FOX Fox Creek Land System

Steep hills between Gumeracha and Montacute with a small area between Summertown and Greenhill

Area: 101.3 km^2

Annual rainfall: 620 – 1,070 mm average

Geology: The land is underlain by shales, siltstones and fine sandstones of the Saddleworth, Woolshed Flat and Bethel Formations, with minor quartzites and dolomites of the Stonyfell and Montacute/Castambul Formations respectively. The land is very strongly dissected so there are no residual lateritic formations, and alluvial deposits occupy less than 5% of the area.

Topography: The Fox Creek Land System is characteristically steep to very steep. It includes much of the lower Torrens River watershed, where downcutting by the river and its tributaries has been considerable. The small area of steep slopes in the Mount Lofty area is not associated with the Torrens but is included because of other similarities of topography and soil type. 70% of the land has slopes steeper than 30% (i.e. not traversable by most farm machinery). Most of the rest is moderately steep. Watercourses occupy very narrow valleys or gullies, but larger streams flow in well defined creek flats. These are minor in area.

Elevation: 100 m where the Torrens flows out of the System, to 670 (Mount Bonython)

Relief: Relief of 200 m is common

Soils: Most soils are moderately deep to shallow over weathering rock. Surface soils are generally loamy, and clayey subsoils are usual except on steepest slopes. Red and orange colours are typical. Deeper soils occur on lower slopes and on creek flats, but these are minor overall.

Main soils

Soils formed in weathering basement rock

K2a Acidic loam over red clay
K1 Acidic gradational brown loam over fresh weathering rock (**K1a**) or highly weathered kaolinitic rock (**K1b**)
C2 Shallow gradational red loam over calcareous rock
L1a Shallow stony loam

Minor soils

Soils formed in weathering basement rock

K2b Acidic loam over red and brown mottled clay
K4 Acidic sandy loam over brown clay
K5 Acidic gradational sandy loam
L1b Shallow stony sandy loam

Soils formed in deeply weathered basement rock

F1a Loam over brown clay

Soils formed in alluvial outwash sediments

F1b Sandy loam to loam over brown clay
M1 Deep gradational sandy loam
M2 Deep black clay loam

Main features: The Fox Creek Land System is typically steep to very steep, and includes some precipitous cliffs in the Torrens Gorge. The soils are generally well drained and inherently fertile, but often shallow. However, more than two thirds of the land is too steep for uses other than grazing or conservation. On the gentler slopes (most of which are still too steep for cultivation), the typical loamy soils with clayey subsoils are ideal for perennial horticultural crops such as grape vines, cherries and pome fruits. The main management issues are erosion control and amelioration of soil acidity. Most cleared slopes are susceptible to landslip.

Soil Landscape Unit summary: 13 Soil Landscape Units (SLUs) mapped in the Fox Creek Land System:

SLU	% of area	Main features #
AaD	5.1	Steep to very steep hillslopes formed on siltstones, fine sandstones and minor quartzites and dolomites. Relief is up to 200 m, slopes are 30-75%, but less than 10% on some upper slopes and broader crests. There is occasional rock outcrop and moderate surface stone. Drainage depressions are narrow with well defined water courses. Most soils are loamy with red to yellowish brown clay subsoils forming in weathering rock. On steeper slopes, loamy surface soils are formed directly in rock. Red loamy soils overlying abundant soft to semi-hard carbonate occur on calcareous rocks. Main soils: Acidic loam over red clay - **K2a** (C) Shallow stony loam - **L1a** (C) Acidic gradational brown loam - **K1a** (L) Acidic loam over red and brown clay - **K2b** (L) Shallow gradational red loam - **C2** (L) These soils are usually moderately deep, well drained and inherently fertile, but the steep terrain limits land use options. Where cleared, the land is used mostly for light grazing.
AbC AbD	20.1 45.1	Moderately steep to very steep hills formed on shales, siltstones, fine sandstones and minor quartzites and dolomites. Slopes range from 18% to 90%, but are usually less than 75%. Relief varies from 30 m to 200 m. Crests and drainage depressions are narrow in the steeper country, but are broader where the slopes and relief are more subdued. **AbC** Rolling low hills and slopes with relief to 80 m and slopes of 18-30%. **AbD** Steep to very steep rocky hills with relief to 200 m and slopes of 30-90%. The soils are predominantly loamy with brown to yellow subsoil clays forming in weathering rock. On steeper slopes, soils are shallow on rock, while on lower slopes, clay subsoils are thick with rock deeper than a metre. Main soils: Acidic gradational brown loam - **K1a** (C) Acidic loam over red clay - **K2a** (C) Shallow stony loam - **L1a** (L-C) on steeper slopes Deep acidic gradational brown loam - **K1b** (L) on upper slopes Loam over brown clay on deeply weathered rock - **F1a** (L-M) on lower slopes This land is all non arable, but the less steep slopes of **AbC**, with moderately deep, well drained and reasonably fertile soils, are ideal for perennial horticulture. The main limitations are potential for erosion during establishment, and soil acidity. The steep slopes of **AbD** are largely undeveloped or are used for grazing, with some horticulture in more accessible areas. Both units, but particularly **AbD** are susceptible to landslip.
AcC AcD	1.3 12.4	Moderately inclined to very steep and occasionally precipitous hillslopes of the Torrens Gorge and tributary valleys underlain by siltstones, calcareous siltstones and dolomites of the Montacute and Castambul Formations. Slopes are mostly between 20% and 80%, but are up to 250% in places. Relief is up to 200 metres. Creek flats are very narrow, with an abrupt break in slope to the adjacent hillsides. Rock outcrop is less than 10% overall, but is very extensive on precipitous slopes. There is abundant surface stone. **AcC** Moderately inclined hillslopes with relief to 100 m and slopes of 20-30%. **AcD** Steep to precipitous rocky hills with relief to 200 m and slopes of 30-250% Soils are predominantly red and loamy, with variable subsoils including friable red or orange clay, or soft carbonate, depending on the nature of the parent rock. Shallow loams formed directly on bedrock are common on steeper slopes. Main soils: Acidic loam over red clay - **K2a** (E) } on non calcareous rocks Shallow stony loam - **L1a** (C) } Acidic gradational brown loam - **K1a** (L) } Shallow gradational red loam - **C2** (L) on calcareous rocks

