

MTO Mount Torrens Land System

Discontinuous ridges extending from Meadows to north of Birdwood

Area: 66.5 km²

Annual rainfall: 700 – 945 mm average

Geology: The land system is a distinctive strike ridge of Mitcham, Gilbert Range and Stonyfell Quartzites. Although the resistant quartzites provide the characteristic relief of the land system, the most common rocks are micaceous sandstones, with finer grained micaceous rocks of the Mintaro Shale sequence. The rocks are commonly deeply weathered and kaolinized, and lateritic remnants occur in places.

Topography: The land system is a long, narrow belt of country formed on massive quartzite beds. The landscape is dominated by discontinuous quartzite ridges, including the peaks of Mount Torrens, Mount Charles and Mount Barker. These features are steep and rocky, but most of the ridge is moderately steep with sporadic outcrop. Flanking the ridges are tracts of undulating to gently rolling rises and low hills. Water courses draining the land flow in both directions from the spine of the ridge. Drainage depressions and outwash fans occupy less than 10% of the area. Lateritic remnants are recognizable as low flat topped hills.

Elevation: 330 m to 580 m

Relief: Maximum relief is 130 m

Soils: Most soils are formed in freshly or deeply weathered basement rock. Most have sandy loam surfaces which either abruptly overlie clayey subsoils, or merge with them indistinctly. On steeper and / or rocky slopes, soils are shallow and stony directly overlying hard rock. On lower or gentle slopes, soils are deeper, usually with medium textured surfaces over thick brown clayey subsoils. On creek flats, sandy texture contrast and deep loamy soils occur in combination with the loamy texture contrast types. All soils are acidic, at least in their surface layers.

Main soils

Soils formed in weathering basement rock

- K4a** Acidic sandy loam over poorly structured brown clay
- K3** Acidic sandy loam over red clay
- L1** Shallow loamy sand to loam on hard rock
- F1b** Thick sandy loam over brown clay on deeply weathered rock

Minor soils

Soils formed in weathering basement rock

- K1** Acidic gradational loam
- K4b** Acidic sandy loam over well structured brown clay
- K5** Acidic gradational sandy loam

Ironstone soils

- J2** Deep acidic texture contrast or gradational ironstone soil

Hard loamy soils with deep brown clayey subsoils

- F1a** Thick loam over brown clay on deeply weathered rock
- F1c** Sandy loam over brown clay on alluvium



- F1d** Sandy loam over brown clay on ironstone gravelly clay
F2a Sandy loam over poorly structured brown clay on alluvium
F2b Sandy loam over poorly structured brown clay on deeply weathered rock
Sandy soils
G3 Thick sand over brown clay
H3 Bleached siliceous sand
Deep loamy soils
M2a Deep grey clay loam
M2b Deep black clay loam to clay

Main features: The Mount Torrens Land System is dominated by linear ridges, although less than 5% of the total area comprises steep and very rocky crests. Moderately steep non-arable ridges occupy about 45% of total area, and about 40% is undulating to gently rolling low hills. Soils are characteristically moderately deep to deep sandy loams with brown mottled clayey subsoils. Many are waterlogged during winter. Most have low inherent fertility and all are prone to acidification. Erosion is a potential problem on cultivated or over-grazed land due to the high erodibility of the soils, and moderate slopes. About 10% of the land area is drainage depressions and fans. Soils are similar to those of the rising ground, but waterlogging is a greater threat and salinity is more likely to be a problem, albeit minor.

