

LHC Langhorne Creek Land System

Alluvial plains of the Angas and Bremer Rivers

Area: 156.0 km²

Annual rainfall: 380 – 495 mm average

Geology: The majority of the land is underlain by alluvial sediments of the Angas and Bremer Rivers. These include silty sands, clayey sands, sandy clays and silty clays. Scattered occurrences of Blanchetown Clay equivalent occur in the south. Near the lake the alluvial sediments are overlain by thin veneers of black lacustrine clays, deposited during the most recent high sea level stand when the lakes inundated lower lying flats. Subsoil carbonates, so prominent in soils of adjacent older Land Systems, are generally minor, except on relict land surfaces, or where fluctuating ground watertables have caused precipitation. The land surface is sporadically overlain by windblown sands.

Topography: The land surface is a low relief plain extending from the foothills in the north to the shores of Lake Alexandrina in the south. The Angas and Bremer Rivers have meandered across the plains over time, creating extensive flood plains. Old meander channels are not uncommon. Low sandy rises are scattered across the plains. The channels of the two rivers are well defined and are incised 5-10 m in the north, but this decreases towards the south, where they break up into several distributary watercourses. Mosquito Creek is the main example, branching to the east from the main Bremer channel.

Elevation: 80 m in the foothills to 0 m at the lake edge

Relief: Less than 5 m

Soils: There is a range of soils varying in surface texture, degree of profile differentiation and sodicity. Typical soils include sandy loam texture contrast profiles, sandy uniform or gradational soils, loamy to clayey uniform to gradational soils, and deep sands on rises.

Main soils

- M4** Gradational red sandy loam on alluvial flats
- H2a** Deep red sand on sandy rises
- M1** Deep silty sand on alluvial flats
- G1a** Loamy sand over red sandy clay on alluvial flats
- F2a** Sandy loam over poorly structured brown clay on alluvial flats

Minor soils

Soils of sandy rises and levees

- H2b** Moderately deep grey brown sand
- G1b** Loamy sand over red sandy clay loam
- H2c** Deep red sand over alluvium (levees)

Texture contrast soils of alluvial flats

- D2** Sandy loam over red clay
- D3a** Sandy loam over dispersive red clay
- D3b** Clay loam over dispersive red clay
- D5** Thick loamy sand over red clay



F1	Sandy loam over friable brown clay
F2b	Sandy loam over poorly structured brown clay
F2c	Sandy clay loam over poorly structured dark clay
F2d	Moderately saline sandy loam over brown sodic clay
G1c	Thick loamy sand over red sandy clay
G1d	Loamy sand over brown sandy clay loam
<i>Loamy to clayey surfaced uniform and gradational soils of alluvial flats</i>	
C3	Gradational red sandy loam, calcareous
E1a	Alluvial black cracking clay
E1b	Lacustrine black cracking clay
E3	Brown cracking clay
M2/M1	Gradational brown loam
M2a	Gradational red clay loam
M2b	Dark gradational clay loam
N3	Dark wet clay loam
<i>Shallow soils over calcrete of alluvial flats</i>	
B3	Gradational loamy sand over calcrete
B5	Shallow black clay loam

Main features: The Langhorne Creek Land System is characterized by extensive alluvial plains, sporadically covered by sandy rises. All soils are deep, but vary considerably in profile properties. In the north, the soils are mainly coarse textured, well drained, low in fertility and with restricted waterholding capacity. Towards the south, there is a tendency to finer textured soils and texture contrast soils of moderate to high fertility. Drainage becomes increasingly impeded and salt levels become significant in places, particularly near the lakes. Most of the land is potentially productive, and there is substantial scope for horticulture, provided that sites are carefully selected.

