CUN Cunliffe Land System

Mostly low lying stony plains forming a broad drainage basin

Area: 260.6 km^2

Landscape: Mostly low lying stony plains, with a few very low rises and some depressions. Ill-defined drainage ways are common; and some well-defined drainage depressions occur. Calcrete (Bakara/Ripon Calcrete: ancient Bridgewater Formation), at shallow to moderate depth, is prevalent over most of the system. This seems to mostly be underlain by older red clayey sediments (Hindmarsh Clay): in depressions where calcrete has been 'dissolved' soils are formed in this clay. Areas of more recent calcareous loess deposits occur (Woorinen Formation), generally as very slight highs on undulating land. Alluvial deposition of clayey sediments has occurred in many low lying areas. This has resulted in clayey layers overlying calcrete in some areas. (Alternatively water-borne accumulations of carbonate in subsoils in low lying areas may have hardened to form calcrete).

Drainage is toward the north. Drainage from the Agery basin and adjacent slopes, the high country around Arthurton and further north, and the Paskeville plateau, all seeps or flows into the Cunliffe basin. Actual drainage depressions occur in the very southwest of the system at the end of the Agery basin, and in the northeast and north of the system where a channel skirts the base of the Paskeville plateau. Actual overland flow along drainage depressions only occurs rarely. A drainage depression continues from the very northeastern end of the Cunliffe basin, skirting the eastern and then northern edge of the Kadina-Wallaroo land system, and drains into the saline land behind the coastal dunes of Wallaroo Bay. (This drainage route, from the beyond the head of the Agery basin to the outlet at Wallaroo Bay, is almost 60 km long!).

In the very north of the system a saline watertable is close enough to the surface to result in salinised depressions. This indicates that much of the water entering the basin eventually seeps into the saline watertable. There are landscape indications that the saline seepage at the north of the Cunliffe basin seeps westward from the very northwestern end of the basin, through to the drainage depression in the central Kadina-Wallaroo land system, and then onto the low lying salinised plains adjacent to the coast, as well as on to the drainage depression which dissects Wallaroo and continues to the coastal land beside Wallaroo Bay. This seepage route probably once catered for overland flow.

Annual rainfall: 360 - 415 mm average

Main soils:

B2	shallow calcareous loam on calcrete (around 53% of area)
A6	gradational calcareous clay loam (around 15% of area)
A5-**A4**	(rubbly) calcareous loam (around 16% of area)

Minor soils:

B6	shallow loam over red clay (around 6% of area)
C4	gradational clay loam (around 5% of area)
B3	shallow loam on calcrete (approximately 4% of area)

Main features: Various shallow soils on calcrete with loamy to clay loamy surfaces dominate this system. There are some areas where the soils are too shallow to be cropped. Profiles which are shallow and/or contain hard carbonate rubble have limited moisture holding capacity and hence limited production potential. However, where subsoil clay layer occur moisture holding capacity is increased. Surface stone also interferes with many farming practices. Fine carbonate in soils limits the availability of certain nutrients.

However, this effect depends on the amount of fine carbonate present, especially in the surface soil, and many surface soils in this system contain only moderate to minor amounts of fine carbonate. Accumulations of boron and sodium in subsoils is particularly prevalent where clayey subsoils are present. Clayey subsoils usually have relatively poor physical structure, resulting in waterlogging, especially in the lower lying areas where these soils tend to occur. Minor flooding can also occur along some drainage depressions. Many soils have clay loamy surfaces which set hard. High salinity levels associated with saline watertables occurs in depressions in the north of this system. Salinity in other low lying areas is normally present as raised subsoil levels.

Soil Landscape Unit summary: Cunliffe Land System (CUN)