		Most of this land is steep and difficult to traverse. Soils are well drained and inherently fertile, but often shallow. There is some horticulture on gentler slopes, but most of the land is used for grazing or is undeveloped. Cleared areas are prone to landslip.
AqC	0.6	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. **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%. Main soils: Acidic sandy loam over poorly structured brown clay - **K4a** (E) Shallow sandy loam on rock - **L1** (E) on steeper rocky slopes Acidic sandy loam over red clay - **K3** (L) Sandy loam over brown clay on deeply weathered rock - **F1b** (L) 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 water holding capacities. Natural fertility is low, and all soils are prone to acidification. Most soils have poor surface structure, and are highly erodible.
AuD	0.7	Steep to very steep low hills and hills developed on medium to coarse grained sandstones and quartzites. Slopes generally range from 12% to 75% and relief is up to 250 metres. In the Waterfall Gully, Morialta and Torrens Gorge areas, precipitous slopes and cliffs occur. The slopes are rough and very rocky. **AuD** Rocky, steep low hills with relief to 100 m and slopes of 30-75%. Drainage depressions are narrow and deeply incised. The ain soil features are shallow profiles over bedrock and grey, sandy surfaces which are gritty and stony. Subsoils are often not present. Main soils: Acidic gradational sandy loam on rock - **K5** (E) Shallow sandy loam on rock - **L1a** (C) Acidic sandy loam over brown clay on rock - **K4** (L) Acidic sandy loam over red clay on rock - **K3** (L) Acidic gradational brown loam - **K1** (M) on fine grained rocks This land has very limited productive potential due to the combination of steep terrain, rocky land surface and shallow infertile soils. Most of it is used for conservation.
AwC AwD	0.2 7.3	Steep hillslopes with occasional low rounded hills and ridges, formed on fine to coarse grained sandstones and quartzites. Relief is up to 200 m and slopes are 20-100%. Rocky outcrops are variable, but extensive on steeper slopes. **AwC** Moderately inclined low ridges to 30 m high with slopes of 15-30%. **AwD** Steep rocky hillslopes with relief to 300 m and slopes of 30-100%. Most soils are shallow over bedrock. Surface soils are usually sandy with abundant grit and rock fragments. Clayey subsoils are common. Main soils: Shallow stony sandy loam - **L1b** (C) } on coarser grained rocks Acidic gradational sandy loam - **K5** (L) } Acidic sandy loam over brown clay - **K4** (E) } Acidic gradational brown loam - **K1a** (L) } on finer grained rocks Shallow stony loam - **L1a** (L) } Most of this land is very rugged with little potential for development. Rough grazing is the most common use where land has been cleared.
BFD	2.5	Gently rolling rises and low hills with relief to 40 m and slopes of 8-18%, formed shales, siltstones, fine sandstones and minor quartzites and dolomites. The soils are predominantly loamy with brown to yellow subsoil clays forming in weathering rock. On lower slopes, clay subsoils are thick with rock deeper than a metre. Main soils: Acidic gradational brown loam - **K1a** (C) Acidic loam over red clay - **K2a** (C) Deep acidic gradational brown loam - **K1b** (L) on upper slopes Loam over brown clay on deeply weathered rock - **F1a** (L) on lower slopes Shallow gradational red loam - **C2** (L) on calcareous rocks This land is semi arable, but generally easily accessible. Its moderately deep, well drained and reasonably fertile soils are ideal for perennial horticulture. The main limitations are potential for erosion during establishment, and soil acidity.
LdE	4.1	Creek flats formed on clayey alluvium.

