

UHR Upper Hill River Land System

Southern half of the Hill River catchment

Area: 136.8 km²

Annual rainfall: 550 – 650 mm average

Geology: The catchment is bounded by quartzite ridges of Gilbert Range Formation and other unnamed quartzites within the Appila Tillite. Most of the land within the catchment is underlain by tillites and fine grained sedimentary rocks of the Appila and Tapley Hill Formations. These are sporadically mantled by aeolian carbonates, more so in the northern parts. Occasional gravelly Tertiary? age deposits overlie the basement. Between the basement rock rises are extensive outwash fan and valley floor alluvial deposits, mostly fine grained, but sandier adjacent to the quartzite ridges. These sediments are generally mantled by soft carbonate.

Topography: The land system is bounded by a U-shaped formation of Gilbert Range Quartzite with Mt. Horrocks marking the base of the "U" at the southern end of the land system. In the north, the catchment merges with the Lower Hill River Land System. There is a well defined topo-sequence from the sides of the "U" to its open top in the north. This sequence comprises:

- moderately steep to steep ridges with slopes of up to 75% and relief up to 70 m;
- moderately inclined slopes of 10 - 20% abutting the base of the ridges;
- undulating rises with slopes of 3 - 10%;
- outwash fans and valley floors in the centre of the land system.

Elevation: Mt. Horrocks (610 m) is the highest point. 360 m where the river flows into the Lower Hill River Land System is the lowest point.

Relief: Maximum relief from valley floor to ridge top is 150 m.

Soils: The most common soils have loamy surfaces over red clay subsoils, on weathering rock or alluvium. Less common soils include shallow loams over rock, gradational loams to clays loams, hard poorly structured brown sandy loams over clay and cracking clays.

Main soils:

D3	Hard loam over red dispersive clay - lower slopes and fans
K2	Hard acidic loam over red clay on rock - rises in the south
D1	Hard loam over red clay on rock - rises
C2	Shallow gradational loam - rises

Minor soils: *Soils formed on basement rock on rises*

A2	Shallow calcareous loam
B4	Well structured loam over calcreted rock
F2a	Sandy loam over brown clay on deeply weathered rock
K3	Hard acidic sandy loam to clay loam over dispersive red clay on rock
K1	Shallow acidic gradational loam on rock
L1	Shallow stony loam to sandy loam

Soils formed on alluvium on lower slopes, fans and flats

A6	Calcareous clay loam
C3	Deep gradational loam
D2	Loam over red clay
D6	Gravelly sandy loam over dispersive red or brown clay
E2/E3	Red / brown cracking clay
F1	Thick loam over brown clay
F2b	Sandy loam over dispersive brown clay



Main features: The Upper Hill River catchment consists of a variety of land forms and soils. The quartzite ridges are too steep, stony and exposed for any agricultural uses other than rough grazing. The moderately inclined to undulating slopes are characterized by moderately deep, generally fertile soils, which are potentially highly productive given the rainfall. Main limitations are poor surface structure, waterlogging (in the higher rainfall southern parts) and erosion potential. Acidification is a potential problem, together with salinity which is largely confined to lower slopes and drainage depressions. The fans and valley flats also have deep fertile soils, but are subject to waterlogging and salinity.

Soil Landscape Unit summary: 20 Soil Landscape Units (SLUs) mapped in the Upper Hill River Land System

