

# KUM Kumorna Land System

(Based on the description by A. K. McCord in "A Description of Land in the Southern Mallee of South Australia")

Gently undulating plains and dunefields west and south of Tintinara

**Area:** 408.2 km<sup>2</sup>

**Annual rainfall:** 470 – 520 mm average

**Geology:** The System is underlain by sandy clays and limestones of the Padthaway Formation, calcreted at the surface. These are extensively overlain by Molineaux Sands which have been reworked into jumbled dunes. Thick sandy surfaces on many flats may be Molineaux Sand, or may be derived by clay leaching from sandier parent sediments.

Saline groundwater tables are rising and are commonly within two metres of the surface on the flats. There are minor swampy areas where the water table is at the surface, although this is more a characteristic of the adjacent Richards, Lake Ellen, Monkoora and McNamara Land Systems.

**Topography:** The System is a flat to gently undulating plain. Most relief is attributable to variable thicknesses of sand, as high jumbled sand dunes through to very low sandy (or occasionally stony) rises. Minor swampy depressions are the only other prominent land surface features.

**Elevation:** 10 - 30 m

**Relief:** Up to 10 m

**Soils:** The soils on the flats include several sandy to loamy sand types, either with clayey subsoils, or formed over calcrete at shallow depth. Deep sandy soils dominate the rises. Wet saline sandy to clay loamy soils characterize poorly drained flats.

## Main soils

### *Rises*

**H3** Deep bleached sand  
**G2** Sand grading to sandy clay loam

### *Flats*

**B7** Sand over friable brown sandy clay on calcrete  
**G3** Thick sand over brown sandy clay

## Minor soils

### *Stony flats and rises*

**B3** Shallow stony loamy sand over calcrete.

### *Poorly drained and swampy depressions*

**N2/G4** Sand over yellow and grey saline waterlogged clay  
**N2** Wet highly saline grey clay

**Main features:** The Kumorna Land System is characterized by sandy surfaced soils either on dunes (deep sands) or flats (sand over clay). Fertility is very low to moderately low and wind erosion potential is very high to moderate, depending on landscape position. Although in their natural state, most soils are well drained and non saline, rising saline groundwater tables are posing a threat to most of the lower lying ground, with limited areas already affected, and likely to increase.



**Soil Landscape Unit summary:** 20 Soil Landscape Units (SLUs) mapped in the Kumorna Land System:

SLU	% of area	Main features #
MJB	0.1	<p>Rises and low hills formed on calcarenite, partially overlain by windblown sand. There is variable surface calcrete (depending on the thickness of the sand cover).</p> <p><b>MJB</b> Gentle lower slopes.</p> <p>Main soils: <u>sandy loam over red sandy clay on calcrete</u> - <b>B6</b> (V), with <u>loamy sand over brown sandy clay on calcrete</u> - <b>B7</b> (E) on thin sand spreads, and <u>sand over sandy clay</u> - <b>G2</b> (M) and <u>deep bleached sand</u> - <b>H3</b> (M) on sand hills.</p> <p>Key properties:</p> <p>Drainage: Well to rapidly drained.</p> <p>Fertility: Low (stony soils) to very low (deep sands).</p> <p>Physical condition: There are no soil physical limitations to root growth.</p> <p>AWHC: Moderately low to low.</p> <p>Salinity: Low.</p> <p>Erosion potential: Water: Moderately low (<b>MIC</b>, <b>MJC</b> and <b>MJY</b>) to moderate (<b>MJD</b>). Wind: Low (stony soils), moderate (shallower sands) to high/very high (sand dunes).</p> <p>Water repellence: Moderate to high on sandy soils.</p> <p>Rockiness: Up to 20% surface calcrete with occasional outcropping reefs. No surface stone on sand dunes.</p> <p><u>Summary:</u> The ranges are dominated by moderately shallow to shallow soils of marginal fertility with significant surface stone and some outcrop, restricting cultivation. Associated sandy soils are infertile, water repellent and prone to wind erosion.</p>
NAA NAD NAF NAP NAa NAd	5.5 8.2 2.1 4.4 3.3 2.8	<p>Plains with variable very low sandy or stony rises formed on calcareted sediments of the Padthaway Formation. Groundwater tables are within two metres of the surface.</p> <p><b>NAA</b> Plains with minor low sandy and stony rises.</p> <p><b>NAD</b> Complex of plains and about 30% low sandy (occasionally stony) rises.</p> <p><b>NAF</b> Plains with minor poorly drained and saline depressions.</p> <p><b>NAP</b> Complex of plains, low sandy rises and poorly drained depressions.</p> <p><b>NAa</b> Plains as for <b>NAA</b>, but marginally saline.</p> <p><b>NAd</b> Complex as for <b>NAD</b>, but with marginally saline flats.</p> <p>Main soils:</p> <p>Flats <u>Sand over friable brown sandy clay on calcrete</u> - <b>B7</b> (E-V) <u>Thick sand over brown sandy clay</u> - <b>G3</b> (L) <u>Shallow stony loamy sand over calcrete</u> - <b>B3</b> (L)</p> <p>Rises <u>Deep bleached sand</u> - <b>H3</b> (M-L) <u>Sand grading to sandy clay loam</u> - <b>G2</b> (M-L).</p> <p>Poorly drained flats <u>Sand over yellow / grey saline waterlogged clay</u> - <b>N2/G4</b> (M) <u>Wet highly saline grey clay</u> - <b>N2</b> (M).</p> <p>Key properties:</p> <p>Drainage: Well to moderately well drained (flats), rapidly drained (rises) and imperfectly to poorly drained (swampy depressions).</p> <p>Fertility: Moderately low (flats) to low (rises).</p> <p>Physical condition: There are no significant surface or subsurface soil structure impediments to root growth.</p> <p>AWHC: Moderately low to moderate (flats). Moderately low (rises).</p> <p>Salinity: Flats Low in surface to moderate in subsoil. Moderate to high in <b>NAa</b> and <b>NAd</b>. Rises Low. Depressions High to very high due to shallow saline watertable.</p> <p>Erosion potential: Water: Low. Wind: Moderate to moderately low on flats. High on rises.</p> <p>Water repellence: Moderate on flats. High on rises.</p>



