

# HMP Hampden Land System

Undulating rises in the Julia Creek catchment and extending through the Light River catchment to St. Kitts Creek.

**Area:** 136.6 km<sup>2</sup>

**Annual rainfall:** 425 – 500 mm average

**Geology:** The Land System is formed on a range of mostly fine grained metamorphosed basement rock formations. The most common are Tapley Hill and Tarcowie Formations. Typical lithologies are phyllites, metasiltstones and metasandstones. Thin bands of Gumbowie Arkose and Eudunda Arkose provide the major relief within the landscape. There are significant deposits of locally derived fine to medium grained alluvium as outwash fan or creek flat sediments. Most rocks and sediments are mantled by secondary carbonates of aeolian origin. These are strongly developed in places, and include soft, rubbly and sheet forms, depending on the degree of exposure to the atmosphere and/or water.

**Topography:** The land is mainly undulating, having basement rock rises with slopes of up to 10% alternating with fans and creek valleys with slopes of usually less than 4%. There are occasional steeper slopes, either ridges formed on reefs of resistant arkose, or rises formed on harder rocks within the relatively soft phyllites. The northern part of the Land System forms the eastern side of the Julia Creek catchment. The southern part lies within the Hansborough loop of the Light River. Water courses here flow directly into the river.

**Elevation:** 520 m in the north east to 240 m in the south west

**Relief:** Maximum relief is 50 m

**Soils:** Most soils are moderately shallow over basement rock. They include loamy texture contrast, calcareous and shallow stony types. Deeper texture contrast and gradational loams occur on lower slopes and flats.

## Main soils

*Soils formed on undulating rises on basement rock*

**D1** Loam over friable red clay on rock - extensive

**A2** Calcareous loam - limited

*Soils formed on lower slopes and flats on alluvium*

**D3** Hard loam over dispersive red clay - limited

## Minor soils

*Soils formed on basement rock*

**L1** Shallow stony loam - steeper and / or rockier slopes

**D7** Hard loam over red dispersive clay on rock - undulating rises

**C2** Gradational red loam on rock - undulating and steeper rises

**B2/B3** Shallow loam over calcrete - stony rises

**B6** Loam over red clay on calcrete - rises

*Soils formed on lower slopes and flats on alluvium*

**C3** Gradational loam

**D2** Hard loam over friable red clay

**A6** Deep calcareous loam over clay

**M4** Deep alluvial loam



**Main features:**

The characteristic feature of the Hampden Land System is the predominance on rising ground of well structured loamy surfaced soils. This is in sharp contrast to the poorly structured loams with tight clay subsoils typical of most land in the district. This feature is at least partly attributable to the significant amounts of carbonate in the soils, either throughout the profile or at least in the subsoil. The soils are therefore well drained and aerated. However, against these advantages are reduced fertility and depth associated with the shallow loamy soils overlying rock. In the valleys and on outwash fans, the characteristic loam over red clay soils are less well structured, but are deeper and more fertile, and are generally typical of other soils in the district formed on alluvium. Apart from the adverse effects on productivity and workability associated with dispersive soils, these areas are extensively affected by acidification and gully erosion.

