AVO Avon Land System

Very gently undulating plains with some low dunes in the Avon - Pinery - Wild Horse Plains area

Area: 107.5 km^2

Annual rainfall: 350 – 375 mm average

Geology: The Land System is formed over Hindmarsh Clay - a red and grey mottled coarsely structured heavy impermeable clay. This material is within 100 cm of the land surface over about a third of the area. Elsewhere the clay is mantled by a layer of highly calcareous Woorinen Formation material - soft medium to fine grained carbonate of aeolian origin. Most of the upper layer of carbonate has been altered 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 dunes which occur sporadically across the landscape.

Topography: The Avon Land System is a very gently undulating plain with an overall gradient to the west of less than 0.2%. Most of the plain is a mosaic of flats and very low (less than two metres) stony rises in an approximate areal ratio of two to one. Scattered across the landscape are linear sand dunes up to 5 m high with a south east - north west orientation. These occupy about 10% of the land surface. There is no surface drainage pattern.

Elevation: 40 m in the east to 10 m in the west

Relief: Less than 5 m

Soils: The majority of soils are calcareous sandy loams or deep sands

Main soils

A4 Rubbly calcareous sandy loam - extensive on low rises, flats and swales
A5 Calcareous loam on clay - extensive on flats and swales

Minor soils

A6 Calcareous loam - flats and swales
B2 Shallow calcareous sandy loam over calcrete - stony flats and low rises
H2 Deep sand - sand dunes
D2 Sandy loam over red clay - flats
B6 Sandy loam over red sandy clay on calcrete - stony flats

Main features: The Avon Land System is fully arable with the exception of some minor dune crests. The majority of soils are calcareous throughout and contain significant rubble. The main soil limitations to productivity are caused by restricted water holding capacity in the more rubbly profiles, and lime induced nutrition problems. Boron toxicity is a minor limitation on flats where the Hindmarsh Clay is within a metre of the surface (about half of the flats). The sand dunes have low fertility soils prone to wind erosion. Frequent soil changes from dune to swale make this land difficult to manage.

Soil Landscape Unit summary: 5 Soil Landscape Units (SLUs) mapped in the Avon Land System:

SLU	% of area	Main features #
SeA	84.0	Very gently undulating plain formed on Hindmarsh Clay overlain by rubbly Woorinen Formation carbonates. Approximately 65% of the area is flats and 35% is very low rises. Surface calcrete stone is variable - flats have up to 10% and rises up to 20%. Main soils: Flats: rubbly calcareous sandy loam - **A4** (E), calcareous loam on clay - **A5** (C) and calcareous loam - **A6** (L), with shallow calcareous sandy loam - **B2** (M), sandy loam over red clay - **D2** (M) and sandy loam over red clay on calcrete - **B6** (M). Rises: rubbly calcareous sandy loam - **A4** (V) with calcareous loam on clay - **A5** (C) and shallow calcareous sandy loam - **B2** (L). These soils are moderately shallow to deep, but virtually all are alkaline throughout (with implications for nutrient availability) and 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.
U-C U-D	2.9 1.5	Isolated linear sand dunes. **U-C** Low to moderate sand dunes. **U-D** Low sand dunes. Main soils: deep sand - **H2** (V) with rubbly calcareous sandy loam - **A4** and calcareous loam on clay - **A5** (C) on lower slopes. The sandy soils are low in fertility and highly susceptible to wind erosion. The U-C dunes in particular are fragile and most have eroded in the past. Trash retention, minimum tillage and controlled grazing are needed to minimize the risk of damage. Nutrition and disease management will improve productivity and stability.
UOI UOJ	8.7 2.9	Dunefields comprising linear dunes separated by swales formed on Woorinen Formation rubbly carbonates overlying Hindmarsh Clay. **UOI** 30-60% low to moderate sand dunes. **UOJ** 30-60% low sand dunes. Main soils: Dunes: deep sand - **H2** (V), with rubbly calcareous sandy loam - **A4** and calcareous loam on clay - **A5** (C) on lower slopes. Swales: rubbly calcareous sandy loam - **A4** (E) and calcareous loam on clay - **A5** (E). 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.

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 grading to a Class III C or III B rubble layer at 25 cm, becoming less rubbly in a very highly calcareous sandy clay loam matrix continuing below 100 cm.

A5 Calcareous loam on clay (Regolithic, Hypercalcic Calcarosol)
10 - 20 cm calcareous loam to sandy loam over a very highly calcareous sandy clay loam to light clay with abundant fine carbonate from 35 cm grading to Hindmarsh Clay at 85 cm.

A6 Calcareous loam (Pedal, Hypercalcic Calcarosol)
10 - 25 cm calcareous loam to clay loam becoming more clayey and calcareous with depth over fine clayey carbonate at 40 cm, grading to Hindmarsh Clay from 85 cm.

B2 Shallow calcareous sandy loam over calcrete (Petrocalcic, Lithocalcic Calcarosol)
5 - 20 cm calcareous sandy loam over rubbly Class III C carbonate, with sheet or rubbly calcrete at about 30 cm.

B6 Sandy loam over red sandy clay on calcrete (Petrocalcic, Red Chromosol)
20 cm firm sandy loam over a red massive sandy clay with rubble at shallow depth, over calcrete at about 40 cm.

D2 Sandy loam over red clay (Calcic / Lithocalcic Red Chromosol)
15 - 20 cm firm sandy loam to loam abruptly overlying a red sandy clay to clay over fine to rubbly carbonate at 35 cm grading to Hindmarsh Clay at 80 cm.

H2 Deep sand (Calcic / Supracalcic Calcarosol OR Calcareous, Arenic, Red-Orthic Tenosol)
60 - 120 cm loose sand (calcareous by 30 cm if not from the surface), over a very highly calcareous or rubbly loamy sand.

Further information: DEWNR Soil and Land Program