Soil Landscape Unit summary: 23 Soil Landscape Units (SLUs) mapped in the Langhorne Creek Land System:

SLU	% of area	Main features #
HEB	0.2	<p>Very gently undulating plains, gently inclined slopes and low rises with slopes ranging from 1% to 5% underlain by Tertiary clays and alluvium, partly overlain by calcareous aeolian deposits of the Woorinen Formation.</p> <p>HEA Very gently undulating plains and valley floors with slopes of 1-2%. HEB Gently inclined slopes and low rises with slopes of 2-5%.</p> <p>Main soils: <u>Loam over red clay - D2a</u> (E) <u>Gradational red sandy loam - C1</u> (C) <u>Hard loamy sand over red clay - D5</u> (L) <u>Deep rubbly calcareous loam - A4</u> (L) <u>Sandy loam over poorly structured brown clay - F2</u> (L) <u>Gradational calcareous clay loam - A6</u> (M)</p> <p>These soils are mostly deep and inherently fertile, although boron levels are elevated in subsoils. Poorly structured surfaces are a minor limitation in D2a and D5 soils, while shallow carbonate layers restrict rootzone depth in places. Productivity potential is high.</p>
JfA	20.8	<p>Level plains associated with the Angas and Bremer Rivers where they emerge from the ranges, and extending southwards till they give way to the modern flood plains. Slopes are 1% to 2%, with little relief, except where former channels have left small depressions. Underlying sediments are micaceous thinly bedded silts, silty clay loams and silty clays with minor soft and nodular carbonates.</p> <p>Main soils: <u>gradational red sandy loam - M4</u> (E), with <u>sandy loam over red clay - D2</u> (C), <u>sandy loam over dispersive red clay - D3a</u> (L), <u>loamy sand over red sandy clay loam - G1a</u> (L), and <u>deep silty</u></p>



		<u>sand</u> - M1 (L). The gradational soils are well drained, but are relatively infertile and have limited waterholding capacity. The texture contrast soils are heavier soils with better nutrient and water holding capacities, but less well drained and prone to surface sealing and root impedence (dispersive types). The latter are difficult soils to irrigate.
JiA	1.2	Shallow depressions, probably representing abandoned watercourses. Underlying sediments are silty clays, silty clay loams and silts, often micaceous and typically thinly bedded. Most soils: sandy to loamy surface texture contrast types, mainly <u>sandy loam over dispersive red clay</u> - D3a (E) and <u>sandy loam over brown clay</u> - F2a (E). This land is prone to waterlogging due to a combination of low lying position and sodic, dispersive clayey subsoils. Root growth in subsoils may be impeded, and non sandy surfaces tend to set hard. Moderate levels of subsoil salt are likely. These soils have moderate dryland productive potential, except in wet seasons, but irrigation potential is poor.
JmA	6.8	Flood plains of the lower reaches of the Angas River, mostly downstream from Belvidere. Shallow depressions of distributary meander channels occur throughout. The plains are commonly separated from the river by low levees, mapped as KnE. In their southern occurrences, the plains are interrupted by sand drifts, which create discrete depressions, some of which are seasonally inundated. There is a range of soils with sandy to clayey surfaces. Main soils: <u>sandy loam over friable brown clay</u> - F1 (E), with <u>dark gradational clay loam</u> - M2b (C), <u>alluvial black cracking clay</u> - E1a (L), <u>gradational brown loam</u> - M2/M1 (L) and <u>sandy loam over red clay</u> - D2 (M). <u>Dark wet clay loam</u> - N3 (M) occurs in scattered wet depressions. The soils are mostly well drained but subsoil salt levels can be moderate. Natural fertility varies from moderate to very high. All soils have satisfactory water holding capacities, but their water release characteristics are different depending on clay content. Irrigation potential is good to fair.
KkA KkK KIA KIK KmA	25.0 1.8 7.5 1.1 3.5	Very gently undulating old flood plains of the Angas and Bremer Rivers, formed on medium to coarse grained and commonly silty alluvial sediments, partly overlain by windblown sands. In the south, underlying materials tend to be more clayey. The plains appear to have been subjected to a series of alluvial deposition and erosion events, accompanied by the deposition of windblown sand. This has resulted in a slightly hummocky landscape, with sandy rises occupying about half of the area. Distinctive sand hills are mapped separately as Soil Landscape Unit U-K. KkA Plains. KkK Marginally saline variant of KkA. KIA Plains underlain by more clayey sediments than KkA. KIK Marginally saline variant of KIA. KmA Less well drained variant of KIA. KIA, KIK and KmA all lie below the 10 m contour. There is a variety of soils depending on the nature of the parent sediments and the position in the landscape. Sandy to sandy loam soils with or without more clayey subsoils are characteristic. <u>Loamy sand and thick loamy sand over red sandy clay</u> - G1a/G1c (C), <u>deep silty sand</u> - M1 (C), <u>gradational red sandy loam</u> - M4 (C) and <u>sandy loam over red clay</u> - D2 (L) are the typical soils of KkA and KIA. On the less well drained land, texture contrast soils are more common. These include <u>sandy loam and clay loam over dispersive red clay</u> - D3a/D3b (M), <u>thick loamy sand over red clay</u> - D5 (M) and <u>sandy loam over poorly structured brown clay</u> - F2a/F2c (M), the latter typical of KIK. <u>Gradational loamy sand on calcrete</u> - B3 (M) occurs occasionally. On the rises, moderately deep to <u>deep red sand</u> - H2a (E) is predominant, with <u>moderately deep grey brown sand</u> - H2b (M) where calcrete or rubble occurs within 100 cm. The G1a, M1, M4 and D2 soils of the flats are generally well drained, with moderate fertility and water holding capacity. These soils are ideal for irrigation. The dispersive soils (D3, D5 and F2) are less well structured and are prone to waterlogging, surface sealing and impeded root growth. These are more common in KIA and KIK. They may be moderately saline with depth. As a general rule, clay content, degree of waterlogging and severity of salinity increase towards the lake.
KnA KnE	3.2 2.8	Flats and levees adjacent to the Angas River downstream from Belvidere, and terraces intermittently adjacent to the Angas and Bremer Rivers. KnA Flats with irregular surfaces, due to the uneven nature of deposition and flood induced erosion. KnE Levees less than 400 metres wide and less than 2 metres high, with slopes of 2% away from the stream. The landscape also includes the river channels where they are too narrow to be mapped separately.