Soil Landscape Unit summary: 15 Soil Landscape Units (SLUs) mapped in the Mount Torrens Land System:

SLU	% of area	Main features #
AqC AqD	43.2 1.8	<p>Moderately inclined to steep strike ridges, generally with well defined north-south lineation. Parent rocks are metamorphosed sandstones and quartzites of the Stonyfell, Gilbert Range and Mitcham Quartzite Formations. In general, slopes are 15% to 30%, but up to 50% in places and relief is up to 80 metres. Creek lines are well defined and narrow, usually unmappable.</p> <p>AqC Moderately inclined and sporadically rocky hillslopes, upper slopes and crests and rolling low hills with relief to 80 m and slopes of 15-30%.</p> <p>AqD Steep, rocky hillslopes and prominent ridges with relief to 100 m and slopes of 30-50%. There is a range of soils, usually with gravelly sandy loam to sandy clay loam surfaces and variably coloured and structured clay subsoils, formed on fresh weathering or deeply weathered and kaolinitic micaceous sandstones. Shallow stony soils are common on steeper or rocky slopes. Deeper texture contrast soils occur on lower slopes.</p> <p>Main soils: <u>Acidic sandy loam over poorly structured brown clay</u> - K4a (E) <u>Shallow sandy loam on rock</u> - L1 (E) on steeper rocky slopes <u>Acidic sandy loam over red clay</u> - K3 (L) <u>Sandy loam over brown clay on deeply weathered rock</u> - F1b (L)</p> <p>The land is non-arable, although the majority is suitable for perennial crops provided erosion is controlled. Despite the rocky reefs, most soils are moderately deep, moderately well drained and have adequate waterholding capacities. Natural fertility is low, and all soils are prone to acidification. Most soils have poor surface structure, and are highly erodible.</p>
AsD	2.2	<p>Steep very rocky quartzite peaks (Mount Barker and Mount Torrens). Slopes are 30-75%. Soils are very shallow and stony, and there is 50% or more surface stone and rocky outcrop.</p> <p>Main soils: <u>Shallow stony sandy loam</u> - L1 (E) <u>Acidic gradational sandy loam</u> - K5 (E)</p> <p>This land is too steep and too rocky for any productive agriculture.</p>
AxC	1.9	<p>Moderately steep slopes formed on phyllites, fine grained schists, slates and metasiltstones, with interbedded quartzites and metasandstones. Slopes are generally in the range 20% to 30%, but occasional slopes may reach 50%. Relief varies from 50-90m. The dominant soils have loamy surfaces and clay subsoils with variable colours and structure depending on the type of parent rock.</p> <p>Main soils: <u>Acidic loam over red clay on rock</u> - K2a (C) <u>Acidic sandy loam over red clay on rock</u> - K3 (C)</p>



