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Bull Creek Land System

Steep hills in the Bull Creek area.

Area: 37.7 km²

Annual rainfall: 660 – 950 mm average

Geology: The System is underlain by metamorphosed fine grained sedimentary rocks of Proterozoic age. Typical lithologies include phyllites, fine grained schists, slates and metasiltstones, with interbedded quartzites, metasandstones and limestones. Extensive lateritic cappings formed during Tertiary times have all but disappeared due to the degree of dissection of the landscape. Locally derived alluvial and colluvial sediments occur in narrow valleys occupying less than 10% of the land area.

Topography: The System comprises most of the Bull Creek catchment. It is dominated by moderately steep to steep hills formed by the downcutting of Bull Creek and its tributaries including McHarg Creek, as well as some smaller water courses not included in the main catchment. The hillslopes typically drop abruptly to narrow valleys, with little concave lower slope or fan development. The hills form more or less elongate ridges aligned with the strike of the country rocks. Quartzite reefs occur sporadically along this lineation. Over 60% of the land has slopes of more than 20%, while drainage depressions occupy less than 10%.

Elevation: 180 m where Bull Creek flows out of the System to 480 m (Bull Knob)

Relief: 50 - 150 m

Soils: The soils are predominantly moderately deep to shallow over basement rock. Surface soils vary from sandy loam to clay loam depending on the grain size of the parent rock. Clayey subsoils are usual, but shallow soils formed directly on rock are common on steeper slopes. Deep texture contrast or gradational soils occur on lower slopes and flats.

Main soils

Soils on hillslopes formed on weathering basement rock

K2 Acidic loam over clay – red clay (**K2a**), brown clay (**K2b**) or black clay (**K2c**)

K3 Acidic sandy loam over red clay – on schist (**K3a**) or sandstone (**K3b**)

K4 Acidic sandy loam over brown clay on rock

K1 Acidic gradational loam – on deeply weathered rock (**K1a**), on schist (**K1b**) or on siltstone (**K1c**)

L1 Shallow sandy loam (**L1a**) to loam (**L1b**)

Minor soils

Soils on hillslopes formed on weathering basement rock

C2 Shallow gradational clay loam

K5 Acidic gradational sandy loam

Soils on upper slopes formed in deeply weathered lateritized basement rock

J2 Ironstone soil – brown soil (**J2a**) or red soil (**J2b**)

Soils of lower slopes formed on outwash sediments or deeply weathered rock

F1 Loam over brown clay – on fine grained alluvium (**F1a**), on silty alluvium (**F1b**), on coarse grained alluvium (**F1c**), or deeply weathered rock (**F1d**).

M1 Deep sandy loam

M2 Deep black clay loam



Main features:

The Bull Creek Land System is characterized by moderately steep to steep hillslopes, dropping abruptly to narrow valleys. Over 60% of the land is non arable due to excessive slopes. The soils are generally loams or sandy loams over red clayey subsoils, moderately deep over weathering rock. The loamy types are inherently fertile and well drained, productivity being limited mainly by the topography. There are minor areas of semi arable loamy soils. The sandy loam types are less fertile, less well drained and more erodible, and are less attractive although they comprise over 10% of the land area. Water course erosion is severe in places, while steeper slopes on slaty rocks are subject to landslip.

