

# WHL White Lagoon Land System

An old lake floor area consisting of White Lagoon, Rush Lagoon, and some other shallow lagoonal depressions; adjacent old lake floor plains and depressions; wind-deposited lunettes; and other low-lying plains and depressions. The system is bordered by slightly higher elevation plains on all sides except to the north-west where it lies adjacent to very gently inclined slopes which define part of the very margin of Kangaroo Island's central plateau.

**Area:** 31 km<sup>2</sup>

**Annual rainfall:** 500 - 550 mm average

**Geology:** The majority of this land system is composed of Holocene age lacustrine marly sediments. Some recent lagoonal deposits incorporate small shells (derived from lake shellfish). There are areas of older Pleistocene age lacustrine clayey sediments. Deposits of wind-blown material derived from lagoonal surfaces occur as clay loamy calcareous lunette mounds, sandy lunettes, and rubbly (hard carbonate) and calcreted older lunettes, and as slight slopes and rises at the edge of old lagoon areas. Recent clay based river-borne alluvial deposits occur, especially where Timber Creek previously flowed into this area from the west. Early Cambrian age Kanmantoo Group meta-sandstones occur mostly at depth, having near surface expression only in the north-western and western parts of this system.

**Genesis of Lunettes:** From aerial photographic evidence it appears that Timber Creek once flowed into White Lagoon, whereas the majority of its flow now enters Murray Lagoon. The most recent wind-deposited materials derived from the White Lagoon surface have formed calcareous clay loamy lunette mounds on the north, east and south sides of White Lagoon; while older materials derived from a formerly larger lagoonal surface form non-calcareous to calcareous calcreted and rubbly sandy loam lunettes cum low rises in two parallel lines to the east of White Lagoon; and the oldest materials derived from the lagoonal surface form non-calcareous deep sandy lunettes cum rises to the east of this system. These various lunette deposits suggest different parent materials have entered White Lagoon over time: from non-calcareous and sandy in the past, possibly when greater flow from Timber Creek used to flow into the lagoon carrying topsoil from the western plateau area; to calcareous and clay loamy in more recent times when the reduced flow into the lagoon mostly seems to come from the north where more clayey soils with fine carbonate occur.

**Topography:** A low-lying lagoonal basin and old lake floor area. Salinized drainage areas occur in the west and north-west. Lunettes and low rises (basically older lunettes) occur mostly on the eastern side of the system. A major lunette strip, surrounding three sides of White Lagoon itself, consists of hummocky calcareous mounds from about 2 m to 5 m high. Much of the eastern edge of the basin is bordered by a short slope (cum lunette) of approximately 3% slope. Slopes across the system are generally from 0 - 1%.

**Elevation:** Mostly 15 m to 20 m. Elevation reaches 30 m above mean sea-level on a rise just east of White Lagoon; and reaches 40 m to 50 m at the upper reaches of a drainage depression in the north-west of the system.

**Relief:** Less than 10 m



**Major Soils:** **G4-G3-F2** Sodic texture contrast soil  
**N2a-A7-C5-N3a** Clay loam over marl  
**N2b-F2-N3b** Sandy loam over marl  
**C1-N3c** Deep to moderate depth sandy loam to sandy soil

**Minor soils:** **B2-B3** Shallow soil on calcrete  
**A4-C1** Deep loamy soil  
**A6** Deep calcareous clay loamy soil

**Main Features:** Arable, semi-arable and non-arable areas. Topsoils are mostly from sandy loam to light clay. Arable soils mostly have sandy loam, clay loam or light clay topsoils over sodic clayey subsoil which is often wet. Saline areas are common. Lagoons, saline depressions and some marginally saline areas occur. Many soils have fine carbonate in their subsoil or lower subsoil; while some soils are calcareous throughout. Drainage is poor due to low relief and relatively impermeable sodic and clayey subsoils.