		<p><u>Acidic loam over brown clay on rock - K2b</u> (L) <u>Shallow loam on rock - L1</u> (L) on steeper rocky slopes <u>Acidic loam over black clay on rock - K2c</u> (M) on slaty rocks <u>Acidic sandy loam over brown clay on rock - K4</u> (M) on quartzites</p> <p>These soils are generally moderately deep, inherently fertile and moderately well drained. The main limitation is the topography although the more moderate slopes are suitable for perennial crops. Steeper slopes are prone to landslip.</p>
CbC CbD	2.3 27.7	<p>Undulating rises to gently rolling low hills formed on micaceous sandstones, commonly kaolinized, of the less quartzitic strata of the Stonyfell and Mitcham Quartzite Formations. Slopes range from 3% to 18% and relief is as low as 20 metres on undulating rises to a maximum of 60 metres on low hills. Watercourses are well defined in broad drainage depressions.</p> <p>CbC Undulating rises with relief to 40 m and slopes of 3-8%. CbD Gently rolling low hills with relief to 60 m and slopes of 8-18%.</p> <p>The majority of soils have sandy to loamy surfaces overlying brown or red clay subsoils forming in fresh, or more commonly deeply weathered, basement rock. Deeper texture contrast soils on alluvium are common on lower slopes.</p> <p>Main soils: <u>Acidic sandy loam over poorly structured brown clay - K4a</u> (E) } on slopes <u>Acidic sandy loam over red clay - K3</u> (C) } <u>Sandy loam over brown clay on deeply weathered rock - F1b</u> (C) } <u>Sandy loam over brown clay - F1c and F1d</u> (L) on lower slopes and drainage creek flats</p> <p>Most soils are deep, but drainage is commonly imperfect due to perching of water on clayey subsoils, and natural fertility is low. All soils are prone to acidification. The soils are highly erodible, so CbD in particular is at high risk of erosion if protective vegetative cover is removed.</p>
CdC CdD	4.5 6.6	<p>Undulating rises and gently rolling low hills formed on micaceous sandstones and coarse grained schists, commonly kaolinized, of the Stonyfell and Mitcham Quartzite Formations. Slopes are up to 16% and relief is less than 50 m. Watercourses are well defined in broad depressions. Some lateritic (ironstone) residuals occur.</p> <p>CdC Undulating rises with up to 20 metres relief and slopes of 3-8%. CdD Gently rolling low hills with relief of up to 50 metres and slopes of 8-16%.</p> <p>Most soils consist of sandy to sandy loam surfaces overlying yellow and brown subsoils, sometimes shallow over weathering rock, but more commonly grading to deeply weathered and often kaolinitic rock. Ironstone is common in many soils. There are some shallow coarse to medium textured gravelly soils formed on hard rock.</p> <p>Main soils: <u>Acidic sandy loam over well structured brown clay - K4b</u> (E) on weathering rock <u>Shallow stony sandy loam - L1</u> (C) on hard rock <u>Sandy loam over brown clay on deeply weathered rock - F1b</u> (L) <u>Acidic deep ironstone soil - J2</u> (M) on lateritic residuals</p> <p>These soils are generally moderately deep and moderately well drained, but inherent infertility is a significant limitation, particularly as the soils are highly susceptible to acidification. Steeper slopes are prone to erosion; the soils are highly erodible. Minor saline seepages occur on lower slopes.</p>
FdZ	1.1	<p>Gentle upper slopes, crests and summit surfaces formed on highly weathered kaolinized schists and metasandstones of the Kanmantoo Group of rocks. There are minor deposits of Tertiary sands. Slopes are 5-10%, with occasional breakaway slopes of 20%. Most of the land surface is a flat to very gently inclined summit surface. There is variable surface ferricrete. Soils have sandy to sandy loam surfaces with abundant ironstone gravel. Subsoil clays are thick and grade to kaolinitic weathering material.</p> <p>Main soils: <u>Brown ironstone soil - J2</u> (V) <u>Red ironstone soil - K1/J2</u> (L)</p> <p>Thick sands (M) on Tertiary remnants</p> <p>These soils are very old and leached. Inherent fertility is very low, a condition exacerbated by strong acidity and high phosphate fixing capacity caused by the abundant ironstone gravel. The brown ironstone soils are imperfectly drained, with perched water tables readily forming on the clayey subsoil. On slopes, water erosion potential is moderate to high.</p>



