

# HRP Harper Land System

- Area:** 53.2 km<sup>2</sup>
- Annual rainfall:** 550 – 620 mm average
- Geology:** The land system is formed on ancient coastal dune sand which has become indurated at the surface to form calcarenite (Pleistocene age Bridgewater Formation). The system is a discontinuous single range, which probably derived from the coalescence of severally closely spaced dunes. There are extensive sand spreads and shallow stony soils.
- Topography:** The land system is a limestone ridge that runs in a north-north easterly to south-south easterly direction. There is frequent outcropping of limestone and no swamps.
- Elevation:** 30 - 50 m
- Relief:** Maximum relief 10 m
- Main soils:**
- Shallow stony soils*
- RR** Limestone outcrop
  - B2** Shallow calcareous loam on calcrete
  - B6** Shallow loam over red-brown clay on calcrete
  - B7** Shallow sand over clay on calcrete
  - D2** Loam over red clay
- Sandy soils*
- H3** Bleached siliceous sand
  - G3** Thick sand over clay
  - G4** Sand over poorly structured clay
- Other soils*
- D2** Loam over red clay
  - F1** Loam over brown or dark clay
  - F2** Sandy loam over brown or dark poorly structured clay
- Main features:** The Harper Land System is a discontinuous linear calcarenite range that runs parallel with the Stewart Range Land System to the west. The Land System is characterised by shallow and/or stony soils and deep sandy soils. The shallow stony soils have limited water holding capacity and moderately low to moderate fertility. Within these shallow soils are some deeper loamy soils over limestone which have moderate waterholding capacity and high fertility. The deep sands have low fertility and moderate water holding capacity and are prone to water repellence, soil acidity and wind erosion.



**Soil Landscape Unit summary:** 9 Soil Landscape Units (SLUs) mapped in the Harper Range Land System:

SLU	% of area	Main features #
M-B M-C	13.8 8.0	<p>Parallel ridges with a NNW-SSE orientation formed on calcreted calcarenites of ancient coastal dunes. Greater than 50% calcrete outcropping on these rises with associated shallow soils over limestone and minor deep sands.</p> <p><b>M-B</b> Gently sloping undulating rises <b>M-C</b> Undulating rises to low hills</p> <p>Main soils: <u>limestone outcrop - RR (C)</u>, <u>shallow calcareous loam on calcrete - B2 (C)</u>, <u>shallow loam over red clay on calcrete - B6 (L)</u>.</p> <p>The stony soils are very shallow, have moderately low to moderate fertility and very low to moderately low water holding capacity. The rocky areas are semi-arable with up to 50% exposed outcropping in concentrated areas.</p> <p>The minor soils include <u>loam over red clay - D2 (L)</u>, <u>bleached siliceous sand - H3 (M)</u> and <u>thick sand over clay - G3 (L)</u>.</p> <p>The deep sandy soils have low fertility and moderate water holding capacity. Other limitations include soil acidity, water repellence and susceptibility to wind erosion. The moderately deep loamy soils have high fertility and high water holding capacity. They have high productive potential.</p>
MDC	1.1	<p>Undulating rises formed on calcreted calcarenite and overlain by siliceous sand. There is up to 10 m relief and slopes vary from 3-6%.</p> <p>Main soils: <u>loam over red clay - D2 (C)</u>, <u>loam over brown or dark clay - F1 (L)</u>, <u>shallow red loam on limestone - B4 (C)</u>, <u>shallow calcareous loam on calcrete - B2 (C)</u>, <u>shallow sandy loam on calcrete - B3 (M)</u>, <u>shallow sand over clay on calcrete - B7 (M)</u>, <u>bleached siliceous sand - H3 (L)</u> and <u>thick sand over clay - G3 (M)</u>.</p> <p>The moderately deep loamy soils have high fertility and water holding capacity and are well drained. The shallow, stony soils have moderately low fertility, very low water holding capacity and are rapidly drained. Rockiness is a limitation, variable to 50% in concentrated areas. The sandy soils have moderately low to low fertility, moderate to high water holding capacity and are rapidly drained. Other limitations include water repellence and susceptibility to wind erosion.</p>
MHB MHC MHV	5.3 49.4 12.6	<p>Undulating rises formed on calcreted calcarenite and overlain by siliceous sand. There is up to 10 m relief and slopes vary from 3-6%. There is variable surface calcrete, depending on the presence of sand. 10-20% stone cover is common, with outcropping reefs and heavy stone in places.</p> <p><b>MHB</b> Gently undulating rises <b>MHC</b> Undulating rises to low hills</p> <p>Main sandy soils: <u>bleached siliceous sand - H3</u>, <u>loam over red clay - D2</u>, and <u>shallow calcareous loam on calcrete - B2</u> and <u>limestone outcrop - RR</u>.</p> <p>Minor soils: <u>thick sand over clay - G3</u> and <u>sand over poorly structured clay - G4</u>.</p> <p>These soils are deep with moderately low to low fertility, moderate water holding capacity and are well drained. Water repellence and wind erosion are limitations. The shallow and loamy soils are similar to <b>M-B</b> landscape unit and also include <u>shallow sand over clay on calcrete - B7 (M)</u>.</p> <p>This land is semi-arable as these soils are very shallow and/or stony and have moderately low water holding capacity and moderate fertility and are well drained. These soils are calcareous throughout. The loamy soils are moderate to shallow, have moderate to high water holding capacity and moderate fertility.</p>
MWAA MWB	1.9 5.3	<p>Gently sloping undulating rise with less than 3% slope and maximum relief of 10m, which is formed on calcreted calcarenites of ancient coastal dunes. There is variable deep sand and non sandy slopes and surface stone.</p> <p><b>MWAA</b> Slightly elevated level plain <b>MWB</b> Gently undulating rises</p> <p>Main soils: <u>sandy loam over poorly structured brown or dark clay - F2</u>, <u>loam over brown or dark clay - F1</u>, <u>shallow loam over red clay on calcrete - B6</u>, <u>shallow sandy loam on calcrete - B3</u>, <u>bleached siliceous sand - H3</u>, <u>sand grading to sandy clay loam - G2</u>, <u>thick</u></p>