SLU	% of area	Main features #
ABH	0.7	Moderately steep rises to 30 m high with slopes of 10-25%, quartzite reefs and eroded watercourses. Main soils: <u>shallow stony loam - L1</u> (E) with <u>hard acidic loam over red clay on rock - K2</u> (C) and <u>shallow acidic gradational loam on rock - K1</u> (C). The hills are non arable due to the roughness of the terrain, moderate slopes and shallow stony soils. Rocky outcrops limit accessibility in places. Runoff is rapid and exposure is high, so a significant proportion of rainfall does not infiltrate the soil. Watercourses are particularly susceptible to erosion.
AFC	3.0	Moderately steep slopes formed on Appila Tillite lying between steep quartzite ridges. Slopes are 10-30%; relief: up to 100 m. No soil inspections available, but shallow loamy soils over basement rock or hard carbonate, with deeper loam over red clay soils on lower slopes are probable. Land is relatively free of rock outcrop, and is mostly accessible for implements. However it is too steep for cropping.
ARB ARC ARD	1.4 8.4 4.2	Moderately steep to steep ridges and low hills formed on Gilbert Range Quartzite, un-named quartzites within the Appila Tillite Formation and interbedded siltstones. ARB Low ridge to 20 m high with slopes of 10-20% and up to 20% surface stone. ARC Moderately steep ridges and low hills with slopes of 15-30%, relief to 60 m and up to 10% rocky outcrop and 20% surface stone. ARD Steep ridges to 70 m high with slopes of 25-75%. There is up to 20% rock outcrop and up to 50% surface quartzite. Main soils: stony <u>shallow stony sandy loam - L1</u> (E), with <u>hard acidic loam over red clay on rock - K2</u> (E) and <u>shallow acidic gradational loam on rock - K1</u> (E). Most of this land is too steep, rocky and exposed for any agricultural uses other than rough grazing. Care must be taken to maintain surface cover as an erosion control measure. Some landslips occur on the outer south east facing slopes.
BAC BAD BAL BAM	3.4 7.2 1.6 4.4	Rises and low hills formed on fine grained rocks of the Appila Tillite and Tapley Hill Formations. Ironstone occurs on some upper slopes. BAC Undulating rises up to 30 m high with slopes of 3-10%. BAD Rolling rises and low hills to 40 m high with slopes of 10-20%. BAL Gently undulating low rises up to 10 m high with slopes of 2-3% and sporadic saline seepages on lower slopes. BAM Undulating rises up to 30 m high with slopes of 3-10% and sporadic saline seepages on lower slopes. Main soils: <u>hard acidic loam over red clay on rock - K2</u> (E) and <u>hard acidic sandy loam to clay loam over dispersive red clay on rock - K3</u> (E), with <u>hard loam over red dispersive clay - D3</u> (L), <u>sandy loam over brown clay on deeply weathered rock - F2a</u> (L) and <u>shallow stony loam - L1</u> (L). Most soils are non calcareous throughout. They are moderately fertile (although prone to acidification), and moderately deep. Subsoils are commonly poorly structured, so waterlogging is often a problem. This is of particular concern on lower slopes where saline seeps have developed. Poor surface structure is widespread, creating excessive runoff and working difficulty. However, provided erosion is controlled, and wetter areas avoided, the high rainfall and mostly gentle slopes make this land potentially productive.
DFB DFC DFM	9.9 23.5 2.8	Rises formed on siltstones of the Tapley Hill Formation, calcreted in places. There are sporadic Tertiary remnants. DFB Low rises 10-20 m high with slopes of 2-3%. DFC Rises to 30 m high with slopes of 3-10%. DFM Rises to 30 m high, slopes of 3-10% and sporadic saline seeps on lower slopes.



		<p>Main soils: <u>hard (acidic) loam over red clay on rock</u> - D1/K2 (E) and <u>shallow gradational loam</u> - C2/B4 (C), with <u>hard loam over red dispersive clay</u> - D3 (L) and <u>sandy loam over brown clay on deeply weathered rock</u> - F2a (L) on lower slopes, <u>shallow stony loam</u> - L1 (L) on stony slopes and <u>red / brown cracking clay</u> - E2/E3 (M). <u>Gravelly sandy loam over dispersive red or brown clay</u> - D6 occurs on minor Tertiary? remnants. These soils are naturally fertile, moderately deep (except the L1 soils) and generally well drained. Poor surface structure (mainly in the D1/K2 soils) is the chief limitation, causing excessive runoff and erosion, working problems and patchy emergence. Dispersive subsoils impede drainage in the more sodic of these soils. Saline seepage is a potential problem, particularly on lower slopes on the eastern side of the valley.</p>
ESD ESI	0.5 2.0	<p>Moderately steep stony slopes of 10-20% and up to 30 m high with 10-20% rocky outcrops. Underlying rocks are interbedded quartzitic shales and dolomites.</p> <p>ESD Slopes with stable water courses. ESI Slopes with some water course erosion.</p> <p>Main soils: shallow <u>calcareous loam</u> - A2 (E), <u>shallow stony loam</u> - L1(C), <u>hard loam over red clay on rock</u> - D1(C) and <u>shallow gradational loam</u> - C2/B4 (L). Rocky reefs, shallow stony soils and sometimes moderate slopes limit cropping of these areas. The arable land is generally confined to strips between the reefs of rock. Water erosion is a potential problem because of the high runoff from the shallow soils and rocky areas.</p>
JAK JAL JAO JAb	14.9 7.8 1.8 0.9	<p>Flats, outwash fans and drainage depressions formed on clayey alluvium.</p> <p>JAK Flats with slopes of less than 1% and sporadic saline seepage. JAL Fans with slopes of 1-3% and sporadic saline seepage. JAO Drainage depressions with slopes of 2-4%, sporadic saline seepage and some water course erosion. JAb Fans with slopes of 1-3%, sporadic saline seepage and eroded water courses.</p> <p>Main soils: <u>hard loam over red dispersive clay</u> - D3 (E), with <u>loam over red clay</u> - D2 (L), <u>sandy loam over brown dispersive clay</u> - F2b (L), <u>deep gradational loam</u> - C3 (L), <u>red / brown cracking clay</u> - E2/E3 (M), <u>thick loam on brown clay</u> - F1 (M) and <u>calcareous clay loam</u> - A6 (M). The soils are deep and inherently fertile, but productivity potential is reduced by waterlogging (caused by poorly structured dispersive subsoils) in the D3/F2 soils, and saline seepages which occur sporadically throughout. Productive pastures can be maintained on affected land, but careful site selection is needed for more intensive uses to avoid wet and/or saline land. On land which is not saline or waterlogged, poor surface soil structure can be a problem leading to excessive runoff and erosion. Hard sealing surfaces can be overcome by the use of gypsum and changes to surface management practices. Soil acidity should be monitored on this land.</p>
JTH JTb	0.7 0.9	<p>Outwash fans formed on mixed sandy and clayey alluvium.</p> <p>JTH Fans with slopes of 2-8% and eroded water courses. JTb Fans with slopes of 2-3%, eroded water courses and sporadic saline seepage.</p> <p>Main soils: <u>sandy loam over brown dispersive clay</u> - F2b (V), and <u>hard loam over red dispersive clay</u> - D3 (E). Poor soil structure and associated waterlogging and erosion potential are the main features of this land. Fertility is low on the sandier soils, but loamier soils have moderate to high fertility. Salinity and acidity should be monitored, as both are potential problems. High runoff volumes from the adjacent steep slopes have contributed to erosion in the past and should be kept under control.</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 description:

