

SEN Senior Land System

Dunefields occupying the central part of the Hundred of Senior

Area: 205.1 km²

Annual rainfall: 450 – 500 mm average

Geology: The land system is formed on Pleistocene? age clays which are calcified by fine carbonates, leached into the soil from aeolian deposition over a considerable time. The clays in turn are partially overlain by windblown Molineaux Sand deposits.

Topography: The Senior Land System comprises a tract of sand hill - swale country to the north of the Tatiara District. It occupies most of the Hundred of Senior and extends into the eastern part of Cannawigara. The landscape is gently undulating, and is overlain by low sand hills with a general east - west orientation. The flats and swales between the sand hills are variable, with clay soils predominant in the lower lying flats and sand over clay soils predominant in the higher flats.

Elevation: 105 m in the west to 130 m in the east

Relief: Up to 10 m

Soils: The soils include a mixture of sands (deep and texture contrast), sandy loam texture contrast soils, and cracking clays.

Main soils: *Soils of sandy rises and higher level flats*

G4 Sand over dispersive brown clay - flats and higher swales

H3 Deep bleached sand - dunes

Soils of lower lying clayey flats

E3 Hard grey cracking clay - flats and lower elevation swales

Minor soils: *Soils of sandy rises and higher level flats:*

F2 Hard loam over dispersive brown clay - broader flats

G3 Thick sand over friable clay - higher level swales and lower slopes

Soils of lower lying clayey flats

E1 Black cracking clay - flats and lower elevation swales

Vegetation: Mallee, heath and stringybark on dunes
Mallee and broombush on flats and swales

Main features: The Senior Land System is typical sand dune - swale country with significant changes in soil type over short distances. The sand dunes are characterized by deep, infertile water repellent sands, sometimes with saline seepages where they contact the intervening flats sand swales. The flats between the larger dunes have sandy texture contrast soils with marginal fertility and impeded drainage. The broader flats have a wider variety of soils, with sand or loam over dispersive clay subsoils common on higher flats and clayey soils on lower lying flats. Most of these soils are imperfectly drained. The texture contrast soils are marginally fertile; the clayey soils are more fertile but most have poorly structured surfaces. Moderate salinity and boron toxicity are likely in these soils.



Soil Landscape Unit summary: 4 Soil Landscape Units (SLUs) mapped in the Senior Land System:

SLU	% of area	Main features #
GaA	25.4	<p>Very gently undulating flats and swales, with limited gilgai, formed on Tertiary clays and sandy clays. Gilgai flats tend to be in lower lying areas.</p> <p>Main soils: <u>sand over dispersive brown clay</u> - G4 (V) on flats and higher elevation swales, <u>hard grey cracking clay</u> - E3 (L) and <u>black cracking clay</u> - E1 (M) on flats and lower elevation swales, and <u>hard loam over dispersive brown clay</u> - F2 (M) on broader flats. Key properties:</p> <p>Drainage: Imperfect due to dispersive clay subsoils or heavy poorly structured clays. Fertility: Marginal (sandy G4 soils) to high (E1 black clays). Physical condition: Sandy G4 soils and black E1 clays have loose sandy or friable surfaces which do not impede root growth. The loamy texture contrast soils (F2) and grey E3 clays have hard surfaces which restrict emergence and root growth. All subsoil clays restrict root growth.</p> <p>AWHC: Moderate to high. Salinity: Moderate to moderately high in subsoils. Erosion potential: Water: Low. Wind: Moderately low.</p> <p>Water repellence: Nil (clays) to moderate (sandy soils) Rockiness: Nil. Other: Boron toxicity may be expected in clay soils.</p> <p><u>Summary:</u> The flats are generally imperfectly drained due to dispersive or heavy clay subsoils. Fertility varies from marginal on sand over clay soils to high on black cracking clays. Poor surface structure may be a problem on grey clays and loamy texture contrast soils. Subsoil salinity and boron toxicity may be expected.</p>
OBF	5.5	<p>Jumbled and parabolic sand dunes to 10 metres in height, with small enclosed swales occupying less than 40% of the total area. Underlying materials are calcified clays, extensively overlain by Molineaux Sand.</p> <p>Main soils: <u>deep bleached sand</u> - H3 (V) on dunes, with <u>sand over dispersive brown clay</u> - G4 (L) and <u>thick sand over friable clay</u> - G3 (L) in swales.</p> <p>Key properties:</p> <p>Drainage: Rapid (sand hills). Imperfect to well drained in swales, depending on the nature and depth of the subsoil. G4 subsoils cause water to perch. Fertility: Very low (sand hills). Marginal (swales). Physical condition: Good in surface soils. Dispersive subsoils restrict root growth; G3 and H3 subsoils are not limiting.</p> <p>AWHC: Moderately low (sandhills - H3 soils) to moderate in G4 soils and moderately high in G3 soils. Salinity: Low (sand hills). Moderate (swales). Erosion potential: Water: Low. Wind: Moderate to high (sand hills). Moderately low (swales).</p> <p>Water repellence: High (sandhills), moderate (swales). Rockiness: Nil. Other: Saline seepage at base of some sand hills.</p> <p><u>Summary:</u> Deep very infertile water repellent sands on dunes. Marginal fertility sandy soils with dispersive subsoils causing impeded drainage and root growth in some swales, and deeper well drained sand over clay soils in others.</p>



