagoon, similar clay loamy topsoils overlie calcrete at moderate depth. Found on tidal flats with samphire or a mixture of samphire/melaleuca vegetation.
- N2b** Wet saline shallow soil on calcrete (*Petrocalcic Supratidal Hydrosol*). Shallow very dark grey sandy to loamy soil containing shell fragments on calcrete. Found on tidal flats. Associated with areas of bare sheet calcrete.

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

