

# CUR Curramulka Land System

An extensive network of low lying drainage areas. The system includes drainage depressions, closed depressions, low lying plains, plains, lower slopes, and some low rises.

**Area:** 114.0 km<sup>2</sup>

**Landscape:** Mostly low lying drainage areas including: drainage depressions, closed depressions, low lying plains, plains, lower slopes, and some low rises. The extensive network of this system drains much of the intertwined high ground of south-central Yorke Peninsula. However, surface flows are not particularly common. These drainage areas were mostly formed in past ages when climatic conditions were wetter. The system is mostly underlain by Proterozoic age bedrock, although, soil profiles contain little to no evidence of this rock. In the Curramulka valley in the very southwest of the system, the underlying bedrock is a Cambrian age grey to yellow limestone-dolomite (Kulpara Limestone), while lower slopes to the south and west of Curramulka are underlain by slightly younger dark blue-grey limestone-dolomite (Parara Limestone). Most soils in this area are underlain by calcrete, much of which may be the calcreted surface of the underlying limestone-dolomite bedrock. Topographic features found in this area, such as sinkhole depressions, are characteristic of limestone based landscapes. The Curramulka valley may have been formed by a glacier in Permian times.

Accessions of wind-deposited carbonate dust have infused into profiles in relatively recent geological times: a significant number of soils are calcareous throughout. Many soils across the system are underlain by calcrete, and many more contain hard carbonate rubble. Much calcrete is remnant dune core material. Most other soils are underlain by red clayey sediments – some possibly alluvial and some formed in situ.

**Annual rainfall:** 400 – 460 mm average

**Main soils:**

<b>D3</b>	Loam over red clay (around 22% of area)
<b>B6</b>	Shallow loam over red clay on calcrete (around 19% of area)

**Other soils:**

<b>B3</b>	Shallow red loam on calcrete (around 16% of area)
<b>C4-C3</b>	Gradational red clay loam (around 10% of area: mostly C4 soil)
<b>B2</b>	Shallow calcareous loam on calcrete (around 9% of area)
<b>A5-A4</b>	Calcareous loam (around 8% of area: mostly A5 soil)
<b>A6</b>	Gradational calcareous clay loam (around 6% of area)
<b>B7</b>	Shallow sand over clay on calcrete (around 5% of area)
<b>G4</b>	Sand over clay (approximately 4% of area)

**Main features:** The system is mostly arable, however, some soils are too stony and shallow to be cropped, and a few patches are too saline. Most soils have clayey subsoils. Soils underlain by calcrete at shallow depth are also common – many of these also have clayey subsoils. Surface soil textures range from sands to clay loams, and many surfaces are hardsetting. Sandy topsoils occur on the margins of the system where adjacent landscapes are dominated by 'sand over clay' soils. Clay loamy topsoils are mostly found in the north of the system.

Many soil profiles contain hard carbonate fragments, while fine quartz fragments also occur in some soils. The presence of hard carbonate fragments and/or calcrete at shallow depth, limits profile water holding capacity and hence its productive potential.

Many soils have clayey subsoils, which are typically dispersive at least in their lower part. Also some calcareous clay loamy to light clayey subsoils occur which are typically



dispersive. Such subsoils restrict soil internal drainage and can lead to waterlogging conditions, particularly when situated in low lying areas as many soils in this system are. Dispersive and hard subsoils also limit potential root exploration of such layers.

In this low lying system saline seepage affects many soils. In some areas, non arable patches of highly saline soil occur. Correspondingly, it is likely that many subsoils, and especially lower subsoils, have accumulations of sodium which are toxic to the majority of crop roots. The status of toxic accumulations of boron in the lower subsoil is not known well – upper subsoils usually have no problem – although it is likely that many substrates have high boron levels.

Where calcareous soils occur, they restrict the availability of certain nutrients: deficiencies of the major nutrient phosphorus and the trace element zinc are common, while deficiencies of the trace elements manganese and iron are possible. Temporary trace element deficiencies can occur in cold and wet conditions with susceptible crops. This is particularly true for soils with highly calcareous surfaces.

