

KAL Kallora Land System

Gently undulating dunefields between Port Wakefield and Pinery

Area: 229.7 km²

Annual rainfall: 335 – 375 mm average

Geology: The land system is formed over Hindmarsh Clay - a red and grey mottled coarsely structured heavy impermeable clay. However this material is only within 100 cm of the land surface in low lying areas. The clay is generally mantled by a layer of highly calcareous Woorinen Formation material - soft medium to fine grained carbonate of aeolian origin. Most of the surface of the carbonate has been indurated to Class III B or III C rubble. Over the top of the Woorinen Formation, younger Molineaux Sand has been deposited and reworked into low to moderate dunes which dominate the present landscape.

Topography: The Kallora Land System is a gently undulating plain with an overall gradient to the west of less than 0.2%. Most of the plain is a dunefield consisting of low to moderate (usually less than 5 m high) linear sand dunes with a south east - north west orientation. Between the dunes are very gently undulating swales which comprise about two thirds flats underlain by Hindmarsh Clay within a metre or so of the surface, and one third stony rises formed on rubbly Woorinen Formation carbonates. Broader plains where the dunes thin out to a 10-20% coverage have a similar landscape pattern. There is no surface drainage network, although there are some saline depressions in the west.

Elevation: 56 m (five km north east of Avon) to 10 m on the western side

Relief: Maximum relief is 5 m (sand dunes)

Soils: The characteristic soils are calcareous sandy loams to loams and deep sands

Main soils

- A4** Rubbly calcareous sandy loam - common (rises and flats)
- H2** Deep sand - common (sand dunes)
- A6** Calcareous loam - common (flats)

Minor soils

- A5** Rubbly calcareous sandy loam over clay - flats and swales
- G1** Sand over red sandy clay loam - sandhills
- B2** Shallow calcareous sandy loam over calcrete - swales and low rises
- D3/D2** Sandy loam over red clay - flats and depressions between sand dunes
- N2** Saline swamp soil - salt pans

Main features: The Kallora Land System is typical dune - swale country, with sandy, infertile and wind erosion prone soils on the rises mixed with heavier soils in the swales. The soils of the swales and broader plains between the dunes are almost all calcareous and generally rubbly. Restricted water holding capacity and fertility problems induced by the alkalinity and mostly light sandy loam textures are the most significant limitations to cropping. Boron toxicity can be expected on the flats.



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

SLU	% of area	Main features #
ScA	38.1	<p>Very gently undulating plain formed on Hindmarsh Clay, capped by rubbly Woorinen Formation carbonates in turn overlain by 10-20% Molineaux sand dunes. The plains consist of flats and very low rises in an approximate ratio of 2:1. The flats have variable surface calcrete, up to 10%. The rises have 10-20% surface calcrete.</p> <p>Main soils:</p> <p>Flats: <u>Calcareous loam - A6 (E)</u>, <u>rubbly calcareous sandy loam over clay - A5 (C)</u> and <u>rubbly calcareous sandy loam - A4 (C)</u>, with <u>shallow calcareous sandy loam over calcrete - B2 (M)</u> and <u>sandy loam over red clay - D3/D2 (M)</u>.</p> <p>Rises: <u>Rubbly calcareous sandy loam - A4 (V)</u> with <u>shallow calcareous sandy loam over calcrete - B2 (L)</u> and <u>sand over red sandy clay loam - G1 (M)</u>.</p> <p>Dunes: <u>Deep sand - H2 (D)</u>.</p> <p>On the flats and stony rises the soils are moderately shallow to deep, but virtually all are alkaline throughout (with implications for nutrient availability) and are well structured. Variations in crop growth can be expected due to the differences in water holding capacities between the shallow and deep types. Boron toxicity is likely in soils on flats. The soils on the dunes are deep, sandy, infertile and prone to wind erosion.</p>
UOH UOI	52.0 8.8	<p>Dunefields consisting of moderate to low linear dunes and intervening very gently undulating swales comprising about two thirds flats and one third low stony rises.</p> <p>UOH 30-60% moderate dunes.</p> <p>UOI 30-60% low to moderate dunes.</p> <p>Main soils:</p> <p>Dunes: <u>Deep sand - H2 (V)</u> with <u>sand over red sandy clay loam - G1 (L)</u>.</p> <p>Swales: <u>Rubbly calcareous sandy loam - A4 (E)</u> with <u>calcareous loam - A6 (L)</u>, <u>rubbly calcareous sandy loam over clay - A5 (L)</u>, <u>shallow calcareous sandy loam over calcrete - B2 (L)</u> and <u>sandy loam over red clay - D3/D2 (M)</u>.</p> <p>This is typical dune - swale land with significant soil differences over short distances. Low fertility sands susceptible to wind erosion dominate the dunes, and heavier, but often shallow and stony soils occur in the swales. Fertility maintenance is probably the most important overall issue, with wind erosion control on the rises.</p>
VFH	1.1	<p>Depressions formed over clayey sediments and including 50% marginally saline flats, 20% stony rises and 30% salt pans.</p> <p>Main soils:</p> <p>Flats: <u>Rubbly calcareous sandy loam over clay - A5 (E)</u> and <u>calcareous loam - A6 (E)</u>.</p> <p>Rises: <u>Rubbly calcareous sandy loam - A4 (V)</u> with <u>shallow calcareous sandy loam over calcrete - B2 (L)</u>.</p> <p>Salt pans: <u>Saline swamp soil - N2 (D)</u>.</p> <p>These small areas have little agricultural value because of their moderate to high salinity.</p>