		<u>sand over clay - G3</u> and <u>highly leached sand - I1</u> . The loamy soils are shallow to moderately deep, have moderate fertility and high water holding capacity. The sandy soils are deep with low fertility, moderate water holding capacity and rapid drainage. Severe water repellence and soil acidity are limitations for pasture and crop growth and is susceptible to wind erosion.
MYB	2.6	Gently sloping undulating rise with less than 3% slope and maximum relief of 10m, which is formed on calcreted calcarenites of ancient coastal dunes.  Main soils: <u>shallow loam over red clay on calcrete - B6</u> , <u>shallow red loam on limestone - B4</u> , <u>shallow calcareous loam on calcrete - B2</u> and <u>limestone outcrop - RR</u> . The soils are shallow to moderate with moderate fertility and moderate water holding capacity. This land is semi-arable as the soils are very shallow, have moderately low fertility and very low water holding capacity. The soils are calcareous and alkaline throughout.

# 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:

**B2** Shallow calcareous loam on calcrete (Petrocalcic, Lithocalcic Calcarosol)

Thin stony calcareous sandy loam to clay loam, becoming more clayey and rubbly with depth, overlying calcreted calcarenite shallower than 50 cm.

**B4** Red sandy loam over calcrete (Petrocalcic, Red Dermosol)

Medium thickness red sandy loam grading to friable red clay loam over calcreted calcarenite within 50 cm.

**B6** Sandy loam over red sandy clay on calcrete (Petrocalcic, Red Kandosol)

Medium thickness loamy sand with slight ironstone gravel overlying a weakly structured reddish brown sandy clay on calcarenite within 50 cm.

**B7** Shallow sand over sandy clay on calcrete (Petrocalcic, Brown Chromosol)

Medium thickness sand overlying brown friable sandy clay to clay on limestone or calcreted sandy clay within 50 cm - flats.

