DUI Duck Island Land System

Saline flats in the Duck Island area

Area: 79.4 km^2

Annual rainfall: 515 – 545 mm average

Geology: Calcareous clays and limestones of the Padthaway Formation, partially overlain by Molineaux Sand.

Topography: The Duck Island Land System is transitional between the broad plains of the Marcollat Land System, and the sand hill - swamp complex of the McNamara Land System. The plains are partly overlain by low rounded sand rises, with the occasional steeper jumbled dune. Water from the south collects in the flats and swampy depressions. Waterlogging and flooding are compounded by the rise of saline groundwater tables to within a metre or less of the surface over much of the area.

Elevation: 15 - 30 m

Relief: Up to 15 m (isolated sand dunes). Elsewhere, less than 5 m (low sand rises)

Soils: There is a range of soils on the flats; many are wet and saline. Sand over clay, grey clay and calcareous loam are all common. On rising ground, sandy soils predominate, some with and some without clayey subsoils.

Main soils

Soils of wet saline flats

N2a Sand over grey mottled saline waterlogged clay
N2b Wet highly saline sand
N2c Wet highly saline grey clay
N2d Wet saline calcareous loam

Soils of seasonally wet flats

G4 Sand over grey mottled dispersive clay

Soils of sandy rises

H3 Deep bleached sand
G2 Sand grading to sandy clay loam

Minor soils

Soils of moderately well drained flats

G3 Thick sand over friable clay

Main features: The Duck Island Land System is characterized by seasonally inundated saline flats, and associated low sandy rises with minor dunes. Most of the flats are too saline for conventional pasture species to survive, and salt tolerant pastures are required. The sandy rises have low fertility and are prone to water repellence and wind erosion.

Soil Landscape Unit summary: 6 Soil Landscape Units (SLUs) mapped in the Duck Island Land System:

SLU	% of area	Main features #
OSS	2.8	Moderate to steep longitudinal, parabolic or jumbled siliceous sand hills, up to 15 m high, with about 10% swampy swales where the saline groundwater table is at the surface. Main soils: deep bleached sand - **H3** (V) on dunes, thick sand over friable clay - **G3** (L) on lower slopes and well drained swales, and sand grading to sandy clay loam - **G2** (L) on low rises, with sand over grey mottled dispersive clay - **G4** (M), sand over grey mottled saline waterlogged clay - **N2a** (M) and wet highly saline sand - **N2b** (M) in swampy swales. Key properties: Drainage: Rapid (rises). Poor (swampy swales). Fertility: Very low to low (rises). Moderate (swales). Physical condition: No limitations in surface soils. Clayey subsoils in some swales are dispersive and restrict root growth. AWHC: Moderately low (rises). Moderate (swales). Salinity: Low (rises). Very high (swales). Erosion potential: Water: Low. Wind: High. Low to moderate in swales. Water repellence: High (rises). Low in swampy swales. Rockiness: Nil. Summary: The land is dominated by low fertility sandhills prone to water repellence and wind erosion. Swampy swales are generally confined between sandhills and the salinity is unlikely to expand significantly.
ZnJ Znj	5.5 34.8	Flat plains with occasional small (unmappable) swamps, and sandy or stony rises formed on clayey and limestone sediments of the Padthaway Formation. The land is seasonally waterlogged and affected by saline groundwater tables. Znj is land where salinity is higher and which is subject to inundation in wet years. Main soils: sand over grey mottled saline waterlogged clay / wet highly saline sand - **N2a** / **N2b** (E) and sand over grey mottled dispersive clay - **G4** (E). Key features: Drainage: Imperfectly to poorly drained, due to shallow water tables and dispersive clay subsoils. Fertility: Moderately low. Physical condition: Surface soil is not limiting. Dispersive subsoils prevent satisfactory root growth. AWHC: Moderate. Salinity: High (**ZnJ**) to very high (**Znj**). This land is influenced by rising saline ground water tables. Erosion potential: Water: Low Wind: Low. Water repellence: Nil. Rockiness: Nil. Summary: 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).
ZnM	8.5	Very gently undulating plains with occasional small (unmappable) swamps, and approximately 25% of the area covered by sandy rises up to two metres high. The land is formed on clayey and limestone sediments of the Padthaway Formation, partially overlain by Recent windblown sands. The land is seasonally waterlogged and affected by saline groundwater tables. Main soils: sand over grey mottled dispersive clay - **G4** (E), sand over grey mottled saline waterlogged clay - **N2a** (C) and wet highly saline sand - **N2b** (L) on flats and swamps, with deep bleached sand - **H3** (L) and sand grading to sandy clay loam - **G2** (L) on rises. Key features: Drainage: Imperfectly to poorly drained, due to shallow water tables and dispersive clay subsoils. Well drained on rises.

