

TIS Tilley Swamp Land System

Inter-dune corridor extending from Tilley Swamp to Martin's Washpool

Area: 183.8 km²

Annual rainfall: 500 – 550 mm average

Geology: The land system is formed on calcareous clays and limestones of the Padthaway Formation, and swamp floor clays and marls. Scattered throughout are isolated calcarenite rises, remnants of low dune systems largely buried by lagoonal sediments.

Topography: The land system is an elongate corridor with an imperceptible slope to the north. There is also a very gentle grade to the west. Surface water flowing in from the south moves northwards along the western side of the corridor. A narrow gap in the north separates the main corridor from the broad expanse of Martin's Washpool, the natural discharge area for the water course. Although there is no natural outlet from the Washpool, a drain has been excavated through a low calcarenite ridge to allow flood waters to flow into the Coorong via Salt Creek.

Elevation: 20 m on rising ground in the south to 3 m in Martin's Washpool

Relief: Less than 5 m

Soils: There is a range of shallow to moderately deep calcareous loamy sands to loams, some characteristically shelly. Sandy soils are sub-dominant.

Main soils: *Soils of flats*

- N2a** Sand over yellow and grey saline clay
- N2b** Wet saline calcareous loam
- N2c** Wet saline clay over sand
- A7** Dark calcareous loam overlying buried sand over clay soil

Minor soils: *Soils of flats*

- A1** Shelly loam
- B7/G3** Loamy sand over sandy clay loam
- A5** Calcareous loam
- F2** Sandy loam over grey clay
- G3/G4** Sand over dispersive brown clay

Soils on rising ground

- B8** Shallow sand on calcrete
- B2/B3** Shallow calcareous loamy sand on calcrete
- H3/H2** Deep sand

Main features: The Tilley Swamp Land System is an extensive flat with increasing problems of salinization and flooding. The soils are variable, but calcareous loams and sand over clays are the most common. Fertility and depth limitations are overshadowed by salinity and waterlogging. Over most of the northern parts where salinity is highest, pasture productivity depends on the establishment of salt and flooding tolerant species. In the south where the flats are not as wet or saline and where there are significant areas of rising ground, production potential is higher, limited mainly by fertility and restricted waterholding capacity.



Soil Landscape Unit summary: 13 Soil Landscape Units (SLUs) mapped in the Tilley Swamp Land System

SLU	% of area	Main features #
MJB	3.1	<p>Low isolated rises projecting from the flats, formed on calcreted calcarenite. There is extensive calcrete outcrop - up to 20% in places, and variable surface stone.</p> <p>Main soils: <u>shallow sand on calcrete</u> - B8 (E) and <u>shallow calcareous loamy sand on calcrete</u> - B2/B3 (E) with <u>deep sand</u> - H3/H2 (L).</p> <p>Key properties:</p> <p>Drainage: Rapidly to well drained.</p> <p>Fertility: Moderately low to low.</p> <p>Physical condition: No physical limitations to root growth in the soil.</p> <p>AWHC: Very low to moderate, depending on depth to calcrete.</p> <p>Salinity: Low.</p> <p>Erosion potential: Water: Low to moderate. Wind: Low to moderately low.</p> <p>Water repellence: Low to moderate (on sand spreads)</p> <p>Rockiness: Up to 20% calcrete stone and outcrop.</p> <p><u>Summary:</u> The rises are well drained and not saline, but occur as small "islands" surrounded by saline flats. Most rises have not been developed and usually carry scrub.</p>
MJn	8.4	<p>Complex of low stony rises formed on calcreted calcarenite with up to 20% swampy depressions formed on lagoonal clays and limestones.</p> <p>Main soils: <u>shallow sand on calcrete</u> - B8 (E), <u>shallow calcareous loamy sand on calcrete</u> - B2/B3 (C) and <u>deep sand</u> - H3/H2 (L) on rises, with <u>sand over yellow and grey saline clay</u> - N2a (L), <u>saline clay over sand</u> - N2c (M) and <u>wet saline calcareous loam</u> - N2b (M) on flats.</p> <p>Key properties:</p> <p>Drainage: Well drained (rises). Poorly drained (depressions).</p> <p>Fertility: Low.</p> <p>Physical cond.: Good. No soil physical limitations to root growth.</p> <p>AWHC: Low to moderate.</p> <p>Salinity: Low (rises). High to very high (depressions).</p> <p>Erosion potential: Water: Low. Wind: Low.</p> <p>Water repellence: Nil.</p> <p>Rockiness: Up to 20% surface and outcropping calcrete (rises). Nil in depressions.</p> <p><u>Summary:</u> The rises are well drained and non saline, but soils are usually shallow and infertile. However, they are capable of useful pasture production. The flats are usually too saline for conventional pasture species.</p>
MRL MRt	9.5 3.0	<p>Complex of low rises, up to 10 m high, formed on calcreted calcarenite with overblown sands, and flats formed on calcified clayey sands to sandy clays of the Padthaway Formation. Ratio of flats to rises is about 1:1. There are occasional granite outcrops in the south.</p> <p>MRL Flats are generally well drained.</p> <p>MRt Some flats are swampy.</p> <p>Main soils: <u>shallow calcareous loamy sand on calcrete</u> - B2/B3 (C), <u>shallow sand on calcrete</u> - B8 (L) and <u>deep sand</u> - H3/H2 (L) on rises, with <u>sand over dispersive brown clay</u> - G3/G4 (C) and <u>loamy sand over sandy clay loam</u> - B7/G3 (L) on better drained flats, and <u>sand over yellow and grey saline clay</u> - N2a (M) with <u>wet saline calcareous loam</u> - N2b (M) and <u>saline clay over sand</u> - N2c (M) on swampy flats.</p> <p>Key properties:</p> <p>Drainage: Well drained (rises). Moderately well to imperfectly drained (higher flats). Poorly drained (swamps).</p> <p>Fertility: Low to moderately low.</p> <p>Physical condition: No restrictions in surface soils. Subsoils are dispersive and restrictive in sand over clay soils.</p> <p>AWHC: Moderately low to moderate.</p> <p>Salinity: Low (rises). Moderate (higher flats). Very high (swampy flats).</p> <p>Erosion potential: Water: Low to moderately low. Wind: Low.</p> <p>Water repellence: Nil generally. Moderate on sandy rises.</p>



