

# HOL Holder Land System

(Based on the description by Potter, Wetherby and Chittleborough (1973) in "A Description of the Land in County Albert, County Alfred and Part of County Eyre, South Australia". Dept. of Agric. S.A. Soil Cons. Branch LD1).

Very gently undulating plains with low dunefields occupying a large area of the north western mallee with a small area east of Renmark.

**Area:** 2,455.6 km<sup>2</sup>

**Annual rainfall:** 245 – 295 mm average

**Geology:** The System is underlain by a more or less continuous layer of Bakara Calcrete capping Bungunnia Limestone. The calcrete tends to be dense and close to the surface in the west, with a gradual weakening to the east accompanied by increased soil depth. The calcrete is overlain by deposits of windblown Molineaux Sand which covers about 30% of the total land area.

**Topography:** The System is a vast calcrete plain with some low rises and occasional solution depressions providing a few metres of relief. The main topographic features are the overlying sand deposits which generally occur in fields of low, rounded, more or less parallel east - west ridges. There are minor areas of moderate dunes.

**Elevation:** 40 - 80 m

**Relief:** 3 - 9 m

**Soils:** Most soils are calcareous sandy loams dominated by carbonate accumulations. Some are calcareous throughout, others are non calcareous at the surface, but all have large amounts of rubbly or fine carbonate at shallow to moderate depth. The exceptions are the deep sands of sandhills.

## Main soils

### *Flats and low rises*

**A4** Rubbly calcareous sandy loam

**B2** Shallow calcareous sandy loam

**A4/C1** Red calcareous sandy loam

### *Sandhills*

**H2a** Deep sand

**H2b** Deep calcareous sand

**H2c** Deep calcareous loamy sand (lower slopes)

## Minor soils

### *Depressions*

**B3** Red stony sandy loam on calcrete

**C1** Gradational loamy sand

**Main features:** The Holder Land System is characterized by extensive areas of low sandhill country with low fertility sandy soils prone to wind erosion, a problem exacerbated by the generally low rainfall. The intervening land is flat to very gently undulating and dominated by calcareous sands to sandy loams. These tend to be very shallow and commonly non arable in the west. There is a gradual increase in average soil depth in an easterly direction, but restricted moisture holding capacity, along with marginal fertility, is a common limitation to productivity throughout.



**Soil Landscape Unit summary:** 17 Soil Landscape Units (SLUs) mapped in the Holder Land System:

SLU	% of area	Main features #
QMA QOA	9.2 11.0	<p>Flat to very gently undulating calccrete, with extensive surface stone and outcropping sheet rock. Low rounded and generally linear sandhills cover up to 20% of the area.</p> <p><b>QMA</b> Stony flats with less than 5% sandy rises. <b>QOA</b> Stony flats with 5-20% sandy rises.</p> <p>Main soils: <u>shallow calcareous sandy loam - B2 (V)</u>, with <u>deep (calcareous) sand - H2a/b (L)</u> on sandy rises. These flats are very stony with shallow soils which are largely non arable. Much of the land is uncleared, or has been allowed to regenerate. The sandhills, although marginally arable, are generally too small and scattered to support cropping. They are commonly at risk of wind erosion.</p>
QVA QVB QYA QYB	8.8 3.0 7.4 2.0	<p>Flats and gently undulating low rises formed on mixed sheet and rubbly calccrete, and overlain by up to 30% low sand hills. There is variable surface stone, sufficient to require picking or rolling in places, and minor non arable areas where sheet calccrete is close to the surface.</p> <p><b>QVA</b> Very gently undulating flats with less than 10% sandy rises. <b>QVB</b> Gently undulating rises and flats with less than 10% low sand hills. <b>QYA</b> Very gently undulating flats with 10-30% sandy rises. <b>QYB</b> Gently undulating low rises with 10-30% sand hills.</p> <p>Main soils: <u>rubbly calcareous sandy loam - A4 (E)</u> and <u>shallow calcareous sandy loam - B2 (E)</u>, with <u>red calcareous sandy loam - A4/C1 (L)</u> and <u>gradational loamy sand - C1 (L)</u>, and <u>deep (calcareous) sand to loamy sand - H2a/b/c (M-C)</u> on low sand hills. This land is less stony than <b>QMA/QOA</b>, but the typical soils are nevertheless shallow, with up to 10% of the area too stony for cropping. The main limitation on the arable land is restricted water holding capacity. The sandy rises are prone to wind erosion and water repellence, and are less fertile than the calcareous sandy loams.</p>
RCE	0.9	<p>Depressions (probably solution hollows) within the calccrete cap. They are more or less circular in shape.</p> <p>Main soils: <u>red stony sandy loam on calccrete - B3 (E)</u>, <u>gradational loamy sand - C1 (E)</u> and <u>shallow calcareous sandy loam - B2 (V)</u>. These isolated areas have soils of variable depth - some are arable and some are not.</p>
SaA SaB SgA SgB SgE	5.0 0.8 3.0 3.6 0.1	<p>Flats and gently undulating low rises formed on rubbly calccrete and overlain by up to 30% low sandhills. There is patchy surface stone associated with limited areas of shallow soils.</p> <p><b>SaA</b> Very gently undulating flats with less than 10% sandy rises. <b>SaB</b> Gently undulating rises and flats with less than 10% low sandhills. <b>SgA</b> Very gently undulating flats and sandy rises with 10-30% sandhills. <b>SgB</b> Gently undulating low rises with 10-30% low sandhills. <b>SgE</b> Low lying very gently undulating flats with 10-30% low sandhills.</p> <p>Main soils: <u>red calcareous sandy loam - A4/C1 (E-C)</u>, <u>rubbly calcareous sandy loam - A4 (E-C)</u>, <u>gradational loamy sand - C1 (L)</u>, and <u>shallow calcareous sandy loam - B2 (L)</u> with <u>deep (calcareous) sand to loamy sand - H2a/b/c (L-C)</u> on low sandhills and rises. This land represents the more productive parts of the Holder System, due to a higher proportion of deeper soils. The land is fully arable, although some soils have limited water holding capacity. There are moderate amounts of salt in the subsoils. The sandy rises and sandhills have low fertility and are prone to wind erosion. Near the River Murray, these landscapes are irrigated, although saline seepages occur on lower slopes and in depressions.</p>
U-D UMF UMG UMI UMJ	0.1 2.5 0.2 3.1 39.3	<p>Flat to gently undulating land where sandhills occupy more than 30% of the area. The sandhills are generally low and linear with roughly east-west orientation. They rarely cover more than 50% of the land surface. However there are small areas of closely spaced moderate sandhills. Sandhills spacing usually varies from 200 to 400 m, and height rarely exceeds 9 m.</p> <p><b>U-D</b> Individual low sandhills. <b>UMF</b> About 60% moderate irregular shaped sandhills. <b>UMG</b> About 60% low rounded hummocky sandhills. <b>UMI</b> 30-60% low to moderate parallel sandhills. <b>UMJ</b> 30-60% low parallel sandhills.</p> <p>Main soils: <u>deep (calcareous) sand to loamy sand - H2a/b/c (V-E)</u> on sandhills, with <u>red calcareous sandy loam - A4/C1 (C)</u>, <u>rubbly calcareous sandy loam - A4 (C)</u> and <u>gradational loamy sand - C1 (L)</u> on flats and rises between the sandhills. These areas are</p>