There is some potential for water erosion for soils on land adjacent to slopes and along drainage ways – texture contrast soils with loose surfaces and shallow depth to clayey subsoils are especially a potential risk. Also, sandy topsoils are particularly prone to wind erosion. Care needs to be taken with surface management in these areas to minimise the risk of water and wind erosion.

#### Soil Landscape Unit summary: Curramulka Land System (CUR)

SLU	% of area	Main features #
GMO	4.4	Land dominated by sandy texture contrast soil. Main soils: <i>sand over clay G4</i> grading to <i>loam over red clay D3</i> . With some <i>shallow sand over clay on calcrete B7</i> grading to <i>shallow loam over red clay on calcrete B6</i> . <b>GMO</b> – drainage depression/drainage area with drainage lows (slopes 0-1%).
GTO	2.9	Land dominated by sandy texture contrast soil. Main soils: <i>sand over clay G4</i> grading to <i>loam over red clay D3</i> . And common to extensive areas of <i>shallow sand over clay on calcrete B7</i> grading to <i>shallow loam over red clay on calcrete B6</i> . <b>GTO</b> – drainage depression with some slight rises (slopes <1%).
GUO	1.0	Land dominated by sandy texture contrast soil. Main soils: <i>sand over clay G4</i> grading to <i>loam over red clay D3</i> . With areas of <i>shallow sand over clay on calcrete B7</i> . <b>GUO</b> – drainage area/depression with drainage way (slopes <1%).
HNE	0.3	Land dominated by loamy texture contrast soils formed in clayey sediments. Main soils: <i>loam over red clay D3</i> grading to <i>gradational red clay loam C4</i> . With common to extensive areas of <i>shallow loam over red clay on calcrete B6</i> . <b>HNE</b> – closed depression (slopes <1%): probably a sink holes in Kulpura Limestone.
HVe	0.4	Land dominated by loamy texture contrast soils formed in clayey sediments. Main soils: <i>loam over red clay D3</i> grading to <i>gradational red clay loam C4</i> and possibly some <i>gradational calcareous clay loam A6</i> . With some <i>shallow loam over red clay on calcrete B6</i> , and some <i>calcareous loam A5</i> in some areas. <b>HVe</b> – drainage depression with a drainage line in the lower part, and areas of marginal to high salinity (slopes 0-1.5%, 3-4s+). <b>HVK</b> – low lying plain with drainage lows (slopes 0-1%). <b>HVO</b> – drainage depression/drainage area (slopes <1%). <b>HVT</b> – depression/drainage depression area with areas of marginal salinity and a few patchy surface effects of saline seepage evident (slopes <1%, 4-3s°)
HVK	4.8	
HVO	9.4	
HVT	0.9	
IYA	5.3	Land dominated by calcareous soils formed in clayey sediments. Main soils: <i>gradational calcareous clay loam A6</i> grading to <i>loam over red clay D3</i> . With some <i>rubbly calcareous loam A5-A4</i> , and some <i>shallow loam over red clay on calcrete B6</i> grading to <i>shallow calcareous loam on calcrete B2</i> . <b>IYA</b> – low rises/gently undulating plain (slopes 0-1%). <b>IYT</b> – relatively low lying gently undulating plains/lower slopes with drainage lows (slopes 0-
IYK	8.2	
IYP	3.8	
IYL	0.7	
IYO	0.6	
IYT	0.2	



