

DAR Darlington Land System

Moderate to steep rocky slopes and undulating rises scattered between Darlington and Pedlar Creek

Area: 42.2 km²

Annual rainfall: 515 – 690 mm average

Geology: The land is underlain, usually at shallow depth, by weakly to strongly calcified siltstones, slates, fine sandstones and limestones of the Tapley Hill Formation, Brachina Shale and Brighton Limestone, and other minor geological formations. These rocks are the characteristic feature of the Land System, as on much of the surrounding land, basement rocks are covered by younger unconsolidated sediments. Exposure of basement in the Darlington System is due to either faulting (exposing rocks on escarpments), or dissection (exposing rocks on valley sides). There are only minor alluvial deposits (in valley flats) and Tertiary remnants (on crests adjacent to the McLaren Vale Land System).

Topography: The Land System comprises three distinctive topographic components.

- Dissected escarpments occur at Darlington and Hackham. These are moderately steep, but water courses cutting down through them have created steeper slopes in places.
- The lower end of the Onkaparinga Gorge cuts through the escarpment at Noarlunga, where slopes are very steep.
- The Field River and Pedlar Creek have cut valleys through the Tertiary sedimentary cover of the gently undulating plains of the Noarlunga Land System. This down cutting has exposed basement rocks in valley sides which are undulating to moderately steep (and steep in places).

Elevation: 10 m in the south (where the Onkaparinga River flows out of the System) to 240 m north of the Onkaparinga Gorge.

Relief: Up to 100 m

Soils: The soils are typically shallow to moderately deep over basement rock. Most are loamy with subsoils varying from well structured and thick red clays, to highly calcareous clay loams with weathering rock fragments. Many soils on steeper slopes are moderately shallow to shallow directly over rock. The carbonate coating the rocks is cemented in places to calcrete.

Main soils

Soils formed on calcified basement rock

- D1** Shallow loam over red clay
- A2** Shallow calcareous loam
- C2** Shallow gradational red loam
- B2** Shallow calcareous loam on calcrete

Minor soils

Soils formed on calcified basement rock

- B6/B4** Shallow loam over red clay on calcrete
- L1a** Shallow stony loam

Soils formed in weathering non-calcified basement rock

- K2** Acidic loam over red clay
- L1b** Shallow stony loam



Soils formed in alluvium

- C1** Gradational red sandy loam
- D2** Loam over red clay
- M1** Deep sandy loam
- M2** Deep dark clay loam

Main features: The Darlington Land System is characterized by undulating to steep slopes formed on calcareous basement rocks. More than 50% of the land is moderately steep to steep, commonly rocky and with mainly shallow stony loamy soils. Much of this land is in Hills Face reserves or other semi-urban areas. The undulating to gently rolling slopes have deeper soils (calcareous loams or loamy soils with red friable clayey subsoils) which are fertile and well drained. However, only in the south are there any prospects for more intensive agricultural development, as most of the northern areas are urbanized.

Soil Landscape Unit summary: 14 Soil Landscape Units (SLUs) mapped in the Darlington Land System:

