

# GRE Greenock Land System

Undulating to moderately steep land in the Daveyston - Greenock - Moppa area

**Area:** 87.8 km<sup>2</sup>

**Annual rainfall:** 480 - 605 mm average

**Geology:** The land system is largely formed on basement rock, but the pattern of rock formations, which are largely responsible for the topography and soils, is complex. In the west are mainly siltstones of the Saddleworth Formation, interrupted by a band of Undalya Quartzite. In the east is a contorted arrangement of tillites, fine sandstones, siltstones and quartzites of the Appila, Tapley Hill and Saddleworth Formations. There are minor relict deposits of Tertiary sediments on the western margins. These apparently once covered most of the basement rocks, but have been largely eroded away. There are widespread occurrences of locally derived alluvium in valleys. These sediments are fine to medium grained. Most rocks and sediments are mantled by secondary carbonates occurring as soft segregations at the boundary between the soil profile and the underlying material.

**Topography:** The Greenock Land System forms the north west part of the Barossa Valley. It is characterized by an irregular topographic pattern of moderately steep rocky ridges, undulating slopes and creek flats. On the western side are undulating slopes interrupted by a north - south rocky ridge. Several west flowing watercourses cut across these slopes and the ridge. These slopes are separated from the eastern part of the Land System by the Belvidere Range. This area is in the Greenock Creek catchment and is mainly undulating, with some steep linear ridges in the Seppeltsfield - Marananga area.

**Elevation:** 392 m (Belvidere in the north west) to 220 m in the south

**Relief:** Maximum relief is 120 m (Belvidere Range to Greenock Creek)

**Soils:** Sandy loam to clay loam red texture contrast soils are predominant. Dispersive and non dispersive forms occur. Gradational loams and occasional cracking clays and shallow stony soils make up the remainder.

### Main soils

*Soils formed on basement rocks on slopes*

**D7a** Sandy loam over dispersive red clay - Extensive on slopes in the eastern areas

**D1a** Loam over red friable clay - Extensive on slopes in the western areas

**D7b** Clay loam over red heavy clay - Common on slopes in the eastern areas

**C2/C5** Gradational clay loam - Common on slopes in western areas

*Soils formed on alluvium on lower slopes and flats*

**D2** Loam over red clay - Extensive in valleys

### Minor soils

*Soils formed on basement rocks on slopes*

**L1** Shallow stony loamy sand to loam - Common on steep ridges

**D1b** Stony sandy loam over red clay on rock - Limited to rocky ridges

*Soils formed on alluvium on lower slopes and flats*

**D3** Loam over dispersive red clay - Common in valleys

**F2** Sandy loam over poorly structured brown clay - Limited in valleys



- M2** Gradational clay loam - Common in valleys  
Soils formed on Tertiary sediments or deeply weathered rock on rises
- G3** Thick loamy sand over red mottled clay - Limited, but can occur throughout
- D6** Ironstone gravelly sandy loam over red clay - Limited on the western margin
- E2** Dark red cracking clay - Limited in southern areas

**Main features:** The Greenock Land System consists of three main components. Moderately steep, rocky and non arable ridges are prominent features, although minor in overall area. Undulating rises formed on basement rock occupy most of the area, but there is a variety of soils. These vary from moderately deep, fertile and well structured gradational loams and loam over clay soils through to poorly structured stony texture contrast soils with hard sandy loam surfaces and dispersive subsoils. Apart from the low infiltration rates, lower slope waterlogging and patchy crop growth associated with these soils, they are highly erodible. They tend to be concentrated in the northern areas - most of the viticulture and other horticulture is in the mid to southern parts on the better soils. The third component is the valley floor system, characterized by deep loam over red clay soils with high fertility and moisture holding capacity, but subject to waterlogging and frosts in places. Salinity occurs in these areas and should be monitored.