		1.5%). <b>IYP</b> – low lying plains/drainage area/depression with drainage ways, mostly marginal salinity, and surface effects of saline seepage commonly evident (slopes 0-1%, 4-3s+). <b>IYL</b> – lower slopes/drainage area with drainage ways/drainage lows and some surface effects of saline seepage evident (slopes 0.5-2%, 3-4s+). <b>IYO</b> – drainage depression (slopes 0-1%). <b>IYT</b> – closed depression probably with some marginally saline areas (slopes <1%): probably a sinkhole in Kulpara Limestone.
QIA	4.8	Land dominated by shallow soil on calcrete. Main soils: <i>shallow red loam on calcrete B3</i> grading to <i>shallow loam over red clay on calcrete B6</i> and <i>shallow calcareous loam on calcrete B2</i> . Also with some <i>loam over red clay D3</i> in lows. <b>QIA</b> – slight rise with some drainage lows (slopes <1%).
QnA	1.7	Land dominated by shallow soil on calcrete. Main soils: <i>shallow calcareous loam on calcrete B2</i> and extensive areas of <i>shallow red loam on calcrete B3</i> grading to <i>shallow loam over red clay on calcrete B6</i> . Minor to limited areas of <i>loam over red clay D3</i> may occur in lows. <b>QnA</b> – gently undulating plains/low rise (slopes 0-1%).
QoA	0.1	Land dominated by shallow soil on calcrete. Main soils: <i>shallow calcareous loam on calcrete B2</i> grading to <i>shallow loam on calcrete B3</i> and <i>shallow loam over clay on calcrete B6</i> . With some <i>loam over red clay D3</i> in lows. <b>QoA</b> – slight rise (slopes 0-1%).
QqK	5.3	Land dominated by shallow soil on calcrete. Main soils: <i>shallow calcareous loam on calcrete B2</i> , with common to extensive areas of <i>shallow red loam on calcrete B3</i> grading to <i>shallow loam over red clay on calcrete B6</i> . Also with areas of <i>rubbly calcareous loam A4-A5</i> . <b>QqK</b> – relatively low lying gently undulating stony plain (slopes 0-1%).
QsA	1.9	Land dominated by shallow soil on calcrete. Main soils: <i>shallow calcareous loam on calcrete B2</i> and extensive areas of <i>shallow red loam on calcrete B3</i> , and some <i>shallow loam over red clay on calcrete B6</i> . <b>QsA</b> – gently undulating plain (slopes 0-1%).
RCA	1.5	Land dominated by shallow soil on calcrete.
RCB	1.7	Main soils: <i>shallow red loam on calcrete B3</i> with some <i>shallow calcareous loam on calcrete B2</i> .
RCE	1.8	<b>RCA</b> – relatively low lying plain (slopes <1%) <b>RCB</b> – lower slope (slopes 1-2.5%): underlain by Parara Limestone. <b>RCE</b> – low lying plain/drainage area with some low stony rises (slopes 0-2%): approximately 20-30% non arable low stony rises. Some <i>hard red loam C4b-D3b</i> may occur in flats.
RFA	0.1	Land dominated by shallow soil on calcrete.
RFE	0.5	Main soils: <i>shallow loam over red clay on calcrete B6</i> grading to some <i>shallow red loam on calcrete B3</i> and <i>shallow calcareous loam on calcrete B2</i> . Minor to limited areas of <i>loam over red clay D3</i> may occur in lows.
RFO	2.6	<b>RFA</b> – low rise (slopes 0-1%). <b>RFE</b> – closed depression (slopes <1%): probably a sinkhole in Kulpara Limestone. <b>RFO</b> – low lying plain/drainage area with a few low rises (slopes 0-1%).
RHK	2.1	Land where shallow soil on calcrete is the most common soil. Main soils: <i>shallow loam over red clay on calcrete B6</i> and extensive areas of <i>loam over red clay D3</i> grading to <i>calcareous loam A5-A4</i> . <b>RHK</b> – relatively low lying plain/lower slopes with some vague drainage lows with minor surface expression of saline seepage (slopes 0-1%).
RJA1	5.7	Land dominated by shallow soil on calcrete.
RJA4	5.7	Main soils: <i>shallow red loam on calcrete B3</i> grading to <i>shallow loam over red clay on calcrete B6</i> and sometimes a few <i>shallow calcareous loam on calcrete B2</i> , and with some calcrete outcrop.
RJB1	0.4	<b>RJA1</b> – non arable stony rise to low rise with a few drainage lows (slopes 0-1.5%). <b>RJA4</b> – semi arable gently undulating plains and relatively low lying plains with non arable very stony low rises and mostly arable flats (slopes 0-1.5%): approximately 30% arable land. Some <i>hard red loam C4b-D3b</i> may occur in flats. <b>RJB1</b> – non arable stony slopes (slopes 0.5-3.5%).
ROA	3.9	Land dominated by shallow soil on calcrete. Main soils: <i>shallow loam over red clay on calcrete B6</i> .



