

FIB Fisherman Bay Land System

Low lying coastal landscapes stretching from Port Davis to Fisherman Bay, then from Port Broughton to just north of Tickera, and then as disconnected areas at Wallaroo Bay, Warburto Point, and Cape Elizabeth. The system consists of tidal flats, salt flats, samphire flats, mud flats, shell grit flats, low coastal dunes and jumbled dunes. The adjoining coastal landscapes to the south of Cape Elizabeth are dominated by high jumbled dunes, while coastal landscapes to the north of this system have mangroves and more extensive tidal and samphire flats.

Area: 174.7 km²

Annual rainfall: 330 – 355 mm average

Geology: Recent marine and coastal sediments (St. Kilda Formation) comprising shell beds, siliceous and carbonate sands, and clays. Older gypseous clays occur further inland. The land is overlain in places by gypseous deposits and drift sand, and by low beach dunes along the coast. A few inland dunes and sandy rises occur (Molineaux Sand). There are a few slightly raised land areas composed of calcareous medium textured wind deposited sediments (Woorinen Formation) which have become salinized.

Topography: The land system consists a sequence of coastal land forms progressing from the sea to further inland. Although not all land forms are always present, a typical sequence of all land forms would be: an intertidal flat; a shell grit flat; a low beach dune; a stranded mud, salt or samphire flat; and then a higher level samphire flat, maybe with some slightly raised areas of older salinized land with a few inland longitudinal dunes and sandy rises (with NW-SE orientation where not disturbed). Further inland can be older flats formed on gypseous clays overlain in some places by hummocky sand deposits. Stranded mud, salt or samphire flats occur in low lying areas which have been cut off from the sea by intervening coastal dunes. Jumbled dunes occur just north of Wallaroo and just north of Moonta Bay.

Elevation: All of the land system is below the 10m contour. The only relief is provided by coastal sand dunes and the few inland longitudinal or hummocky sand dunes (5 m maximum).

Soils:

- N2a** Shelly saline swamp soil (around 38% of area)
- N2b** Saline swamp soil (around 25% of area)
- H1b** Deep carbonate sand (around 14% of area)
- H1a** Shell grit (around 11% of area)
- H2a** Deep calcareous siliceous sand (around 6% of area)
- D4** Calcareous loam over red clay (around 5% of area)
- H2b** Deep red siliceous sand (less than 1% of area)
- A5** Calcareous loam on red clay (less than 1% of area)

Main features: The Fisherman Bay Land System is a complex of coastal flats and coastal dunes, and is of little agricultural value due to high or extreme salinity and waterlogging/tidal inundation on flats, and very low fertility and wind erosion potential on dunes and sandy rises. Mostly the land is either unused or lightly grazed; only some shell beds and a few other areas are farmed.



Soil Landscape Unit summary: Fisherman Bay Land System (FIB)

