LHR Lower Hill River Land System

Lower Hill River catchment

Area: 148.7 km^2

Annual rainfall: 420 – 585 mm average

Geology: Siltstones, tillites and slates of the Tapley Hill, Appila and Kadlunga Formations underlie the valley. These are capped by the scattered remnants of a Tertiary sedimentary cover. These unconsolidated sediments are typically bright yellow coloured sandy clays. Between the basement rock and Tertiary rises are extensive valley fill deposits on alluvial flats and outwash fans. These are fine to medium grained. All geological materials are mantled by aeolian carbonates, usually as soft segregations (sometimes nodular) between 50 and 200 cm below the ground surface.

Topography: The catchment of the Lower Hill River is defined by a low range to the west, separating it from the parallel valley of the Hutt River. On the east, the valley is bounded by the Camel's Hump Range. The southern (upstream) boundary is somewhat arbitrary, roughly separating out the more strongly undulating and higher rainfall Upper Hill River Land System. The northern end is defined by the junction of the Hill and Broughton Rivers (and includes a section of the Broughton). The valley consists of a central alluvial flat with adjacent gently inclined fans with slopes up to 10%. Between the fans are basement rock and Tertiary sediment rises and low hills with slopes usually less than 12%. On the eastern side abutting the Camel's Hump Range are steeper slopes up to 50 m high with gradients of 15 - 30%.

Elevation: 270 m in the north to 500 m in the south east

Relief: Maximum relief is 50 m

Soils: Loam over red clay is the most common soil. These may be texture contrast or gradational profiles. All are either shallow over weathering rock, or deep over alluvium. Other soils are shallow loams, cracking clays and deep alluvial loams.

Main soils

Rising ground over basement rocks or Tertiary sediments

D1 Hard sandy loam over well structured red clay on rock – all slopes
A2 Shallow calcareous loam – upper slopes
D2b Hard sandy loam over well structured red clay on Tertiary sediments

Outwash fans and flats over alluvium

D2a Hard loam over red clay
D3 Hard loam over dispersive red clay

Minor soils

Rising ground over basement rocks or Tertiary sediments

L1 Shallow stony loam – stony slopes on rock
C3b Gradational clay loam over Tertiary sediments
C2 Shallow gradational loam – on basement rock

Outwash fans and flats over alluvium

C3a Gradational loam with calcareous subsoil
M2 Gradational loam
E2/E3 Red / brown cracking clay
A6 Deep calcareous loam
M1 Alluvial sandy loam

Main features: The Lower Hill River Land System comprises undulating rises and gently sloping outwash fans on either side of the Hill River flats. There are some steeper semi to non arable slopes along the eastern edge abutting the Camels Hump Range. The soils of the rising ground are generally fertile and moderately deep, with only minor limitations caused by poor surface structure in the most extensive soil type (sandy loam over red clay). With sound conservation management to improve soil structure and reduce erosion hazard, this land is potentially highly productive. The deeper soils of the fans and flats are potentially more productive, but are affected in places by salinity and subsoil sodicity. The main soil types in these areas also have poor surface structure, and are prone to acidification. Improved water use efficiency on the rising ground will help to overcome the salinity problems of the lower lying areas.

Soil Landscape Unit summary: 17 Soil Landscape Units (SLUs) mapped in the Lower Hill River Land System:

SLU	% of area	Main features #
ABI	4.0	Low hills up to 50 m high formed on mainly fine grained rocks with linear quartzite reefs. Slopes are 15-30%. There is up to 20% surface quartzite and siltstone, and moderate water course erosion. Main soils: shallow stony loam - **L1** (E) with shallow calcareous loam - **A2** (C), hard sandy loam over well structured red clay on rock - **D1** (L) and shallow gradational loam - **C2** (L). 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. However, areas of deeper soils are potentially productive for grazing.
DCB DCC DCH DCM	0.4 10.6 7.8 8.4	Rises formed on fine grained basement rock. **DCB** Low rises to 10 m high with slopes of 2-4%. **DCC** Gentle slopes of 3-10% with minor rocky reefs. **DCH** Undulating rises and low hills to 50 m high with slopes of 4-12%, eroded watercourses and minor rocky reefs. **DCM** Undulating rises and low hills to 40 m high with slopes of 4-12%. Saline seepage affects 1-5% of the land (mainly lower slopes). Main soils: hard loam over well structured red clay on rock - **D1** (E) with shallow calcareous loam - **A2** (C), shallow gradational loam - **C2** (L) and shallow stony loam - **L1** (L). The soils are moderately fertile, well drained and have moderately high waterholding capacities, except for the shallower calcareous and stony soils. The slopes are mostly arable, but gradients are moderate and often long, with a consequent potential for water erosion. This is exacerbated by the predominant hard setting, poorly structured soil type which tends to seal over and shed water. Other effects of poor structure are difficulty in working and patchy emergence. Saline seepages, affecting between 1% and 5% of the land, occur on some lower slopes.
DXB	4.2	Complex of low basement rock rises and gently sloping outwash fans with slopes of 2-4%. Main soils: hard loam over well structured red clay on rock - **D1** (E), with shallow calcareous loam - **A2** (L) and shallow gradational loam - **C2** (L) on rises, and hard loam over (dispersive) red clay - **D2a/D3** (C) on fans. Hard setting surface soils and poorly structured dispersive subsoils are characteristic of the D3 soils on the fans. The better structured red texture contrast soils on both rises (D1) and fans (D2) have similar but less severe conditions. Reduced infiltration, erosion, poor workability and root growth, and patchy emergence are attributable to poor surface structure. The other soils of the rises are better structured although shallower, and have good productivity potential.