		<p>Rockiness: Up to 5% surface calcrete stone on flats with heavier patches.</p> <p><u>Summary:</u> Slightly to moderately saline flats dominated by soils with sandy surfaces over clayey subsoils usually at shallow depth. Drainage is generally moderate to good, fertility is moderately low. Rising saline groundwater tables have the potential to cause substantial loss of productivity.</p>
<p>NGA 6.6 NGD 10.6 NGF 0.4 NGG 0.1</p>		<p>Flat to gently undulating plains formed on sandy Padthaway Formation sediments, partly overlain by Molineaux Sands.</p> <p><b>NGA</b> Flats with minor low sandy rises.</p> <p><b>NGD</b> Gently undulating land comprising a complex of flats, sandy rises, some stony rises and minor depressions.</p> <p><b>NGF</b> Flats as for NGA but with up to 10% swampy depressions.</p> <p><b>NGG</b> Gently undulating land as for <b>NGD</b>, but with swampy depressions.</p> <p>Main soils: <u>thick sand over brown sandy clay</u> - <b>G3</b> (E-V) on flats, <u>sand over friable brown sandy clay on calcrete</u> - <b>B7</b> (C) and <u>shallow stony loamy sand over calcrete</u> - <b>B3</b> (M) on flats and stony rises, and <u>deep bleached sand</u> - <b>H3</b> (M-L) with <u>sand grading to sandy clay loam</u> - <b>G2</b> (M) on deeper sand rises. <u>Sand over yellow and grey saline waterlogged clay</u> - <b>N2/G4</b> (M) and <u>wet highly saline grey clay</u> - <b>N2</b> (M) occur in swampy depressions.</p> <p>Key properties:</p> <p>Drainage: Well to rapidly drained (flats and rises). Imperfectly to poorly drained (swampy depressions).</p> <p>Fertility: Low.</p> <p>Physical condition: No significant physical limitations to root growth.</p> <p>AWHC: Low to moderately low.</p> <p>Salinity: Moderately low on flats, although moderate to high in subsoils. Very low on rises. Moderately high to very high in swampy depressions. Rising saline groundwater tables are a threat.</p> <p>Erosion potential: Water: Low. Wind: Moderate to moderately low on flats. High on rises.</p> <p>Water repellence: Moderate (flats) to high (rises).</p> <p>Rockiness: Less than 2% surface calcrete stone.</p> <p><u>Summary:</u> Generally well drained and non saline deep soils, but low fertility, water repellence and wind erosion potential limit productivity. Rising saline groundwater tables have potential to significantly reduce productivity.</p>
<p>O-B 3.6 OAE 10.7 OAF 16.8 OAI 1.8 OAJ 17.5 OA 1.7 M 3.4 OAQ</p>		<p>Gently to strongly undulating jumbled dunefields of Molineaux Sand, superimposed over the main landscape. Mapping units are determined by combinations of dune size and frequency, and occurrence of saline swales.</p> <p><b>O-B</b> Isolated moderate to high dunes.</p> <p><b>OAE</b> 60-90% high dunes.</p> <p><b>OAF</b> 60-90% moderate dunes.</p> <p><b>OAI</b> 30-60% moderate dunes.</p> <p><b>OAJ</b> 30-60% low dunes.</p> <p><b>OAM</b> 60-90% moderate dunes with up to 10% saline swampy swales.</p> <p><b>OAQ</b> 30-60% low dunes with up to 10% saline swampy swales.</p> <p>Main soils: <u>deep bleached sand</u> - <b>H3</b> (V-E) on sandhills with <u>sand grading to sandy clay loam</u> - <b>G2</b> (L-E) and <u>thick sand over brown sandy clay</u> - <b>G3</b> (M-C) on lower slopes and in swales and flats. <u>Sand over yellow and grey saline waterlogged clay</u> - <b>N2/G4</b> (M) and <u>wet highly saline grey clay</u> - <b>N2</b> (M) occur in swampy swales.</p> <p>Key properties:</p> <p>Drainage: Rapidly drained (dunes). Well to moderately well drained (swales and flats). Poorly drained (swampy depressions).</p> <p>Fertility: Very low (dunes). Low to moderately low (swales and flats).</p> <p>Physical condition: No physical impediments to root growth.</p> <p>AWHC: Moderately low.</p> <p>Salinity: Low (dunes). Moderately low (swales and flats). High to very high (swampy swales).</p>



