

# HUT Hutt Land System

Lower Hutt River catchment

**Area:** 166.3 km<sup>2</sup>

**Annual rainfall:** 435 – 605 mm average

**Geology:** Fine sandstones, siltstones and tillites with interbedded quartzites of the Rhynie, Saddleworth, Mintaro, Appila and Watervale Formations. Most of the rocks are mantled by aeolian carbonates as fine segregations in the upper weathering zone and lower soil profile. The rocks have been extensively eroded away by the Hutt River and its tributaries and the resulting valleys are filled with fine to medium grained alluvium. These sediments are also calcareous near the surface, with carbonates often in nodular form.

**Topography:** The land system covers most of the Hutt River catchment from the Stanley Flat area to the point where the river enters steeper, strongly dissected land 3 km south of its junction with the Broughton. The Land System is an alluvial valley, the main water course cutting through the basement rocks as it flows due north, parallel to the strike of the rocks. Either side of the main valley are basement rock rises, separated by outwash fans of alluvial sediments. More resistant rock strata form discontinuous steeper rocky ridges along the eastern watershed, along the western side of the river, and sporadically on the western side of the Land System. Slopes on the rises are typically 3-10%, up to 20% on the rocky ridges and occasionally up to 50% on an isolated quartzite range. Fan slopes are usually less than 5%, but up to 10% adjoining the steeper country to the west.

**Elevation:** 280 m where the Hutt River flows out of the System in the north, to 466 m on the isolated quartzite range.

**Relief:** Relief is 30 - 60 m on rocky ridges and a maximum of 40 m in the undulating country.

**Soils:** Texture contrast soils over rock, with gradational loams and shallow soils characterize the rising ground, with deep texture contrast and gradational soils on lower land.

## Main soils

*Rising ground over basement rocks*

**D1/K2** Hard loam over red clay on rock

*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*

**A2** Calcareous loam

**C2** Shallow gradational clay loam on rock

**D7/K3** Hard sandy loam over dispersive red clay on rock

**F2a** Sandy loam over brown clay on deeply weathered rock

**L1/B3** Shallow stony loam

*Outwash fans and flats over alluvium or rises on Tertiary sediments*

**C3a** Gradational clay loam on alluvium

**C3b** Gradational clay loam Tertiary sediments

**D2b** Hard sandy loam over red clay on Tertiary sediments



<b>E2/E3</b>	Cracking clay
<b>F1</b>	Dark loam over black or brown clay
<b>F2b</b>	Hard sandy loam over mottled brown clay
<b>M1</b>	Alluvial sandy loam
<b>M2</b>	Alluvial clay loam

**Main features:** The Hutt Land System comprises moderate to steep and rocky semi arable ridges, undulating rises with moderately fertile and deep soils, and lower slopes (fans) and flats with deep fertile soils significantly degraded in places by saline seepage. More efficient water use on rising ground will go some way towards alleviating salinity on the lower slopes. Poor soil physical characteristics and shallow stony soils are the main limitations on the rising ground. Amelioration of soil structure through modified tillage practices, grazing management and use of soil amendments such as gypsum, together with fertility maintenance and erosion control are the main management issues on the arable rises. On the steeper rocky land, water use efficiency can be improved through more productive pastures (suitable cultivars, adequate nutrition), or by revegetation.