		<p>Rockiness: Up to 10% surface calcrete and outcrop on rises. Nil on flats.</p> <p><u>Summary:</u> Mixture of well drained stony and sandy rises with shallow low fertility soils, and flats with deeper soils, increasingly affected by rising saline water tables.</p>
NVA	5.4	<p>Flat plains formed on calcified clays, shell grits or rubbly to semi-hard or hard calcrete. Main soils: <u>shelly loam</u> - A1 (E), <u>dark calcareous loam overlying buried sand over clay soil</u> - A7 (E) and <u>loamy sand over sandy clay loam</u> - B7/G3 (E).</p> <p>Key properties:</p> <p>Drainage: Well to moderately well drained.</p> <p>Fertility: Moderate.</p> <p>Physical condition: Good.</p> <p>AWHC: Moderate.</p> <p>Salinity: Moderately low to moderate, but at risk from rising water tables.</p> <p>Erosion potential: Water: Low. Wind: Low.</p> <p>Water repellence: Nil.</p> <p>Rockiness: Less than 2% surface calcrete.</p> <p><u>Summary:</u> Marginally saline flats with variable depth reasonably fertile soils characterized by shell grit.</p>
ZnJ Znj	18.3 4.9	<p>Flat plains with occasional small (unmappable) swamps, on the eastern side of the corridor, formed on clayey and limestone sediments of the Padthaway Formation. There are minor sandy or stony rises. The land is seasonally waterlogged and affected by rising saline groundwater tables.</p> <p>ZnJ Flats in the south</p> <p>Znj Flats further downstream in the corridor where salinity is higher and where land is inundated in wet years. Vegetation is typically cutting grass and tea tree.</p> <p>Main soils: <u>sand over dispersive brown clay</u> - G3/G4 (E), <u>loamy sand over sandy clay loam</u> - B7/G3 (C-M), <u>calcareous loam</u> - A5 (L-M) and <u>dark calcareous loam overlying buried sand over clay soil</u> - A7 (C-E). <u>Sand over yellow and grey saline clay</u> - N2a (M-L), <u>wet saline calcareous loam</u> - N2b (M) and <u>wet saline calcareous loam</u> - N2b (M) occur in swamps.</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 (ZnJ) to very high (Znj). This land is influenced by rising saline ground water tables.</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>
ZnL	2.6	<p>Flats with up to 30% low stony calcreted rises. Lowest lying ground tends to be swampy. The land is formed on clayey and limestone sediments of the Padthaway Formation, with outcrops of calcreted Bridgewater Formation. The land is seasonally waterlogged and affected by saline groundwater tables.</p> <p>Main soils: <u>sand over dispersive brown clay</u> - G3/G4 (E) on flats, <u>sand over yellow and grey saline clay</u> - N2a (E) in swamps, and <u>shallow sand on calcrete</u> - B8 (C) on rises.</p> <p>Key properties:</p> <p>Drainage: Flats are poorly drained due to a combination of shallow water tables and dispersive clay subsoils. Rises are well drained.</p> <p>Fertility: Moderately low on flats to low on rises.</p> <p>Physical condition: No limitation in surface soils. Dispersive subsoils on flats restrict root growth.</p> <p>AWHC: Moderate to low.</p> <p>Salinity: Flats - high. Rises - low to moderately low.</p> <p>Erosion potential: Water: Low. Wind: Low.</p> <p>Water repellence: Nil.</p>