LEJ	1.2	<p>Alluvial flats of the River Torrens formed on sand, clayey sand and sandy clay alluvium derived from the erosion of coarse grained metamorphic rocks. The soils are predominantly sandy, with most profiles having clayey subsoils, some of which are sodic. There are also deep sandy soils.</p> <p>Main soils: <u>Sandy loam over poorly structured brown clay</u> - F2a (E) <u>Thick sand over brown clay</u> - G3 (E) <u>Bleached siliceous sand</u> - H3 (L)</p> <p>These flats are inherently infertile, a function of the predominantly sandy soils. Most soils are imperfectly drained due to poorly structured and sometimes sodic subsoils. The river dominates the land. Land use is restricted by problems of accessibility, flooding, stream bank erosion and water pollution potential.</p>
LTB	1.5	<p>Gentle slopes formed on coarse grained outwash sediments and weathering rock. Slopes are less than 5%. There are occasional rocky outcrops.</p> <p>Main soils: <u>Sandy loam over poorly structured brown clay</u> - F2a / F2b (E) <u>Thick sand over brown clay</u> - G3 (E) <u>Bleached siliceous sand</u> - H3 (L) <u>Shallow stony sandy loam</u> - L1 (M) associated with outcrop</p> <p>The soils have low natural fertility and are subject to waterlogging, acidification and compaction. However, with suitable species and grazing management, pasture productivity potential is satisfactory. Watercourse management is an additional consideration, due to past stream bank erosion and high soil erodibility.</p>
LeB LeE	0.6 1.7	<p>Broad, shallow drainage depressions, and gently undulating to undulating lower slopes of up to 10%, formed on deeply weathered medium to fine grained rocks, or on medium to fine grained alluvium derived from upslope siltstones, shales, phyllites and schists.</p> <p>LeB Lower slopes, 1-4%. LeE Shallow valleys with slopes of 0-10%.</p> <p>All the major soils have texture contrast profiles with sandy to loamy surfaces and mottled brown, yellow and grey clay subsoils. Variations between the different soils are due to drainage conditions, nature of parent sediments and ironstone gravel content.</p> <p>Main soils: <u>Sandy loam over brown clay</u> - F1c / F1d (E) } on alluvium <u>Loam over brown clay</u> - F1a (C) } <u>Sandy loam over brown clay</u> - F1b (C) on deeply weathered rock</p> <p>These soils are deep, fertile and moderately well to imperfectly drained. Productive potential is high provided that temporary waterlogging can be managed.</p>
LgF	2.1	<p>Broad alluvial flats formed on clayey alluvial sediments. The dominant soils are dark clay loams to clays. The subdominant soils are texture contrast types with loamy surfaces and brown and yellow mottled clay subsoils.</p> <p>Main soils: <u>loam over brown clay</u> - F1c (E) <u>Deep grey clay loam</u> - M2a (C) <u>Deep black clay loam to clay</u> - M2b (C)</p> <p>These soils are deep and naturally fertile, with high productive potential. Slight limitations are due to waterlogging and minor salinity.</p>
LtE	1.6	<p>Drainage depressions formed on medium to coarse grained locally derived alluvium. Soils have thick sandy to loamy surfaces overlying mottled clayey subsoils.</p> <p>Main soil: <u>Sandy loam over brown clay</u> - F1c (D)</p> <p>These soils are deep and moderately fertile, but prone to waterlogging. Watercourses are well defined and susceptible to erosion if banks are exposed. The narrowness of these areas of land and the predominance of watercourses limits land use potential, but prolonged springtime soil moisture levels provide useful grazing.</p>

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

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



Detailed soil profile descriptions:*Soils formed in weathering basement rock*

- K1** Acidic gradational loam (Bleached, Mesotrophic, Brown Kandosol)
Medium thickness sandy loam to loam, with a pale and gravelly A2 horizon, overlying a yellow and brown sandy clay loam grading to a clay loam or light clay subsoil formed in soft weathering sandstone.
- K3** Acidic sandy loam over red clay (Bleached, Eutrophic, Red Kurosol)
Thick, brown loamy sand to sandy loam with a gravelly and bleached A2 horizon, overlying a red coarsely structured clay, stony and browner with depth, grading to weathering metasandstone by 100 cm.
- K4a** Acidic sandy loam over poorly structured brown clay (Bleached-Mottled, Eutrophic, Brown Kurosol)
Thick gravelly sandy loam to sandy clay loam with a bleached A2 horizon, overlying a yellowish brown, red and greyish brown, coarsely prismatic clay subsoil, grading to weathering metasandstone below 100 cm.
- K4b** Acidic sandy loam over well structured brown clay (Mesotrophic, Brown Chromosol)
Thick, brownish loamy sand to sandy loam with a paler coloured and gravelly A2 horizon, overlying a yellow and brown, finely structured clay subsoil, grading to weathering rock by 100 cm.
- K5** Acidic gradational sandy loam (Bleached-Acidic, Mesotrophic, Yellow Kandosol)
Thick, gravelly loamy coarse sand to coarse sandy loam surface soil with a bleached and very gritty and gravelly A2 horizon, overlying a brown or yellow sandy clay loam to sandy clay subsoil with abundant rock fragments, grading to coarse grained sandstone.
- L1** Shallow stony sandy loam (Acidic, Lithic, Bleached-Leptic Tenosol)
Thick, greyish, very gravelly loamy sand to sandy loam with a bleached A2 horizon, grading to hard metasandstone by 50 cm.