SLU	% of area	Main features #
U-B	0.1	High inland sand dune. Mostly non arable. Main soils: <i>deep calcareous siliceous sand H2a</i> [sandy Calcarosol]. Summary: longitudinal dune (about 10m high) of which more than 50% is covered in native scrub.
UVY	0.4	Gently undulating dunefield formed over saline and gypseous sediments. UVY – undulating plain with 30-60% sand spreads and hummocks, and marginally to highly saline swales. Main soils: <i>Deep calcareous siliceous sands H2a</i> (sandy Calcarosol) (C) on rises; with <i>calcareous loams A5</i> both rubbly (C) and non rubbly (C), with sandy loam topsoil (Hypercalcic-Lithocalcic Calcarosol), and <i>calcareous loam over red clay D4</i> (Red Sodosol) (M) in the swales and flats. Summary: this land is only semi arable due to a combination of low rainfall, salinity (flats) and low fertility/wind erosion potential (rises). These limitations are exacerbated by the complexity of the land and soil patterns.
WFD1 WFE1 WFE3 WFH4 WFr5 WFU1 WG- WGH1 WGK4 WKR4	2.6 0.7 0.3 0.9 0.5 0.1 1.1 0.1 0.6 1.1	Coastal dunes, beaches and flats composed of a mixture of carbonate and siliceous sands, or, dominantly composed of carbonate sand. <i>Dunes composed of a mixture of carbonate and siliceous sand:</i> WFD1 – jumbled coastal dunes: non arable. WFE1 – low coastal dunes: non arable. WFE3 – low coastal dunes: about 20% arable. WFH4 – low coastal dunes with swamps: about 40% arable. <i>Flats composed of a mixture of carbonate and siliceous sand:</i> WFr5 – flats with swamps: about 60% arable. WFU1 – flats/low sandy rises. <i>Dunes dominantly composed of carbonate sand:</i> WG- – low coastal dunes (3-5 m high) and associated beaches: non arable. WGH1 – low coastal dunes with swamps: non arable. WGK4 – low coastal dunes with flats: about 40% arable. <i>Flats dominantly composed of carbonate sand:</i> WKR4 – flats: about 40% arable. Main soils: <i>Deep carbonate sand H1b</i> – coastal dunes and beaches: dunes and some flats (moderate depth variants may occur on some flats) [sandy Shelly Rudosol]. <i>Deep calcareous siliceous sand H2a</i> – coastal dunes and beaches: some dunes and some flats (moderate depth variants may occur on some flats) [sandy Rudosol]. <i>Shelly saline swamp soil N2a</i> – moderate to shallow shelly clay loam, or, medium thickness shelly sand over shelly clay loam, often overlying calcarenite or calcrete: swamps and some flats [Shelly Hypersalic Hydrosol]. <i>Shallow carbonate dominant sandy loam on calcrete B1</i> – highly calcareous loamy sand to light sandy loam on calcrete at shallow depth: possibly on some flats (Petrocalcic Shelly Calcarosol or Supracalcic Petrocalcic Calcarosol). Summary: the low coastal dunes are non arable due to their wind erosion and fertility limitations. Sand dunes have very poor nutrient and moisture holding ability due to the low clay contents. The dominance of carbonate sand in some dunes creates nutrient availability problems which are particularly difficult to remedy. Dunes are covered with low shrubs. The swampy depressions are too saline for agricultural use and are usually covered with samphire plants. Flats may be arable, although fertility and moisture holding limitations are considerable.
WL- WLQ5 WLQ7 WLR2 WLR3	6.8 0.2 0.9 0.1 1.2	Shell beds (shell grit flats). WL- – shell beds: non arable. WLQ5 – shell beds: about 60% arable. WLQ7 – shell beds: most arable.