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

SLU	% of area	Main features #
AKB AKI	0.5 2.5	Rocky ridges formed on Undalya Quartzite. <b>AKB</b> Low ridges to 30 m high with slopes of 15-30%. <b>AKI</b> Ridges to 50 m high with slopes of 20-40% and some water course erosion. Main soils: <u>shallow stony loamy sand to loam - L1</u> (E) and <u>stony sandy loam over red clay on rock - D1b</u> (E). This land is too stony and steep for any agricultural uses other than rough grazing. Its wooded slopes provide useful stock shelter.
ARC	6.1	Moderately steep rocky ridges formed on interbedded quartzites and siltstones. Relief is up to 60 m and slopes are 15-40%. There is up to 50% surface quartzite, with ironstone in places, and sporadic rocky reefs. Main soils: <u>sandy loam over dispersive red clay - D7a</u> (E) and <u>shallow stony loamy sand to loam - L1</u> (E). Land too steep and rocky for any agricultural uses other than rough grazing.
DAC	13.4	Undulating rises formed on siltstones and slates of the Saddleworth, Mintaro and Bethel Formations. Slopes are 4-10% with relief to 30 m. Main soils: <u>loam over red friable clay - D1a</u> (E), and <u>gradational clay loam - C2</u> (E), with <u>dark red cracking clay - E2</u> (L). Soils moderately deep, fertile and generally well structured, although surface soils are commonly hard setting. There is a risk of erosion on the moderate slopes - water runoff must be managed, together with surface soil condition.
DBC DBD	0.4 1.7	Rises formed on Undalya Quartzite, associated with rocky slopes of AKB and AKI. <b>DBC</b> Rises with slopes of 4-10%. <b>DBD</b> Rises with slopes of 10-18%. Main soils: <u>stony sandy loam over red clay on rock - D1b</u> (E) and <u>loam over red friable clay - D1a</u> (E), with <u>shallow stony loamy sand to loam - L1</u> (L). These soils are moderately shallow and stony, with fair productive potential. The occurrences of this land are restricted and surrounded by steep rocky slopes or incised water courses, making cropping management difficult. There is some watercourse erosion.
DHC DHD DHH	24.4 15.3 2.2	Rises formed on mixed tillites, fine sandstones, siltstones and quartzites of the Tapley Hill, Appila, Saddleworth and Ulupa Formations. Remnant Tertiary deposits occur to a limited extent. <b>DHC</b> Rises to 30 m high with slopes of 4-10%. <b>DHD</b> Slopes and low hills to 50 m with slopes of 8-20%, and up to 10% rocky outcrops. <b>DHH</b> Slopes of 5-10% with eroded watercourses. Main soils: <u>sandy loam over dispersive red clay - D7a</u> (E) and <u>clay loam over red heavy clay - D7b</u> (C), with <u>loam over red friable clay - D1a</u> (L) and <u>shallow stony loamy sand to loam - L1</u> (M). <u>Thick loamy sand over red mottled clay - G3</u> (L) occurs on Tertiary



		sandstones. Except on steeper rocky rises within <b>DHD</b> (which are unmappable areas of <b>ARC</b> ), soils are moderately deep and reasonably fertile, but generally poorly structured. Hard setting surfaces and often dispersive subsoil clays (in D7a/D7b soils) restrict water entry, affect workability and cause patchy emergence and early growth. Subsurface waterlogging is likely in depressions and lower slopes, and is associated with patchy salinity. These soils are highly erodible, mainly by water, but some sandy types are also prone to wind erosion if left bare.
EJC EJD	4.9 0.6	Rises formed on fine grained rocks of the Saddleworth Formation. <b>EJC</b> Rises with slopes of 5-10%. <b>EJD</b> Slopes of 10-20%. Main soils: <u>gradational clay loam - C2</u> (E), <u>loam over red friable clay - D1a</u> (E) and <u>shallow stony loam - L1</u> (L). These soils are moderately fertile and well structured, but generally quite shallow over rock or dense carbonate, resulting in poor finishing capacity in drier springs. There are occasional saline patches.
EKC	4.8	Rises formed on fine grained rocks and clays derived from their weathering. Slopes: 4-12%. Main soils: <u>gradational clay loam - C2</u> (E), <u>dark red cracking clay - E2</u> (C), and <u>loam over red friable clay - D1a</u> (C). These soils are moderately deep to deep, well structured and fertile. Slopes are moderate in places, creating the risk of erosion, but otherwise, this land has no significant limitations to agricultural use.
HJC	4.8	Rises and footslopes formed on remnant Tertiary sandy clays. Slopes are 4-12% with occasional short steeper grades to 20%. There is minor to moderate water course erosion. Main soil: <u>ironstone gravelly sandy loam over red clay - D6</u> (D). Productivity is limited by sub optimal fertility and poor soil structure, both attributable to the sandy surface soil. Productivity can be improved through modified surface management practices and the appropriate use of gypsum. Erosion potential is moderately high.
JBB JBE JBJ JBO	2.7 1.3 13.6 0.8	Drainage depressions and outwash fans formed on fine to medium grained alluvium. <b>JBB</b> Fans with slopes of 2-4%. <b>JBE</b> Drainage depressions and narrow flats with well defined but mostly stable watercourses. <b>JBJ</b> Flats with eroded water and sporadic saline seepage. <b>JBO</b> Drainage depressions with saline seepage. Main soils: <u>loam over red clay - D2</u> (E), with <u>loam over dispersive red clay - D3</u> (C), <u>gradational clay loam - M2</u> (C) and <u>sandy loam over poorly structured brown clay - F2</u> (M). These soils are deep and fertile, but commonly have hard poorly structured surfaces, and sometimes dispersive subsoils, restricting water movement. This, in combination with their low lying position, results in waterlogging. Some areas may be difficult to access when wet. Poor surface structure also affects workability and early plant growth. Soil salinity should be monitored.

