

PIP Pinkerton Plains Land System

Very gently undulating plains extending from the Light River southwards to Reeves Plains

Area: 258.4 km²

Annual rainfall: 400 – 470 mm average

Geology: The land is formed on Tertiary / Pleistocene age Hindmarsh Clay, although basement rocks are relatively close to the surface, as indicated by the outcrops in the incised channel banks of the Light River. The clays are overlain by highly calcareous aeolian Woorinen Formation materials. These were originally finely divided silts and clays, but there has been substantial post depositional alteration to rubbly forms, a result of exposure to wetting and drying cycles. On the eastern side of the System, the underlying sediments are sandier. There has been some reworking of these materials into low dune fields.

Topography: The Pinkerton Plains Land System is a very gently undulating plain with a gradual fall of about 0.5% from northeast to southwest. The bulk of the area comprises flats with weakly defined watercourses and very low stony rises. On the eastern edge are a gentle pediment grading to the higher Templers Land System, and some small areas of sandy rises and low dunes. Across the north, the Light River has gouged a 20 m deep trench through the plains. The Light defines the western side of the Land System where it has cut a 10 - 20 m high escarpment separating the Pinkerton Plains from the river flood plains of the Mallala Land System. This escarpment becomes less well defined towards the south.

Elevation: 130 m in the northeast to 40 m in the southwest

Relief: Relief throughout the majority of the land system is less than 10 m, but there is up to 20 m where the River Light has incised its channel.

Soils: Loamy soils with either red clayey subsoils or very highly calcareous clay loamy to clayey subsoils are most common. There are also limited deep sands, sands over clay, shallow stony sandy loams and cracking clays.

Main soils

D3 Hard loam over dispersive red clay on loamy flats

A4a Rubbly calcareous sandy loam on rises

C3a Gradational red clay loam to loam on loamy flats

Minor soils

Soils on loamy flats

A3 Deep calcareous loam

A6a Calcareous clay loam

A6b Highly calcareous sandy clay loam

C5 Dark gradational clay loam

D2 Hard loam over red clay

E2/E3 Red or brown cracking clay

F2/F1 Loam over (dispersive) brown clay



Soils on rises

A4b	Calcareous sandy loam
A5	Calcareous rubbly loam on clay
B2	Shallow calcareous sandy loam on calcrete
B3	Gradational sandy loam on calcrete
B4/B6	Loam over red clay loam on calcrete
C1	Gradational sandy loam
C3b	Rubbly gradational red loam
G4	Loamy sand over dispersive brown clay

Soils on sandy areas

D5	Loamy sand over hard red clay
G1	Loamy sand over red sandy clay
H2	Deep sand

Soils on river cliffs

A2	Shallow calcareous loam over rock
D1	Loam over red clay on rock

Main features:

The Pinkerton Plains Land System is a mainly flat to gently undulating plain with a range of soils which can be broadly divided into two groups. On the flats are deep medium to fine textured soils with high inherent fertility, but some physical limitations (hard setting surfaces and dispersive subsoils), and a heavy clay substrate with associated salt and boron accumulations. On rising ground, soils are generally coarser textured and most are calcareous with significant carbonate rubble content. Shallow depth (with reduced moisture holding capacity) and lime induced nutrition problems are the main limitations. Limited areas of sandy soils are characterized by low fertility and wind erosion potential.

Soil Landscape Unit summary: 12 Soil Landscape Units (SLUs) mapped in the Pinkerton Plains Land System:

SLU	% of area	Main features #
AAAn	0.9	Incised channel of the River Light, < 20 m deep. Basement rock is exposed in the dissection slopes which have variable gradients ranging from 20% to near vertical. Erosion scars common on slopes. Main soils: <u>shallow calcareous loam over rock</u> - A2 (E) and <u>loam over red clay on rock</u> - D1 (E). This land is steep and fragile. It has little agricultural value, even as grazing land, as disturbance by livestock carries the risk of erosion and associated sedimentation in the river.
GDB	2.5	Rises with slopes of 2-3% formed on sandy Tertiary sediments. Main soils: <u>loamy sand over red sandy clay</u> - G1 (V), with <u>loamy sand over hard red clay</u> - D5 (L) and <u>calcareous sandy loam</u> - A4b (L). These soils have inherently low fertility and restricted water holding capacity. However, provided that nutrition and wind erosion are managed, moderate productivity can be achieved.
HAE	2.0	Low lying depressions underlain by Tertiary clays. Well defined water courses which run water after prolonged rainfall occur in places. The soils are typically heavy. Main soils: <u>gradational red clay loam</u> - C3a (E) and <u>red cracking clay</u> - E2 (E), with <u>dark gradational clay loam</u> - C5 (L), <u>hard loam over dispersive red clay</u> - D3 (L) and <u>calcareous clay loam</u> - A6a (L). These soils are deep and fertile, but are prone to waterlogging and possibly flooding in very wet years. They are difficult to manage once wet. Subsoil boron and salt levels are likely to be high.
HgA HgB	44.0 2.1	Flats and outwash fans formed on heavy Tertiary / Pleistocene clay (Hindmarsh Clay). HgA Flats with slopes of less than 1%. HgB Fans with slopes of 1-3%. Main soils: <u>hard loam over dispersive red clay</u> - D3 (E), <u>gradational red clay loam</u> - C3a (C), <u>calcareous clay loam</u> - A6a (L), and <u>hard loam over red clay</u> - D2 (L), with <u>red or brown cracking clay</u> - E2/E3 (M), <u>loam over brown (dispersive) clay</u> - F2/F1 (M) and <u>deep calcareous loam</u> - A3 (M). These soils are deep and generally fertile, although the most common soil class (D3) is poorly