		<p>The soils are characterized by fine sandy and silty textures. Some profiles have relatively uniform texture profiles, others have gradually increasing clay contents with depth, and some are texture contrast.</p> <p>Main soils: <u>gradational red sandy loam</u> - M4 (E), <u>gradational brown loam</u> - M2/M1 (E), <u>deep red sand over alluvium</u> - H2c (C), <u>deep silty sand</u> - M1 (L) and <u>sandy loam over red clay</u> - D2 (L). These soils are well drained with moderately low natural fertility. Despite their depth they often have limited waterholding capacity, due to high fine sand and silt content. They are generally friable and not restrictive to root growth, although they are susceptible to compaction. Stream bank erosion is a problem in places. Lower lying land is subject to flooding.</p>
KpA KpE	6.4 0.5	<p>KpA Present flood plain of the lower Bremer River from Langhorne Creek to Lake Plains, between the 25 metre and 10 metre contours. The land includes the river channel. In places, particularly on the margins, the alluvium is thin, overlying older land (KkA and KIA).</p> <p>KpE Flats of an abandoned channel of the Bremer River.</p> <p>On the upper plains, the soils tend to be sandy with gradually increasing clay contents at depth, while further south, soils tend to be dark, with loamy to clay loamy surfaces, clayey with depth.</p> <p>Main soils: <u>gradational brown loam</u> - M2/M1 (E) and <u>gradational red clay loam</u> - M2a (C), with <u>thick loamy sand over red clay</u> - D5 (L), <u>gradational red sandy loam</u> - M4 (M), <u>brown clay</u> - E3 (M), <u>alluvial black cracking clay</u> - E1a (M), <u>deep silty sand</u> - M1 (M) and <u>clay loam over dispersive red clay</u> - D3b (M). Soils as for KkA and KIA occur toward the margins. These soils are all deep but there is considerable variation with respect to drainage, waterholding capacity and fertility. The heavier types (especially the brown and black clays) are more fertile but tend to be less well drained and are prone to structural problems. Salt accumulation under irrigation is a threat in these soils. The lighter soils are better drained and although less fertile are more suited to irrigation.</p>
KqE	1.8	<p>Flood plain of Mosquito Creek. This is a distributary channel of the Bremer River, consisting of terraces, numerous small swamps and the watercourse. The soils are similar to those of KpA, but are less well drained and probably more saline.</p> <p>Main soils: <u>sandy loam over brown sodic clay</u> - F2b (E) and <u>gradational red clay loam</u> - M2a (C), with <u>gradational red sandy loam</u> - M4 (L) and <u>brown clay</u> - E3 (L). These soils are deep and fertile, but imperfect drainage and the risk of salinization restrict their horticultural potential.</p>
KtP	1.1	<p>Flats near the mouth of the Angas River, characterized by swamps and depressions of an old river channel.</p> <p>Main soil: <u>moderately saline sandy loam over brown sodic clay</u> - F2d (D). These soils are seasonally waterlogged and alkaline, which together with their moderate salt levels virtually eliminates horticultural potential. Dryland cropping productivity is also restricted.</p>
SdB	0.6	<p>Low benches and gently undulating low rises with relief of less than 10 metres and slopes of less than 4%, formed on rubbly to sheet calcrete, mostly Classes III C, III B and II, overlying Tertiary sands to sandy clays, or Pleistocene heavy clays. Surface calcrete stone is common and there is minor sheet rock outcrop. There is no surface drainage pattern. Most soils are calcareous throughout with rubble at shallow depth. There are some red texture contrast types.</p> <p>Main soils: <u>Deep rubbly calcareous loam</u> - A4 (E) <u>Shallow calcareous loam on calcrete</u> - B2 (E) <u>Gradational red sandy loam</u> - C1 (M) <u>Loam over red clay</u> - D2a (M)</p> <p>These soils are well drained and moderately fertile, but waterholding capacity is commonly restricted by shallow rubble or sheet rock. Workability is a limitation in places due to surface stone.</p>
U-K U-R	7.3 0.1	<p>Low dunes and sand rises with relief of less than 10 metres and slopes of up to 5% formed on reddish to pale brown aeolian non calcified sand (Bunyip Sand). They are superimposed on the alluvial plains of the Bremer and Angas Rivers, but occasionally overlie calcrete, which may be exposed in blowouts or in the banks of the rivers where they have cut through.</p> <p>U-K Low rises U-R Low rises adjacent to the lake with marginally saline swales.</p> <p>Main soils: <u>deep red sand</u> - H2a (E) and <u>loamy sand over red sandy clay loam</u> - G1b (C), with <u>moderately deep grey brown sand</u> - H2b (L) on rises. <u>Gradational red sandy loam</u> - M4 (C), <u>gradational red sandy loam, calcareous</u> - C3 (L) and <u>sandy loam over red clay</u> - D2 (M) occur in swales and depressions between the sand rises. Shallow sandy soils over calcrete or rubble may occur in blowouts or where the rises have been dissected by river flow. These soils are deep and well drained, but infertile and susceptible to water repellence and wind erosion. Although not favourable</p>