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:

- A4** Rubbly calcareous sandy loam (Regolithic, Lithocalcic / Supracalcic Calcarosol)
10 - 20 cm calcareous sandy loam over Class III C or III B rubble at 25 cm, grading to a very highly calcareous slightly rubbly sandy clay loam continuing below 100 cm.
- A5** Rubbly calcareous sandy loam over clay (Regolithic, Lithocalcic / Supracalcic Calcarosol)
10 - 20 cm calcareous sandy loam to sandy clay loam over Class III C or III B rubble at 25 cm, grading to a very highly calcareous slightly rubbly sandy clay loam to sandy light clay, grading to Hindmarsh Clay within 120 cm of the surface.
- A6** Calcareous loam (Regolithic / Pedal, Hypercalcic Calcarosol)
10 - 25 cm calcareous loam to clay loam becoming more clayey and calcareous with depth over soft clayey carbonate at 40 cm, grading to Hindmarsh Clay from 85 cm.
- B2** Shallow calcareous sandy loam over calcrete (Petrocalcic, Lithocalcic Calcarosol)
10 - 20 cm calcareous sandy loam over rubbly carbonate, overlying a sheet or rubbly calcrete pan shallower than 50 cm.
- D3/D2** Sandy loam over red clay (Hypercalcic / Lithocalcic, Red Sodosol / Chromosol)
15 - 20 cm hard sandy loam to sandy clay loam abruptly overlying a red clay with variable structure (coarse prismatic and dispersive to fine friable polyhedral), with fine to rubbly carbonate from about 35 cm, grading to Hindmarsh Clay at 100 cm.
- G1** Sand over red sandy clay loam (Calcic / Lithocalcic, Red Sodosol / Chromosol)
35 - 50 cm soft sand over a red sandy clay loam to sandy clay, sometimes dispersive, with fine to rubbly carbonate from about 60 cm, grading to highly calcareous sandy clay loam.
- H2** Deep sand (Calcareous, Arenic, Red-Orthic Tenosol OR Calcic, Calcarosol)
35 - 70 cm loose sand to loamy sand (non calcareous in 75%, calcareous in 25% of soils), usually with a slight clay accumulation with depth, over either rubbly carbonate at 75 cm or calcareous clayey sand continuing below 100 cm.
- N2** Saline swamp soil (Hypersalic Hydrosol)
10 - 20 cm calcareous sandy loam to clay loam over a brown very highly calcareous clay loam with a rubbly calcrete pan at 25 cm grading to a saturated grey, brown and yellow mottled clay from 50 cm.

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