### Soil Landscape Unit summary: White Lagoon Land System (WHL)

SLU	% of area	Main features #
VMA VMB VMC	6.6 11.4 5.7	<p>Arable to non-arable old lake floor area: with clay loamy topsoil. Level plains and depressions.</p> <p>Main soils: <u>clay loam over marl</u> - non-calcareous to calcareous clay loamy to light clayey topsoil over highly calcareous sodic grey clay (marl); overlying non-calcareous sandy to sandy clay sediments or sometimes calcrete <b>N2a-A7-C5-N3a</b> (<i>Hydrosol-Calcarosol-Dermosol</i>). Sometimes these soils have sandy loam or loam topsoils (<b>N2b-F2-N3b</b>).</p> <p><b>VMA</b> – flats (2-3s): barley cropping, etc.  <b>VMB</b> – marginally saline depressions (4*s): melaleuca, marginal barley cropping, reeds and bottle brush.  <b>VMC</b> – saline depressions (5s): with grasses, samphire and bare ground.</p> <p>Summary: the main issues are waterlogging, saline seepage, surface soil physical condition, and nutrient tie-up where soils are calcareous throughout.</p>
VOA	10.2	<p>Arable older lake floor: with sandy loam topsoil. Bottle brush shrubs are common.</p> <p>Main soil: <u>sandy loam over marl</u> - medium thickness sandy loam with a bleached sandy sub-surface layer, over highly calcareous sodic grey clay (marl), overlying non-calcareous sandy to sandy clay sediments or sometimes calcrete <b>N3b-F2</b> (<i>Hydrosol</i> or <i>Hypercalcic Sodosol</i>): some of these soils have clay loam topsoils (<b>N3a-C5</b>). With <u>deep to moderate depth sandy loam to sandy soil</u> with a calcareous subsoil, overlying a highly calcareous sandy clay loam substrate (marly material) <b>C1-N3c</b> (<i>Tenosol</i> or <i>Hydrosol</i>).</p> <p><b>VOA</b> – flats and depressions (3-2s)</p> <p>Summary: the main issues are waterlogging and saline seepage.</p>
ZA-	6.7	<p>Non-arable salinized flats, depressions and drainage depressions.</p> <p>Main soils: <u>sodic texture contrast soil</u> - medium thickness sandy loam over sodic clay <b>F2</b> (<i>Grey Sodosol</i>).</p> <p><b>ZA-</b> – highly saline flats, depressions and drainage depressions: with grasses, samphire and some bare ground.</p> <p>Summary: non-arable salinized land.</p>
ZO- ZQ- ZR- ZS- ZU-	0.1 3.4 2.7 7.5 8.8	<p><i>Non-arable marginally saline small depressions:</i></p> <p>Main soils: <u>sodic texture contrast soil</u> - medium thickness sandy loam over sodic clay <b>F2</b> (<i>Grey Sodosol</i>).</p> <p><b>ZO-</b> – marginally saline/waterlogged depressions: usually with salt/waterlogging tolerant grasses.</p> <p><i>Non-arable lagoonal depressions:</i></p>



		<p>Main soils: <u>clay loam over marl</u> – calcareous clay loam to light clay, over olive to grey calcareous sodic clay (marl) <b>N2a-A7</b> (<i>Hydrosol</i> or <i>Calcarosol</i>). Some soils have sandy loam topsoils (<b>N2b-F2</b>).</p> <p><b>ZQ-</b> – lagoon: with melaleuca (5s). With some 'lunette-like' low mound areas.</p> <p><b>ZR-</b> – lagoon: with samphire and bare ground (7s)</p> <p><b>ZS-</b> – lagoon: often submerged; mostly bare ground (8s)</p> <p><b>ZU-</b> – lagoon: usually submerged; bare ground (8s)</p> <p>Summary: Highly saline lagoons and marginally saline depressions, subject to seasonal inundation.</p>
ZL4 ZL6 ZL7	2.6 0.6 1.4	<p>Non-arable to semi-arable lunettes.</p> <p>Main soils: <u>deep calcareous clay loamy soil</u> on clay loamy lunette mounds <b>A6</b> (<i>Hypercalcic Calcarosol</i>). And deep to moderate depth sands on sandy lunettes <b>I1-H3</b> (<i>Podosol-Tenosol</i>).</p> <p><b>ZL4</b> – clay loamy lunette mounds (5m). With approx. 5% saline flats (3-2<sup>+</sup>s).</p> <p><b>ZL6</b> – low sandy lunette (1-2m) (2s)</p> <p><b>ZL7</b> – sandy lunette (2-5m). With approx. 2-5% saline seepage (2-3<sup>+</sup>s).</p> <p>Summary: the clay loamy lunette mounds are non-arable due to difficult topography; while the sandy lunettes have low fertility, a high wind erosion risk, and strong water repellence.</p>
PbK	3.0	<p>Mostly arable level plains: with sandy topsoil. Probably an old lake floor. These somewhat raised sediments are some of the oldest in this system.</p> <p>Main soils: medium to thick, even some very thick sandy topsoil with a bleached sub-surface layer, over sodic clay or sandy clay loam with fine carbonate <b>G3-G4</b> (<i>Hypercalcic Brown Sodosol</i>).</p> <p><b>PbK</b> – level plains with &lt;10% saline seepage (2s).</p> <p>Summary: the main issues are reduced fertility due to the bleached sandy topsoils, water repellence, some wind erosion risk, and relatively impermeable sodic clay subsoils.</p>
PkK PkO PkU	3.9 0.5 19.6	<p>Arable to semi-arable plains and depressions: with light sandy loam topsoil. These river-borne alluvial sediments have often 'cut-through' and been deposited over older lacustrine sediments.</p> <p>Main soils: <u>sodic texture contrast soil</u> - medium thickness, or occasionally thick light sandy loam (with some sandy loam), with a bleached sandy sub-surface layer sometimes including ironstone nodules and/or small to medium quartz fragments and occasionally including quartz-rich ferricrete; over sodic clay with fine carbonate in the lower subsoil. <b>G4-G3-F2</b> (<i>Brown-Grey Sodosol</i>).</p> <p><b>PkK</b> – level plains with &lt;10% saline seepage (3s). Slightly raised above surrounding land.</p> <p><b>PkO</b> – valley flat with &lt;10% saline seepage (3s)</p> <p><b>PkU</b> – low-lying alluvial plain with marginal salinity (4s)</p> <p>Summary: the main issues are waterlogging, saline seepage, and the presence of sodic clay subsoils.</p>
STA	5.2	<p>Arable to semi-arable low rises, slopes (which are really old lunette areas) and low lunettes: with rubbly calcareous deposits and some shallow soil on calcrete. These are wind-deposited calcareous loamy sediments derived from lagoonal surfaces. Vegetation is of mallee and melaleuca. These deposits are identical morphologically to the wind-deposited 'Woorinen Formation' sediments found in many of the drier agricultural areas of South Australia.</p> <p>Main soils: <u>deep loamy soil</u> - non-calcareous to calcareous sandy loam <b>A4-C1</b> (<i>Hypercalcic-Lithocalcic Calcarosol-Tenosol</i>). With 10-30% <u>shallow soil on calcrete</u> - non-calcareous to calcareous sandy loam over calcareous soil with calcrete fragments on calcrete <b>B2-B3</b> (<i>Petrocalcic Calcarosol-Tenosol</i>). With 5-10% deep sandy soil overlying calcrete on low lunettes <b>I1-H3</b> (<i>Tenosol-Podosol</i>).</p> <p><b>STA</b> - low rises, slopes and low lunettes (slopes of 3%, 1e).</p> <p>Summary: water holding capacity is reduced in shallow soils and those with carbonate rubble; there is some stoniness (hard carbonate rubble/calcrete fragments); some wind erosion risk and some water repellence; and nutrient tie-up where soils are calcareous throughout.</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:****G4-G3-F2** Sodic texture contrast soil (*Brown-Grey Sodosol*)

