THC Thompson Creek Land System

Mildly to highly saline flats associated with minor watercourse systems on the Gawler River alluvial plain

Area: 54.7 km^2

Annual rainfall: 400 – 450 mm average

Geology: The land is underlain by alluvial clays of the Pooraka Formation. Hard carbonate segregations are a distinctive feature of at least the upper layers of these sediments. They are indicative of fluctuating water tables which are also a feature of the landscape. On the western (seaward side), the alluvial clays grade to marine and estuarine clays.

Topography: The land system includes flat plains associated with minor drainage systems, one to the north and the other to the south of the Gawler River. The Salt Creek section extends from east of Two Wells in a south westerly direction to the coastal flats of the Parham Land System. The Thompson Creek section extends from west of Virginia in a southerly direction to the coastal flats. Each section is drained by sluggish watercourses which meander and eventually flow on to tidal mud flats. The surrounding flats are imperfectly drained and are characterized by saline water tables often within two metres of the surface.

Elevation: Less than 20 m in the east to less than 5 m in the west

Relief: Nil

Main soils: There are three distinctive broad soil categories. Sand to sandy loam over clay profiles are most common. With increasing influence of recent alluvial activity, these grade to gradational or uniform clay loamy to clay soils. The most waterlogged and saline land is characterized by calcareous soils, usually with hard calcrete fragments.

Main soils

D3 Hard sandy loam over dispersive red clay
F2 Hard silty clay loam over dispersive brown clay
D5 Loamy sand over hard red clay
A6 Calcareous loam over clay

Minor soils

Texture contrast soils

G1a Sand over red sandy clay loam
G1b Sand over red clay
D2 Hard sandy loam over friable red clay

Gradational and clayey soils

E1 Black cracking clay
E3 Brown cracking clay
M2 Black gradational clay loam

Gypseous / wet saline soils

A8 Gypseous clay loam
A5/N2 } Waterlogged and saline variants of above
A8/N2 }

Main features: The Thompson Creek Land System comprises low lying flats associated with saline water courses. The flats are imperfectly drained and commonly underlain by saline water tables at shallow depth. Sandy to loamy texture contrast soils are most common. They are deep and moderately fertile, but poor subsoil structure is a common limitation. Clay loamy to clay soils are common. They are deep and fertile, but are difficult to manage once wet. Calcareous loams are typical of the most waterlogged and saline areas. The over-riding features of the landscape are impeded drainage and salinity, recognizable as either saline subsoils, or as surface seepage. Although significant areas are arable, irrigated uses are generally not sustainable without substantial drainage. Much of the lower lying western side is too wet and saline for any uses other than light grazing.

