

MUA Mulara Land System

A land system dominated by 'sand over clay' soils, with landscapes consisting of rises, slopes, elevated plains, and some drainage depressions.

Area: 57.8 km²

Landscape: Rises, slopes and elevated plains, with some drainage depressions. This area is a bedrock high – mostly underlain by Proterozoic age rock (Crawford, A.R., 1965). No surface or near surface evidence of underlying rock was encountered in field work, however, many soils contain some fine quartz fragments which is a sign that these soils formed in situ. Soil profiles are mostly underlain by clayey to clay loamy sediments. Most soils are texture contrast; the majority having sandy topsoils. A few sand dunes with sand over clay soils occur. Significant drainage depressions transect the system, especially in the north of the system, with drainage in a southeasterly direction. Accessions of wind-deposited carbonate dust have infused into profiles in relatively recent geological times: many profiles have calcareous lower subsoils, and a few soils are calcareous throughout. Many profiles contain calcrete and/or hard carbonate rubble: much calcrete is remnant dune core material.

Annual rainfall: 370 – 420 mm average

Main soils:

- G4** *sand over clay*
- B7** *shallow sand over clay on calcrete*
- D3** *loam over clay*

Minor soils:

- G3** *thick sand over clay*
- B6** *shallow loam over clay on calcrete*
- B3** *shallow loam on calcrete*

Main features: The system is mostly arable, however, a few soils are too stony and shallow to be cropped. The most common soils are sandy to loamy texture contrast soils with clayey subsoils. Soils underlain by calcrete at shallow depth are also relatively common. The presence of hard carbonate rubble and/or calcrete at shallow depth, limits profile waterholding capacity and hence its productive potential.

Most soils have clayey subsoils: these are typically dispersive, at least in their lower part, and are often coarsely structured. Such subsoils restrict soil internal drainage and can lead to waterlogged conditions, particularly when situated in low lying areas. Dispersive, hard and coarsely textured subsoils also limit potential root exploration of such layers.

Topsoils are often sandy. Sandy soils have low nutrient retention capacities, allowing soluble nutrients to be readily leached. Clayey subsoils restrict the downward movement of these nutrients, however, they may seep laterally along clay surfaces. Wind erosion is a potential risk with loose sandy soils, and the water repellent nature of many sandy topsoils compounds this risk. There is also some potential for water erosion on sloping land – texture contrast soils with loose sandy to loamy topsoils and clay at shallow depth are particularly a potential risk. Care needs to be taken with surface management in these areas to minimise the risk of wind and water erosion.

Some soils have raised subsoil salinity levels. In most instances, this is probably due to an accumulation of cyclic salt in soil profiles. Correspondingly, it is likely that many lower subsoils have accumulations of sodium which are toxic to the majority of crop roots.



Soil Landscape Unit summary: Mulara Land System (MUA)

