CAO Caora Land System

Gently undulating flats and low rises in the central part of the Hundred of Wells

Area: 48.9 km^2

Annual rainfall: 550 – 570 mm average

Geology: The System is formed on sandy clays and limestones of the Padthaway Formation, lying between isolated outcrops of Bridgewater Formation calcarenites. Limited areas of Molineaux Sand overlie these formations.

Topography: The Land System is a complex of calcarenite rises and very gently undulating corridors and depressions. The rises are up to 30 m high, with variable sheet rock outcrops of calcrete, and associated surface stone, and sand spreads. The corridors vary from relatively well drained higher level flats, to closed depressions with variable swamps, formed as saline groundwater rises to the surface. All flats are affected to some degree by salinization, and are at risk of increased problems.

Elevation: 20 - 50 m

Relief: Up to 30 m

Soils: Soils on rising ground are either moderately shallow and stony, or deep and sandy. On flats, sand over clay and calcareous loams dominate the better drained areas, with wet saline soils on poorly drained land.

Main soils
Soils on rises
B3 Shallow stony loamy sand over calcrete
B7a Sand over brown clay on calcrete
G2 Loamy sand over sandy clay loam
H3 Deep bleached sand
Soils on moderately well to imperfectly drained flats
B7/N2 Sand over saline clay on calcrete
N2/G4 Sand over saline clay

Minor soils
Soils on moderately well to imperfectly drained flats
A5 Calcareous sandy loam
B7b Sand over brown clay on calcrete
G3/G4 Sand over dispersive clay
Soils on wet saline flats
N2a Saline clay over sand
N2b Wet highly saline calcareous loam

Main features: The Caora Land System is a complex landscape of well drained and non saline rises with low fertility sandy and shallow stony soils, and variable soils on flats and depressions subject to salinization by rising ground water tables. Productivity depends on maintaining or improving fertility on rises and establishing salt tolerant species on flats.

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

SLU	% of area	Main features #
MJC	40.0	Undulating to rolling rises and low hills formed on calcreted calcarenite and overlain by siliceous sand. There is up to 30 m relief and slopes vary from 3-12%. There is variable surface calcrete, depending on presence of sand. 10-20% stone cover is common, with outcropping reefs and heavy stone in places. Main soils: loamy sand over sandy clay loam - **G2** (E), deep bleached sand - **H3** (E), shallow stony loamy sand over calcrete - **B3** (C) and sand over brown clay on calcrete - **B7a** (L). Key properties: Drainage: Rapidly to well drained. Fertility: Very low on deep sands to moderately low on stony soils. Physical condition: Surface soils are soft to loose and do not restrict root growth. Where subsoils occur they are friable and not restrictive to root growth. AWHC: Moderate on sandy soils. Very low to low on stony soils, due to shallow depth to hard calcrete. Salinity: Low. Erosion potential: Water: Low to moderate, depending on slope. Wind: High on sand spreads to moderately low on stony ground. Water repellence: Strong on sand spreads. Low to slight on stony land. Rockiness: Nil on sand spreads. Variable to 50%, usually less than 20%. Other: The higher rises are exposed. Summary: Deep, low fertility, water repellent and erodible sands with shallow, stony soils of marginal fertility.
MJb MJt	11.8 12.8	Complex of calcarenite rises and depressions. **MJb** Low rises with about 20% flats and minor swamps. **MJt** Low rises with about 20% swampy flats. Main soils: shallow stony loamy sand on calcrete - **B3** (C), loamy sand over sandy clay loam - **G2** (L), sand over brown clay on calcrete - **B7a** (L) and deep bleached sand - **H3** (L) on rises. Soils on flats include sand over brown clay on calcrete - **B7b** and sand over dispersive clay - **G3/G4** (moderately well drained), sand over saline clay (on calcrete) - **N2/G4** and **B7/N2** (imperfectly drained), and wet saline soils - **N2a** and **N2b** in swamps. Key properties: Drainage: Well drained on rises. Moderately well to poorly drained in depressions. Fertility: Moderately low to low. Physical condition: No limitations to root growth. AWHC: Moderate. Salinity: Moderately low on rises. Moderate to very high in depressions. Erosion potential: Water: Low Wind: Moderately low. Water repellence: Moderately low. Rockiness Up to 20% surface calcrete on rises. Summary: Low fertility (but well drained and non saline soils) on rises are dominant. Flats are variable; the less saline areas are potentially productive, but rising saline water tables are reducing this potential.
NAp	16.2	Very gently undulating flats formed on Padthaway Formation sediments with extensive very low sandy rises and limited poorly drained depressions. Main soils: sand over brown clay on calcrete - **B7b** (E) on moderately well drained flats, loamy sand over sandy clay loam - **G2** (E) on rises, sand over dispersive clay - **G3/G4** (L) on imperfectly drained flats, and sand over saline clay on calcrete - **B7/N2** (M) and sand over saline clay - **N2/G4** (M) in poorly drained depressions. Key properties: Drainage: Moderately well drained (flats), rapidly drained (rises) and poorly drained (depressions).