SLU	% of area	Main features
ICA	0.5	Plains with soils dominantly formed in clayey sediments. Main soils: *gradational calcareous clay loam* **A6**. With limited to common areas of *calcareous loam* **A5**-**A4**. **ICA** – gently undulating plains (slopes 0-1.5%).
IDA	0.4	Plains/depressions with soils dominantly formed in clayey sediments. Main soils: *gradational calcareous clay loam* **A6**. **IDA** – relatively low lying plains/depressions (slopes 0-1%).
IIE	0.4	Drainage depression with soils dominantly formed in clayey sediments. Main soils: *gradational calcareous clay loam* **A6**. With limited to common areas of *rubbly calcareous loam* **A5**-**A4**. **IIE** – drainage depression (slopes 0-1%).
INA INE	3.2 2.2	Plains and drainage depressions with soils dominantly formed in clayey sediments. Main soils: *gradational calcareous clay loam* **A6**. With limited to common areas of *rubbly calcareous loam* **A5**-**A4**. Possibly with some *gradational clay loam* **C4**. **INA** – gently undulating plains (slopes 0-1.5%). **INE** – drainage depressions (slopes 0-15).
IPA	1.0	Slopes with soils dominantly formed in clayey sediments. Main soils: *gradational calcareous clay loam* **A6**. With limited to common areas of *rubbly calcareous loam* **A5**-**A4**, and *shallow calcareous loam on calcrete* **B2**. Possibly with some *gradational clay loam* **C4**. **IPA** – slight slopes (0.5-2%).
ISA	0.4	Depressions/plains with soils dominantly formed in clayey and calcreted sediments. Main soils: *gradational calcareous clay loam* **A6**, and extensive areas of *shallow calcareous loam on calcrete* **B2**. **ISA** – depressions with some relatively low lying plains (slopes <1%).
ObD	0.04	Old inland dune. This dune is of the 'sand over clay' type, but grading toward a mallee type sand dune. Main soils: *sand over sandy clay loam* **G1** to *sand over clay* **G4**-**G3**, and *calcareous loam* with loamy sand surface soil **A4**. **ObD** – low dune ridge.
QBA	4.7	Plains dominated by shallow calcreted soils. Main soils: *shallow calcareous loam on calcrete* **B2**, and extensive areas of *rubbly calcareous loam* **A5**-**A4**. **QBA** – relatively low lying gently undulating plain (slopes 0-1%).
QeA QeBg QeCg	36.9 1.1 0.3	Plains and slopes dominated by shallow calcreted soils. Main soils: *shallow calcareous loam on calcrete* **B2**, including some *shallow sandy loam on calcrete* **B3**. With limited to common areas of *gradational calcareous clay loam* **A6** grading toward *gradational clay loam* **C4**, found in low lying patches such as ill-defined drainage ways; and *calcareous loam* **A5**-**A4**. **QeA** – mostly relatively low lying gently undulating plains with ill-defined drainage ways (slopes 0-1.5%). **QeBg** – slopes with drainage channels (slopes 0-8%) **QeCg** – slopes with a deep and relatively steep drainage channel (slopes 2-15%).
QfA	1.8	Plains dominated by shallow calcreted soils. Main soils: *shallow calcareous loam on calcrete* **B2**, possibly including some *shallow sandy loam on calcrete* **B3**. With limited to common areas of *gradational calcareous clay loam*

		A6 grading toward *gradational clay loam* **C4**, found in low lying patches; and *rubbly calcareous loam* **A5**-**A4**. **QfA** – somewhat elevated gently undulating plains (slopes 0-1%).
QhA QhO	2.3 0.2	Plains and depressions dominated by shallow calcreted soils. Main soils: *shallow calcareous loam on calcrete* **B2** to *shallow loam over red clay on calcrete* with loam to clay loam surfaces **B6**. With limited to common areas of *gradational calcareous clay loam* **A6** grading to *gradational clay loam* **C4**, found in low lying areas; and *calcareous loam* **A5**-**A4**. Soils with clayey subsoils (soils **B6**, **A6** and **C4**) mostly occur in lower lying areas such as ill-defined drainage ways. **QhA** – slight slopes and gently undulating plains with ill-defined drainage ways (slopes 0-2%). **QhO** – shallow drainage depression (slopes <1%).
QIP	2.5	Plains dominated by shallow calcreted soils. Main soils: *shallow calcareous loam on calcrete* **B2**. With limited to common areas of *gradational calcareous clay loam* **A6** grading to *calcareous loam* with clay loam surfaces **A5**-**A4**, mostly in the lowest lying patches. **QIP** – low lying plain with marginal salinity and some highly saline depressions (slopes <1%).
QJA QJP	1.0 1.1	Plains dominated by shallow calcreted soils. Main soils: *shallow calcareous loam on calcrete* **B2**. With limited to common areas of *gradational calcareous clay loam* **A6** grading to *calcareous loam* with clay loam surfaces **A5**-**A4** in the 'QJP' land unit (mostly in low lying patches), and *rubbly calcareous loam* **A5**-**A4**. **QJA** – elevated plain and slight slopes (slopes 0-1.5%). **QJP** – low lying plain with marginal salinity (slopes <1%).
QKK	5.5	Plains dominated by shallow calcreted soils. Main soils: *shallow calcareous loam on calcrete* **B2**. With limited to common areas of *calcareous loam* **A5**-**A4**. **QKK** – relatively low lying level to gently undulating plain (slopes 0-1%).
QlE	0.1	Depressions dominated by shallow calcreted soils. Main soils: *shallow calcareous loam on calcrete* **B2**, including some *shallow sandy loam on calcrete* **B3**. With limited to common areas of *gradational calcareous clay loam* **A6** grading to *gradational clay loam* **C4**, found in the lowest lying patches. **QlE** – drainage depression (slopes 0-1%).
QqA QqK	14.9 13.1	Plains dominated by shallow calcreted soils. Main soils: *shallow calcareous loam on calcrete* **B2**. With some *shallow loam over red clay on calcrete* with clay loam to loam surfaces **B6**, and *shallow loam on calcrete* **B3**. There are minor areas of *gradational calcareous clay loam* **A6** grading to *gradational clay loam* **C4** in some depressions. **QqA** – low lying level to gently undulating stony plain with some depression areas and a few very low rises (slopes 0-1.5%). Some vague drainage patterns are evident. Very stony non arable patches are common in area. **QqK** – low lying level to gently undulating mostly stony plain with some ill-defined drainage ways (slopes 0-1%). Very stony non arable patches are limited in area.
QRA QRB	1.7 0.2	Plains and rises dominated by shallow calcreted soils. Main soils: *shallow calcareous loam on calcrete* **B2**, possibly with some *shallow sandy loam on calcrete* **B3**. **QRA** – gently undulating plains (slopes 0-1%) **QRB** – stony to very stony rise (slopes 1-3.5%).
SbA	2.1	Plains dominated by soils formed in rubbly calcareous loess. Main soils: *rubbly calcareous loam* **A5**-**A4**. With limited to common areas of *gradational calcareous clay loam* **A6** grading to *gradational clay loam* **C4**, found in low lying patches. **SbA** – relatively low lying gently undulating to level plains with a few ill-defined drainage ways (slopes 0-1%).
SdA	0.5	Plains/depression dominated by soils formed in rubbly calcareous loess. Main soils: *rubbly calcareous loam* **A5**-**A4**. With limited to common areas of *gradational calcareous clay loam* **A6** possibly grading to *gradational clay loam* **C4**, found in low lying patches; and *shallow calcareous loam on calcrete* **B2** possibly grading to *shallow loam on calcrete* **B3**. **SdA** – low lying plain/depression (slopes 0-1%).
SMA	0.2	Rise dominated by soils formed in calcareous loess. Main soils: *calcareous loam* **A5**-**A4**. **SMA** – very low rise (slopes 0-1%).