SLU	% of area	Main features
GHA GHB	10.7 21.2	Land dominated by sandy texture contrast soil. Main soils: <i>sand over clay G4</i> with some <i>thick sand over clay G3</i> on low sandy rises with minor areas of <i>loam over clay D3</i> in lows. GHA – gently undulating rises (slopes 0-1.5%). GHB – slopes with a few drainage ways (slopes 0.5-4%).
GJA GJC GJE GJEg GJO	4.0 2.9 0.6 1.0 0.3	Land dominated by sandy texture contrast soil. Main soils: <i>sand over clay G4</i> grading to <i>loam over clay D3</i> . GJA – low rise and slight slopes with a few drainage lows (slopes 0-1.5%). GJC – slopes (slopes 1-6%). GJE – depression (slopes 0-1%). GJEg – drainage depression (slopes 0-1.5%). GJO – closed depression with some saline seepage and a saline patch (slopes <1%, 3s+).
GMA GMB	18.3 2.0	Land dominated by sandy texture contrast soil. Main soils: <i>sand over clay G4</i> grading to <i>loam over clay D3</i> . With some <i>shallow sand over clay on calcrete B7</i> grading to <i>shallow loam over clay on calcrete B6</i> . GMA – rise surface/elevated plains and plains with some vague drainage lows (slopes 0-1.5%). GMB – rises and slopes (slopes 0.5-2.5%).
HFA HFB HFE	6.3 5.1 8.5	Land dominated by loamy texture contrast soils formed in clayey sediments. Main soils: <i>loam over clay D3</i> grading to <i>sand over clay G4</i> in some cases. HFA – gently undulating somewhat elevated plains with some lows (slopes 0-1.5%). HFB – slopes and low rises (slopes 1-3.5%). HFE – drainage depression (slopes 0-1%).
HVB	0.6	Land dominated by loamy texture contrast soils formed in clayey sediments. Main soils: <i>loam over clay D3</i> grading to <i>sand over clay G4</i> and <i>calcareous loam A5-A4</i> , and with some <i>shallow loam over clay on calcrete B6</i> grading to <i>shallow calcareous loam on calcrete B2</i> . HVB – slopes (slopes 0.5-2.5%): concave drainage area.
OaC	1.0	Sand over clay dunes. Main soils: <i>thick sand over clay G3</i> . OaC – sand dune.
ObD	0.5	Sand over clay dunes. Main soils: <i>thick sand over clay G3</i> grading to <i>sand over clay G4</i> . ObD – low sand dune.
RFB	1.5	Land dominated by shallow soil on calcrete. Main soils: <i>shallow loam on calcrete B3</i> with some <i>shallow loam over clay on calcrete B6</i> grading to <i>shallow sand over clay on calcrete B7</i> . RFB – rises and slopes (slopes 0.5-3.5%).
RJB	1.1	Land dominated by shallow soil on calcrete. Main soils: <i>shallow loam on calcrete B3</i> , possibly grading to <i>shallow loam over clay on calcrete B6</i> and <i>shallow sand over clay on calcrete B7</i> . RJB – stony slopes (slopes 0.5-2.5%): mostly non-arable very stony areas.
RRA RRB	0.9 4.5	Land dominated by shallow soil on calcrete. Main soils: <i>shallow sand over clay on calcrete B7</i> grading to <i>shallow loam over clay on calcrete B6</i> . Minor areas of <i>loam over clay D3</i> grading to <i>sand over clay G4</i> may occur in lows. RRA – rise surface (slopes 0-1%): can include significant areas non-arable very stony land. RRB – rise and slopes (slopes 0.5-2%): can include significant areas of non-arable stony land.
RSA RSB RSC	6.3 1.6 1.0	Land dominated by shallow soil on calcrete. Main soils: <i>shallow sand over clay on calcrete B7</i> including some <i>sand over clay G4</i> . With some <i>loam over clay D3</i> in lows. RSA – low rise with some drainage lows (slopes 0-1.5%) RSB – rise and slopes (slopes 0.5-2.5%). RSC – rise and slopes (slopes 0.5-3.5%).



Detailed soil profile descriptions:**Soils:**

- G4** *sand over clay* [Hypercalcic-Lithocalcic Red-Brown Sodosol-Chromosol]
Medium thickness to thin loamy sand to sand overlying a red to red brown clayey subsoil. Subsoils can contain hard carbonate rubble. Often only lower subsoils are calcareous. Subsoils can be coarsely structured, and are typically dispersive, at least in their lower part. Profiles can be underlain by calcrete at moderate depth or more. The sandy topsoils are often water repellent. These soils grade to similar soils with thick to very thick sandy topsoils which are found on sand dunes: *thick sand over clay* (soil **G3**).
- B7** *shallow sand over clay on calcrete* [Petrocalcic Red-Brown Sodosol-Chromosol]
Medium thickness to thin, or occasionally thick, sandy topsoil overlying a red to red brown clayey subsoil, which is underlain by calcrete at shallow depth. This is a shallow variant of soil **G4**. Profiles often have hard carbonate rubble in the layer directly overlying the calcrete layer. Subsoils are typically not dispersive. Profiles are occasionally calcareous throughout. The sandy topsoils are often water repellent. These soils grade to similar soils with loamy topsoils: *shallow loam over clay on calcrete* (soil **B6**).
- D3** *loam over clay* [Hypercalcic-Lithocalcic Red-Brown Chromosol]
Medium thickness to thin loamy topsoil (mostly sandy loam) overlying red to red brown clayey subsoil. Subsoils can contain hard carbonate rubble. Subsoils can be coarsely structured, and are typically dispersive at least in their lower part. Profiles can be calcareous throughout, but more commonly are calcareous only in the lower subsoil.
- B3** *shallow loam on calcrete* [Petrocalcic Tenosol]
Shallow to very shallow loamy to clay loamy soil overlying calcrete. Typically found in non-arable very stony areas. These soils grade to similar soils which are calcareous throughout: *shallow calcareous loam on calcrete* (soil **B2**).

References: Crawford, A.R. (1965). 'The Geology of Yorke Peninsula'. *Bull. geol. Surv. S. Aust.*, 39.

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