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

| SLU | % of area | Main features # |
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| AqC AqD | 0.7 13.2 | <p>Moderately inclined to steep strike ridges, generally with well defined north-south lineation. Parent rocks are metamorphosed sandstones and quartzites of the Stonyfell and Mitcham Quartzite Formations. Slopes are 15% to 75% and relief is up to 100 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 30-75%. The soils usually have gravelly sandy 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 brown clay on rock - K4 (E)</u> <u>Acidic sandy loam over red clay on sandstone - K3b (L)</u> <u>Shallow sandy loam on rock - L1a (C)</u> on steeper rocky slopes <u>Acidic gradational sandy loam - K5 (L)</u> on upper slopes and crests</p> <p>Soil depth varies considerably as rocky reefs alternate with deeply weathered strata. Most soils are moderately well drained but inherent fertility is generally low and susceptibility to acidification is high. The slopes are usually too steep for uses other than grazing. Erosion potential is high to extreme.</p> |
| AxC AxD | 20.5 10.7 | <p>Moderately steep to steep slopes and rolling low hills formed on phyllites, fine grained schists, slates and metasiltstones, with interbedded quartzites, metasandstones and limestones. Slopes are generally in the range 20% to 30%, but steeper hillslopes may reach 50%. Relief varies from 50 metres to 100 metres.</p> <p>AxC Rolling low hills with relief to 80 m and slopes of 20-30%.</p> <p>AxD Steep rocky hillslopes with relief to 100 m and slopes of 30-50%. 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 - K2a (C)</u> <u>Acidic sandy loam over red clay on schist - K3a (C)</u> <u>Acidic loam over brown clay on rock - K2b (L)</u> <u>Shallow loam on rock - L1b (L)</u> on steeper rocky slopes <u>Acidic loam over black clay on rock - K2c (M)</u> on slaty rocks <u>Acidic sandy loam over brown clay on rock - K4 (L)</u> on quartzites <u>Shallow gradational clay loam - C2 (L)</u> on calcareous rocks</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 of AxC are suitable for perennial crops. Steeper slopes are prone to landslip.</p> |
| AyC AyD | 5.5 13.7 | <p>Rolling low hills to steep hillslopes formed on phyllites, schists and metasiltstones, with minor interbedded quartzites and metasandstones. Gradients are rarely less than 18%, and are up to 50% on steep slopes. Relief is usually between 50 and 150 m.</p> <p>AyC Rolling low hills with relief to 80 m and slopes of 18-30%.</p> <p>AyD Steep rocky hillslopes with relief to 150 m and slopes of 30-50%. Soils typically have loamy surfaces overlying reddish or brownish clay subsoils grading to weathering rock. Differences reflect variations in parent rock type, degree of weathering and position in the landscape.</p> |



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| | | <p>Main soils: <u>Acidic sandy loam over red clay on schist - K3a (C)</u> <u>Acidic gradational loam - K1b (C)</u> <u>Acidic loam over red clay on rock - K2a (L)</u> <u>Shallow loam on rock - L1b (L) on steeper rocky slopes</u> <u>Acidic gradational loam - K1a (L) on upper slopes</u></p> <p>This land is similar to AxC/AxD, but the soils tend to be sandier and consequently less fertile, more susceptible to acidification and more erodible.</p> |
| AzC | 12.1 | <p>Rolling low hills formed on mixed metasiltstones and metasandstones, commonly kaolinized, of the Brachina, Tapley Hill and Tarcoorie Formations. Slopes range from 18% to 30% and relief varies from 20 to 80 metres. Water courses are well defined and occupy broad, shallow drainage depressions. There is little rock outcrop except on the steepest slopes.</p> <p>The soils almost all have texture contrast profiles with sandy loam to clay loam surfaces and variably structured and coloured subsoil clays. They are moderately deep to very deep over basement rock. The deepest soils occur on lower slopes and drainage depressions where the parent materials are either deeply weathered rocks or locally derived alluvium, and on upper slopes where deep weathering profiles are common.</p> <p>Main soils: <u>Acidic sandy loam over brown clay on rock - K4 (E)</u> <u>Sandy loam over brown clay - F1d (C)</u> <u>Acidic loam over brown clay on rock - K2b (L)</u> <u>Acidic gradational loam - K1a (L)</u></p> <p>These soils are deep, imperfectly to moderately well drained, acidic and infertile. Slopes are non arable but suitable for perennial crops. Erosion potential is high.</p> |
| BbD | 1.8 | <p>Gently rolling low hills formed on phyllites, fine grained schists, slates and metasiltstones, with relief to 60 m and slopes of 10-20%.</p> <p>Main soil: as for AxC/AxD (above). These soils are generally moderately deep, inherently fertile and moderately well drained. Slopes are moderate, so although marginal for annual crops, the land is well suited to perennial crops with appropriate soil conservation management.</p> |
| CoD | 5.5 | <p>Gently rolling low hills with relief to 50 m and slopes of 10-18% formed on phyllites, schists and metasiltstones, with minor interbedded quartzites and metasandstones.</p> <p>Soils are as for AxC/AyD (above). The soils are moderately deep but inherent fertility is marginal, and the main soils have impeded drainage caused by tight clayey subsoils. Soil erodibility is high, increasing the management requirements for horticultural crops.</p> |
| CqD | 5.7 | <p>Gently rolling low hills with relief to 70 m and slopes of 10-18% formed on mixed metasiltstones and metasandstones, commonly kaolinized.</p> <p>Soils are as for AzC (above). They are deep, but imperfectly drained, acidic and infertile. Slopes are semi arable but suitable for perennial crops, although erosion potential is high.</p> |
| FaD | 2.4 | <p>Upper slopes of 10-20% formed on deeply weathered, kaolinized and lateritized sandstones and siltstones. There is sporadic surface ironstone.</p> <p>Main soils: <u>Ironstone soils - J2a and J2b (V)</u> <u>Acidic gradational sandy loam - K5 (L)</u> <u>Acidic gradational loam - K1a (L)</u>.</p> <p>These soils are deep but imperfectly drained and infertile due to strong leaching. They are also prone to waterlogging due to the thick subsoil clay. Most of these isolated upper slopes are exposed, further reducing productive potential.</p> |
| FcD | 1.9 | <p>Moderately inclined upper slopes and crests with slopes of 10-30% formed on deeply weathered, kaolinized and lateritized siltstones. There are minor surface fragments of ferruginized siltstone.</p> <p>Main soils: <u>Red ironstone soil - J2b (V)</u> <u>Acidic gradational loam - K1a and K1c (C)</u>.</p> <p>These landscapes are similar to FaD, but soils are loamier, more fertile, better drained and less erodible.</p> |
| LdE | 4.8 | <p>Narrow drainage valleys consisting of water courses and associated terraces and flats formed on fine grained alluvium derived from the erosion of hillslopes underlain by siltstones, shales and slates. Water courses are commonly eroding. There is usually a very sharp break in slope from the flats to the adjacent hillslopes. The soils are loamy to clay loamy.</p> <p>Main soils: <u>Deep black clay loam - M2 (E)</u> <u>Loam over brown clay - F1a and F1b (E)</u>.</p> <p>These soils are deep and inherently fertile, although often with impeded drainage.</p> |