# 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:

*Soils formed on basement rocks on slopes*

#### **C2/C5** Gradational clay loam (Calcic, Red / Black Dermosol)

10 - 30 cm friable clay loam grading to a well structured red to dark clay, calcareous from 50 cm over weathering siltstone at 75 cm. Common on slopes in western areas.

#### **D1a** Loam over red friable clay (Calcic, Red Chromosol)

20 - 40 cm hard siltstone gravelly loam abruptly overlying a red well structured clay, calcareous from about 50 cm (25% are non calcareous), grading to siltstone at 75 cm. Extensive on slopes in the western areas.



- D1b** Stony sandy loam over red clay on rock (Calcic, Red Chromosol)  
10 - 20 cm sandstone gravelly sandy loam overlying a well structured red clay, calcareous from 25 cm, grading to sandstone at 75 cm. Limited to rocky ridges.
- D7a** Sandy loam over dispersive red clay (Calcic, Red Sodosol / Chromosol)  
15 - 35 cm quartz and ironstone gravelly hard massive sandy loam or soft loamy sand abruptly overlying a red (often with brown mottles) coarsely structured dispersive clay, calcareous from 55 cm (30% are non calcareous), grading to tillite or quartzitic fine sandstone at about 70 cm. 25% of profiles have well structured non dispersive clays (Chromosols). Extensive on slopes in the eastern areas.
- D7b** Clay loam over red heavy clay (Calcic, Red Sodosol)  
20 - 40 cm hard clay loam abruptly overlying a red and brown mottled coarsely structured heavy clay, calcareous from 55 cm, grading to fine grained rock at 90 cm. Common on slopes in the eastern areas.
- L1** Shallow stony loamy sand to loam (Lithic, Leptic Tenosol / Rudosol)  
Up to 50 cm stony loamy sand to loam directly overlying quartzite, sandstone or siltstone. Common on steep ridges.

*Soils formed on alluvium on lower slopes and flats*

- D2** Loam over red clay (Calcic, Red Chromosol)  
20 - 60 cm hard sandy loam to clay loam abruptly overlying a red (often with brown mottles) well structured clay with minor carbonate from 80 cm, grading to alluvium. Extensive in valleys.
- D3** Loam over dispersive red clay (Calcic, Red Sodosol)  
20 - 60 cm hard sandy loam to clay loam abruptly overlying a red (usually with brown mottles) coarsely structured dispersive clay with minor carbonate from 80 cm, grading to alluvium. Common in valleys.
- F2** Sandy loam over poorly structured brown clay (Calcic, Brown Sodosol)  
15 - 30 cm hard loamy sand to sandy loam with a bleached A2 layer, over a coarsely structured dispersive brown mottled clay, weakly calcareous with depth. Minor in valleys.
- M2** Gradational clay loam (Calcic, Red Dermosol)  
20-30 cm clay loam grading to a well structured red to dark brown clay, calcareous from 60 cm over alluvium. Common in valleys.

*Soils formed on Tertiary sediments or deeply weathered rock on rises*

- D6** Ironstone gravelly sandy loam over red clay (Hypercalcic, Red Chromosol)  
20 - 45 cm hard ironstone gravelly sandy loam abruptly overlying a red moderately well structured clay, calcareous from 40 cm, grading to Tertiary sandy clay. Limited on the western margin.
- E2** Dark red cracking clay (Red / Brown / Black Vertosol)  
Seasonally cracking, strongly structured red or dark clay, becoming coarser structured, more clayey and calcareous with depth. Limited in southern areas.
- G3** Thick loamy sand over red mottled clay (Eutrophic, Red Sodosol)  
Thick soft loamy sand with a bleached and quartz gravelly A2 layer, abruptly overlying a red, brown and grey mottled clay grading to sandstone at about 100 cm.

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