Ironstone soils

- J2** Acidic deep ironstone soil (Bleached-Ferric, Mesotrophic, Brown Kurosol)
Medium thickness grey brown loamy sand with a bleached A2 horizon containing over 50% ironstone gravel, overlying a yellow brown clay with soft red inclusions of weathered ironstone, grading to a greyish silty clay forming in weathering schist or micaceous sandstone deeper than 200 cm.

Hard loamy soils with deep brown clayey subsoils

- F1a** Loam over brown clay on deeply weathered rock (Eutrophic, Brown Kurosol)
Thick dark brown sandy loam to clay loam with a bleached A2 horizon, overlying a brown, yellowish brown and red, coarsely blocky clay subsoil grading to grey and brown coarsely prismatic clay forming in weathering schist or phyllite, deeper than 200 cm.
- F1b** Sandy loam over brown clay on deeply weathered rock (Bleached-Mottled, Mesotrophic, Brown Kurosol)
Thick grey loamy sand to loam with a gravelly and bleached A2 horizon, overlying a brown, yellowish brown and red coarsely prismatic sandy clay to clay subsoil, becoming siltier and greyer with depth. Soft weathering metasandstone occurs from about 150 cm.
- F1c** Sandy loam over brown clay (Bleached-Mottled, Hypocalcic, Brown Chromosol)
Thick loamy sand to sandy clay loam surface soil with a strongly bleached A2 horizon, sharply overlying a yellowish brown, grey and red mottled clay subsoil grading to fine grained alluvium.
- F1d** Sandy loam over brown clay (Bleached-Mottled, Mesotrophic, Brown Kurosol)
Thick, greyish loamy sand to sandy clay loam with a bleached and ironstone gravelly A2 horizon, overlying a brownish yellow, brown and red well structured clay, grading to kaolinitic and ironstone gravelly clay continuing below 200 cm.
- F2a** Sandy loam over poorly structured brown clay (Bleached-Mottled, Natric, Brown Kurosol)
Thick massive grey loamy sand to loam with a bleached and quartz gravelly A2 horizon, overlying a yellow brown and grey brown sandy clay to clay with prismatic structure, grading to coarse, medium or fine textured, micaceous alluvium from about 100 cm.



- F2b** Sandy loam over poorly structured brown clay (Eutrophic, Mottled-Subnatric, Brown Sodosol)
Thick, massive, grey loamy sand to loam with a bleached and gravelly A2 horizon, overlying a grey brown, red and yellow brown mottled clay with prismatic structure, grading to silty alluvium or deeply weathered soft schist.

Sandy soils

- G3** Thick sand over brown clay (Eutrophic / Calcic, Mottled-Mesonatric, Brown Sodosol)
Thick grey to brown sand with a bleached A2 horizon, overlying a yellow brown, dark brown and grey mottled sandy clay to clay with coarse prismatic to columnar structure, grading to a sandier sediment below 100 cm. Class I carbonate layer of soft calcareous segregations occasionally occurs below 70 cm.
- H3** Bleached siliceous sand (Regolithic, Bleached-Orthic Tenosol)
Very deep greyish brown massive sand, grading to white sand, overlying layers of brown, yellow and grey sand to clayey sand.

Deep loamy and clayey soils

- M2a** Deep grey clay loam (Melanic, Eutrophic, Black / Grey Dermosol)
Thick black silt loam to clay loam with strong granular structure, overlying a black to dark brown clay with strong blocky structure, becoming yellow and grey mottled with depth.
- M2b** Deep black clay loam to clay (Melanic, Calcic, Black Dermosol / Black Vertosol)
Thick black clay loam to clay with granular structure, overlying a dark grey to black heavy clay with strong blocky structure. The clay is yellower and weakly calcareous with depth.

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