A2 Shallow calcareous loam (Paralithic, Hypercalcic / Lithocalcic Calcarosol)

Calcareous loam grading to soft or rubbly carbonate over basement rock within 50 cm.

A6 Calcareous clay loam (Pedal, Calcic Calcarosol)

Thick reddish brown moderately calcareous granular clay loam grading to a red brown to dark brown highly calcareous clay.



- B4** Well structured loam over calcreted rock (Petrocalcic, Red Dermosol)
15-25 cm friable loam to clay loam grading to a well structured red clay loam to clay overlying a carbonate pan at depths up to 65 cm. The carbonate pan is thin over soft highly calcareous weathered siltstone.
- C2** Shallow gradational loam (Hypercalcic, Red Dermosol)
Medium thickness loam to clay loam grading to a well structured red clay over fine carbonate at about 75 cm grading to weathering siltstone within 100 cm.
- C3** Deep gradational loam (Calcic, Red Dermosol)
Medium thickness loam to clay loam grading to a well structured red clay over soft carbonate on alluvium.
- D1** Hard loam over red clay on rock (Calcic, Red Chromosol)
Medium thickness hard setting fine sandy loam to clay loam abruptly overlying a well structured red clay, calcareous with depth, grading to weathering siltstone within 100 cm.
- D2** Loam over red clay (Calcic, Red Chromosol)
Medium to thick hard setting loam over a red well structured clay, calcareous with depth, grading to alluvium.
- D3** Hard loam over red or brown dispersive clay (Calcic, Red / Brown Sodosol)
Medium to thick sandy loam to clay loam with a bleached A2 sharply overlying a coarsely structured dispersive red or brown (often mottled) clay with soft carbonate at depth, grading to alluvium.
- D6** Gravelly sandy loam over dispersive red or brown clay (Ferric / Calcic, Red / Brown Sodosol)
Thick hard sandy loam to loamy sand with abundant quartz and ironstone gravel, over a brown and red mottled coarsely structured dispersive clay, grading to Tertiary? sediments.
- E2/E3** Red / brown cracking clay (Red / Brown Vertosol)
Dark brown or red cracking clay, usually with a well structured surface, and calcareous and sodic with depth.
- F1** Thick loam over brown clay (Eutrophic, Brown Chromosol)
Thick to very thick loam with a paler coloured A2 layer, over a brown mottled well structured clay.
- F2a** Sandy loam over brown clay on deeply weathered rock (Calcic, Brown Sodosol)
Medium to thick hard sandy loam to sandy clay loam with a bleached A2 layer, abruptly overlying a coarsely structured brown and red mottled heavy clay, calcareous with depth, grading to highly weathered basement rock.
- F2b** Sandy loam over dispersive brown clay (Mesotrophic, Brown Sodosol)
Medium to thick grey sandy loam to loamy sand with a bleached A2 layer over a brown or grey mottled clay grading to sandy clay alluvium.
- K1** Shallow acidic gradational loam on rock (Eutrophic, Red Dermosol / Kandosol)
Medium thickness gravelly loam to clay loam grading to a weakly to moderately well structured clay loam to light clay merging with weathering rock within 50 cm.
- K2** Hard acidic loam over red clay on rock (Eutrophic, Red Chromosol)
Medium thickness hard setting fine sandy loam to clay loam abruptly overlying a well structured red clay grading to weathering siltstone within 100 cm.
- K3** Hard acidic sandy loam to clay loam over dispersive red clay on rock (Eutrophic, Red Sodosol)
Medium to thick hard sandy loam to clay loam with variable quartz gravel over a coarsely structured dispersive red clay grading to weathering quartzitic rock within 100 cm.
- L1** Shallow stony loam to sandy loam (Paralithic, Leptic Tenosol / Rudosol)
Medium thickness stony sandy loam to loam overlying weathering rock. Soft carbonate may be present in fissures in the rock.

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