SLU	% of area	Main features #
AAC	4.1	Moderate slopes of 15-30%, up to 50 m high, formed on siltstones, slates and fine sandstones. There is up to 10% surface stone but negligible rock outcrop. Water courses are well defined in narrow drainage depressions. Soils are generally loamy with red clayey subsoils forming in weathering rock, but there are deeper forms over highly weathered rock or alluvium on lower slopes. Main soils: <u>Shallow loam over red clay</u> - D1 (V) <u>Loam over red clay</u> - D2 (L) These slopes are too steep for cropping but the soils are fertile and moderately deep, with high viticultural potential.
AJC	5.9	Moderately steep dissected west facing escarpment slopes formed on weakly calcified siltstones, slates and fine sandstones. Slopes are 15-30% and relief is up to 80 m. Water courses are well defined in regularly spaced narrow parallel valleys. Rock outcrop is sporadic, but extensive in places. There is variable surface stone. Most soils are shallow to moderately deep over siltstone which may be non-calcified or contain soft carbonate in rock fissures. Surface textures are invariably loamy. Main soils: <u>Shallow loam over red clay</u> - D1 (E) } on calcified rocks <u>Shallow gradational red loam</u> - C2 (C) } <u>Shallow calcareous loam</u> - A2 (L) } <u>Shallow stony loam</u> - L1a (M) } <u>Acidic loam over red clay</u> - K2 (M) } on non calcified rocks <u>Shallow stony loam</u> - L1b (M) } The soils are inherently fertile and well drained, but depth is highly variable. The slopes preclude any cultivated agriculture, but the land is suitable for perennial horticulture or viticulture where water is available. Westerly exposure may be a problem in places.
AJC AYC AYD	24.0 18.5	Moderately inclined to steep slopes occurring in two geomorphic environments, viz; a) escarpment slopes at Darlington and Hackham, 50-100 m high with slopes of 12-30% and b) dissection slopes where the Onkaparinga River has cut through the frontal slopes at Noarlunga, and where the Pedlar Creek and Field River systems have cut through the undulating Tertiary sedimentary cover to expose the underlying basement rocks. These landforms typically consist of steep sided V-shaped gullies with slopes up to 100% (but usually less than 75%) and relief to 100 metres, grading to more gently sloping upper slopes and crests, where slopes are as low as 5%, but overall steeper than 12%. Rock outcrop is extensive on the steeper ground, but negligible on upper slopes and crests. Water courses are very well defined in narrow drainage depressions. In all the above situations the parent rocks are strongly calcified siltstones, slates and fine sandstones. AYC Moderate slopes with relief to 60 m and slopes of 12-30%. AYD Steep to very steep rocky hillslopes with relief to 100 m and slopes of 30-75%. The majority of soils are shallow over calcified siltstone, or siltstone mantled with a thick layer of soft to semi-hard carbonate. Main soils: <u>Shallow calcareous loam on rock or calcreted rock</u> - A2/B2 (V-E) <u>Shallow loam over red clay on rock or calcreted rock</u> - D1/B6 (L-M) <u>Shallow stony loam</u> - L1a (M-C) <u>Shallow gradational red loam</u> - C2 (L)



		These soils are shallow and the slopes are steep. Land use is restricted to grazing only.
AwC AwD AwF	0.3 0.3 2.7	<p>Rolling to steep low hills with some precipitous slopes in river gorges. Underlying rocks are sandstones, siltstones, fillites, shales and quartzites of the Sturt Tillite, Belair Sub-group, Tapley Hill Formation and Mitcham Quartzite. Slopes are generally more than 18%, but crests are often broad and relatively flat, with slopes as low as 5%. Water courses are well defined in narrow depressions. Rock outcrop is common on steeper slopes, particularly where the Onkaparinga River has cut its gorge through the landscape.</p> <p>AwC Rolling low hills with relief to 90 m and slopes of 18-30%.</p> <p>AwD Steep, rocky hillslopes with relief to 100 m and slopes of 30-75%.</p> <p>AwF Precipitous, very rocky hillslopes with relief to 140 m and slopes of 80-150%, in the Onkaparinga Gorge.</p> <p>There is a wide variation in soil profiles due to the diversity of rock types. Shallow soils on rock are common. Most other soils have sandy to loamy surface soils and variably structured and coloured clayey subsoils.</p> <p>Main soils: <u>Acidic loam over red or brown clay</u> - K2a / K2b (E) <u>Acidic sandy loam over brown clay</u> - K4 (C) <u>Shallow stony loam or sandy loam</u> - L1a / L1b (L) on steeper slopes <u>Acidic gradational ironstone soil</u> - J2 (L) } on upper <u>Acidic sandy loam over brown clay on kaolin rock</u> - K4/J2 (L) } slopes and crests</p> <p>These soils are moderately deep. They have moderate to moderately low natural fertility and are susceptible to acidification. They generally have hard setting surfaces which are prone to erosion if disturbed. Drainage is generally satisfactory. There is potential for horticultural development on AwC where water is available, but the rest of the land is too steep and / or rocky.</p>
DBD	9.6	<p>Gently rolling rises and low hills to 40 m high with slopes of 10-18%. Underlying rocks are siltstones, slates and fine sandstones. There is minor surface stone but no rock outcrop. Drainage depressions are narrow. Soils are generally loamy with red clayey subsoils forming in weathering rock, but there are deeper forms over highly weathered rock or alluvium on lower slopes.</p> <p>Main soils: <u>Shallow loam over red clay</u> - D1 (V) <u>Loam over red clay</u> - D2 (L)</p> <p>These soils are potentially highly productive with high inherent fertility, and adequate depth and drainage, but most has been urbanized (except for the occurrences on the Glenthorne Experimental property).</p>
DCC DCD	12.2 15.6	<p>Undulating rises and rolling low hills formed on calcified siltstones, slates and fine sandstones. Slopes range from 4% to 18%. Rock outcrop is sporadic, but there is up to 10% surface stone.</p> <p>DCC Undulating upper slopes of 4-10%.</p> <p>DCD Moderate slopes of 10-18%, up to 40 m high.</p> <p>Most soils are moderately deep to shallow over calcified siltstone, or siltstone mantled by soft to semi hard carbonate.</p> <p>Main soils: <u>Shallow loam over red clay</u> - D1/B6 (V-E) <u>Shallow calcareous loam</u> - A2/B2 (C) <u>Shallow gradational red loam</u> - C2 (L) <u>Shallow stony loam</u> - L1a (M) <u>Loam over red clay</u> - D2 (M) on lower slopes and creek flats</p> <p>The soils are fertile and well drained, although often shallow, thereby restricting water holding capacity. Surface soils set hard, creating workability and emergence problems, and increasing erosion susceptibility. The land is potentially productive although most of the northern areas are either urbanized or in reserves. In the south DCC is suitable for cropping provided that adequate erosion control measures are used, but DCD is marginal due to the potential for erosion. The land is suited to horticultural development where water is available.</p>
FiZ	0.4	<p>Summit surfaces with broad flat to very gently undulating crests, grading away to slopes of up to 15% at the margins. The land is underlain by Tertiary sandstones and clays, deeply weathered and lateritized in places. The soils are mainly sandy, but there are more loamy types. Most soils have clayey subsoils.</p> <p>Main soils: <u>Bleached sand over sandy clay loam</u> - G2 (E) <u>Sandy loam over dispersive brown clay</u> - F2a (L) <u>Thick ironstone gravelly sand over clay</u> - J2 (L) <u>Loamy sand over dispersive clay</u> - G4 (L)</p> <p>The soils are deep, but with variable drainage and fertility. The most common soils (G2 and</p>