WLR	6.2	WLR2 – shell beds: high-moderately high salinity; about 10% arable.
WLR1	0.2	WLR3 – shell beds: high-moderately high salinity; about 20% arable.
WLR5	0.3	WLR – shell beds with swamps.
WLU3	0.4	WLR1 – shell beds with swamps: high salinity; non arable.
WLU4	0.7	WLR5 – shell beds with swamps: moderately high salinity; about 60% arable.
WLu1	0.9	WLU3 – shell beds with very low coastal dunes: high-mod.high salinity; about 20% arable.
WLu3	1.4	WLU4 – shell beds with low coastal dunes: high-mod.high salinity; about 40% arable.
WLu4	3.9	WLu1 – shell beds, swamps & low coastal dunes: high-mod.high salinity; non arable. WLu3 – shell beds, swamps & low coastal dunes: high-mod.high salinity; 20% arable. WLu4 – shell beds, swamps & low coastal dunes: high-mod.high salinity; 40% arable.
<p>Main soils: <i>Shell grit H1a</i> – moderate to deep coarse shelly material (fine gravelly size), often overlying calcarenite or calcrete: on shell beds [Shelly Rudosol]. <i>Deep carbonate sand H1b</i> – coastal dunes and beaches [sandy Shelly Rudosol]. <i>Deep calcareous siliceous sand H2a</i> – coastal dunes and beaches [sandy Rudosol]. <i>Shelly saline swamp soil N2a</i> – moderate to shallow shelly clay loam, or, medium thickness shelly sand over shelly clay loam, often overlying calcarenite or calcrete: swampy depressions [Shelly Hydrosol].</p> <p>Summary: cereal growing occurs on some of the shell bed areas, however, most of these areas are covered with native shrubs. Fertility, moisture holding capacities, and salinity levels are particularly limiting. The complete lack of clay in these soils greatly limits their ability to retain nutrients and store moisture, and the dominance of the carbonate material creates nutrient availability problems which are particularly difficult to remedy. The swampy depressions are too saline for agricultural use and are usually covered with samphire plants. The low coastal dunes are generally covered with low native shrubs. Some of the shell bed areas have been covered by medium thickness deposits of wind blown sand since European settlement: the sand cover seems to slightly improve the fertility of these soils!</p> <p><u>Soil descriptions - WLO5</u> Flat: Petrocalcic Shelly Rudosol; medium, moderately gravelly, sandy/sandy, moderate Flat adjacent to dunes: Shelly Rudosol; thick, non-gravelly, sandy/sandy, moderate (40cm of drift over shelly soil)</p> <p><u>Soil descriptions - WLu4</u> Flat: Petrocalcic Shelly Rudosol; thick, slightly gravelly, sandy/sandy, moderate. Flat: Shelly Rudosol; thick, slightly gravelly, sandy/sandy, moderate.</p> <p><u>Related soils on adjacent land units - WFr5</u> Flat: Arenaceous Shelly Calcarosol; medium, slightly gravelly, sandy/loamy, shallow.</p>		
WO-	25.3	Samphire, salt and intertidal flats.
WQ-	13.4	
WR-	0.1	WO- – samphire flats: near coastal mud flats dominated by samphire.
WS-	20.4	WP- – bare salt flats.
WT-	7.6	WQ- – mixture of bare salt flats and samphire flats: tidal mud flats with sparse or intermittent samphire. WR- – samphire flats with low coastal dunes. WS- – samphire flats with up to 30% longitudinal inland dunes. WT- – intertidal flats.
<p>Main soils: <i>Saline swamp soil N2b</i> – medium to thick calcareous clay loam over brown to reddish clay with abundant fine carbonate: flats [Hypersalic Calcarosol-Hydrosol]. <i>Shelly saline swamp soil N2a</i> – moderate to shallow depth shelly clay loam, or, medium thickness shelly sand over shelly clay loam, often overlying calcarenite or calcrete: flats and intertidal flats [Shelly Hypersalic Hydrosol]. <i>Calcareous loam over red clay D4</i> – medium thickness calcareous loam over reddish clay with abundant fine carbonate and crystalline gypsum: slightly higher elevation flats [Effervescent Red Sodosol]. <i>Deep calcareous siliceous sand H2a</i> – longitudinal inland dunes [sandy Calcarosol].</p> <p>Summary: the land is unused or used for light grazing. The samphire and salt flats are non arable due to waterlogging and saline conditions. Most of the land is covered by the very salt tolerant samphire plants, while the most saline areas are bare. Inland longitudinal dunes, where not cleared, are covered with low trees. The intertidal areas are non arable due to tidal inundation and severe salinity limitations: samphire plants occur.</p>		