		soils for cropping, their horticultural potential is good, limited mainly by the distribution of the unit as small isolated "islands".
VyB VzJ	4.5 1.9	<p>Flats at the mouths of the Angas and Bremer Rivers. The flats are formed on lake bed clays, deposited during the most recent high sea level stand, when the lake inundated the lowest lying areas. The depth of the clay is variable, commonly overlying older soils buried by the lake sediments.</p> <p>VyB Flat plains at the mouths of the Angas and Bremer Rivers, and Mosquito Creek. There are occasional swamps and meander channels which carry flood waters.</p> <p>VzJ Lake edge flats with swampy depressions between the two rivers.</p> <p>The soils include sandy loam texture contrast types and medium to fine textured black soils with some sandy soils on very low rises.</p> <p>Main soils of VyB: <u>sandy clay loam over poorly structured brown clay</u> - F2c (E), with <u>dark gradational clay loam</u> - M2b (C), <u>lacustrine black cracking clay</u> - E1b (C) and <u>dark wet clay loam</u> - N3 (L).</p> <p>Main soils of VzJ: <u>sandy loam over poorly structured brown clay</u> - F2b (E) and <u>dark gradational clay loam</u> - M2b (C), with <u>loamy sand over brown sandy clay loam</u> - G1d (L) on low rises, and <u>lacustrine black cracking clay</u> - E1b (L), <u>clay loam over limestone</u> - B5 (L) and <u>dark wet clay loam</u> - N3 (L) in moderately saline and waterlogged depressions. The lower lying ground supports some pasture / fodder crop irrigation but is generally too wet and / or saline for sustained production. Elsewhere, horticultural potential is fair to marginal due to risk of watertable encroachment and rising salinity. Soil depth, waterholding capacity and fertility are all favourable.</p>
XHS XHT	0.6 0.3	<p>Beds, banks and levees of the Angas and Bremer Rivers.</p> <p>XHS Angas River with frequently eroded banks and lateral gully development.</p> <p>XHT Bremer River with generally more stable banks.</p> <p>Main soils: <u>deep silty sand</u> - M1 (E), <u>gradational red sandy loam</u> - M4 (E) and <u>gradational brown loam</u> - M2/M1 (C). The main issue is control of watercourse erosion and maintenance of a healthy aquatic environment in the river.</p>
ZH-	1.0	Saline flats.

