

# PAA Paradean Land System

Relatively low lying plains with low rises, broad drainage areas, and some lower slopes

**Area:** 51.5 km<sup>2</sup>

**Landscape:** Relatively low lying plains with low rises, broad drainage areas, and some lower slopes. This system skirts the central highlands area to the northwest, southwest and southeast. Broad drainage areas connect to the lower lying Yorke Valley area to the west and southwest, and the adjoining North Maitland Flat in the northwest. Some drainage out of the central highlands area heads in the opposite direction toward Cunningham in the southeast. The system is largely underlain by pre-Adelaidean Proterozoic age metamorphosed bedrock at depth. Soils are underlain by clayey sediments, including clayey outwash; clay loamy, light clayey or loamy saprolitic sediments; or sometimes calcrete. Gilgai microrelief occurs in some areas of clayey outwash.

Accessions of wind-deposited carbonate dust have infused into profiles. Numerous profiles are calcareous throughout; and many include hard carbonate fragments. Calcrete occurs under some profiles. Wind-deposited calcareous loess (Woorinen Formation) overlies older sediments in a few places. It is likely that much of this system was once covered by calcareous loess, most of which has subsequently been removed by water, and remnants of which remain as low rises.

**Annual rainfall:** 420 – 485 mm average

**Main soils:** **C4-D3-D7** *clay loam to loam over clay*  
**A6** *gradational calcareous clay loam*

**Minor soils:** **B6** *shallow clay loam over clay on calcrete*  
**A5** *calcareous loam*  
**E3** *brown cracking clay*

**Main features:** The land system is mostly arable. The most common soils are clay loams overlying clayey subsoil. Many soils are calcareous throughout. Many soils contain some hard carbonate fragments, and small amounts of fine quartz fragments.

Most subsoils are dispersive, resulting in restricted internal drainage and the potential for waterlogged conditions. Flooding may occur in drainage depressions, and possibly on some low lying patches on level surfaces. Saline seepage affects soils in low lying areas – mostly with resultant raised subsoil salinity. A few patches of highly saline land occur. Areas with gilgai microrelief pose special challenges, with conditions and land surface changing significantly over short distances, for example, crabholes can remain waterlogged throughout most of the growing season.

Water erosion is a potential problem on sloping land, but especially in the drainage depressions where overland flow of water can concentrate. It is likely that there has been erosion of topsoils in some areas since clearing and settlement, especially in drainage depressions.

Toxic accumulations of boron and sodium were not found to be a significant issue. However, the lower subsoils of many profiles have high sodium levels, and the bases of profiles can have high boron levels.



Where they occur, calcareous soils 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 those soils with highly calcareous surfaces.

