

# FLH Flagstaff Hill Land System

Low range west of Burra

**Area:** 26.9 km<sup>2</sup>

**Annual rainfall:** 430 – 515 mm average

**Geology:** The system is underlain by siltstones of the Saddleworth Formation, and more quartzitic rocks of the Appila Tillite. Beds of resistant Leasingham and Undalya Quartzite give the land its relief. Extensive deposits of locally derived gritty clay outwash sediments occur as outwash fans and valley fill between the basement rock highs. The rocks and sediments are partially mantled by soft aeolian carbonates.

**Topography:** A central ridge of Leasingham Quartzite forms the spine of the Land System. To the west of the ridge are undulating rises formed on mainly Appila Tillite, and discrete fans and drainage depressions. Flanking the eastern side of the ridge are undulating rises formed on Saddleworth Formation siltstones, and an extensive outwash fan. On the lower edge of the fan (the eastern margin of the Land System) is a discontinuous ridge of Undalya Quartzite. Slopes are variable - up to 75% on the central ridge, 4-12% on the undulating rises and less than 8% on fans.

**Elevation:** The highest point is 647 m (Bald Hill North). Much of the eastern edge has an elevation of around 480 m.

**Relief:** Maximum relief is 167 m (from Bald Hill North to the foot of the outwash fan)

**Soils:** The predominant soils are hard loams to sandy loams over red clay, with gradational loams and shallow stony soils.

#### Main soils

##### *Soils formed on basement rocks*

**D1** Hard loam over friable red clay on rock

**L1** Shallow stony sandy loam

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

##### *Soils formed on outwash sediments*

**D3** Hard sandy loam over dispersive clay

**C3** Gradational loam

**Main features:** The Flagstaff Hill Land System is mostly undulating and arable, but there are significant areas of semi arable slopes where rocky reefs and moderate slopes restrict cropping. There are also some discrete ridges which are too steep and rocky for any uses other than grazing. On the arable rises and outwash fans, soils are moderately deep to deep and generally fertile, but poor surface structure is widespread on the dominant loamy texture contrast soils. This condition causes excessive runoff and associated erosion, and emergence / early growth problems. Dispersive subsoil clays, extensive in valley floors, present the additional problems of waterlogging and root growth impairment. Gypsum applications and modified surface management practices can help overcome these problems. Acidification is a potential problem which should be monitored.



**Soil Landscape Unit summary:** 8 Soil Landscape Units (SLUs) mapped in the Flagstaff Hill Land System:

SLU	% of area	Main features #
ABC	2.3	Moderately steep rocky slopes of 20-30% with prominent reefs of Leasingham Quartzite occupying up to 20% of the area. There is 20% or more surface stone. Main soils: <u>shallow stony sandy loam - L1</u> (V) with <u>hard loam over friable red clay on rock - D1</u> (C) and <u>hard sandy loam over dispersive red clay on rock - D7</u> (L). This land is moderately steep, stony and exposed, with mainly shallow soils. Agricultural use is restricted to rough grazing.
AQD	2.1	Steep ridge of Leasingham Quartzite with slopes of 30-75%. There is up to 50% surface quartzite and up to 20% reefs of outcropping quartzite. Main soils: <u>shallow stony sandy loam - L1</u> (V), with <u>hard sandy loam over dispersive red clay on rock - D7</u> (L). This land is steep, stony and exposed, with mainly shallow soils. Agricultural use is restricted to rough grazing.
DBC	41.1	Undulating rises to 40 m high with slopes of 4-12%, minor rock outcrop and minor water course erosion. Main soils: <u>hard loam over friable red clay on rock - D1</u> (E) and <u>hard sandy loam over dispersive red clay on rock - D7</u> (E). <u>Shallow stony sandy loam - L1</u> (L) occurs on harder rock strata. Although the predominant soils are moderately deep and fertile, they are poorly structured, have low infiltration rates, high erodibilities, poor workability and unfavourable root growth conditions. Erosion control is critical on these soils, which are particularly susceptible to rilling. However with careful management to improve soil structure, they can be productive.
ESD	6.4	Stony ridges and rises up to 50 m high with slopes of 10-20% formed on interbedded tillites, siltstones and quartzites. There is 20% or more surface stone and up to 10% linear rocky reefs. Main soils: <u>shallow stony sandy loam - L1</u> (E), and <u>hard loam over friable red clay on rock - D1</u> (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.
ETD	17.8	Isolated rises up to 30 m high formed on Undalya Quartzite. Slopes are 10-20%. There is extensive rock outcrop and surface stone. Main soils: <u>shallow stony sandy loam - L1</u> (E), <u>hard sandy loam over dispersive red clay on rock - D7</u> (E) and <u>hard loam over friable red clay on rock - D1</u> (E). The extent of rocky outcrop, moderate slopes, shallow soils and high erosion potential limit the use of most of this land to grazing.
JBC JBH	4.6 15.8	Outwash fans with slopes of 4-10% formed on clayey and sandy outwash sediments. <b>JBC</b> Fans with mainly stable water courses. <b>JBH</b> Fans with eroded water courses. Main soils: <u>hard sandy loam over dispersive clay - D3</u> (E) and <u>gradational loam - C3</u> (E). Although deep and moderately fertile, these soils have poorly structured surfaces, shed water readily and are highly erodible. The land is subject to considerable run on water from adjacent steeper slopes, so control of water flow and maintenance of surface cover are critical. Soil acidity and salinity should be monitored on this land.
JXH	9.9	Lower slopes and drainage depressions formed on a complex of outwash sediments and basement rocks. Slopes are 3-10%. Main soils: <u>hard sandy loam over dispersive clay - D3</u> (E) and <u>gradational loam - C3</u> (E) on outwash slopes, and <u>hard loam over friable red clay on rock - D1</u> (C) on rises. The soils are mostly deep and moderately fertile, but with hard setting surfaces causing excessive runoff (and erosion), and emergence / early growth problems. Soil acidity and salinity should be monitored on this land.

## # PROPORTION codes assigned to soils within Soil Landscape Units (SLU):

- |  |                                       |
|--|---------------------------------------|
| (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 descriptions:**

- C3** Gradational loam (Calcic, Red Dermosol)  
Medium thickness hard loam to clay loam grading to a well structured red clay, usually calcareous with depth.
- D1** Hard loam over friable red clay on rock (Calcic, Red Chromosol)  
25 - 35 cm hard siltstone and quartz gravelly fine sandy loam to clay loam abruptly overlying a well structured red clay, calcareous with depth, grading to weathering siltstone within 100 cm.
- D3** Hard sandy loam over dispersive clay (Brown / Red Sodosol)  
30 - 60 cm hard gritty sandy loam to sandy clay loam abruptly overlying a dispersive coarsely structured brown or red mottled clay, continuing below 100 cm.
- D7** Hard sandy loam over dispersive red clay on rock (Calcic, Red Sodosol)  
15 - 30 cm hard quartz gravelly sandy loam to loam abruptly overlying a coarsely structured dispersive red clay, calcareous with depth, grading to weathering tillite, sandstone or quartzitic shale.
- L1** Shallow stony sandy loam (Paralithic / Lithic, Leptic Tenosol / Rudosol)  
Variable thickness stony sandy loam to clay loam grading to hard or weathered basement rock, usually within 50 cm.

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