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| | | Productive potential is high, but the narrowness of the flats and the relatively high proportion of land occupied by water courses limits development opportunities. |
| LtE | 1.5 | <p>Narrow valleys including water courses and adjacent flats formed on mixed alluvium derived from a range of coarse, medium and fine grained basement rocks. A mosaic of soils occurs, including a range of miscellaneous alluvial soils consisting of layers of coarse, medium and fine textured sediments. Other common soils have texture contrast profiles with sandy to loamy surfaces overlying variable clayey subsoils.</p> <p>Main soils: <u>Deep sandy loam - M1 (E)</u> <u>Sandy loam over brown clay - F1c (C)</u> <u>Loam over brown clay - F1a (C)</u> <u>Deep black clay loam - M2 (M)</u>.</p> <p>These soils are deep and moderately well drained with moderate to low fertility. The predominance of water courses and associated stream bank erosion and flooding restricts use of these flats.</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:

C2 Shallow gradational clay loam (Hypercalcic, Red Dermosol)

Medium thickness red brown loam to clay loam grading to a very well structured red clay loam to clay over highly calcareous fine grained weathering rock or limestone at depths of between 50 and 100 cm.

F1a Loam over brown clay (Bleached-Mottled, Hypocalcic, Brown Chromosol)

Thick loamy sand to sandy clay loam with a strongly bleached A2 horizon, sharply overlying a yellowish brown, grey and red mottled clay subsoil grading to fine grained alluvium.

F1b Loam over brown clay (Eutrophic, Brown Chromosol)

Thick grey brown massive loam to silty loam, with a pale brown A2 horizon, overlying a light grey and yellowish brown clay with coarse blocky structure, grading to clayey or silty alluvium.

F1c Sandy loam over brown clay (Bleached-Mottled, Eutrophic, Brown Chromosol)

Thick dark brown loamy sand to light sandy clay loam with a bleached A2 horizon, overlying a yellow brown and grey brown sandy clay with coarse prismatic structure, grading to a grey, brown and yellow mottled clayey sand.