### Soil Landscape Unit summary: Paradean Land System (PAA)

| SLU                               | % of area                       | Main features #  |
|-----------------------------------|---------------------------------|--|
| DGB<br>DGC                        | 0.4<br>1.4                      | Land dominated by texture contrast soils formed on rock.<br>Main soils: <i>loam to clay loam over red clay</i> <b>D7-C4</b> . With minor to limited areas of <i>shallow clay loam over red clay on calcrete</i> <b>B6</b> , and <i>calcareous loam on saprolitic sediments</i> <b>A2-C2</b> .<br><b>DGB</b> – mid-level rise (slopes 0.5-1.5%, 2-1e).<br><b>DGC</b> – lower slopes with drainage areas, some signs of sheet erosion, and some contour banking (slopes 1-3%).   |
| HAB<br>HAC                        | 14.0<br>1.4                     | Land dominated by soils formed in clayey to saprolitic sediments.<br>Main soils: <i>loam to clay loam over red clay</i> <b>D3-C4</b> grading to <i>gradational calcareous clay loam</i> <b>A6</b> . Some soils in the northern 'HAB' unit have vertic (reactive) subsoils. With minor to limited areas of <i>shallow clay loam over red clay on calcrete</i> <b>B6</b> .<br><b>HAB</b> – lower slopes and low rises with some drainage lows (slopes 0.5-2%). Northern-most unit has a slight gilgai look.<br><b>HAC</b> – lower slopes with drainage lows (slopes 0.5-3.5%).   |
| HVA<br>HVAw<br>HVB<br>HVBw<br>HVC | 3.3<br>0.5<br>5.5<br>5.6<br>1.2 | Land dominated by soils formed in saprolitic to clayey sediments.<br>Main soils: <i>clay loam to loam over red clay</i> <b>C4-D3</b> grading to <i>gradational calcareous clay loam</i> <b>A6</b> . With minor to limited areas of <i>shallow clay loam over red clay on calcrete</i> <b>B6</b> .<br><b>HVA</b> – low rises to very low rises (slopes 0-1%).<br><b>HVAw</b> – relatively low lying plain areas (slopes <1%).<br><b>HVB</b> – crests and rises and upper slopes (slopes 0-2.5%).<br><b>HVBw</b> – gently undulating plains and rises with drainage lows, drainage ways and depressions, with minor areas of gilgai microrelief (slopes 0-2%).<br><b>HVC</b> – slopes (slopes 1-3%). |
| IOA                               | 5.7                             | Land dominated by calcareous soils formed in or on clayey sediments.<br>Main soils: <i>gradational calcareous clay loam</i> <b>A6</b> grading to <i>clay loam to loam over red clay</i> <b>D3-C4</b> . And common to extensive areas of <i>calcareous loam</i> <b>A5</b> .<br><b>IOA</b> – low rises and slight slopes with some drainage lows (slopes 0-1.5%).  |
| Kae<br>KaO                        | 3.2<br>0.9                      | Drainage depressions dominated by soils formed in clayey sediments.<br>Main soils: <i>clay loam to loam over red clay</i> <b>C4-D3</b> . Possibly with some <i>gradational calcareous clay loam</i> <b>A6</b> in some areas – especially in southern arm of 'Kae' unit with gilgai microrelief.<br><b>Kae</b> – drainage depression with a central drainage line traversing most of the unit, some saline seepage, and significant signs of erosion (slopes 0-2%). The southern arm of the unit has signs of gilgai microrelief.<br><b>KaO</b> – drainage depression with a central drainage line, some saline seepage, and some signs of erosion (slopes 0-1.5%).                                 |
| KbA<br>KbC<br>KbO                 | 1.5<br>1.9<br>24.4              | Land dominated by calcareous soils formed in clayey sediments.<br>Main soils: <i>gradational calcareous clay loam</i> <b>A6</b> with some <i>clay loam over red clay</i> <b>C4-D3</b> .<br><b>KbA</b> – gently undulating slight rise (slopes 0-1.5%).<br><b>KbC</b> – drainage area: slopes with a drainage line (slopes 1-3%).<br><b>KbO</b> – depression area with drainage ways and depressions, and some patches of gilgai microrelief, especially along drainage ways (slopes 0-1%). With many soils with vertic (reactive) subsoils; and possibly some <i>brown cracking clay</i> <b>E3</b> in gilgai areas.  |
| KEE                               | 7.6                             | Drainage depressions dominated by soils formed in clayey sediments.<br>Main soils: <i>clay loam to loam over red clay</i> <b>C4-D3</b> .<br><b>KEE</b> – drainage depression areas (slopes 0.5-2%).  |