		<p><u>Soil descriptions - WO-</u> Flat: Petrocalcic Shelly Calcarosol; thin, non-gravelly, clay loamy/clay loamy, very shallow. Flat: Hypervescent Petrocalcic Supracalcic Calcarosol; medium, non-gravelly, clay loamy/clay loamy, shallow.</p>
Ybg Ycd	0.3 0.5	<p>Flats with shallow soils which are dominantly composed of carbonate grains.</p> <p>Ybg – flats. Shallow carbonate dominant soil on calcrete, with some shallow calcareous soil on calcrete: with moderately high salinity levels. Ycd – flats and low coastal dunes. Shallow carbonate dominant soil on calcrete, with some deeper carbonate dominant soils, and some shallow calcareous soil on calcrete, overlain by 30-60% low coastal dunes or sandy rises: with moderately high salinity levels on flats. Some flats are overlain by spreads of wind blown sand up to 50cm thick.</p> <p>Main soils: <i>Shallow carbonate dominant sandy loam on calcrete</i> B1 – highly calcareous loamy sand to light sandy loam on calcrete at shallow depth: (E-V) on flats (Petrocalcic Shelly Calcarosol or Supracalcic Petrocalcic Calcarosol). <i>Shallow calcareous loam on calcrete</i> B2 – calcareous loamy sand to sandy loam on calcrete at shallow depth: (L-C) on flats (Haplic-Hypercalcic Petrocalcic Calcarosol). <i>Carbonate dominant sandy loam</i> A1 – deep to moderate depth highly calcareous loamy sand to light sandy loam, usually overlying calcrete: (M-C) on flats (Shelly Calcarosol or Supracalcic Calcarosol). <i>Deep (to moderate depth) carbonate sand</i> H1b – deep grey sands dominated by carbonate grains: found on low coastal dunes and sandy rises (sandy Shelly Rudosol). <i>Deep (to moderate depth) calcareous siliceous sand</i> H2a – greyish white siliceous sand with fine carbonate: possibly on some low coastal dune or sandy rise areas (sandy Rudosol).</p> <p>Summary: these areas used for cropping and grazing but have considerable limitations imposed by low fertility and wind erosion risk. Flats also have raised salinity levels.</p>
ZA- ZB-	0.3 0.2	<p>Salinized land.</p> <p>ZA- – non arable highly salinized land. Consists of calcareous loamy flats (Woorinen Formation) with about 20% longitudinal inland sand dunes (some of which have been severely eroded). Main soils: <i>Calcareous loam over red clay</i> D4 or <i>calcareous loam on red clay</i> A5 – medium to very thick calcareous loam over reddish clay with abundant fine carbonate and crystalline gypsum [Effervescent Red Sodosol or loamy Calcarosol on red clay]. <i>Deep calcareous siliceous sand</i> H2a: on dunes [sandy Calcarosol]. Summary: this land has probably become more saline since clearing and settlement due to rising saline water tables. Halophytic plants dominate. Soils are of aeolian origin, with calcareous loamy wind deposited sediments having been deposited on older clayey sediments, and then subsequently sand deposited as longitudinal dunes. Low trees cover dunes where they have not been cleared. Cleared dune areas have suffered severe wind erosion. Some flats are covered in a medium thickness layer of drift sand.</p> <p>ZB- – very highly salinized land. Samphire swamp areas, much of which is covered by a thin to thick layer of drift sand.</p> <p>Main soil: <i>Shelly saline swamp soil</i> N2a – shelly sandy to clay loamy topsoil over shelly clay loam, often overlying calcarenite or calcrete (Shelly Hypersalic Hydrosol) <i>Shallow calcareous loam on calcrete</i> B2 – calcareous loamy sand to sandy loam on calcrete at shallow depth (Haplic-Hypercalcic Petrocalcic Calcarosol).</p> <p>Summary: these highly saline depression areas with halophytic vegetation (especially samphire) are old sea floor/tidal areas, now forming back swamps since being cut off from the sea by jumbled coastal dunes.</p>

PROPORTION codes assigned to soils within Soil Landscape Units (SLU):

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| (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:

- N2a** *Shelly saline swamp soil* (Shelly Hypersalic Hydrosol).
Shelly sandy to clay loamy topsoil over shelly clay loam, often overlying calcarenite or calcrete. Found on tidal, salt or samphire flats.
- N2b** *Saline swamp soil* (Hypersalic Hydrosol-Calcarosol).
Thin brown calcareous clay loam or clay overlying a wet brown or reddish clay with grey mottles, abundant fine carbonate, crystalline gypsum, and jarosite(?) segregations. Found on tidal, salt, samphire or mud flats.
- H1b** *Deep carbonate sand* (sandy Shelly Rudosol).
Deep grey sands dominated by carbonate grains. Found on coastal dunes.
- H1a** *Shell grit* (Shelly Rudosol).
Coarse grained shell grit (mainly fine gravelly size), often overlying calcarenite or calcrete at moderate depth. Found on shell beds.
- H2a** *Deep calcareous siliceous sand* (sandy Rudosol-Calcarosol).
Greyish white siliceous sand with fine carbonate. Found on coastal dunes, and inland dunes and sandy rises.
- D4** *Calcareous loam over red clay* (Calcic-Hypercalcic Effervescent Red Sodosol).
Medium thickness to thick calcareous loam, sharply overlying friable red clay with crystalline gypsum and abundant fine carbonate from about 50 cm. Found on samphire flats, especially older and slightly more elevated flats occurring further inland.
- H2b** *Deep red siliceous sand* (sandy Regolith Hypocalcic Calcarosol).
Very thick red slightly to moderately calcareous siliceous sand grading to a slightly more clayey subsoil with minor fine carbonate throughout. Found on inland dunes and sandy rises.
- A5** *Calcareous loam on red clay* (loamy Calcarosol on red clay).
Very thick calcareous loam, overlying red clay with crystalline gypsum and abundant fine carbonate. Found on slightly elevated salinized land.

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