		<p>Erosion potential: Water: Low. Wind: Very high (dunes) to moderately high (swales).</p> <p>Water repellence: Strongly to moderately repellent.</p> <p>Rockiness: Nil.</p> <p><u>Summary:</u> The dunefields are characterized by well drained and non saline soils with moderate to high limitations due to wind erosion potential and low fertility.</p>
ZS-	0.2	Saline swamps, usually water filled.
ZnJ	0.2	<p>Isolated depressions with occasional small (unmappable) swamps formed on clayey and limestone sediments of the Padthaway Formation. The land is seasonally waterlogged and affected by saline groundwater tables.</p> <p>Main soils: <u>sand over yellow and grey saline waterlogged clay - N2/G4 (E)</u> and <u>wet highly saline grey clay - N2 (E)</u>.</p> <p>Key features:</p> <p>Drainage: Imperfectly to poorly drained, due to shallow water tables and dispersive clay subsoils.</p> <p>Fertility: Moderately low.</p> <p>Physical condition: Surface soil is not limiting. Dispersive subsoils prevent satisfactory root growth.</p> <p>AWHC: Moderate.</p> <p>Salinity: High to very high. This land is influenced by rising saline ground watertables.</p> <p>Erosion potential: Water: Low Wind: Low.</p> <p>Water repellence: Nil.</p> <p>Rockiness: Nil.</p> <p><u>Summary:</u> Flats with poorly drained saline soils requiring salt tolerant species for productive pasture growth (ie clovers and conventional perennial grasses will not persist on most of this land).</p>

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

(D) Dominant in extent (>90% of SLU)

(V) Very extensive in extent (60–90% of SLU)

(E) Extensive in extent (30–60% of SLU)

(C) Common in extent (20–30% of SLU)

(L) Limited in extent (10–20% of SLU)

(M) Minor in extent (<10% of SLU)

### Detailed soil profile descriptions:

#### Rises

#### **H3** Deep bleached sand (Basic, Arenic, Bleached-Orthic Tenosol)

Thick to very thick bleached sand, organically darkened at the surface over yellow sand continuing below 100 cm.

#### **G2** Sand grading to sandy clay loam (Mesotrophic, Yellow Kandosol)

Thick bleached sand, organically darkened at surface, over a yellow and red friable massive sandy clay loam.

#### Flats

#### **B7** Sand over friable brown sandy clay over calcrete (Petrocalcic, Brown Chromosol)

Medium thickness sand overlying a brown friable sandy clay loam to sandy clay on limestone or calcreted sandy clay within 50 cm.

#### **G3** Thick sand over brown sandy clay (Calcic, Brown Chromosol)

Thick sand with a bleached A2 layer abruptly overlying a brown sandy clay, slightly calcareous with depth.



*Stony flats and rises*

- B3** Shallow stony loamy sand over calcrete (Petrocalcic, Leptic Tenosol)  
Medium thickness loamy sand to sandy loam overlying a layer of mixed calcrete rubble and pockets of brown sandy clay grading to calcreted lagoonal sediments.

*Poorly drained and swampy depressions*

- N2/G4** Sand over yellow and grey saline waterlogged clay (Sodosolic Hypersalic Hydrosol OR Hypercalcic / Lithocalcic, Grey Sodosol)  
Medium thickness loamy sand abruptly overlying a grey and yellow brown mottled clay (seasonally saturated), with rubbly to soft carbonate at depth and a saline water table within 100 cm.
- N2** Wet highly saline grey clay (Dermosolic, Hypersalic Hydrosol)  
Medium thickness dark grey to black clay loam to clay grading to a well structured dark grey clay with minor carbonates and a water table within 50 cm.

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