|                    |                   |  |
|--------------------|-------------------|--|
| KKB<br>KKE         | 3.0<br>1.1        | Land dominated by calcareous soils formed in clayey outwash sediments.<br>Main soils: <i>gradational calcareous clay loam A6</i> with vertic (reactive) subsoils, grading to <i>brown cracking clay E3</i> . Possibly with minor areas of <i>clay loam over red clay C4-D3</i> with vertic (reactive) subsoil.<br><b>KKB</b> – slopes with drainage lows and gilgai microrelief (slopes 1-2.5%).<br><b>KKE</b> – drainage depressions with gilgai microrelief (slopes 0-1.5%). |
| RHB                | 9.4               | Land dominated by shallow soils on calcrete.<br>Main soils: <i>shallow clay loam over red clay on calcrete B6</i> . With extensive areas of <i>clay loam to loam over red clay D3-C4</i> . With minor to common areas of <i>gradational calcareous clay loam A6</i> .<br>RHB – low rises and lower slopes (slopes 0.5-1.5%).   |
| TPA<br>TPAw<br>TPC | 4.6<br>2.3<br>0.6 | Land dominated by soils formed in clayey sediments with clay loamy to clayey surfaces.<br>Main soils: <i>clay loam over red clay C4-D3</i> grading to <i>gradational calcareous clay loam A6</i> .<br><b>TPA</b> – low rises (slopes 0-1.5%). Probably with some <i>shallow clay loam over red clay on calcrete B6</i> .<br><b>TPAw</b> – low lying plain/drainage area (slopes 0-1%).<br><b>TPC</b> – sloping drainage area (slopes 0.5-2.5%).                                |
| ZA-<br>ZB-         | 0.2<br>0.3        | Saline land.<br>Main soils: <i>clay loam over red clay C4-D3</i> and <i>saline soil N2</i> (salinised variants of <i>clay loam over red clay C4-D3</i> ).<br><b>ZA-</b> – salinised and waterlogging prone depression (slopes <1%).<br><b>ZB-</b> – saline and scalded drainage depression area (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:****C4-D3-D7** *clay loam to loam over clay*

[Sodic-Effervescent Hypercalcic-Supracalcic Red-Brown Dermosol-Chromosol]

Red brown to brown thin to medium thickness clay loamy, clayey or loamy topsoil overlying red to brown clayey subsoil grading to clay with abundant fine carbonate. This is underlain by clayey sediments, or light clayey to loamy saprolitic sediments, or occasionally weathered rock. Profiles often including some hard carbonate fragments, and small amounts of fine quartz fragments. Topsoils can be slightly calcareous when the profile is gradational (grading to soil **A6**), and slightly to highly calcareous when the profile is texture contrast. Subsoils are typically dispersive, and topsoils are occasionally dispersive. Soils formed in outwash clays often have vertic (reactive) subsoils.

**A6** *gradational calcareous clay loam*

[Pedal Hypercalcic-Supracalcic Calcarosol]

Calcareous grey brown to brown medium thickness to thin clay loamy, clayey or loamy topsoil overlying brown to yellow brown clayey subsoil with abundant fine carbonate. Fine carbonate content increases with depth. This is underlain by clayey sediments, or clay loamy saprolitic sediments. Profiles often include some hard carbonate fragments. Subsoils are usually dispersive, and surface soils are sometimes dispersive.

**Minor soils:****B6** *shallow clay loam over red clay on calcrete*

[Sodic-Effervescent Petrocalcic Red-Brown Chromosol-Dermosol]

Red brown to red medium thickness to thin clay loamy, light clayey, or loamy topsoil overlying red clayey subsoil. Underlying this is a calcrete layer. Subsoils are typically dispersive, and surfaces can be dispersive. Found on slightly raised land.

**A5** *calcareous loam*

[Regolithic Hypercalcic-Supracalcic Calcarosol]

Grey brown medium thickness calcareous clay loamy topsoil grading to clay loamy or light clayey subsoil with abundant fine carbonate. Lower subsoils are dispersive and strongly alkaline. Profiles typically contain some hard carbonate rubble, and are usually underlain by clayey sediments. Especially found on low rises.

**E3** *brown cracking clays*

[Brown Vertosol]

Cracking and mostly calcareous brown light clayey surface soil grading to yellow brown to red brown clayey subsoils with abundant fine carbonate which shrink on drying and swell on wetting. Found in areas of gilgai microrelief (mounds, flats, and crabholes) which have formed in clayey outwash, typically along broad drainage ways. These typically grade to **A6** soils.

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