**Soil Landscape Unit summary:** 19 Soil Landscape Units (SLUs) mapped in the Hutt Land System:

SLU	% of area	Main features #
ARC ARD	1.8 0.7	Rocky quartzite ridges, 40 m high with slopes of 20-30% ( <b>ARC</b> ) and 60 m high with slopes of 30-50% ( <b>ARD</b> ). Main soils: <u>shallow stony loam - L1</u> (E), <u>hard loam over well structured red clay on rock - D1/K2</u> (E) and <u>hard sandy loam over dispersive red clay on rock - D7/K3</u> (E). These ridges are non arable due to steep slopes and rocky outcrop. Soils are very stony, although often moderately deep with thick clayey subsoils, giving them fertility and moisture holding capacity.
DAB DAC	0.3 35.9	Rises formed on fine grained rocks. <b>DAB</b> Isolated low rises with slopes of less than 3%. <b>DAC</b> Undulating rises to 30 m high with slopes of 3-10%. There are minor saline seepages in some drainage depressions and sporadic rocky reefs. Main soils: <u>hard loam over well structured red clay on rock - D1/K2</u> (E) and <u>shallow gradational clay loam on rock - C2</u> (C), with <u>shallow stony loam - L1/B3</u> (L) and <u>gradational clay loam - C3b</u> (M). These soils are generally moderately deep, inherently fertile and well drained, but usually have poor surface structure leading to excessive runoff (erosion hazard), surface sealing and difficulty in working. Productive potential is high.
DCM	13.0	Rises formed on Mintaro Shale with slopes of 4-12% and relief to 40 m. There are minor rocky reefs. Main soils: <u>hard loam over well structured red clay on rock - D1/K2</u> (E), with <u>shallow gradational clay loam on rock - C2</u> (C), <u>calcareous loam - A2</u> (L) and <u>shallow stony loam - L1</u> (L). The soils are moderately fertile, well drained and have moderately high water holding capacities, except for the shallower A2 and L1 soils. The slopes are mostly arable, but gradients are moderate 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 limitations caused by poor structure are difficulty in working and patchy emergence. Saline seepages, affecting between 1% and 5% of the land, occur on lower slopes.
DHC DHD DHH	1.2 2.1 2.5	Undulating rises with some steeper slopes and ridges formed on quartzitic sandstones. These are sometimes kaolinized and ferruginized. Surface quartzite and ironstone are common on steeper slopes and crests. There is minor saline seepage on some lower slopes. <b>DHC</b> Undulating rises to 20 m high with slopes of 5-10%. <b>DHD</b> Moderately steep rises and ridges up to 40 m high. <b>DHH</b> Undulating rises to 20 m high with slopes of 5-10% and eroded water courses. Main soils: <u>hard sandy loam over dispersive red clay - D7/K3</u> (E) on rising ground, with <u>shallow stony loam - L1</u> (L) on steeper slopes and crests and <u>sandy loam over brown clay on deeply weathered rock - F2a</u> (L) and <u>hard loam over dispersive red clay - D3</u> (L) on lower



		slopes. These soils are poorly structured and of moderately low fertility. They are prone to waterlogging, erosion and acidification.
ESD	11.0	Moderately steep stony ridges with slopes of 10-20%, maximum relief of 50 m, and 10-20% rocky outcrops. Underlying rocks are resistant strata of Watervale Sandstone and Appila Tillite. Main soils: <u>hard loam over well structured red clay on rock</u> - <b>D1/K2</b> (E), <u>shallow stony loam</u> - <b>L1</b> (E) and <u>calcareous loam</u> - <b>A2</b> (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	0.7	Rises to 20 m high with slopes of 5-10% formed on Tertiary age sandy clays with some surface ironstone. Main soils are <u>hard sandy loam over red clay</u> - <b>D2b</b> (E) and <u>gradational clay loam</u> - <b>C3b</b> (E). These isolated rises have moderately fertile and deep soils, although with generally poor surface structure. This causes excessive runoff and associated erosion potential, along with some workability and emergence problems.
JAB	0.9	Outwash fans and flats formed on alluvial sediments and localized slope wash.
JAC	5.8	<b>JAB</b> Fans with slopes of 2-3%.
JAE	0.6	<b>JAC</b> Fans with slopes of 5-10% adjacent to the steep ridges of the Yackamoondie
JAK	10.5	Range Land System. There is localized water course erosion.
JAL	6.5	<b>JAE</b> Narrow drainage depressions (1-2%) with minor erosion and saline seepage.
JAP	0.3	<b>JAK</b> Alluvial flats adjacent to the Hutt River and White Hut Creek with swampy sections
JAb	2.0	and up to 10% of the land affected by saline seepage. <b>JAL</b> Fans with slopes of 1-3% and significant saline seepage. <b>JAP</b> Marginally saline flats. <b>JAb</b> Fans with slopes of 1-3%, eroded water courses and saline seepage. Main soils: <u>hard loam over (dispersive) red clay</u> - <b>D2a/D3</b> (E), with <u>gradational clay loam</u> - <b>C3a</b> (C), <u>alluvial clay loam</u> - <b>M2</b> (L), <u>cracking clay</u> - <b>E2/E3</b> (L) and <u>alluvial sandy loam</u> - <b>M1</b> (M). 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. 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. Erosion control is necessary on sloping land, particularly <b>JAC</b> .
JSA	3.0	Flats of the upper reaches of the Hutt River (Stanley Flat area) formed on clayey alluvium. Slopes are less than 1%. Main soils: <u>dark loam over black or brown clay</u> - <b>F1</b> (V) with <u>alluvial clay loam</u> - <b>M2</b> (L), and <u>hard sandy loam over mottled brown clay</u> - <b>F2b</b> (L). Most soils are deep and fertile with high productive potential. They are prone to waterlogging, so wetter sites should be avoided for horticultural uses. Poorly structured surface soils may require some amelioration, and soil salinity levels should be monitored.
JTe	1.2	Drainage depressions formed on clayey alluvium, with sporadic deep subsoil carbonate accumulations. Slopes are up to 5%. Water course erosion and saline seepage are common. Main soils: <u>hard sandy loam over mottled brown clay</u> - <b>F2b</b> (E) and <u>hard loam over dispersive red clay</u> - <b>D3</b> (C), with <u>dark loam over black or brown clay</u> - <b>F1</b> (L). Poor soil structure and associated waterlogging are the main features of this land. Fertility is low on the F2 soils, but the other soils have moderate to high fertility. Acidification and increased salinization are potential problems requiring monitoring.

