

NAP Northern Adelaide Plains Land System

Plains flanking the Gawler River alluvial plain, north of Adelaide

Area: 100.4 km²

Annual rainfall: 410 – 460 mm average

Geology: The System is formed on mixed clayey and sandy loam to sandy clay sediments deposited under alluvial conditions by ancient streams (precursors of the modern Gawler River) emanating from the ranges to the east. The clayey sediments bear some resemblance to Hindmarsh Clay. They are mantled by aeolian carbonates which are usually soft, but in places are indurated to nodular forms. There are occasional low stony rises where these carbonate accumulations have not been eroded away.

Topography: The landscape is a flat to very gently undulating plain with slopes of less than 1%. There are some low sandy rises and shallow depressions, but relief is very low. The System comprises two sections, one either side of the Gawler River alluvial plain (Angle Vale Land System). It appears as though the plain may once have been uninterrupted, until the modern Gawler River caused it to be bisected with the formation of a younger alluvial plain adjacent to the river, and fanning out from the point at which it flows from the ranges.

Elevation: 50 m in the east to 5 m in the southwest

Relief: Negligible

Soils: Most soils have sandy to loamy surfaces over clayey subsoils. There are limited areas of uniform or gradational loamy to clayey soils, and some rubbly calcareous types.

Main soils

- D5** Loamy sand over hard red clay
- D3** Hard sandy loam over dispersive red clay
- D2** Hard sandy loam over friable red clay
- G1a** Sand over red sandy clay loam

Minor soils

Alluvial plains and flats

- G1b** Sand over red clay
- F2** Hard silty clay loam over brown clay
- C1** Gradational loamy sand
- M2/E1** Black clay
- E3** Brown cracking clay

Stony flats and rises

- B6** Gradational red loam over rubbly calcrete
- B3** Shallow loam over rubbly calcrete
- A4** Rubbly calcareous sandy loam
- A5** Rubbly calcareous loam over clay
- B2** Shallow calcareous sandy loam on calcrete



Main features: The Northern Adelaide Plain Land System is a very gently inclined plain with a range of sand to sandy loam soils over clayey subsoils. As irrigated horticulture is the main land use in the System, differences in thickness of surface soil, and profile drainage are significant. All soils appear to be accumulating sodium under irrigation, a trend which should be monitored. Most soils are saline at depth, partly due to accumulated salt leaching under irrigation, and partly due to saline groundwater influence.

Soil Landscape Unit summary: 8 Soil Landscape Units (SLUs) mapped in Northern Adelaide Plains Land System:

These soil landscape units are based on the units described by Matheson, W.E. (1975) in *The suitability of land for irrigation in portion of the Northern Adelaide Plain, South Australia*. Specific Land Use Survey SS10. Dept. of Agriculture, South Australia. (Cited below as "SS10").

SLU	% of area	Main features #
JoA	11.2	Equivalent to SS10 - Map Unit 1. Very gentle rises. Main soil: <u>Sand over red sandy clay loam</u> - G1a (V) <u>Gradational loamy sand</u> - C1 (C) This land is well drained and the soils are relatively deep, although low in fertility and susceptible to wind erosion. Provided that erosion is controlled, the land is suitable for a wide range of irrigated crops. Soil sodicity is increasing under irrigation and should be monitored.
JpA	19.0	Equivalent to SS10 - Map Unit 2. Flats and very gentle slopes. Main soils: <u>Loamy sand over hard red clay</u> - D5 (E) <u>Sand over red sandy clay</u> - G1b (E) <u>Hard sandy loam over dispersive red clay</u> - D3 (E) These soils are considered to be suitable for most irrigated crops, as potential rooting depth is adequate and drainage is satisfactory, the soils are relatively fertile and erosion potential is moderately low. Soil sodicity is increasing under irrigation and should be monitored.
JqA	51.6	Equivalent to SS10 - Map Unit 3. Flats. Main soils: <u>Loamy sand over hard red clay</u> - D5 (V) <u>Hard sandy loam over dispersive red clay</u> - D3 (L) <u>Hard sandy loam over friable red clay</u> - D2 (L) These soils are satisfactory for most irrigated crops, except deeper rooted vegetable crops and tree crops which are sensitive to somewhat restrictive clayey subsoils and marginal salt accumulation. The thinner surface soils, compared with soils in JoA and JpA, reduce irrigation flexibility, choice of crops and probably productivity to some degree. Soil sodicity is increasing under irrigation and should be monitored.
JrA	11.9	Equivalent to SS10 - Map Unit 4. Flats and depressions. This land represents the least favourable conditions in a sequence of soil depth and drainage capacity (JoA - JpA - JqA - JrA). Main soils: <u>Hard sandy loam over dispersive red clay</u> - D3 (E) <u>Hard silty loam over dispersive brown clay</u> - F2 (C) <u>Rubbly calcareous loam over clay</u> - A5 (L) <u>Loamy sand over hard red clay</u> - D5 (L) <u>Brown cracking clay</u> - E3 (M) in depressions This land is considered to be generally unsuitable for irrigated crops due to insufficient surface soil thickness, impeded drainage and elevated subsoil salinity.



