

RIC Richards Land System

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

Gently undulating flats and low sand hills south of Tintinara

Area: 83.4 km²

Annual rainfall: 450 – 500 mm average

Geology: The land system is underlain by sandy clays and limestones of the Padthaway Formation, calcreted at the surface. The calcrete is typically very shallow in this System. The land surface is partly overlain by Molineaux Sands which have been reworked into jumbled dunes. Saline groundwater tables are rising and are commonly within a metre of the surface on the flats. There are extensive swampy areas where the water table is at the surface. There are minor outcrops of Bridgewater Formation calcarenite (remnants of ancient coastal dunes).

Topography: The land system is a flat to gently undulating plain, with the only relief provided by low to moderate sandy rises and jumbled dunes. Swampy depressions are scattered extensively across the landscape. These vary from water filled swamps through bare salt pans to samphire flats. Surface stone is common in places where the underlying calcrete capping has been brought to the surface by cultivation.

Elevation: 9 - 20 m

Relief: Less than 10 m

Soils: Shallow soils over calcrete and moderately deep to deep sands occur on rises, with variable wet saline soils in poorly drained depressions and swamps.

Main soils

Poorly drained and swampy depressions

N2a Loamy sand over black to grey brown (saline and waterlogged) clay

N2b Wet highly saline grey clay

Moderately well drained flats

B6 Sandy loam over brown clay on calcrete

B7 Sand over mottled clay on calcrete

Imperfectly drained flats

B7/N2 Sand over mottled clay on calcrete

Minor soils

Sandy rises

G2 Sand grading to sandy clay loam

H3 Deep bleached sand

Well drained flats and stony rises

B3 Shallow stony loamy sand on calcrete - flats and rises

B8 Bleached sand on calcrete - rises

F2 Sandy loam over grey brown clay - flats

G3 Thick sand over brown sandy clay - flats



Main features: The Richards Land System is characterized by extensively salinized flats associated with shallow saline ground water tables. Although the predominant soils are shallow over calcrete and only marginally fertile, salinity is the main determinant of land use over more than half of the area. Rising ground is unaffected, but most is sandy with very low fertility and high susceptibility to wind erosion.

Soil Landscape Unit summary: 8 Soil Landscape Units (SLUs) mapped in the Richards Land System:

| SLU | % of area | Main features # |
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| MJB | 0.4 | <p>Low ridges (coastal dune remnants) formed on calcarenite. They are partly overlain by thin wind blown sand spreads. There is variable surface stone on the non sandy slopes.</p> <p>Main soils: <u>shallow stony loamy sand on calcrete</u> - B3 (E), <u>sand over brown sandy clay on calcrete</u> - B7 (E), and <u>bleached sand on calcrete</u> - B8 (E).</p> <p>Key properties:</p> <p>Drainage: Rapidly to well drained.</p> <p>Fertility: Moderately low to low.</p> <p>Physical condition: There are no soil structure restrictions to root growth.</p> <p>AWHC: Very low to moderately low.</p> <p>Salinity: Low.</p> <p>Erosion potential: Water: Moderately low. Wind: Moderately low on stony ground to high on sand spreads.</p> <p>Water repellence: Low to slight on stony land. Strong on sand spreads.</p> <p>Rockiness: Variable to 50%, usually less than 20%. Nil on sand spreads.</p> <p><u>Summary:</u> Shallow stony soils of marginal fertility with deep, low fertility, water repellent and erodible sands.</p> |
| NAb | 16.8 | <p>Plains with variable very low sandy or stony rises formed on calcreted sediments of the Padthaway Formation. Saline groundwater tables are generally within two metres of the surface. There are occasional swampy depressions (less than 10% of the area) where the water table is at the surface.</p> <p>Main soils:</p> <p>Flats and stony rises: <u>sand over brown sandy clay on calcrete</u> - B7 (C) and <u>sandy loam over brown clay on calcrete</u> - B6 (C), with <u>sand over mottled clay on calcrete</u> - B7/N2 (L) in wetter areas.</p> <p>Sandy rises: <u>deep bleached sand</u> - H3 (L) and <u>sand grading to sandy clay loam</u> - G2 (M).</p> <p>Stony rises: <u>shallow stony loamy sand on calcrete</u> - B3 (M)</p> <p>Depressions: <u>loamy sand over dark saline and waterlogged sandy clay</u> - N2a (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 low (flats). Moderately low to moderate (rises).</p> <p>Salinity: Flats Moderate to high. Rises Low. Depressions High to very high due to shallow saline water table.</p> <p>Erosion potential: Water: Low. Wind: Moderate to moderately low on flats. High on rises.</p> <p>Water repellence: Moderate on flats. Moderate to high on rises.</p> <p>Rockiness: Commonly up to 20% surface calcrete stone on flats with heavier patches.</p> <p><u>Summary:</u> Slightly to moderately saline flats dominated by shallow sandy surfaced soils with calcrete 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> |