# 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, Hypercalcic / Supracalcic Calcarosol)

Calcareous loam grading to a very highly calcareous clay loam or rubble layer merging with calcareous weathering rock within 50 cm.



- C2** Shallow gradational clay loam on rock (Hypercalcic / Supracalcic, Red Dermosol)  
Loam to light clay grading to a well structured clay with soft to rubbly carbonate at depth, over weathering rock within 100 cm.
- C3a** Gradational clay loam (Calcic, Red Dermosol)  
Clay loam grading to a well structured red clay with soft carbonate below 50 cm grading to alluvium.
- C3a** Gradational clay loam (Calcic, Red Dermosol)  
Clay loam grading to a well structured red clay with soft carbonate below 50 cm grading to Tertiary sediments.
- D1/K2** Hard loam over well structured red clay on rock (Calcic / Eutrophic, Red Chromosol)  
Medium thickness hard setting sandy loam to clay loam abruptly overlying a well structured red clay, usually with soft carbonate accumulations (D1), but absent in K2 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.
- D2b** Hard sandy 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 Tertiary sandstone.
- 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.
- D7/K3** Hard sandy loam over dispersive red clay on rock (Calcic / Eutrophic, Red Sodosol)  
Medium to thick hard sandy loam with a gravelly and bleached A2 layer, over a coarsely structured dispersive red clay with minor or no soft carbonate at depth grading to sandstone or quartzite within 100 cm.
- E2/E3** Cracking clay (Red / Brown / Black Vertosol)  
Deep red, brown or black cracking clay.
- F1** Dark loam over black or brown clay (Black / Brown Chromosol)  
Thick dark loam to clay loam with a bleached or pale A2 layer, over a coarsely structured black or dark brown clay with minor carbonate at depth.
- 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** Hard sandy loam over mottled brown clay (Hypocalcic, Brown Sodosol)  
Thick brown hard sandy loam with a bleached A2 layer over a mottled brown, yellow and red coarsely structured clay with minor soft carbonate at depth.
- L1/B3** Shallow stony loam (Paralithic / Petrocalcic, Leptic Tenosol / Rudosol)  
Shallow stony loam, sometimes calcareous with depth, overlying basement rock or calcrete capped calcareous rock within 50 cm. Pockets of red clay may occur in the weathering rock.
- M1** Alluvial sandy loam (Regolithic, Brown-Orthic Tenosol)  
Very thick sandy loam with variable gritty or more clayey lenses, formed over recent alluvium.
- M2** Alluvial clay loam (Eutrophic, Red / Black / Brown Dermosol)  
Thick dark clay loam to light clay grading to a well structured red, black or brown clay, sometimes weakly calcareous with depth, continuing below 100 cm.

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