JsA	0.2	Equivalent to SS10 - Map Unit 6. Flats near watercourses. These appear to be intermediate between the flats of JqA and the modern alluvial flats of the Gawler River Land System. Main soils: <u>Hard silty clay loam over dispersive brown clay</u> - F2 (V) <u>Hard sandy loam over dispersive red clay</u> - D3 (L) <u>Hard sandy loam over friable red clay</u> - D2 (L) <u>Brown cracking clay</u> - E3 (M) in depressions These soils tend to become wet and difficult to manage in winter due to restricted drainage. However they are deep and fertile, and suitable for most irrigated vegetable crops, and vines. Soil sodicity is increasing under irrigation and should be monitored.
KTA	0.1	Equivalent to SS10 - Map Unit 5. Black flats near watercourses. Main soil: <u>Black clay</u> - M2/E1 (D) These soils are deep and highly fertile. However, restricted drainage does not favour perennial crops. The land is suitable for vegetable production.
RKA	4.7	Stony flats with a rubbly calcrete layer within a metre, and usually within 50 cm of the land surface. Main soils: <u>Gradational red loam over rubbly calcrete</u> - B6 (V) <u>Shallow loam over rubbly calcrete</u> - B3 (L) <u>Hard sandy loam over friable red clay</u> - D2 (L) This land is well drained and potentially productive, but uneven depth to rubble makes horticultural (particularly vegetable) production difficult.
SbA	1.3	Equivalent to SS10 - Map Unit 7. Low stony rises. Main soils: <u>Rubbly calcareous sandy loam</u> - A4 (V) <u>Shallow calcareous sandy loam on calcrete</u> - B2 (C) Soils are moderately fertile and well drained, but usually shallow. Moisture stress in spring time is likely to be a significant limitation. Stone content makes soils unsuitable for most vegetable crops.

PROPORTION codes assigned to soils within Soil Landscape Units (SLU):

(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:

Alluvial plains and flats

G1a Sand over red sandy clay loam (Sodic, Calcic, Red Kandosol)

More than 35 cm soft loamy sand to light sandy loam over a red light sandy clay loam with weak coarse prismatic structure, and minor soft carbonate from about 70 cm, overlying a sandy to medium clay from about 100 cm.

G1b Sand over red sandy clay (Calcic, Red Sodosol)

25 - 35 cm soft loamy sand to light sandy loam abruptly overlying a coarsely structured reddish brown sandy clay to light clay, highly calcareous and with variable nodular calcrete from about 55 cm, grading to sandy clay loam to sandy loam alluvium within 100 cm.

C1 Gradational loamy sand (Calcic / Eutrophic, Red Kandosol)

Thick loamy sand grading to a red light sandy clay loam with increasing clay content and sporadic carbonate at depth.

D5 Loamy sand over hard red clay (Calcic, Red Sodosol)

15 - 25 cm hard loamy sand to sandy loam abruptly overlying a coarsely prismatic hard red clay with soft or nodular carbonate from about 50 cm, grading to variable sandy to clayey alluvium from about 100 cm.



- D3** Hard sandy loam over dispersive red clay (Calcic, Red Sodosol)
Less than 15 cm hard platy sandy loam to sandy clay loam abruptly overlying a red coarsely structured dispersive medium clay, calcareous from about 45 cm and grading to sandy clay loam to clay sediment at about 100 cm.
- D2** Hard sandy loam over friable red clay (Calcic, Red Chromosol)
Less than 15 cm hard platy sandy loam to sandy clay loam abruptly overlying a red well structured medium clay, calcareous from about 45 cm and grading to sandy clay loam to clay sediment at about 100 cm.
- F2** Hard silty loam over dispersive brown clay (Calcic, Brown Sodosol)
15 - 45 cm hard silty loam (sometimes loamy sand) with a paler coloured A2 layer, overlying a dark brown coarsely structured dispersive medium clay, with minor soft carbonate and hard calcrete fragments from about 40 cm, grading to alluvial clay at about 100 cm.
- E3** Brown cracking clay (Massive, Brown / Grey Vertosol)
Up to 30 cm grey brown hard coarsely structured clay, grading to a brown and grey mottled coarsely structured heavy clay. This soil may be overlain by up to 20 cm sand to sandy loam (drift).
- M2/E1** Black clay (Hypocalcic, Black Dermosol)
Up to 25 cm black crumbly silty clay loam to medium clay, with seasonal cracking in more clayey types, grading to a coarsely structured black or brown clay, slightly calcareous at depth, overlying sandy clay loam to light clay alluvium.

Stony flats and rises

- B6** Gradational red loam over rubbly calcrete (Lithocalcic / Petrocalcic, Red Chromosol)
25 - 35 cm firm loam over a red friable light to medium clay over heavy rubble or sheet calcrete at depths between 35 and 70 cm.
- B3** Shallow loam over rubbly calcrete (Petrocalcic, Leptic Tenosol)
20 - 35 cm firm sandy loam to loam with increasing carbonate nodules, over rubbly calcrete at between 35 and 45 cm.
- A4** Rubbly calcareous sandy loam (Lithocalcic / Supracalcic Calcarosol)
10 - 30 cm calcareous loam grading to a highly calcareous brown clay loam over rubbly Class III B/C carbonate from 30 cm, becoming less rubbly and more clayey at depth.
- A5** Rubbly calcareous loam over clay (Lithocalcic Calcarosol)
10 - 20 cm calcareous loam grading to a highly calcareous brown clay loam over nodular calcrete at about 30 cm, overlying a very highly calcareous pale coloured clay (often wet and saline).
- 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.

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