SRA	1.3	Plains dominated by soils formed in calcareous loess. Main soils: *calcareous loam* **A5-A4**. With limited to common areas of *shallow calcareous loam on calcrete* **B2**, and *gradational calcareous clay loam* **A6**. **SRA** – gently undulating plains with a few ill-defined drainage ways (slopes 0-1%).
ZA- ZB-	0.4 0.3	Saline depressions. Main soils: *saline soil* **N2** (usually saline variants of **B2**, **B3**, **A6** and **B6** soils). **ZA-** – saline depressions. **ZB-** – highly saline depressions.

Detailed soil profile descriptions:

Main soils:

B2 *shallow calcareous loam on calcrete* [Petrocalcic Calcarosol]
All of these soils have calcrete at shallow depth. They range from grey brown highly calcareous sandy loams on calcrete, to moderately calcareous red brown clay loams over light clay on calcrete. The heavier textured and less calcareous variants tend to occur in lower lying areas. Abundant hard carbonate rubble is a common feature of many profiles. Some soils are very shallow and non arable.

A6 *gradational calcareous clay loam* [Pedal Hypercalcic-Supracalcic-Lithocalcic-Petrocalcic Calcarosol]
Typically a soil with a hard calcareous red brown to brown clay loamy surface. This overlies or grades to a reddish clayey subsoil with abundant fine carbonate. This is underlain by a substrate of blocky red heavy clay. Hard carbonate rubble occurs in some profiles. A few profiles are underlain by calcrete at moderate depth. Mostly found in low lying areas/depressions. These grade toward **C4** soils.

A5-**A4** (*rubbly*) *calcareous loam* [Regolithic Hypercalcic-Lithocalcic Calcarosol]
Grey brown, brown or red brown calcareous loamy to clay loamy topsoil grading into clay loamy subsoil with abundant fine carbonate. Profiles often contain significant amounts of hard carbonate rubble, and can be underlain by calcrete at moderate depth. Usually underlain by a clayey substrate within 120 cm of the surface (soil **A5**). Often found on slight highs and rises.

Minor soils:

B6 *shallow loam over red clay* [Petrocalcic Chromosol-Sodosol]
Hard red brown clay loam to loam overlying red to red brown clay, with calcrete at shallow depth. These grade to **B3** and **A6** soils, and can be slightly calcareous in the surface. Found in low lying areas.

C4 *gradational clay loam* [Hypercalcic-Supracalcic-Lithocalcic-Petrocalcic Red]
Hard red brown clay loam to loam overlying red clay, which in turn overlies reddish clay with abundant fine carbonate. This is underlain by a blocky red heavy clay substrate. Profiles often contain hard carbonate fragments. These grade to **A6** soils, and can be slightly calcareous in the surface. Found in low lying areas such as drainage depressions and ill-defined drainage ways.

B3 *shallow loam on calcrete* [Petrocalcic Tenosol to Petrocalcic Chromosol]
Red brown sandy loam to clay loam overlying a subsoil with textures as heavy as light clay, overlying calcrete at shallow depth. Grades to B2 soils, and can be slightly calcareous in the surface.

Further information: DEWNR Soil and Land Program