ESD ESI	1.8 10.3	Moderately steep stony slopes of 10-20%, up to 30 m high with 10-20% rocky outcrops. Underlying rocks are interbedded quartzitic rocks and dolomites. Watercourses are generally stable in **ESD**, but commonly eroded in **ESI**. Main soils: shallow calcareous loam - **A2** (E), shallow stony loam - **L1** (E) and hard loam over well structured red clay on rock - **D1** (E). 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.
HKC HKD	17.1 0.6	Rises and low hills between 20 and 50 m high formed on Tertiary sandy clays. The rises commonly have flat crests, or ironstone knobs. **HKC** Slopes of 4-12%. **HKD** Slopes of 10-20%. Main soils: hard sandy loam over well structured red clay - **D2b** (E) and gradational clay loam - **C3b** (E). These isolated rises have moderately fertile and deep soils, although with generally poor surface structure (D2b soils). This causes excessive runoff and associated erosion potential, along with some workability and emergence problems.
JAB JAC JAH JAK JAL JAQ	0.3 1.5 0.9 8.3 16.8 0.7	Outwash fans and flats formed on alluvial sediments and low basement rock residuals. **JAB** Fans with slopes of 2-3%. **JAC** Fans with slopes of 3-6% and localized water course erosion. **JAH** Fans with slopes of 5-10% and eroded water courses. **JAK** Flats adjacent to Hill River with slopes of less than 1% and up to 5% of the land affected by saline seepage. **JAL** Fans with slopes of 1-4% and up to 5% of the land affected by saline seepage. **JAQ** Fans with slopes of 2-3%, eroded watercourses and significant areas affected by saline seepage. Main soils: hard loam over (dispersive) red clay - **D2a/D3** (V), with gradational clay loam - **C3a** (L), red / brown cracking clay - **E2/E3** (L) and deep gradational clay loam - **M2** (L). The soils are deep and inherently fertile, but productivity potential is reduced by saline seepages which occur on some lower slopes. However productive pastures can be maintained on affected land. On non saline land, poor soil structure is the main limitation. Hard setting and sealing surfaces lead to reduced water infiltration, subsurface waterlogging, difficulty in working and patchy seedling emergence. Water erosion, acidification and subsoil sodicity affect the land in places and should be allowed for in management strategies.
JPO	6.3	River flats near the confluence of the Hill and Broughton Rivers. There are swampy sections, particularly adjacent to the Broughton, and up to 10% of the land is affected by saline seepage. Slopes are less than 1%. Main soils: hard loam over (dispersive) red clay - **D2a/D3** (V), with gradational clay loam - **M2** (L), deep calcareous loam - **A6** (L) and alluvial sandy loam - **M1** (L). The soils are deep and inherently fertile, but productivity potential is reduced by significant areas affected by saline seepage and waterlogging. However productive pastures can be maintained on affected land. Poor soil structure in the D3 soils and potential acidification of non calcareous soils are problems in places.

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 description:

A2 Shallow calcareous loam (Paralithic, Hypercalcic / Supracalcic Calcarosol)
Calcareous loam grading to a very highly calcareous clay loam or rubble layer merging with calcareous weathering rock within 50 cm.

A6 Deep calcareous loam (Regolithic, Calcic / Supracalcic Calcarosol)
Calcareous loam to clay loam grading to a highly calcareous clay with soft and nodular carbonate at depth.

C2 Shallow gradational loam (Calcic, Red Dermosol)
Loam to clay loam grading to a well structured clay with soft to rubbly carbonate at depth, over weathering rock within 100 cm.

C3a Gradational clay loam with calcareous subsoil (Hypercalcic, Red Dermosol)
Clay loam grading to a well structured red clay, highly calcareous from 50 cm over alluvium.

C3b Gradational clay loam over Tertiary sediments (Calcic, Red Dermosol)
Clay loam to light clay grading to a well structured clay with soft to rubbly carbonate at depth, over Tertiary clay within 100 cm.

D1 Hard sandy loam over well structured red clay on rock (Calcic, Red Chromosol)
Medium thickness hard setting sandy loam to loam abruptly overlying a well structured red clay, with soft carbonate accumulations, grading to weathering rock within 100 cm.

D2a Hard loam over red clay (Calcic, Red Chromosol)
Medium to thick hard sandy loam to loam abruptly overlying a well structured red clay with accumulations of soft carbonate below 50 cm, grading to alluvium.

D2b Hard sandy loam over well structured red clay on Tertiary sediments (Calcic, Red Chromosol)
Medium thickness hard setting sandy loam to loam abruptly overlying a well structured red clay, with soft carbonate accumulations, grading to Tertiary sandy clay within 100 cm.

D3 Hard loam over dispersive red clay (Calcic, Red Sodosol)
Medium to thick hard sandy loam to loam abruptly overlying a poorly structured, dispersive red clay with accumulations of soft carbonate below 50 cm, grading to alluvium.

E2/E3 Red / brown cracking clay (Epipedal, Red / Brown Vertosol)
Red or brown well structured seasonally cracking clay, becoming more clayey, coarser structured and variably calcareous with depth, grading to fine grained alluvium.

L1 Shallow stony loam (Paralithic, Leptic Tenosol / Rudosol)
Shallow stony loam, sometimes calcareous with depth, overlying basement rock within 50 cm.

M2 Gradational clay loam (Hypocalcic / Eutrophic, Red Dermosol)
Clay loam grading to a well structured red clay, often weakly calcareous from 50 cm, over alluvium.

M1 Alluvial sandy loam (Regolithic, Red-Orthic Tenosol)
Very thick sandy loam with variable gritty or more clayey lenses, formed over recent alluvium.

Further information: DEWNR Soil and Land Program