		<p>Rockiness: Minor (flats). Up to 20% surface calcrete stone (rises).</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). The rises are not salt affected, but have low fertility, shallow stony soils.</p>
ZqJ Zqj	8.0 9.7	<p>Flats transitional from the very wet and saline ZqO flats to the west and the less swampy ZnJ flats to the east. The landscape is inundated in wet years. The land is formed on calcified sediments of the Padthaway Formation, with some swamp floor calcareous clays and marls. Typical vegetation is tea tree and cutting grass.</p> <p>Zqj is a more saline variant, occurring further downstream in the corridor. Inundation is more likely than on ZqJ.</p> <p>Main soils: <u>sand over dispersive brown clay</u> - G3/G4 (E), <u>dark calcareous loam overlying buried sand over clay soil</u> - A7 (E) and <u>shelly loam</u> - A1 (C-L), with <u>sand over yellow and grey saline clay</u> - N2a (M-L), <u>wet saline calcareous loam</u> - N2b (M) and <u>saline clay over sand</u> - N2c (M) in swamps.</p> <p>Key properties:</p> <p>Drainage: Poorly to very poorly drained. Fertility: Moderately low to moderate. Physical condition: Good (surface). Fair in subsoil (dispersive clays). AWHC: Moderate. Salinity: High (NqJ) to very high (Nqj). Erosion potential: Water: Low. Wind: Low. Water repellence: Nil. Rockiness: Nil.</p> <p><u>Summary:</u> This land is affected by rising saline groundwater tables and flooding to the extent that conventional pasture species are unlikely to persist over much of the land.</p>
ZqL	1.7	<p>Complex of 50% swampy flats and 50% low stony ridges of Martin's Washpool, the natural discharge area of the Tilley Swamp water course. A drain has been excavated through this landscape to assist the flow of water from the narrow gap to the east to the flats of the Washpool.</p> <p>Main soils: <u>wet saline calcareous loam</u> - N2b (C) and <u>saline clay over sand</u> - N2c (C) on swampy flats, with <u>shallow sand on calcrete</u> - B8 (C), <u>shallow (calcareous) loamy sand on calcrete</u> - B2/B3 (C) and <u>deep sand</u> - H3/H2 (M) on rises.</p> <p>Key properties:</p> <p>Drainage: Poor (flats). Well drained (rises). Fertility: Low. Physical condition: Good (surface). Fair to poor on flats (dispersive subsoils). AWHC: Low to moderate. Salinity: Very high (flats). Low (rises). Erosion potential: Water: Low. Wind: Low. Water repellence: Nil. Rockiness: Nil (flats). Up to 20% calcrete stone and outcrop (rises).</p> <p><u>Summary:</u> This land is largely contained within the Conservation Park. The shallow stony soils of the rises and the wet saline soils of the flats have limited productive capacity.</p>
ZqO	23.7	<p>Seasonally inundated flats and swamps formed on lagoonal sediments along the western side of the corridor. Typical vegetation is cutting grass and tea tree. These flats are severely affected by saline water tables.</p> <p>Main soils: <u>wet saline calcareous loam</u> - N2b (C), <u>calcareous loam</u> - A5 (L), <u>sand over yellow and grey saline clay</u> - N2a (L), <u>sandy loam over grey clay</u> - F2 (L), <u>dark calcareous loam overlying buried sand over clay soil</u> - A7 (L) and <u>shelly loam</u> - A1 (L).</p> <p>Key properties:</p> <p>Drainage: Poorly to very poorly drained. Fertility: Not applicable. Physical condition: Not applicable. AWHC: Not applicable. Salinity: Very high to extreme. Erosion potential: Water: Low. Wind: Low. Water repellence: Nil. Rockiness: Nil.</p>