<p>OBJ</p>	<p>61.7</p>	<p>Gently undulating plains formed on calcified clays, partially overlain by low dunes of Molineaux Sands. Dune coverage is 30-60%. They are low (up to 5 metres) and although jumbled tend to be more strongly aligned in an east - west direction than do the dunes in OBF. The overall pattern is a mosaic of rounded low dunes and flats. The dunes are less than 300 metres apart. Where the intervening flats are wider than this, they are mapped out as GaA or TTA. Main soils: <u>deep bleached sand</u> - H3 (E) on dunes, with <u>sand over dispersive brown clay</u> - G4 (E), and <u>hard grey cracking clay</u> - E3 (C) on flats.</p> <p>Key properties:</p> <p>Drainage: Rapid on sand hills. Imperfect on flats due to dispersive subsoils or heavy clays.</p> <p>Fertility: Very low on sand hills. Marginal (G4 soils) to moderate (E3 soils) on flats.</p> <p>Physical condition: Most surface soils are sandy and non limiting. Exceptions are hard clays which cause patchy emergence and uneven root growth. Subsoils in both soils of the flats are very restrictive to root growth.</p> <p>AWHC: Moderately low (deep sands) to high (cracking clays).</p> <p>Salinity: Low (sand hills). Moderate (flats).</p> <p>Erosion potential: Water: Low. Wind: High (sand hills). Moderately low to low (flats).</p> <p>Water repellence: High (sandhills), moderate (sandy flats), low (clay flats)</p> <p>Rockiness: Nil.</p> <p>Other: Saline seepage at base of some sand hills.</p> <p><u>Summary:</u> Marginally to moderately fertile sand over dispersive clays, and poorly structured but fertile cracking clays on flats (all imperfectly drained), with deep very infertile water repellent sands on dunes.</p>
<p>TTA</p>	<p>7.4</p>	<p>Low lying flats and swales, with extensive gilgai, formed on clayey sediments of Tertiary age. Main soils: <u>hard grey cracking clay</u> - E3 (E) and <u>hard loam over dispersive brown clay</u> - F2 (C), with <u>black cracking clay</u> - E1 (L) in gilgai areas, and <u>sand over dispersive brown clay</u> - G4 (C) elsewhere.</p> <p>Key properties:</p> <p>Drainage: Imperfect to poor due to heavy poorly structured clays and / or dispersive clay subsoils.</p> <p>Fertility: Moderate to high (heavier textured soils) to moderately low (sandy soils).</p> <p>Physical condition: The loamy F2 soils and grey E3 clays have hard surfaces which restrict emergence and root growth. Sandy soils and black clays have loose sandy or friable surfaces which do not impede root growth. All subsoil clays restrict root growth.</p> <p>AWHC: Moderate to high.</p> <p>Salinity: Moderately high in subsoils.</p> <p>Erosion potential: Water: Low. Wind: Moderately low.</p> <p>Water repellence: Nil (clays soils) to moderate (sandy soils)</p> <p>Rockiness: Nil.</p> <p>Other: Boron toxicity may be expected in clay soils.</p> <p><u>Summary:</u> The flats are generally imperfectly to poorly drained due to heavy and/or dispersive clay soils at or near the surface. Fertility varies from moderate to high for the heavier soils to moderately low on sand over clay soils. Poor surface structure is widespread. Subsoil salinity and boron toxicity can be expected.</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:

- E1** Black cracking clay (Self-mulching, Black Vertisol)
Black self-mulching seasonally cracking clay, becoming coarser structured, greyer and calcareous with depth.
- E3** Hard grey cracking clay (Epipedal, Grey Vertisol)
Hard coarse blocky seasonally cracking grey clay, calcareous and prismatically structured at depth.
- F2** Hard loam over dispersive brown clay (Hypercalcic, Brown Sodosol)
Medium thickness hard setting loamy sand to loam abruptly overlying a coarsely structured grey brown, yellow and red clay grading to soft carbonate.
- G3** Thick sand over friable clay (Eutrophic / Calcic, Brown Chromosol)
Thick to very thick bleached sand to loamy sand with an organically darkened surface abruptly overlying a friable yellowish brown and red sandy clay, with or without soft carbonate accumulations.
- G4** Sand over dispersive brown clay (Hypercalcic, Brown Sodosol)
Thin to medium thickness sand sharply overlying a brown and yellow or grey mottled dispersive clay with strong columnar structure, 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.

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