		<b>ROA</b> – low stony rise/gently undulating plain (slopes 0-1%).
RPA	3.2	Land dominated by shallow soil on calcrete. Main soils: <i>shallow loam over red clay on calcrete</i> <b>B6</b> . With some <i>loam over red clay</i> <b>D3</b> in lows. <b>RPA</b> – low stony rise with drainage lows (slopes <1%).
RRA 6 RRA RRB	0.4 0.6 1.0	Land dominated by shallow soil on calcrete. Main soils: <i>shallow sand over clay on calcrete</i> <b>B7</b> grading to <i>shallow red loam on calcrete</i> <b>B3</b> and/or <i>shallow loam over red clay on calcrete</i> <b>B6</b> . With some calcrete outcrop. <b>RRA6</b> – low rise (slopes 0-1%): 80% arable <b>RRA</b> – non arable low stony rises (slopes 0-1.5%). <b>RRB</b> – non arable low stony rises (slopes 0.5-2.5%).
RSA RSB RSO	0.7 0.5 1.3	Land dominated by shallow soil on calcrete. Main soils: <i>shallow sand over clay on calcrete</i> <b>B7</b> . With some <i>sand over clay</i> <b>G4</b> grading to <i>loam over red clay</i> <b>D3</b> , especially in lows. <b>RSA</b> – relatively low lying gently undulating plain (slopes 0-1%). <b>RSB</b> – slopes with drainage ways/drainage lows (slopes 0.5-2.5%). <b>RSO</b> – drainage depression with drainage ways and a few low rises (slopes 0-2%).
SOK	0.4	Land dominated by loamy soils formed in calcareous loess, but overlying clayey sediments. Main soils: <i>calcareous loam</i> <b>A5</b> with some <i>calcareous loam over red clay</i> <b>D3</b> in lows. <b>SOK</b> – low lying plain with vague drainage lows (slopes 0-1%).
TAA	0.2	Land dominated by clayey to clay loamy soils formed in clayey sediments. Main soils: <i>gradational red clay loam</i> <b>C3-C4</b> grading to <i>loam over red clay</i> <b>D3</b> , often with vertic (reactive) clayey subsoils. With some <i>red-brown cacking clay</i> <b>E2-E3</b> . <b>TAA</b> – lower slopes with some gilgai microrelief (slopes 0-1%)
TBO TBOs	5.7 3.3	Land dominated by clayey to clay loamy soils formed in clayey sediments. Main soils: <i>gradational red clay loam</i> <b>C4-C3</b> grading to <i>loam over red clay</i> <b>D3</b> and possibly some <i>gradational calcareous clay loam</i> <b>A6</b> . <b>TBO</b> – low lying drainage area/depression with drainage lows (slopes <1%). <b>TBOs</b> – drainage depression with some slight rises with some patchy surface effects of saline seepage evident (slopes <1%).

# Classes in the 'Soil Landscape Unit summary' table (eg. 2-1e, 3w, 2y, etc) describe the predominant soil and land conditions, and their range, found in Soil Landscape Units. The number '1' reflects minimal limitation, while increasing numbers reflect increasing limitation. Letters correspond to the type of attribute:

a - wind erosion	e - water erosion	f - flooding	g - gullyng
r - surface rockiness	s - salinity	w - waterlogging	y - exposure

### Detailed soil profile descriptions:

#### Main soils:

- D3** *loam over red clay* [Sodic-Effervescent Hypercalcic-Lithocalcic Red Chromosol-Sodosol]  
Medium thickness to thin loamy topsoil overlying red to red brown clayey subsoil which grades to highly calcareous clay. Surfaces are usually hardsetting. Profiles can be calcareous throughout, and often contain some hard carbonate rubble and/or some fine quartz fragments. Subsoils are dispersive, at least in their lower part, and are occasionally reactive (such soils often crack to the surface). These soils are usually underlain by clayey sediments, but can be underlain by calcrete (which is sometimes relatively soft) at moderate depth. Often found in drainage lows.
- B6** *shallow loam over red clay on calcrete* [Petrocalcic Red Chromosol-Sodosol-Dermosol]  
Medium thickness to thin loamy to clay loamy (often sandy loam) topsoil overlying a red clayey subsoil. This is underlain by calcrete at shallow depth. The soil layer directly overlying the calcrete often contains abundant hard carbonate rubble, and soils often contain some fine quartz fragments. Surfaces are typically hardsetting, and subsoils can be dispersive. Profiles can be calcareous throughout. Mostly found on flats and low rises.