		Main soils: Deep black clay loam - **M2** (E) Sandy loam over brown clay - **F1b** (E) These soils are deep and fertile, but imperfectly drained. Productive potential is high although irrigation must be carefully managed to avoid waterlogging. Water courses dominate the land - flooding and stream bank erosion are important considerations.
LeE	0.4	Drainage depressions formed on medium to fine grained alluvium derived from the erosion of basement siltstones and shales. The major soils have texture contrast profiles with sandy to loamy surfaces and mottled brown, yellow and grey clay subsoils. Main soils: Sandy loam over brown clay - **F1b** (V) on alluvium Loam over brown clay - **F1a** (C) on deeply weathered rock These soils are deep, fertile and moderately well to imperfectly drained. Productive potential is high provided that temporary waterlogging can be managed.
LtD	0.2	Highland outwash slope of 8-15% formed on gravelly colluvium. Main soil: Deep gradational sandy loam - **M1** (D) This isolated area has deep well drained soils suitable for horticultural uses provided that erosion is controlled.

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 in weathering basement rock

C2 Shallow gradational red loam over calcareous rock (Eutrophic, Red Dermosol)
Medium thickness dark reddish brown loam, overlying a reddish well structured loam to clay loam, grading to soft highly calcareous siltstone, or soft carbonate with siltstone fragments throughout at about 50 cm.

K1a Acidic gradational brown loam (Eutrophic, Brown Dermosol)
Medium thickness loamy surface soil, becoming clay loamy and gravelly with depth, overlying an orange friable clay subsoil, grading to soft shale or siltstone.

K1b Deep acidic gradational brown loam (Eutrophic, Brown Kandosol)
Medium to thick loam with a pale coloured and gravelly A2 horizon, overlying a reddish yellow to brown massive clay loam, grading to a yellow light clay with abundant rock fragments throughout. Highly weathered kaolinized siltstone occurs between 50 and 100 cm and continues below 200 cm.

K2a Acidic loam over red clay on rock (Eutrophic, Red Kurosol)
Medium thickness loamy surface soil, with a paler coloured and gravelly A2 horizon, overlying a reddish brown to red well structured clay subsoil with rock fragments, grading to weathering siltstone or slate by 100 cm.

K2b Acidic loam over red and brown clay on rock (Mottled, Eutrophic, Red / Brown Kurosol)
Thick sandy loam to loam with a paler coloured and gravelly A2 horizon, overlying a yellowish brown, brown and red well structured clay grading to weathering siltstone or fine sandstone by 100 cm.

K4 Acidic sandy loam over brown clay on rock (Bleached, Mesotrophic, Brown Kurosol)
Medium to thick gravelly loamy sand to sandy loam surface soil, with a bleached and very gravelly A2 horizon, overlying a yellowish brown, red and brown sandy clay to clay subsoil grading to weathering medium to fine sandstone by 100 cm.

K5 Acidic gradational sandy loam on rock (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.

L1a Shallow stony loam (Acidic, Lithic, Leptic Tenosol)
Thick gravelly and stony brown loam, sometimes grading to a pinkish very stony clay loam overlying hard siltstone or slate.

L1b Shallow stony sandy loam (Acidic, Paralithic, Bleached-Leptic Tenosol)
Thick very gravelly loamy sand to sandy loam, overlying a brown gravelly clayey sand, grading to weathering sandstone by 50 cm.

Soils formed in deeply weathered basement rock

F1a Loam over brown clay (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.

Soils formed in alluvial outwash sediments

F1b Sandy loam to loam over brown clay (Bleached-Mottled, Eutrophic, Brown Chromosol)
Thick sandy loam to clay loam with a strongly bleached A2 horizon, sharply overlying a yellowish brown, grey and red mottled clay subsoil grading to fine grained alluvium.

M1 Deep gradational sandy loam (Eutrophic, Brown Kandosol)
Medium thickness gravelly sandy loam over a red gravelly light sandy clay loam grading to a brown and red massive sandy clay loam with variable gravel continuing below 100 cm.

M2 Deep black clay loam (Melanic, Eutrophic, Black Dermosol)
Thick black silty 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.

Further information: DEWNR Soil and Land Program