		Summary: These flats are extremely wet and saline and have limited productive potential without the establishment of salt and flooding tolerant pastures. Conditions may be too severe for successful establishment.
ZS-	1.7	Saline swamps formed on calcareous clays and marls. These natural features occur in the lowest points of the local landscape. They are usually seasonally inundated and devoid of vegetation. Main soils: wet saline calcareous loam - N2b (E), sand over yellow and grey saline clay - N2a (E) and saline clay over sand - N2c (E). Key properties: Drainage: Very poorly drained. Fertility: Not applicable. Physical condition: Not applicable. AWHC: Not applicable. Salinity: Very high to extreme. Erosion potential: Water: Low. Wind: Low. Water repellence: Nil. Rockiness: Nil. Other: Seasonal inundation. Summary: The swamps are too saline for any production other than opportunistic light grazing, provided that the halophytic vegetation is protected.

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:

- A1** Shelly loam (Shelly Calcarosol)
Thick dark shell-gritty loam over variable thickness white to grey sandy loam to clay loam over rubbly carbonate at about 75 cm.
- A5** Calcareous loam (Regolithic, Lithocalcic Calcarosol OR Calcarosolic, Salic Hydrosol)
Medium thickness calcareous sandy loam to clay loam overlying rubbly carbonate at depths varying from 20 to 70 cm.
- A7** Dark calcareous loam overlying buried sand over clay soil (Calcarosol over Sodosol)
Medium thickness black calcareous loam to clay loam (often shelly), overlying a bleached sand abruptly overlying a grey and brown mottled sandy clay loam to clay within 100 cm.
- B2/B3** Shallow calcareous loamy sand on calcrete (Petrocalcic Calcarosol / Tenosol)
Up to 40 cm (calcareous) loamy sand to sandy loam with variable calcrete rubble overlying calcreted calcarenite.
- B8** Shallow sand on calcrete (Petrocalcic, Leptic Tenosol / Petrocalcic, Bleached-Orthic Tenosol)
Up to 50 cm non calcareous sand, sometimes with a yellowish clayey sand subsoil over calcreted calcarenite within 75 cm.
- F2** Sandy loam over grey clay (Hypercalcic, Grey Sodosol)
20-45 cm loamy sand to loam with a bleached A2 layer, overlying a grey mottled coarsely structured clay, calcareous with depth, grading to fine to medium grained lagoonal sediments.
- B7/G3** Loamy sand over sandy clay loam (Lithocalcic, Brown Kandosol / Sodosol)
Medium thickness loamy sand with a bleached A2 layer over a brown and grey mottled clayey sand to sandy clay loam, and rubbly carbonate within 50 cm.



- G3/G4** Sand over dispersive brown clay (Calcic, Brown Sodosol)
Medium thickness loose sand with a bleached A2 layer, abruptly overlying a brown and grey mottled sandy clay to clay with coarse columnar structure, calcareous with depth.
- H3/H2** Deep sand (Basic, Arenic, Bleached-Orthic / Brown Orthic Tenosol)
Thick brown sand with a bleached or paler coloured A2 layer, grading to a yellow or brown sand continuing below 100 cm.
- N2a** Sand over yellow and grey saline clay (Sodosolic, Salic Hydrosol)
Medium thickness loamy sand to sandy loam abruptly overlying a grey and yellow brown mottled clay (seasonally saturated), with rubbly to soft carbonate at depth.
- N2b** Wet saline calcareous loam (Calcarosolic, Salic Hydrosol)
Grey very highly calcareous loam grading to a pale grey clay loam over a white very highly calcareous silty clay loam to clay (commonly called "pipeclay") by about 30 cm, with a water table within 100 cm.
- N2c** Wet saline clay over sand (Petrocalcic, Calcarosolic, Salic Hydrosol)
Thin highly calcareous dark clay over a very highly calcareous pale mottled clayey sand with sporadic weak calcrete pans and water table within 100 cm.

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