F1d Sandy loam over brown clay (Bleached-Mottled, Eutrophic, Brown Kurosol)

Thick grey loamy sand to sandy clay loam with a gravelly and bleached A2 horizon, overlying a brown, yellowish brown and red well structured sandy clay to clay, grading to soft weathering metasandstone or kaolinitic and ironstone gravelly clay below 100 cm.

J2a Brown ironstone soil (Ferric, Mesotrophic, Brown Kandosol)

Medium thickness loamy sand to sandy loam with abundant ironstone gravel, overlying a brownish yellow and red clay with ironstone fragments, grading to light grey and red kaolinitic clay at about 100 cm.

J2b Red ironstone soil (Ferric, Eutrophic, Red Kurosol)

Medium thickness dark brown loam with a pink A2 horizon containing abundant fragments of ferruginized siltstone, overlying a red and yellow brown clay with blocky structure, grading to grey mottled kaolinitic silty clay. Hard siltstone is deeper than 200 cm.

K1a Acidic gradational loam (Mesotrophic, Red Dermosol)

Thick fine sandy loam with minor ironstone grading to a brownish to reddish coarsely blocky clay loamy to clayey subsoil, siltier with depth, grading to kaolinized phyllite or siltstone, continuing to depths of 200 cm or more.



K1b Acidic gradational loam (Eutrophic, Brown Dermosol)

Thick gravelly brown loam grading to a dark brown and yellow micaceous coarsely prismatic clay loam to clay, merging with weathering schist from about 100 cm.

K1c Acidic gradational loam (Eutrophic, Red Dermosol)

Medium thickness dark brown loam with a paler coloured clay loamy A2 horizon containing abundant ferruginous rock fragments, overlying a red clay with polyhedral structure and increasing rock fragments with depth, grading to soft weathering siltstone at about 100 cm.

K2a Acidic loam over red clay on rock (Eutrophic, Red Kurosol)

Medium thickness reddish loam to clay loam with a gravelly and paler coloured A2 horizon, overlying a red very well structured clay grading to weathering phyllite from about 100 cm.

K2b Acidic loam over brown clay on rock (Eutrophic, Brown Kurosol)

Thick loam with a paler coloured gravelly A2 horizon, overlying a dark brown, yellowish brown and red mottled coarsely structured clay subsoil, grading to weathering metasiltstone or phyllite deeper than 100 cm.

K2c Acidic loam over black clay on rock (Eutrophic, Black Dermosol)

Medium thickness black crumbly clay loam, overlying a black or dark reddish brown very well structured clay, grading to weathering slate from about 100 cm.

K3a Acidic sandy loam over red clay on schist (Bleached, Mesotrophic, Red Chromosol)

Medium thickness sandy loam with a paler or bleached A2 horizon, overlying a dark red prismatic structured clay, grading to weathering schist or phyllite by 100 cm.

K3b Acidic sandy loam over red clay on sandstone (Bleached-Mottled, Eutrophic, Red Kurosol)

Thick brown loamy sand to sandy loam with a gravelly and bleached A2 horizon, overlying a red and brown mottled coarsely structured clay, stony and browner with depth, grading to weathering metasandstone by 100 cm.

K4 Acidic sandy loam over brown clay on rock (Bleached-Mottled, Eutrophic, Brown Kurosol)

Thick gravelly sandy loam with a bleached and gravelly A2 horizon, overlying a yellowish brown, red and greyish brown coarsely prismatic clay subsoil, grading to weathering metasandstone below 100 cm.

K5 Acidic gradational sandy loam (Bleached, Mesotrophic, Brown Kandosol)

Medium thickness loamy sand to sandy loam with a pale and gravelly A2 horizon, grading to a yellow and brown sandy clay loam grading to a clay loam or light clay subsoil formed in soft weathering sandstone.

L1a Shallow sandy loam on rock (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.

L1b Shallow loam on rock (Paralithic, Leptic Tenosol)

Thick stony sandy loam to loam, forming in weathering schist or phyllite at 50 cm or less.

M1 Deep sandy loam (Regolithic, Brown-Orthic Tenosol / Hypocalcic, Brown Kandosol)

Thick brown sandy loam to clay loam, overlying a grey to brown silty loam to clay loam with weak prismatic structure, weakly calcareous with depth. The soil is formed in variable sandy, gritty and clayey alluvial sediments.

M2 Deep black clay loam (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](#)

