GAW Gawler River Land System

Flood plain of the Gawler River, extending from the footslopes of the ranges to the tidal flats at Port Gawler

Area: 37.4 km^2

Annual rainfall: 410 – 440 mm average

Geology: The landscape is underlain by clayey, silty and sandy alluvium, deposited by the Gawler River as it meandered across the North Adelaide Plain. This process is still occurring, with coarser grained sediments being deposited near the river, and finer grained materials being carried as far as floodwaters extend. Minor carbonates, often in the form of hard fragments indicative of fluctuating water tables, occur in the transition layers between the sediments and the overlying soils.

Topography: The landscape is a very gently inclined flood plain flanking the Gawler River between the ranges to the east and the coastal flats to the west. Slopes range from 1% in the east, to 0.2% for most of the System. In the upper reaches where the plains grade up to the footslopes of the ranges, the river has carved a 500 m wide channel over 10 m deep into the plain. At the downstream end, the alluvial flats grade to a flood out plain with several small channels which drain excess flood water into the tidal system. This plain in turn grades to a saline flat, transitional to the coastal mud flats of the Parham Land System.

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

Relief: There is no relief other than the 10 m or so depth of downcutting at the eastern end

Soils: The soils are deep and mostly inherently fertile and moderately well drained - exceptions are the D3 and F2 soils (below) which occur in seasonally wet and saline areas. Black clay loams to clays are characteristic of the landscape.

Main soils

M2/E1 Black clay
F2 Silty loam over dispersive brown clay

Minor soils

D3 Loam over dispersive red clay
G1 Sand over red sandy clay loam
M1 Deep sandy loam

There is a range of minor soils which are similar to the alluvial plains soils of the Angle Vale Land System.

Main features: The Gawler River Land System is a modern flood plain characterized by deep dark clay loamy to clayey soils. These soils are deep and highly fertile. However, restricted drainage does not favour perennial crops. The land is suitable for vegetable production. The risk of flooding limits opportunities for non agricultural developments.

Soil Landscape Unit summary: 9 Soil Landscape Units (SLUs) mapped in the Gawler River Land System:

The dominant soil landscape unit (XMA) is based on Map Unit 5 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").

Minor Soil Landscape Units JpA, JqK, JrK and JsA are outliers of land similar to the adjacent Angle Vale Land System.

SLU	% of area	Main features #
JpA	2.4	Equivalent to SS10 - Map Unit 2. **JpA** Flats and gentle slopes above the 10 m contour. **JpK** Flats below the 10 m contour. Main soils: Loamy sand over hard red clay - **D5** (E) Sand over red sandy clay - **G1b** (C) Hard sandy loam over dispersive red clay - **D3** (L) Gradational sandy clay loam - **C4** (L). 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. Restricted drainage, shallower water tables and increased subsoil salinity can be expected in **JpK**.
JqK	0.5	
JrK	1.0	Equivalent to SS10 - Map Unit 4. **JrK** Flats and depressions below the 10 m contour. This land represents the least favourable conditions in a sequence of soil depth and drainage capacity (**JpA**). Main soils: Hard sandy loam over dispersive red clay - **D3** (E) Hard silty loam over dispersive brown clay - **F2** (C) Rubbly calcareous loam over clay - **A5** (L) Loamy sand over hard red clay - **D5** (L) Brown cracking clay **- E3** (M) in depressions. This land is considered to be generally unsuitable for irrigated crops due to insufficient surface soil thickness, impeded drainage and / or high subsoil salinity. Restricted drainage, shallower water tables and increased subsoil salinity can be expected in **JrK**.
JsA	2.5	Equivalent to SS10 - Map Unit 6. Flats near water courses. These are intermediate between the flats of JqA and the modern alluvial flats of the Gawler River Land System. Main soils: Hard silty clay loam over dispersive brown clay - **F2** (V) Hard sandy loam over dispersive red clay - **D3** (L) Hard sandy loam over friable red clay - **D2** (L). Brown cracking clay **- 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, although suitability decreases with proximity to the Thompson Creek Land System. Soil salinity and sodicity are increasing under irrigation and should be monitored.
KTK	9.0	Flood out flats near the mouth of the Gawler River. These flats include the last channelized section of the river as well as several smaller channels, apparently not connected to the river, which may run water on very high tides and/or help to drain river floodwaters into the sea. Main soil: Black gradational clay loam - **M2/E1** (D) These soils are deep and highly fertile. However, restricted drainage, and probably (unconfirmed) relatively shallow water tables and elevated salinity do not favour perennial crops.
VPC	7.4	Saline flats formed on clayey sediments, transitional between the main river flats and the highly saline tidal flats of the Parham Land System. The land is characterized by extensive branching channels (apparently old tidal creeks) and a samphire / saltbush vegetative cover.

		Main soils: Loam over dispersive red clay - **D3** (E) Silty loam over dispersive brown clay - **F2** (E) This land is non arable due to waterlogging and salinity.
XHA	2.5	Low sandy rises, possibly remnants of old levees or accumulations of coarser grained sediments deposited during flood events. Main soils: Sand over red sandy clay loam - **G1** (E) Deep sandy loam - **M1** (E) The rises have deep well drained soils with marginal fertility.
XJJ	7.8	River flats incised into the surrounding plain extending westward from where the Gawler River flows out of the ranges. The depth of incision reduces in a westerly direction to the point where it peters out altogether. The landscape includes low lying alluvial flats, the river channel (itself incised into the flats) and the banks separating the flats from the surrounding higher level landscape. Main soils: Deep sandy loam - **M1** (E) Black clay - **M2/E1** (E) These soils are deep, moderately to highly fertile and well drained. However, land use options are limited by the complexity of the landscape including the river channel and short, sharp banks, and the risk of flooding.
XMA	66.9	Equivalent to SS10 – Map Unit 5. Flats flanking the present day course of the Gawler River. These flats are characteristically black in colour, as opposed to the predominant red colours of the surrounding Land Systems. Main soils: Black gradational clay loam - **M2/E1** (V) Silty loam over dispersive brown clay - **F2** (L) These soils are deep and highly fertile. However, restricted drainage does not favour perennial crops. The land is suitable for vegetable production.

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:

D3 Loam over dispersive red clay (Calcic, Red Sodosol)
10 - 25 cm loam with a thin bleached A2 layer, over a coarsely structured dispersive red heavy clay with occasional gypsum bands, calcareous from about 40 cm, grading to clayey substrate at about 100 cm.

F2 Silty loam over dispersive brown clay (Calcic, Brown Sodosol)
10 - 35 cm silty loam to clay loam with a bleached A2 layer over a coarsely structured dispersive brown and red mottled heavy clay, weakly calcareous from about 70 cm, grading to clayey sediments.

G1 Sand over red sandy clay loam (Calcic, Red Chromosol)
Medium to thick sand to loamy sand over a red light sandy clay loam to sandy clay, with soft carbonate from about 55 cm, sandier with depth.

M1 Deep sandy loam (Calcareous, Regolithic, Brown-Orthic Tenosol)
Very thick brown loamy sand to silty loam, lighter coloured, weakly calcareous and with more clayey lenses at depth. The soil is formed on variable micaceous sandy and clayey alluvial sediments.

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.

Further information: DEWNR Soil and Land Program