Soil Landscape Unit summary: 18 Soil Landscape Units (SLUs) mapped in the Thompson Creek 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 #
JoK	1.3	Equivalent to SS10 - Map Unit 1. Very gentle rises. Main soil: Sand over red sandy clay loam - **G1a** (D) This land is well drained, although relatively shallow water tables associated with the land's low elevation may restrict deep drainage. 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.
JpK	2.7	Equivalent to SS10 - Map Unit 2. Flats and gentle slopes. Main soils: Sand over red clay - **G1b** (E) Loamy sand over hard red clay - **D5** (E) These soils are considered to be suitable for most irrigated crops, as potential rooting depth is adequate, although rising water tables are causing increases in subsoil salt levels. Deep drainage may be impeded by these relatively shallow water tables. The soils are relatively fertile and erosion potential is moderately low. Soil sodicity is increasing under irrigation and should be monitored.
JqK JqP	16.7 3.1	Equivalent to SS10 - Map Unit 3. **JqK** Flats. **JqP** Lower lying flats. Main soils: Loamy sand over hard red clay - **D5** (V) Hard sandy loam over dispersive red clay - **D3** (L) Hard sandy loam over friable red clay - **D2** (L) These soils are generally 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. Moderately shallow water tables and associated salt concentration will further reduce options and productive capacity. Soil sodicity is increasing under irrigation and should be monitored. Deterioration in conditions, viz. restricted drainage, shallower water tables and increased subsoil salinity can be expected in **JqP**.
JrK JrP	8.1 35.4	Equivalent to SS10 - Map Unit 4. **JrK** Flats and depressions. **JrP** Lower lying flats, broad plains and depressions. This land is characterized by thin surface soils over poorly structured subsoil clays, and moderately shallow water tables. Main soils: Hard sandy loam over dispersive red clay - **D3** (E) Hard silty loam over dispersive brown clay - **F2** (C) Calcareous loam over clay - **A6** (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. These limitations, especially drainage, water tables and subsoil salinity can be expected to be more pronounced in **JrP**.
JsK JsP	1.2 8.0	Equivalent to SS10 - Map Unit 6. **JsK** Flats. **JsP** Lower lying flats and depressions. These flats generally occur adjacent to Salt Creek. 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 moderately shallow and rising water tables impede deep drainage and will increasingly restrict rooting depth. Limitations due to impeded drainage, raised salinity and shallow water tables are more likely to occur in **JsP**.
KTK KTO KTP	1.1 1.1 0.6	Equivalent to SS10 - Map Unit 5. Black flats near water courses. **KTK** Flats. **KTO** Complex of flats and saline water courses. **KTP** Flats adjacent to Salt Creek. Main soils: Black gradational clay loam - **M2** (E) Black cracking clay - **E1** (C) Hard silty loam over dispersive brown clay - **F2** (C) Waterlogged and saline soil - **N2** (M-L) mainly in **KTO** These soils are deep and highly fertile. However, restricted drainage, moderately shallow water tables and elevated salinity restricts horticultural use, certainly for perennial crops. Conditions in **KTO** and **KTP** are marginally more limiting than in **KTK**.
VIB VIC	2.4 2.3	Moderately to highly saline flats. **VIB** Marginally saline flats with patches of highly saline samphire flats. **VIC** Highly saline samphire flats These flats are transitional between the alluvial plains typical of most of the Land System, and the tidal mud flats of the Parham Land System. Main soils: Calcareous loam over clay - **A6** (E) Loam over dispersive red clay - **D3** (E) Silty loam over dispersive brown clay - **F2** (E) This land is mostly too wet and saline for horticulture, but is suitable for grazing and limited cropping.
ZA- ZAz ZB- ZBf ZCz	1.2 2.7 6.2 4.1 1.8	Saline land. **ZA-** Moderately saline flats with samphire patches **ZAz** Moderately saline water courses with significant bare ground and variable halophytic vegetation. **ZB-** Samphire flats **ZBf** Samphire flats with meandering channels feeding tidal creeks **ZCz** Saline water courses. Main soils: Marginally saline calcareous loam over clay - **A6** (E-C) Gypseous clay loam - **A8** (E-C) Waterlogged and saline variants - **N2** (C-E) This land is too saline for cropping or conventional pastures. Most is suitable for saltbush or similar salt tolerant forage plants.

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:

Texture contrast soils

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 sandy to medium clay from about 100 cm.

G1b Sand over red 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.

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.

Gradational and clayey soils

E1 Black cracking clay (Epipedal, Black Vertosol)
15 - 25 cm seasonally cracking black clay with strong granular structure over a coarsely structured black clay becoming greyer with depth, grading to a brown mottled sandy clay below 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 sand to sandy loam (drift).

M2 Black gradational clay loam (Hypocalcic, Black Dermosol)
Up to 25 cm black crumbly silty clay loam grading to a black or brown well structured silty clay, slightly calcareous (minor soft and/or hard carbonate segregations) with depth

Calcareous / wet saline soils

A6 Calcareous loam over clay (Epihypersodic, Regolithic, Hypercalcic / Supracalcic Calcarosol)
10 - 20 cm calcareous loam grading to a highly calcareous brown clay loam with a very highly calcareous clay loam (sometimes with nodular carbonate) at about 30 cm, overlying a very highly calcareous mottled pale red clay (often wet and saline).

A8 Gypseous clay loam (Gypsic, Calcic Calcarosol)
Thin highly calcareous grey brown clay loam over a pale grey highly calcareous clay loam with abundant soft and crystalline gypsum, grading to an orange medium clay with hard calcrete fragments at depth.

A5/N2 } Waterlogged and saline calcareous loam / clay loam (Calcarosolic, Salic Hydrosol)

A8/N2 } Waterlogged and saline variants of A5 and A8 (above)

Further information: DEWNR Soil and Land Program