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| OSM | 10.0 | <p>Undulating flats with about 60% low to moderate jumbled sand dunes interspersed with well drained swales (about 30% of land area) and 10% swampy saline swales (about 10% of the land area). Main soils: <u>deep bleached sand</u> - H3 (C) and <u>sand grading to sandy clay loam</u> - G2 (C) on dunes, <u>thick sand over brown sandy clay</u> - G3 (E) in well drained swales, and <u>loamy sand over dark saline and waterlogged sandy clay</u> - N2a (M) and <u>wet, highly saline grey clay</u> - N2b (M) in swampy depressions.</p> <p>Key properties:</p> <p>Drainage: Rapidly drained (dunes). Well to moderately well drained (swales). Poorly drained (swampy depressions).</p> <p>Fertility: Very low (dunes). Low to moderately low (swales).</p> <p>Physical condition: No physical impediments to root growth.</p> <p>AWHC: Moderately low.</p> <p>Salinity: Low (dunes). Mod 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. Swampy depressions have low productive potential without establishment of salt tolerant grasses.</p> |
| ZS- | 11.6 | Highly saline swamps, generally water filled. |
| ZnJ ZnP Znj | 10.2 21.8 22.3 | <p>Flat plains with scattered small (unmappable) swampy depressions formed on clayey and limestone sediments of the Padthaway Formation. Low rises of Molineaux Sand are common in places. The land is seasonally waterlogged and affected by saline groundwater tables which are within a metre of the surface.</p> <p>ZnJ Marginally saline to saline flats.</p> <p>ZnP Marginally saline to saline flats with about 20% low sandy rises.</p> <p>Znj Highly saline flats.</p> <p>Main soils: <u>loamy sand over dark saline and waterlogged sandy clay</u> - N2a (V), with <u>deep bleached sand</u> - H3 (M) and <u>sand grading to sandy clay loam</u> - G2 (M) on rises.</p> <p>Key features:</p> <p>Drainage: Imperfectly to poorly drained, due to shallow water tables and dispersive clay subsoils. Rises are well drained.</p> <p>Fertility: Moderately low. Low to very low on rises.</p> <p>Physical condition: Surface soil is not limiting. Dispersive subsoils on flats prevent satisfactory root growth.</p> <p>AWHC: Moderate.</p> <p>Salinity: Moderately high to very high. This land is influenced by rising saline ground water tables. Rises are not affected.</p> <p>Erosion potential: Water: Low Wind: Low. High on rises.</p> <p>Water repellence: Nil. Moderate to strong on rises,</p> <p>Rockiness: Nil.</p> <p><u>Summary</u>: Flats with poorly drained saline soils requiring salt tolerant species for productive pasture growth (i.e. clovers and conventional perennial grasses will not persist on most of this land). Rises are infertile and prone to wind erosion.</p> |
| ZoP | 6.9 | <p>Complex of flats and swamps interspersed with sand dunes and rises. The ratio of flats and swamps to dunes and rises is about 50:50. The land is formed on clayey and limestone sediments of the Padthaway Formation and calcareous clays and marls, partially overlain by windblown Molineaux Sands.</p> <p>Main soils: <u>thick sand over brown sandy clay</u> - G3 (L) on better drained flats, <u>sandy loam over grey brown clay</u> - F2 (L) on lower lying flats, <u>loamy sand over dark saline and waterlogged sandy clay</u> - N2a (L) and <u>wet, highly saline grey clay</u> - N2b (L) in swamps, and <u>deep bleached sand</u> - H3 (C) and <u>sand grading to sandy clay loam</u> - G2 (C) on rises.</p> <p>Key properties:</p> <p>Drainage: Poor to very poor (flats and swamps). Rapid (rises and dunes).</p> <p>Fertility: Moderately low (flats). Very low to low (rises).</p> <p>Physical condition: Surface soils have no limitations. Subsoils on flats are dispersive and restrict root</p> |



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| | <p>growth. Subsoil structure not limiting on rises.</p> <p>AWHC: Moderate (flats) to moderately low (rises).</p> <p>Salinity: High to extreme (flats and swamps). Low (rises).</p> <p>Erosion potential: Water: Low. Wind: Low (flats). Moderate to high (rises).</p> <p>Water repellence: Low (flats) to high (rises).</p> <p>Rockiness: Nil.</p> <p><u>Summary:</u> Complex of saline flats, saline swamps, and rises with very low fertility, water repellent, but non saline sands. This is difficult land to manage because of the range and severity of limitations.</p> |
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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:

- B3** Shallow stony loamy sand on 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 calcarenite.
- B6** Sandy loam over brown clay on calcrete (Lithocalcic / Petrocalcic, Brown Chromosol)
Thin sandy loam over a brown sandy clay to clay on limestone or calcreted sandy clay within 50 cm.
- B7** Sand over brown sandy clay on calcrete (Petrocalcic, Brown Chromosol)
Medium thickness sand overlying a brown sandy clay loam to sandy clay on limestone or calcreted sandy clay within 50 cm.
- B7/N2** Sand over mottled clay on calcrete (Eutrophic, Petrocalcic, Brown Sodosol)
Bleached sand overlying a coarsely structured mottled grey sandy clay loam to clay, with a calcrete pan within 50 cm and a saline water table at depth.
- B8** Bleached sand on calcrete (Petrocalcic, Bleached-Leptic Tenosol)
Thick bleached sand over calcreted calcarenite.
- F2** Sandy loam over grey brown clay (Hypercalcic, Brown Sodosol)
Medium thickness sandy loam to sandy clay loam abruptly overlying a brown poorly structured and dispersive heavy with abundant soft carbonate from about 40 cm, grading to clayey sediments with depth.
- 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.
- 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.
- 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.
- N2a** Loamy sand over dark saline and waterlogged sandy clay (Sodosolic, Salic Hydrosol)
Medium thickness loamy sand to sandy loam abruptly overlying a black to greyish brown mottled sandy clay (seasonally saturated), with marl or rubbly to soft carbonate in a clayey matrix at depth.
- N2b** Wet highly saline grey clay (Dermosolic, Salic 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 100 cm.

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