**Soil Landscape Unit summary:** 14 Soil Landscape Units (SLUs) mapped in the Hampden Land System:

SLU	% of area	Main features #
ABB	0.5	Low rocky ridges to 20 m high with slopes of 15-25% and extensive rock outcrop. Main soils: <u>shallow stony loam - L1 (E)</u> and <u>calcareous loam - A2 (E)</u> . These ridges are too rocky for any agricultural uses other than rough grazing.
DCB DCC	16.6 34.2	Rises formed on siltstones of the Tapley Hill and Tarcowie Formations. There is up to 5% rock outcrop, usually on crests. <b>DCB</b> Gently undulating rises with slopes of 2-3%. <b>DCC</b> Rises to 40 m high with slopes of 3-10%. Main soils: <u>loam over friable red clay on rock - D1 (E)</u> , <u>calcareous loam - A2 (C)</u> , <u>gradational red loam on rock - C2 (C)</u> and <u>shallow stony loam - L1 (L)</u> , with <u>hard loam over red dispersive clay on rock - D7 (M)</u> , <u>loam over red clay on calcrete - B6 (M)</u> and <u>shallow loam over calcrete - B2/B3 (M)</u> . <u>Hard loam over dispersive red clay - D3</u> occurs to a minor extent on lower slopes. These soils are moderately fertile and generally well structured, although hard setting surfaces are likely in places. The D7 soils (mainly occurring on lower slopes) are poorly structured. Many of the soils are moderately shallow over rubble or basement rock - this is an important limitation. Maintaining soil fertility may be a problem on the shallow stony and calcareous soils with low clay content and/or high pH. Although the soils are not highly erodible, most slopes are sufficiently inclined that there is potential for water erosion.
DMB DMC	3.4 3.9	Rises formed on medium to fine grained quartzitic rocks. <b>DMB</b> Rises to 20 m high with slopes of 3-5%. <b>DMC</b> Rises and footslopes with slopes of 5-10%. Main soils: <u>hard loam over red dispersive clay on rock - D7 (D)</u> , with <u>shallow stony loam - L1 (M)</u> on rocky ground. These soils are moderately deep and fertile but poorly structured. Hard setting surfaces shed water, are difficult to work and cause uneven plant growth, while dispersive subsoils restrict through flow of water (leading to waterlogging) and uniform root growth. The soils are highly erodible.
DSD	2.3	Ridges to 20 m high with slopes of 10-20% formed on interbedded quartzites and siltstones. There is up to 20% rock outcrop. Main soils: <u>hard loam over red dispersive clay on rock - D7 (V)</u> , with <u>shallow stony loam - L1 (C)</u> on steeper / rocky areas. Soils are generally fertile, although frequently shallow and stony, and the land is about 75% arable due to the moderate slopes and extent of rocky outcrop. Erosion potential is moderately high, and accentuated by the predominantly poorly structured surfaces of the main soils.
EGH	3.1	Rises to 30 m high with slopes of 4-10% and eroded water courses. There is up to 20% surface calcrete and sandstone. Main soils: <u>calcareous loam - A2 (E)</u> , with <u>loam over friable red clay on rock - D1 (C)</u> and <u>shallow stony loam - L1 (C)</u> with <u>deep calcareous loam over clay - A6 (M)</u> on lower slopes. These soils are moderately shallow and less fertile than in DCC, due to their lower clay content and higher alkalinity. There is considerable run off from adjacent land across this unit, and although the soils are not highly erodible, water courses are at risk.



ESC ESD	3.7 5.1	Upper slopes and ridges formed on mixed fine to medium grained and quartzitic rocks. <b>ESC</b> Gently undulating land formed on Eudunda Arkose with slopes of 2-10% bordering the top of the Eudunda escarpment. There is sporadic rock outcrop. <b>ESD</b> Low ridges and rises to 30 m high with slopes of 10-20% and up to 50% outcropping rock. Main soils: <u>calcareous loam - A2</u> (E) and <u>shallow stony loam - L1</u> (C) with <u>loam over friable red clay on rock - D1</u> (L) and <u>shallow sandy loam over calcrete - B2/B3</u> (M). Shallow stony soils, moderate slopes and extensive rocky outcrop limit cropping opportunities on <b>ESD</b> . <b>ESC</b> is flatter and less rocky, although the soils are shallow. This land is mainly arable, but very exposed. Soil fertility and moisture stress are the other main limiting factors.
JEB JEE JEG JEH JEJ	10.6 9.5 2.4 0.7 4.0	Outwash fans and creek flats formed on fine to medium grained alluvium. <b>JEB</b> Fans with slopes of 2-4% and minor water course erosion. <b>JEE</b> Creek flats and drainage depressions with slopes of less than 3% and some water course erosion. <b>JEG</b> Fans with slopes of 2-4% and eroded water courses. <b>JEH</b> Fans with slopes of 4-10% and eroded water courses. <b>JEJ</b> Creek flats and drainage depressions with slopes of less than 3% and severe water course erosion. Main soils: <u>hard loam over dispersive red clay - D3</u> (E) and <u>gradational loam - C3</u> (C), with <u>loam over friable red clay - D2</u> (L), <u>deep calcareous loam over clay - A6</u> (M) and <u>deep alluvial loam - M4</u> (M). The soils are mostly deep and inherently fertile, but most are poorly structured. Hard setting surfaces are common. These restrict water infiltration, are difficult to work and cause patchy emergence and early growth. Subsoil waterlogging is also likely in lower lying areas. Acidification is becoming a problem on those soils with a history of high productivity. Although there is no evidence of salinity, subsoil salt levels are sporadically high, and these should be monitored.