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:

- B3** Gradational loamy sand over calcrete (Petrocalcic, Red Kandosol)
Medium thickness loamy sand grading to a red massive sandy clay loam over calcrete within 50 cm.
- B5** Shallow black clay loam (Petrocalcic, Black Dermosol)
Medium thickness loam to light clay over a black clay sharply overlying cemented calcareous sand or calcreted limestone at about 25 cm.
- C3** Gradational red sandy loam, calcareous (Sodic, Supracalcic/Hypercalcic, Red Dermosol)
Reddish sandy loam to sandy clay loam grading to a red clay, calcareous with depth over medium to fine grained alluvium
- D2** Sandy loam over red clay (Sodic, Calcic, Red Chromosol)
Medium thickness reddish brown loamy sand to clay loam with a pink A2 horizon, overlying a dark reddish brown well structured clay with soft calcareous segregations (Class I or III A carbonate) from 55 cm. The profile grades to brown clayey sand to silty clay loam alluvium from 70 cm.
- D3a** Sandy loam over dispersive red clay (Calcic, Red Sodosol)
Medium thickness reddish brown loamy sand to clay loam with a bleached A2 horizon, overlying a dark reddish brown sandy clay loam to clay with columnar structure, grading to a coarsely blocky clay,



calcareous with depth (Class I or III A carbonate). The profile overlies clayey sand to silty clay loam alluvium from 65 cm.

- D3b** Clay loam over dispersive red clay (Hypocalcic, Red Sodosol)
Medium thickness hard clay loam over a coarsely structured red clay, calcareous with depth.
- D5** Thick loamy sand over red clay (Hypocalcic, Red / Brown Sodosol)
Thick sandy loam to loamy sand with a bleached A2 layer, over a coarsely structured red and brown mottled clay, sometimes weakly calcareous at depth, grading to medium textured alluvium.
- E1a** Alluvial black cracking clay (Pedal, Black Vertosol)
Medium thickness black silty clay to clay with strong blocky structure, overlying a black heavy clay with strong coarse blocky structure and minor calcareous segregations (Class I carbonate) from 50 cm. The clay becomes greyer and sometimes yellow mottled at depth.
- E1b** Lacustrine black cracking clay (Epipedal, Aquic Vertosol)
Medium thickness cracking clay over a black blocky heavy clay, becoming greyer, mottled and commonly sandier or gypseous with depth. Marginally to highly saline water table may occur at about 100 cm.
- E3** Brown clay (Calcic, Brown Dermosol / Brown Vertosol)
Medium thickness dark brown clay overlying brown, yellow and grey mottled strongly structured heavy clay, weakly calcareous (Class I carbonate) with depth, formed over variable alluvial or older sediments.
- F1** Sandy loam over friable brown clay (Hypocalcic, Brown Chromosol)
Medium thickness hard sandy loam over a friable brown clay, weakly calcareous with depth, grading to silty medium to fine grained alluvium.
- F2a** Sandy loam over poorly structured brown clay (Hypocalcic, Brown Sodosol)
Medium thickness dark brown massive loamy sand to loam with a pale grey A2 horizon, overlying a dark brown and yellowish brown mottled sandy clay to heavy clay with strong coarse prismatic structure, weakly calcareous from 50 cm.
- F2b** Sandy loam over poorly structured brown clay (Calcic, Brown / Black Sodosol)
Medium thickness dark brown loamy sand to loam, with a pale grey A2 horizon, overlying a brown to black coarsely prismatic medium clay, calcareous from about 50 cm. Clay may continue below 100 cm, or grade to sandier sediments or buried soil.
- F2c** Sandy clay loam over poorly structured dark clay (Calcic, Black / Brown Sodosol)
Medium thickness hard and often cracking sandy clay loam with a bleached subsurface layer, over a coarsely structured black to dark brown medium heavy clay with slickensides, calcareous from 50 cm, grading to heavy clay. Gypsum occurs sporadically throughout.
- F2d** Moderately saline sandy loam over brown sodic clay (Calcic, Brown Sodosol)
Medium thickness dark brown loamy sand to light sandy clay loam, with a pale grey A2 horizon, overlying a brown and orange mottled columnar structured sandy clay loam, grading to a medium clay with coarse prismatic structure. The soil is moderately calcareous from 30 cm, and becomes more sandy and less calcareous from 60 cm.
- G1a** Loamy sand over red sandy clay (Calcic, Red Chromosol / Sodosol)
Medium to thick reddish sand over a red sandy clay loam to clay subsoil, calcareous with depth, grading to coarse textured alluvium.
- G1b** Sand over red sandy clay loam (Calcic / Petrocalcic, Red Chromosol)
Medium to thick sand to loamy sand over a red light sandy clay loam to sandy clay, with soft to semi-hard carbonate from about 55 cm, sandier with depth. Hard calcrete layers may occur in the 50-100 cm zone.