		structured. Hard setting surfaces and dispersive subsoils restrict infiltration, cause subsurface waterlogging, impede crop emergence and are often difficult to work. The other soils are physically more favourable. The underlying heavy clay restricts deep drainage, so subsoil accumulations of salt and boron are likely.
IBT	0.7	Marginally saline depression formed on Tertiary heavy clay, with low rises of Woorinen Formation. The land is characterized by distinctive grey soils. Main soils: <u>highly calcareous sandy clay loam</u> - A6b (E) on flats, and <u>rubbly and non rubbly calcareous sandy loam</u> - A4a/A4b (E) with <u>loamy sand over dispersive brown clay</u> - G4 (L) on rises. Fertility is affected by the high lime content of these soils (nutrient fixation), and elevated salt levels suppress productivity.
IVA	6.3	Very gently undulating rises formed on Tertiary clay, overlain by variable thickness of Woorinen Formation carbonates. There is variable surface calcrete stone, up to 10%. Half of the soils are calcareous sandy loams, the rest are gradational or texture contrast sands to sandy loams. Main soil groups: <u>rubbly calcareous sandy loam</u> - A4a (E), with <u>hard loam over red clay</u> - D2 (C), <u>loamy sand over hard red clay</u> - D5 (L) and <u>loamy sand over red sandy clay</u> - G1 (L), both on sandy rises, and <u>gradational sandy loam</u> - C1 (M). The sandy loams are moderately fertile, but productivity of the sandier soils is likely to be restricted. These soils are also susceptible to wind erosion.
SbA SbB	32.7 2.9	Rises formed on highly calcareous medium textured sediments. Rubbly forms of carbonate (Classes III B/C) account for two thirds of the calcareous materials. SbA Low rises with slopes of 1-3% and up to 10% surface calcrete stone. SbB Slopes of 3-7% with up to 20% surface calcrete stone. Main soils: <u>rubbly calcareous sandy loam</u> - A4a (E), with <u>rubbly gradational sandy loam</u> - C1 (L), <u>rubbly gradational red loam</u> - C3b (L), <u>gradational sandy loam on calcrete</u> - B3 (L), <u>calcareous sandy loam</u> - A4b (M), <u>calcareous rubbly loam on clay</u> - A5 (M), <u>hard loam over dispersive red clay</u> - D3 (M), and <u>gradational red loam</u> - C3a (M). The soils are moderately fertile and well drained, but often shallow. Moisture stress in springtime is likely to be a significant limitation, particularly in dry finishes. The other important management concern is nutrition on calcareous soils.
ShB	4.8	Stony rises up to 20 m high formed on rubbly carbonates. Slopes are 2-7%. There is extensive surface calcrete stone. Main soils: <u>shallow calcareous sandy loam on calcrete</u> - B2 (E), with <u>rubbly calcareous sandy loam</u> - A4a (C), <u>gradational sandy loam on calcrete</u> - B3 (L) and <u>loam over red clay loam on calcrete</u> - B4/B6 (L). Moisture shortage caused by shallow soil depth is the most limiting feature of this land. Although arable, patchiness in crops and pastures is likely as the soils dry out in spring.
UFJ	1.0	Complex of very low dunes and swales. Main soils: <u>deep sand</u> - H2 (C) and <u>loamy sand over red sandy clay</u> - G1 (C) on dunes and lower slopes, and <u>rubbly and non rubbly calcareous sandy loam</u> - A4a/A4b (E) in swales. These soils are infertile and prone to water repellence and wind erosion. The sandy rises are arable, but careful nutrition and surface management is required.
ZG-	0.1	Old lakebed, possibly inundated in wet years. No soils data. Vegetation cover of samphire and black bluebush indicates moderate to high salinity. Land not cropped and used for light grazing.