# 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:

- A2** Calcareous loam (Paralithic, Lithocalcic / Calcic Calcarosol)  
10 - 25 cm calcareous loam overlying calcrete rubble (50%) or very highly calcareous silty clay loam (50%), grading to weathering phyllite or siltstone at 55 cm.
- A6** Deep calcareous loam over clay (Regolithic, Hypercalcic Calcarosol)  
10 - 25 cm calcareous loam grading to a very highly calcareous light brown clay loam over clayey alluvium below 100 cm.
- B2/B3** Shallow loam over calcrete (Petrocalcic, Supracalcic Calcarosol OR Petrocalcic, Leptic Tenosol)  
Up to 50 cm loam with variable content of fine and rubbly carbonate, overlying calcreted basement rock.
- B6** Loam over red clay on calcrete (Petrocalcic, Red Chromosol)  
15 - 25 cm hard loam over a friable red clay on calcrete within 50 cm of the surface.
- C2** Gradational red loam on rock (Hypercalcic, Red Dermosol)  
10 - 35 cm clay loam to loam grading to a well structured red clay with soft carbonate from about 50 cm, over weathering siltstone from about 100 cm.
- C3** Gradational loam (Calcic / Supracalcic, Red Dermosol)  
10 - 40 cm loam grading to a well structured clay loam to clay over soft or rubbly carbonate at 55 cm, continuing below 100 cm.



- D1** Loam over friable red clay on rock (Hypercalcic, Red Chromosol)  
15 - 40 cm hard loam abruptly overlying a well structured red light clay, calcareous from 50 cm grading to weathering phyllite or siltstone at 75 cm.
- D2** Hard loam over friable red clay (Calcic, Red Chromosol)  
30 - 45 cm hard silty loam to loam abruptly overlying a well structured red clay, weakly calcareous from 70 cm, continuing below 100 cm.
- D3** Hard loam over dispersive red clay (Calcic, Red Sodosol)  
30 - 45 cm hard silty loam to loam abruptly overlying a coarsely structured dispersive red clay, weakly calcareous from 70 cm, continuing below 100 cm.
- D7** Hard loam over red dispersive clay on rock (Hypercalcic, Red Sodosol)  
20 - 30 cm hard quartz gravelly sandy loam to loam abruptly overlying a coarsely structured dispersive red medium to heavy clay, calcareous from 55 cm, grading to weathering quartzitic metamorphic rock at 75 cm.
- L1** Shallow stony loam (Calcareous / Basic, Paralithic, Leptic Tenosol OR Supracalcic / Eutrophic, Red Kandosol)  
10 - 20 cm stony loam, sometimes grading to a weakly structured red clay loam, over calcrete rubble, soft carbonate or basement rock at 35 cm. In profiles with calcareous subsoils, basement rock is at 50 cm.
- M4** Deep alluvial loam (Regolithic, Red-Orthic Tenosol)  
More than 100 cm of massive red brown loam.

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