- G1d** Sand over brown sandy clay loam (Supracalcic, Brown Sodosol)
Medium thickness grey sand with a bleached A2 layer over a brown and grey mottled light sandy clay loam, with moderate amounts of cemented and nodular carbonates at depth, grading to brown and yellow sandy clay.
- H2a** Deep red sand (Basic, Regolithic, Red-Orthic Tenosol)
Deep reddish sand grading to a clayey sand below 100 cm.
- H2b** Moderately deep grey brown sand (Calcareous, Regolithic, Brown-Orthic Tenosol)
Very thick grey brown sand to loamy sand, overlying a thin layer of orange clayey sand on soft to rubbly Class III carbonate.
- M1** Deep silty sand (Calcareous, Regolithic, Brown-Orthic Tenosol)
Thick brown silty sand to silty loam, overlying a brown massive fine sandy to silty loam with limited soft calcareous segregations, grading to very fine brown micaceous sand from 100 cm.
- M2/M1** Gradational brown loam (Hypocalcic, Brown Dermosol)
Thick brown silty loam to clay loam grading to a dark brown silty clay loam to light clay, overlying silty sand to silty loam alluvium with minor calcareous segregations from 65 cm.
- M2a** Gradational red clay loam (Calcic, Red Dermosol)
Medium thickness dark brown clay loam overlying a red and brown mottled strongly structured clay, becoming sandier and with minor soft calcareous segregations (Class I carbonate) from 70 cm, formed over silty or sandy alluvium.
- M2b** Dark gradational clay loam (Calcic, Black Dermosol)
Medium thickness dark clay loam with strong granular structure, overlying a black clay with strong blocky structure, becoming grey and yellow mottled at depth with variable soft and concretionary carbonates. Below 100 cm, profile may grade to pale brown and yellowish brown clayey sand to sandy clay, or olive coloured clay may continue to 200 cm or more. In places, the soil may overlie buried redder soils and sediments from depths as shallow as 50 cm.
- M4** Gradational red sandy loam (Hypocalcic, Red Kandosol)
Thick reddish brown sand to sandy loam, overlying a reddish brown massive light sandy clay loam to sandy clay with occasional carbonate nodules, grading to variable silty, sandy and clayey layered alluvial sediments.
- N3** Dark wet clay loam (Dermosolic, Oxyaquic Hydrosol)
Medium thickness dark clay loam with strong granular structure, overlying a black clay with strong blocky structure, becoming grey and yellow mottled at depth with variable soft and concretionary carbonates. The profile overlies pale brown and yellowish brown clayey sand to sandy clay from 100 cm. Can be marginally saline.

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