		J2) are well drained, but infertile and prone to acidification, water repellence and wind erosion. The others (F2a and G4) are more fertile, but dispersive clay subsoils tend to perch water. The land is not suitable for cropping, but has potential for viticulture and other perennial horticulture provided soil and irrigation management are adequate.
HLC	1.7	<p>Gently undulating to undulating rises formed on Tertiary sandy clays, clayey sands and sandstones. Relief is between 10 metres and 40 metres, and slopes range from 2% to 10%. Drainage depressions are shallow and broad and have poorly defined water courses. There is very occasional surface calcrete or ironstone, but no rock outcrop.</p> <p>HLC Undulating rises with relief to 40 m and slopes of 3-10%.</p> <p>There is a range of sand to sandy loam over clay soils in which subsoils are either friable and well structured, or hard and sodic. There are also minor calcareous soils and shallow soils over carbonate.</p> <p>Main soils: <u>Sandy loam over dispersive red clay</u> - D3a (E) <u>Loamy sand over dispersive clay</u> - G4 (E) <u>Sandy loam over red sandy clay</u> - D2 (L) <u>Sandy loam over dispersive brown clay</u> - F2a (M) <u>Gradational loam over calcrete</u> - B4 (M) <u>Calcareous sandy loam</u> - A4 (M) <u>Clay loam over dark clay</u> - F2c (M)</p> <p>These soils are deep and have moderate to low natural fertility. Most have restricted drainage due to dispersive clayey subsoils. They are also highly erodible. They are not well suited to cropping, but are productive viticultural soils provided that soil and irrigation management are adequate.</p>
JRE	0.3	<p>Very gently to gently inclined outwash fans, valley flats and drainage depressions. The underlying sediments are calcified sandy clays to clays, derived from the erosion and deposition of soil and rock materials from the escarpments to the east. Slopes are 2% to 10%. Well defined water courses occur in each of the drainage depressions and flow across the fans.</p> <p>JRE Drainage depressions with slopes of 1-4%.</p> <p>The main soils have sandy loam to sandy clay loam surfaces over clayey subsoils, usually with abundant soft carbonate at depth. Differences between soils are due to the colour of the subsoil clay (better drained soils are red, less well drained soils are brown mottled), and the soil texture. There are minor deep dark heavy soils.</p> <p>Main soils: <u>Sandy loam over dispersive brown clay</u> - F2b (E) <u>Sandy loam over dispersive red clay</u> - D3b (C) <u>Gradational red sandy loam</u> - C1 (L) <u>Dark gradational clay loam</u> - M2 (M)</p> <p>These soils are deep and inherently fertile; their main limitations are physical. Poorly structured, hard setting surfaces and dispersive clayey subsoils contribute to poor infiltration, perched water tables, difficult workability and patchy emergence. Erosion is a potential problem on most land. Conservative soil management and gypsum application can overcome these limitations.</p>
KUE	2.3	<p>Valley flats and drainage depressions with well defined water courses, formed on alluvial loams to clays, mantled by soft fine grained carbonates. Slopes in channels are less than 2%, but on margins adjacent to rising ground, slopes are up to 10%. The soils are deep with sandy loam to clay loam surfaces and variable subsoils.</p> <p>Main soils: <u>Gradational red sandy loam</u> - C1 (E) <u>Deep sandy loam</u> - M1 (C) <u>Deep dark clay loam</u> - M2 (L) <u>Loam over red clay</u> - D2 (L)</p> <p>These areas are small and mostly in urban areas. Minor occurrences in the south are potentially productive, as the soils are deep and inherently fertile. Drainage may be restrictive in places.</p>
-Q-	2.1	Quarries.