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:*Soils on loamy flats*

- A3** Deep calcareous loam (Regolithic, Calcic Calcarosol)
25 - 40 cm calcareous loam to clay loam grading to a calcareous clay loam to light clay, continuing below 100 cm.
- A6a** Calcareous clay loam (Pedal, Hypercalcic Calcarosol)
20 - 40 cm calcareous clay loam grading to a highly calcareous well structured red brown clay over soft Class I carbonate from 45 cm with heavy clay from 100 cm.
- A6b** Highly calcareous sandy clay loam (Hypervescent, Hypercalcic Calcarosol)
Medium thickness very highly calcareous dark grey sandy clay loam, becoming more clayey, calcareous and paler coloured with depth, over Tertiary heavy clay from about 50 cm.
- C3a** Gradational red clay loam to loam (Hypercalcic, Red Dermosol)
10-40 cm clay loam grading to a well structured red clay over soft Class I carbonate from 55 cm, with heavy clay from 100 cm.
- C5** Dark gradational clay loam (Hypercalcic, Black Dermosol)
10 - 20 cm dark clay loam to light clay grading to a well structured black medium clay with abundant soft carbonate from about 40 cm, grading to Tertiary heavy clay.
- D2** Hard loam over red clay (Hypercalcic, Red Chromosol)
15 - 35 cm hard sandy loam to loam over a well structured red clay with abundant soft or occasionally rubbly carbonate from about 50 cm, grading to Tertiary clay from about 100 cm.
- D3** Hard loam over dispersive red clay (Calcic, Red Sodosol)
10 - 35 cm hard sandy loam to loam abruptly overlying a coarsely structured dispersive red clay, calcareous from 55 cm, grading to heavy clay from 100 cm.
- E2/E3** Red or brown cracking clay (Red / Brown Vertosol)
20 cm dark strongly structured seasonally cracking medium clay, usually calcareous, grading to a red or brown coarsely structured heavy clay with soft carbonate from 55 cm. Strongly slickensided red and grey mottled heavy clay from about 50 cm.
- F2/F1** Loam over (dispersive) brown clay (Calcic, Brown Sodosol / Chromosol)
20 - 35 cm hard fine sandy loam to clay loam with a pale brown A2 layer, over a dark brown coarsely structured, sometimes dispersive clay, calcareous from about 50 cm, grading to heavy clay from about 65 cm.

Soils on rises

- A4a** Rubbly calcareous sandy loam (Regolithic, Lithocalcic / Supracalcic Calcarosol)
10 - 30 cm calcareous loam grading to a highly calcareous brown clay loam over rubbly Class III C/B carbonate from 30 cm, becoming less rubbly and more clayey at depth.
- A4b** Calcareous sandy loam (Regolithic, Hypercalcic Calcarosol)
10 - 30 cm calcareous sandy loam grading to a highly calcareous brown sandy clay loam with abundant soft carbonate from about 30 cm, more clayey with depth.
- A5** Calcareous rubbly loam on clay (Supracalcic Calcarosol)
15 - 30 cm calcareous loam over Class III B carbonate rubble, grading to a very highly calcareous sandy clay loam, over heavy clay at about 100 cm.
- B2** Shallow calcareous sandy loam on calcrete (Petrocalcic Calcarosol)
15 - 35 cm calcareous sandy loam to loam with variable rubble, becoming more rubbly with depth over rubbly or sheet calcrete within 40 cm.



- B3** Gradational sandy loam on calcrete (Petrocalcic, Red Kandosol)
10 - 20 cm sandy loam to loam grading to a friable red clay loam over sheet or rubbly calcrete between 20 and 35 cm.
- B4/B6** Loam over red clay loam on calcrete (Petrocalcic, Red Dermosol / Chromosol)
25 - 35 cm loam to clay loam over a well structured red clay loam to light clay on calcrete at about 35 cm.
- C1** Gradational sandy loam (Hypercalcic / Lithocalcic, Red Kandosol)
30 - 50 cm red sandy loam grading to a red sandy clay loam over Class III A / III C carbonate from about 55 cm, continuing below 100 cm with decreasing rubble.
- C3b** Rubbly gradational red loam (Lithocalcic / Supracalcic, Red Dermosol)
10 - 30 cm loam grading to a moderately well structured red clay loam over rubbly Class III B / C carbonate from 40 cm, becoming less rubbly and more clayey at depth.
- G4** Loamy sand over dispersive brown clay (Hypercalcic, Brown Sodosol)
30 cm loamy sand over a coarsely structured dispersive clay, calcareous from 40 cm over heavy clay at about 100 cm.

Soils on sandy areas

- D5** Loamy sand over hard red clay (Hypercalcic / Supracalcic, Red Chromosol)
Thin firm loamy sand abruptly overlying a red coarsely structured medium clay with abundant soft or rubbly carbonate from about 30 cm, grading to heavy clay from about 65 cm.
- G1** Loamy sand over red sandy clay (Hypercalcic, Red Chromosol)
40 - 60 cm soft loamy sand abruptly overlying a red coarsely structured to massive sandy clay to sandy clay loam, calcareous from about 80 cm.
- H2** Deep sand (Calcareous, Regolith, Red-Orthic Tenosol)
Up to 50 cm loose loamy sand grading to a red sandy loam over soft to rubbly carbonate from about 80 cm.

Soils on river cliffs

- A2** Shallow calcareous loam over rock (Paralithic Calcarosol)
10 - 20 cm calcareous loam grading to a brown highly calcareous stony clay loam over soft carbonate from about 30 cm with weathering bedrock at about 80 cm.
- D1** Loam over red clay on rock (Calcic, Red Chromosol)
20 - 30 cm loam abruptly overlying a well structured red clay, calcareous from about 50 cm, grading to weathering bedrock below 100 cm.

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