Medium thickness, or occasionally thick, light sandy loam (with some sandy loam), with a bleached sandy sub-surface layer which sometimes includes some ironstone nodules and/or small to medium size quartz fragments, and occasionally includes quartz rich ferricrete; over olive-grey, olive, olive-brown or yellow-brown sodic clay, often with fine carbonate in the lower subsoil. Found on flats and in depressions.

On some slightly higher elevation level plains ('PbK') these soils can have medium to thick, or even some very thick, sandy topsoil with a bleached sub-surface layer, over sodic clay or sandy clay loam with fine carbonate (*Hypercalcic Brown Sodosol*).

**N2a-A7-C5-N3a** Clay loam over marl (*Calcarosolic-Dermosolic Hydrosol* or *Calcic-Hypercalcic Calcarosol*)

Thin to thick non-calcareous to calcareous clay loam to light clay, over highly calcareous sodic grey or olive-grey clay (marl). Occasionally there are small shells in some subsoil layers. This soil overlies older non-calcareous sandy to sandy clay sediments or sometimes calccrete. Found on old lake floors.

**N2b-F2** Sandy loam over marl (*Sodosolic Hydrosol* or *Calcic-Hypercalcic Grey-Brown Sodosol-Dermosol*).

Thin to medium thickness sandy loam, with a sub-surface sandy layer which is usually bleached; over or sometimes grading into highly calcareous grey, olive or olive-brown clay (marl). Sometimes there are calccrete fragments in the lower subsoil. This soil overlies older non-calcareous sandy to sandy clay sediments; or sometimes calccrete. Found on the older lake floor areas.

**C1-N3c** Deep to moderate depth sandy loam to sandy soil (*Calcic-Hypercalcic Tenosol* or *Tenosolic Hydrosol*)

Deep to moderate depth sandy loam to sandy soil, sometimes with a bleached sub-surface layer, with a highly calcareous subsoil or lower subsoil. This overlies a highly calcareous grey, olive-grey or yellow-brown sandy clay loam substrate (marly material). Found on the older lake floor areas or flats.

**Minor soils:****B2-B3** Shallow soil on calccrete (*Petrocalcic Calcarosol-Tenosol*)

Calcareous to non-calcareous sandy loam, over highly calcareous loamy soil with calccrete fragments; overlying calccrete. Found on rises cum lunettes, slopes cum lunettes, and lunettes.

**A4-C1** Deep loamy soil (*Hypercalcic-Lithocalcic Calcarosol-Tenosol*)

Calcareous to non-calcareous sandy loam, over highly calcareous sandy loam often with calccrete fragments, over loamy subsoil with abundant fine carbonate. Found on rises cum lunettes, slopes cum lunettes, and lunettes.

**A6** Deep calcareous clay loamy soil (*Hypercalcic Calcarosol*)

Deep highly calcareous grey-brown clay loamy soil. Found on lunette mounds.

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