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** Shallow calcareous loam on rock (Paralithic, Calcic Calcarosol)
Medium thickness calcareous brown gravelly loam overlying a brown highly calcareous stony clay loam, increasingly calcareous and paler coloured with depth, grading to highly calcareous weathering siltstone or slate at about 50 cm.
- B2** Shallow calcareous loam on calcreted rock (Petrocalcic, Hypercalcic Calcarosol)
Medium thickness calcareous brown gravelly loam overlying a brown highly calcareous stony clay loam with a moderately cemented massive to nodular calcrete pan at about 30 cm, and weathering rock at about 60 cm.
- B6/B4** Shallow loam over red clay on calcreted rock (Petrocalcic, Red Chromosol / Dermosol)
Medium thickness hard setting loam with a paler and stony A2 horizon, overlying a dark reddish brown, well structured clay with a massive calcrete pan at 55 cm, overlying a highly calcareous clay loam which grades to weathering calcified rock at variable depths averaging 100 cm.
- C1** Gradational red sandy loam (Calcic, Red Kandosol)
Thick reddish brown sandy loam to fine sandy loam with a pink A2 horizon, overlying a yellowish red weakly structured clay loam to clay, calcareous with depth.
- C2** Shallow gradational red loam on rock (Hypercalcic, Red Dermosol)
Medium thickness red brown loam to clay loam, grading a red well structured clay loam, grading to massive semi hard carbonate, over weathering siltstone below 50 cm.
- D1** Shallow loam over red clay on rock (Hypercalcic, Red Chromosol)
Medium thickness hard setting loam with a paler and stony A2 horizon, overlying a dark reddish brown well structured clay which is highly calcareous from about 50 cm. Weathering calcified siltstone or slate occurs within 100 cm.
- D2** Loam over red clay (Sodic, Calcic, Red Chromosol)
Thick loam with a paler coloured A2 horizon, overlying a dark reddish brown well structured clay, highly calcareous (Class I carbonate) from about 60 cm. The soil grades to medium to fine grained alluvium below 100 cm.
- K2** Acidic loam over red clay on rock (Eutrophic, Red Chromosol)
Medium thickness loam with a paler coloured and gravelly A2 horizon, overlying a reddish brown to red well structured clay with rock fragments, grading to weathering siltstone or slate by 100 cm.
- L1a** Shallow stony loam (Calcareous, Paralithic, Leptic Tenosol)
Thick stony reddish brown loam, grading to highly calcified weathering siltstone or fine sandstone before 50 cm.
- L1b** Shallow stony loam (Basic, Lithic, Leptic Tenosol)
Thick gravelly and stony brown loam, sometimes grading to a pinkish very stony clay loam overlying hard siltstone or slate.
- M1** Deep sandy loam (Regolithic, Red-Orthic Tenosol)
Thick brown sandy loam to loamy sand, overlying a reddish brown clayey coarse sand to silty sand, grading to variable sandy and gritty alluvial sediments.
- M2** Deep dark clay loam (Calcic, Black Dermosol)
Medium thickness black loam to clay loam with strong granular structure, overlying a very dark grey to black clay loam to clay with blocky structure and variable amounts of soft calcareous segregations.

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