		Fertility: Moderately low to low. Physical condition: No restrictions to root growth except in subsoils of dispersive G3/G4 soils. AWHC: Moderate to moderately low. Salinity: Moderate (flats), low (rises), moderately high (depressions). Erosion potential Water: Low Wind: Moderate to moderately low. Water repellence: Moderate to low. Rockiness: Minor surface calcrete on flats. Summary: These flats are potentially productive with mostly well drained moderately deep soils. The main threats are likely increases in salinity and waterlogging as saline ground water tables rise.
ZnJ ZnL ZnO Znl	6.4 8.5 1.6 2.7	Flats formed on Padthaway Formation sediments, generally affected by saline ground water tables. There are varying proportions of swampy depressions and low calcarenite rises. **ZnJ** Flats with minor swamps. **ZnL** Flats with low stony rises. **ZnO** Flats with extensive swampy depressions. **Znl** Flats with low stony rises and extensive swamps. Main soils: sand over saline clay - **N2/G4** (C-L), sand over saline clay on calcrete – **B7/N2** (C-L) and calcareous sandy loam - **A5** (C-L), with wet saline soils - **N2a** and **N2b** (M-E) in swampy depressions. Sand over friable brown clay on calcrete - **B7a** (M-L) and shallow stony loamy sand over calcrete - **B3** (M-L) occur on stony rises. Key properties: Drainage: Poor to very poor (except stony rises). Fertility: Moderately low. Physical condition: No surface limitations, but some subsoils are dispersive and restrict root growth. AWHC: Moderate. Salinity: High to very high. Erosion potential: Water: Low. Wind: Moderately low to low. Water repellence: Low. Rockiness: Nil (except on stony rises). Summary: These flats have low productive potential unless sown to salt and waterlogging tolerant pasture species. Most of the land is too saline for conventional grasses and clovers.

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:

A5 Calcareous sandy loam (Supracalcic Calcarosol)
Calcareous sandy loam grading to a grey highly calcareous sandy clay loam over rubbly calcrete within 60 cm.

B3 Shallow stony loamy sand over calcrete (Petrocalcic, Leptic Tenosol)
Loamy sand to loam with variable rubble and slight clay increase with depth overlying calcreted calcarenite shallower than 50 cm.

B7a Sand over brown clay on calcrete (Petrocalcic, Brown Chromosol)
Medium thickness sand overlying yellowish brown friable clay on calcreted calcarenite within 50 cm.

B7b Sand over brown clay on calcrete (Petrocalcic, Brown Chromosol/ Sodosol)
Medium thickness sand overlying yellowish brown firm to friable clay on calcreted limestone or sandy clay within 50 cm.

B7/N2 Sand over saline clay on calcrete (Petrocalcic, Sodosolic, Salic Hydrosol)
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.

G2 Loamy sand over sandy clay loam (Petrocalcic, Brown Chromosol / Kandosol)
Medium to thick loamy sand with a bleached A2 layer abruptly overlying a brownish friable light sandy clay loam to sandy clay over calcreted calcarenite.

G3/G4 Sand over dispersive clay (Lithocalcic, Brown / Grey Sodosol)
Medium to thick sand abruptly overlying a brown and grey mottled columnar sandy clay loam to sandy clay, with rubbly carbonate at depth.

N2/G4 Wet sand over clay (Hypercalcic / Lithocalcic, Grey Sodosol OR Sodosolic, Hypersalic Hydrosol)
Medium thickness loamy sand abruptly overlying a grey and yellow brown mottled clay (seasonally saturated), with rubbly to soft carbonate at 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 Saline clay over sand (Petrocalcic, Calcarosolic, Salic Hydrosol)
Thin black saline clay overlying a highly calcareous sandy soil with variable calcrete pans and fragments and a saline water table within 100 cm.

N2b Wet highly 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.

Further information: DEWNR Soil and Land Program