

GLA Gladstone Land System

Gently undulating rises situated in two locations: north of Gladstone and a smaller area north of Crystal Brook

Area: 57.6 km²

Annual rainfall 400 – 490 mm average

Geology: Complex of semi-indurated sandstones and unconsolidated clayey sands to sandy clays of Tertiary age, overlain in places by more clayey sediments (Hindmarsh Clay). Fine to medium grained alluvial sediments have accumulated on lower slopes. These materials are covered by a thin veneer of calcareous deposits (Woorinen Formation) which vary from soft and fine grained to hard and rubbly. The underlying country rock (siltstone of the Saddleworth Formation) outcrops in places.

Topography: The land system is characterized by gently undulating to undulating rises (slopes of 2-12%) formed on remnant deposits of Tertiary age and younger sediments. The rises occur in two discrete locations: a) north of Gladstone between the Rocky River and the more strongly undulating land to the east, and b) north of Crystal Brook on the outwash fans abutting the Southern Flinders Ranges. Between the rises in the Gladstone section are gently inclined flats (1 - 4% slope) formed on locally derived outwash sediments. Well defined watercourses occur in most of these flats, and are eroded in places. All of the streams flow east or south into the Rocky River.

Elevation: In the section north of Gladstone, the elevation ranges from 220 m to 340 m. Elevations for the Crystal Brook section are 110 m and 180 m.

Relief: Maximum relief is 40 m, commonly between 10 and 30 m

Soils: The most common soils are calcareous loams, both deep and shallow, rubbly and non rubbly. Gradational loams, loamy texture contrast soils and cracking clays also occur.

Main soils

A5/A4 Rubbly calcareous loam
D3 Sandy clay loam over dispersive red clay
C3 Gradational loam

Minor soils

E2 Red cracking clay
A3 Calcareous clay loam
A6 Calcareous loam
A2 Calcareous loam over weathering rock
C2 Shallow gradational loam on rock
D5 Sandy loam over poorly structured red clay

Main features: The Gladstone Land System is flat to undulating with mainly calcareous soils which are generally deep over unconsolidated sediments. These soils are potentially productive, with minor limitations including lime induced nutrient deficiencies and sub optimal waterholding capacity due to restrictions on root zone depth caused by high pH and boron levels. Other significant soils include well structured and neutral reaction gradational loams (potentially the best soils) and hard setting texture contrast soils with dispersive subsoils. The latter are more common on lower slopes and are susceptible to a range of problems attributable to poor soil structure, including



reduced infiltration, increased erodibility, poor workability, patchy emergence and impaired root growth.

Soil Landscape Unit summary: 8 Soil Landscape Units (SLUs) mapped in the Gladstone Land System:

| SLU | % of area | Main features # |
|-------------------|---------------------|---|
| EGB EGC | 1.6 1.0 | Rises formed on fine grained rock. EGB Slopes of 2-4%. EGC Slopes of 4-12%. Main soils: <u>calcareous loam over weathering rock - A2 (V)</u> , with <u>shallow gradational loam on rock - C2 (C)</u> . The rises are fully arable, although moisture shortages limit crops in dry finishes. Reduction of water loss and erosion through runoff is the main management issue. "Lime - induced" nutrient deficiencies are probable on calcareous soils. |
| IWA IWB IWC | 7.3 51.2 19.3 | Rises formed on Tertiary sandstones, clayey sands to sandy clays or Hindmarsh Clay, and capped by soft to rubbly carbonate. IWA Slopes of 1-2%. IWB Slopes of 2-5%. IWC Slopes of 4-12%. Main soils: <u>rubbly calcareous loam - A5/A4 (V)</u> , with <u>sandy clay loam over dispersive red clay - D3 (L)</u> , <u>gradational loam - C3 (L)</u> , <u>red cracking clay - E2 (L)</u> and <u>sandy loam over poorly structured red clay - D5 (M)</u> . The rises are fully arable and potentially productive although the mixture of soils has a variety of slight limitations including poor structure, shallow root zone depth and moderate fertility (attributable to sandy and calcareous soils). Waterlogging, boron toxicity and salinity are associated with heavier soils. |
| KHA KHB KHG | 8.3 9.7 1.6 | Flats and outwash fans formed on fine to medium grained alluvium. KHA Flats with slopes of less than 2%. KHB Fans with slopes of 2-4%. KHC Fans with slopes of 2-4% and eroded watercourses. Main soils: <u>calcareous clay loam - A3 (E)</u> and <u>sandy clay loam over dispersive red clay - D3 (E)</u> , with <u>gradational loam - C3 (L)</u> and <u>calcareous loam - A6 (L)</u> . These flats are productive with only minor limitations due to poor soil structure in D3 soils, and high boron levels within the root zone in some soils. Apparently rising saline groundwater tables pose a potential threat. |

PROPORTION codes assigned to soils within Soil Landscape Units (SLU):

- (D) Dominant in extent (>90% of SLU)
- (V) Very extensive in extent (60–90% of SLU)
- (E) Extensive in extent (30–60% of SLU)
- (C) Common in extent (20–30% of SLU)
- (L) Limited in extent (10–20% of SLU)
- (M) Minor in extent (<10% of SLU)



Detailed soil profile descriptions:

- A2** Calcareous loam over weathering rock (Paralithic, Supracalcic / Hypercalcic Calcarosol)
Calcareous sandy loam to loam grading to a highly calcareous sandy clay loam with abundant soft to rubbly carbonate segregations from about 30 cm, grading to siltstone or sandstone at depths ranging from 25 to 80 cm. Sheet calcrete overlies the rock in 10% of profiles.
- A3** Calcareous clay loam (Pedal, Hypocalcic / Calcic Calcarosol)
Calcareous loam to clay loam grading to a highly calcareous well structured clay with variable soft Class I carbonate at depth.
- A5/A4** Rubbly calcareous loam (Regolithic, Supracalcic / Lithocalcic Calcarosol)
Calcareous sandy loam to clay loam grading to rubbly Class III B / C carbonate over Tertiary sediments.
- A6** Calcareous loam (Regolithic / Pedal, Hypercalcic Calcarosol)
Calcareous sandy loam to clay loam grading to a very highly calcareous clay loam to clay with soft carbonate over alluvium / Tertiary sediments.
- C2** Shallow gradational loam on rock (Supracalcic, Red Dermosol)
Loam to clay loam grading to a well structured red clay with rubbly Class III B carbonate at shallow depth over weathering rock by 50 cm.
- C3** Gradational loam (Hypercalcic, Red Dermosol)
Sandy loam to clay loam grading to a well structured red sandy clay to clay with abundant soft Class I carbonate from about 50 cm over alluvium / Tertiary sediments.
- D3** Sandy clay loam over dispersive red clay (Calcic / Hypercalcic, Red Sodosol)
Hard sandy loam to sandy clay loam sharply overlying a red clay with soft Class I carbonate from about 50 cm, over alluvium.
- D5** Sandy loam over poorly structured red sandy clay (Hypercalcic / Lithocalcic, Red Sodosol)
Hard sandy loam sharply overlying a coarsely structured red sandy clay with soft Class III A or rubbly Class III B or III C carbonate from about 50 cm over sandstone or sandy sediment.
- E2** Red cracking clay (Epipedal, Red Vertosol)
Red cracking clay with variable soft subsoil carbonate.

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