**D2** Loam over red clay (Mottled, Hypercalcic Red Chromosol)

Medium to thick sandy loam to clay loam overlying a well structured red clay grading to red mottled clay with limestone segregations at depth.

**F1** Loam over brown or dark clay (Melanic, Hypercalcic, Black/Brown Chromosol)

Medium thickness dark brown sandy loam over a thin to medium sand layer over a structured brown to black clay grading to a brown mottled clay with limestone segregations at depth.

**F2** Sandy loam over brown or dark poorly structured clay (Mottled, Mesonatric, Grey/Black Sodosol)

Medium thickness brown sandy loam over a thin to medium thickness pale sand layer over a columnar structured dispersive grey to black clay grading to a brown mottled clay with depth.

**G3** Thick sand over clay (Mesotrophic, Brown Chromosol)

Medium thickness organically darkened sand to loamy sand over pale sand directly overlying a structured brown clay which becomes mottled with depth. Possibility of limestone within 100 cm.

**H3** Bleached siliceous sand (Bleached-Orthic, Argic Tenosol)

Medium thickness organically darkened sandy surface over thick bleached sand over yellow sand continuing below 100 cm.



(Grouped on landscape position)

#### *Shallow stony soils*

- RR** Limestone outcrop (Petrocalcic, Leptic Rudosol)  
Organically stained sandy to loamy sand surface over a sandy sub-soil with very little development on limestone or calcrete.
- B2** Shallow calcareous loam on calcrete (Petrocalcic, Hypocalcic Calcarosol)  
Medium thickness brown sandy loam grading to sandy clay loam in some cases directly overlying calcrete within 15 cm.
- B3** Shallow sandy loam over limestone (Petrocalcic, Orthic Tenosol)  
Loamy sand to sandy loam with variable rubble and slight clay increase with depth overlying calcreted calcarenite shallower than 50 cm.
- B4** Shallow red loam on limestone (Haplic, Petrocalcic, Red Dermosol)  
Reddish loam to clay loam over a red structured clay directly overlying calcrete within 50 cm.
- B6** Shallow loam over red-brown clay on calcrete (Dystrophic, Petrocalcic, Red Sodosol)  
Medium thickness brown sandy loam over a thin pale sand layer over a red structured clay directly overlying calcrete within 50 cm.
- B7** Shallow sand over clay on calcrete (Haplic, Petrocalcic, Brown Chromosol)  
Medium thickness sand to loamy sand organically darkened surface over a thin pale sand layer over a structured sandy clay loam to clay directly overlying calcrete within 50 cm.

#### *Sandy soils*

- H3** Bleached siliceous sand (Bleached-Orthic, Argic Tenosol)  
Medium thickness organically darkened sandy surface over thick bleached sand over yellow sand continuing below 100 cm.
- G3** Thick sand over clay (Mesotrophic, Brown Chromosol)  
Medium thickness organically darkened sand to loamy sand over pale sand directly overlying a structured brown clay which becomes mottled with depth. Possibility of limestone within 100 cm.
- G4** Sand over poorly structured clay (Hypercalcic, Hypernatric, Brown Sodosol)  
Medium thickness organically darkened sand to loamy sand over pale sand directly overlying columnar brown clay that is dispersive and with depth up to 20% soft carbonate nodules and 0 - 20% hard carbonate nodules.

#### *Other soils*

- D2** Loam over red clay (Mottled, Hypercalcic Red Chromosol)  
Medium to thick sandy loam to clay loam overlying a well structured red clay grading to red mottled clay with limestone segregations at depth.
- F1** Loam over brown or dark clay (Melanic, Hypercalcic, Black/Brown Chromosol)  
Medium thickness dark brown sandy loam over a thin to medium sand layer over a structured brown to black clay grading to a brown mottled clay with limestone segregations at depth.
- F2** Sandy loam over brown or dark poorly structured clay (Mottled, Mesonatric, Grey/Black Sodosol)  
Medium thickness brown sandy loam over a thin to medium thickness pale sand layer over a columnar structured dispersive grey to black clay grading to a brown mottled clay with depth.

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