	characterized by low fertility soils prone to wind erosion, and water repellence is a problem in some years. The sandhills are rarely large enough to warrant fencing out, but nevertheless require careful management to avoid drift. The flats and swales are similar to <b>SgA/SgB</b> .
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# PROPORTION codes assigned to soils within Soil Landscape Units (SLU):

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|--|---------------------------------------|
| (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:

#### Flats and low rises

- A4** Rubbly calcareous sandy loam (Regolithic, Lithocalcic Calcarosol)  
Medium thickness calcareous loamy sand to sandy loam, more clayey with depth, over rubbly Class III C carbonate, grading to a very highly calcareous sandy clay loam with little rubble from about 50 cm.
- A4/C1** Red calcareous sandy loam (Epibasic, Supracalcic Calcarosol / Supracalcic, Red Kandosol)  
Loamy sand to sandy loam grading to a moderately calcareous reddish sandy clay loam over Class III B carbonate nodules at about 60 cm. Nodular carbonate grades to very highly calcareous sandy clay loam with depth. More common to the east.
- B2** Shallow calcareous sandy loam (Petrocalcic Calcarosol)  
Medium thickness calcareous loamy sand to sandy loam grading to a highly calcareous rubbly light sandy clay loam over sheet calcrete within 50 cm. Stony flats.

#### Sandhills

- H2a** Deep sand (Calcareous, Arenic, Brown-Orthic Tenosol)  
More than 100 cm sand to loamy sand grading to a reddish calcareous clayey sand.
- H2b** Deep calcareous sand (Regolithic, Calcic Calcarosol)  
Very thick soft calcareous light loamy sand becoming very highly calcareous and slightly more clayey with depth.
- H2c** Deep calcareous loamy sand (Regolithic, Hypercalcic Calcarosol)  
Very thick soft loamy sand becoming highly calcareous and slightly more clayey with depth, overlying rubbly or sheet calcrete below 80 cm.

#### Depressions

- B3** Red stony sandy loam on calcrete (Petrocalcic, Red Kandosol)  
Thin red sandy loam grading to a red sandy clay loam over fractured calcrete at about 20 cm and continuing below 100 cm, and then grading to a very highly calcareous rubbly sandy clay loam.
- C1** Gradational loamy sand (Hypercalcic / Lithocalcic, Red Kandosol)  
Medium thickness sandy loam grading to a red sandy clay loam overlying a highly calcareous sandy clay loam with variable rubble. Sandy Tertiary sediments occur at depth.

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