		Fertility: Moderately low. Very low on rises. Physical condition: Surface soil is not limiting. Dispersive subsoils prevent satisfactory root growth. No limitations on rises. AWHC: Moderate. Salinity: Flats: High. Rises: Low Erosion potential: Water: Low. Wind: Low. High on rises. Water repellence: Nil on flats. High on rises. Rockiness: Nil. Summary: 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). The rises are not salt affected, but have very low fertility, water repellent soils.
ZoP	47.1	Complex landscape of flats and swamps interspersed with sand dune 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 (swamp sediments), partially overlain by Recent windblown sands. Main soils: variable wet saline soils - **N2a**, **N2b**, **N2c** and **N2d** (E) in swamps, sand over grey mottled dispersive clay - **G4** (L) on flats, and deep bleached sand - **H3** (E) with sand grading to sandy clay loam - **G2** (L) on rises. Key features: Drainage: Poor to very poor (flats and swamps). Rapid (rises and dunes). Fertility: Moderately low (flats). Very low to low (rises). Physical condition: Surface soils have no limitations. Subsoils on flats are dispersive and restrict root growth. Subsoil structure not limiting on rises. AWHC: Moderate (flats) to moderately low (rises). Salinity: High to extreme (flats and swamps). Low (rises). Erosion potential: Water: Low. Wind: Low (flats). Moderate to high (rises). Water repellence: Low (flats) to high (rises). Rockiness: Nil. Summary: Complex of rises with low fertility, water repellent, but non saline sands, and saline flats with saline swamps. This is difficult land to manage because of the range and severity of limitations.
ZS-	1.3	Saline swamps formed on calcareous clays and marls. These are natural features, representing the lowest points in the local landscape. They are usually seasonally inundated. Highly saline watertables are at or near the surface all year. Typical vegetation is tea tree, cutting grass, samphire (or commonly bare). Main soils: wet highly saline grey clay - **N2c** (E) and wet saline calcareous loam - **N2d** (E). Key features: Drainage: Very poorly drained. Fertility: Not relevant. Physical condition: Not relevant. AWHC: Not relevant. Salinity: Very high to extreme. Erosion potential: Water: Low. Wind: Low. Water repellence: Nil Rockiness: Nil. Summary: The swamps have little or no agricultural value, and where original vegetation exists, damage by livestock is likely.

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:

Soils of wet saline flats

N2a Sand over grey mottled saline waterlogged clay (Sodosolic Hydrosol)
Medium thickness loamy sand abruptly overlying a grey and yellow brown mottled clay (seasonally saturated), with rubbly to soft carbonate at depth.

N2b Wet highly saline sand (Sandy Calcarosolic / Tenosolic Salic Hydrosol)
Thick bleached (calcareous) sand over a grey and yellow mottled clayey sand in a water table at about 100 cm. Sand commonly overlain by organic mat or dark clay loam up to 10 cm thick.

N2c 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 100 cm.

N2d Wet saline calcareous loam (Calcarosolic, Hypersalic Hydrosol)
Grey very highly calcareous loam grading to a pale grey clay loam over a white very highly calcareous silty clay loam by about 30 cm, with a water table within 100 cm.

Soils of seasonally wet flats

G4 Sand over grey mottled dispersive clay (Hypercalcic / Lithocalcic, Grey Sodosol)
Medium thickness loamy sand abruptly overlying a grey and yellow brown mottled clay, with rubbly to soft carbonate at depth.

Soils of moderately well drained flats

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.

Soils of sandy 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.

Further information: DEWNR Soil and Land Program