**Other soils:**

- B3** *shallow red loam on calcrete* [Petrocalcic Tenosol-Chromosol]  
Red to red brown loamy to clay loamy soil overlying calcrete at shallow to very shallow depth. Profiles often contain abundant hard carbonate rubble, and can contain some fine quartz fragments. Surfaces are often hard setting. Soils can be very shallow and non arable Typically found on low stony rises. These grade to calcareous **B2** soils.
- C4-C3** *gradational red clay loam* [Sodic Hypercalcic Red Dermosol]  
Red brown medium thickness to thin clay loamy topsoil grading to red clayey subsoil which grades to clay with abundant fine carbonate (lower subsoils may be marly). Subsoils are dispersive, at least in their lower part. Profiles can contain some fine quartz fragments, may contain some hard carbonate fragments, and are usually underlain by clayey sediments. Topsoils can be slightly calcareous. Mostly found in low lying area such as drainage depressions. **C4** soils typically have hardsetting surfaces and hard subsoils, while **C3** soils have relatively friable surfaces and often have subsoils which are relatively well structured or sometimes reactive (such soils often crack to the surface).  
A variant of these soils is a *hard red loam* **C4b-D3b** which is found in the flats between very stony low rises near Curramulka: these have red brown hardsetting loam to clay loam topsoils overlying red light clayey dispersive subsoils, which overlie calcrete at moderate depth: these grade to red **B3** soils.
- B2** *shallow calcareous loam on calcrete* [Petrocalcic Calcarosol-Chromosol]  
Grey brown to brown calcareous loamy to clay loamy soil overlying calcrete at shallow to very shallow depth. Profiles often contain abundant hard carbonate rubble, and the underlying calcrete is sometimes relatively soft. Typically found on low stony rises, and some flats.
- A5-A4** *calcareous loam* [Regolithic Hypercalcic-Lithocalcic Calcarosol]  
Grey brown to brown medium thickness calcareous loamy to clay loamy topsoil grading to loamy to light clayey subsoil with abundant fine carbonate. Subsoils can be as strongly coloured as red brown or yellow red (this is unusual for such soils on the Yorke Peninsula). Profiles can contain some hard carbonate rubble, and are often underlain by clayey sediments (soil **A5**). Subsoils are usually strongly alkaline, and are dispersive when clay loamy or light clayey. Found on flats, slightly raised areas, and even in a few drainage depression areas.
- A6** *gradational calcareous clay loam* [Pedal Hypercalcic-Lithocalcic Calcarosol]  
Calcareous grey brown to brown thick to medium thickness loamy to clay loamy topsoil grading to clayey subsoil with abundant fine carbonate. Fine carbonate content increases with depth. Subsoils are typically dispersive. Profiles can include some hard carbonate fragments, and are usually underlain by clayey sediments. These grade to **D3**, **C4** and **A5** soils.
- B7** *shallow sand over clay on calcrete* [Petrocalcic Red Sodosol-Chromosol]  
Medium thickness to thin sandy topsoil overlying a red to red brown clayey, or sometimes sandy clay loam, subsoil. This is underlain by calcrete at shallow to very shallow depth. Subsoils can be dispersive. Profiles are occasionally calcareous throughout. The sandy topsoils are typically water repellent. Usually found on low stony rises.
- G4** *sand over clay* [Hypercalcic-Lithocalcic Red-Brown Sodosol-Chromosol]  
Medium thickness to thin loamy sand to sand overlying red to red brown clayey subsoil. Profiles may contain hard carbonate rubble. Subsoils are dispersive, at least in their lower part, and are typically coarsely structured. Profiles can sometimes be underlain by calcrete at moderate depth. The sandy topsoils are typically water repellent. Typically found in drainage lows and drainage depressions.

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

