

POH Porter Hills Land System

Low ranges surrounding the Hanson and Black Springs flats

Area: 152.1 km²

Annual rainfall: 440 – 585 mm average

Geology: The Porter Hills Land System is formed on a sequence of north-south striking geological formations including siltstones of the Saddleworth Formation, mixed tillites, siltstones and quartzites of the Appila Tillite and fine grained Tapley Hill and Tindelpina Shale rocks. The predominant features however are two linear ridges of Gilbert Range Quartzite, which control the topography of the System. The sequence of formations lies in a syncline structure, so the Appila and Saddleworth Formations occur along the eastern and western sides, and the Tapley Hill/Tindelpina rocks are in the centre. The rocks are sporadically mantled by soft aeolian carbonates. There are small areas of localised alluvium in valleys.

Topography: The land system includes the rises and low hills surrounding the internally draining valley of Porter Lagoon, the Hanson flats and the upper Wakefield River catchment. On the western side is a quartzite ridge flanked by a strip of undulating rises extending the entire length of the land system. Watercourses flowing westwards across this land drain into the headwaters of both the Wakefield River and Farrell Creek. On the eastern side of the ridge is a complex of undulating rises and rocky low hills, which drain into the Hanson Valley, Porter Lagoon or Wakefield River. On the eastern side of the System, the quartzite ridge and flanking slopes are more strongly dissected by watercourses emanating from the Tothill Range. This gives rise to a complicated pattern of discontinuous ridges and undulating rises. Drainage waters on this side flow into Porter Lagoon, except for small areas in the north and east which drain into Gum Creek and Stony Creek respectively.

Elevation: 620 m on the ridge three km north east of Porter Lagoon, to 400 m in the north west

Relief: Maximum relief from valley floor to ridge crest is 180 m

Soils: Hard loams to sandy loams over red clay are the most common soils, with gradational clay loams to sandy loams, cracking clays 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

Minor soils

Soils formed on outwash sediments

- D3** Hard sandy loam over dispersive clay
- C4** Hard gradational red clay loam
- E2/E3** Red / brown cracking clay
- M4** Hard gradational sandy loam

Soils formed on deeply weathered rock

- E2** Red cracking clay



Main features: The Porter Hills Land System includes a mixture of arable rises and semi to non-arable steeper slopes. Use of the latter is restricted to rough grazing, with some cropping opportunities on the gentler, less stony slopes. The arable rises are characterized by predominantly texture contrast soils, most of which have poorly structured hard setting surfaces which shed water and are prone to erosion. Working difficulty and emergence / early crop growth problems may also be experienced on this land. However, with the use of gypsum and modifications to surface management practices, these slopes can be productive provided erosion is controlled. Salinity, particularly on lower slopes, should also be monitored.

Soil Landscape Unit summary: 22 Soil Landscape Units (SLUs) mapped in the Porter Hills Land System:

| SLU | % of area | Main features # |
|-------------------|--------------------|--|
| ABC ABI ABJ | 2.2 3.8 2.5 | <p>Rocky slopes formed on interbedded tillites, siltstones and quartzites. There is 20% or more surface stone and up to 20% quartzite reefs.</p> <p>ABC Low hills to 60 m high with slopes of 15-50%. ABI Slopes of 15-35% with eroded watercourses. ABJ Escarpment slopes of 30-50% with eroded watercourses.</p> <p>Main soils: <u>shallow stony sandy loam</u> - L1 (V) with <u>hard loam over friable red clay on rock</u> - D1 (C) and <u>hard sandy loam over dispersive red clay on rock</u> - D7 (L). This land is too steep and rocky for any agricultural uses other than rough grazing. Much of the land has been eroded in the past, so maintenance of surface cover and control of run off are the main management issues.</p> |
| AQC AQD | 2.1 3.1 | <p>Abrupt rocky ridges formed on Gilbert Range Quartzite. There is up to 50% surface quartzite and up to 20% reefs of outcropping quartzite.</p> <p>AQC Moderately steep ridge to 70 m high with slopes of 20-35%. AQD Steep ridge, 60 m high with slopes of 30-50%.</p> <p>Main soils: <u>shallow stony sandy loam</u> - L1 (V), with <u>hard sandy loam over dispersive red clay on rock</u> - D7 (C). This land is steep, stony, exposed and with mainly shallow soils. Agricultural use is limited to rough grazing.</p> |
| DAB DAC | 0.6 7.2 | <p>Undulating rises formed on siltstones and shales of the Tapley Hill Formation. There is up to 10% surface sandstone and quartzite.</p> <p>DAB Very gently undulating rises to 20 m high with slopes of 2-3%. DAC Undulating rises to 40 m high with slopes of 3-12%.</p> <p>Main soils: <u>hard loam over friable red clay on rock</u> - D1 (V) with <u>red cracking clay</u> - E2 (L). These soils are moderately fertile and usually have sufficient depth to store adequate moisture. Their main drawback is poor structure, particularly of the surface which seals over and sets hard. This leads to excessive runoff and erosion, limited opportunities for effective working, and patchy emergence in some seasons. Modifications to surface management and the use of gypsum will help improve soil structure and reduce erosion.</p> |
| DBB DBC DBH | 0.7 28.1 8.4 | <p>Undulating rises to 30 m high formed on siltstones, fine sandstones and tillites of the Saddleworth, Tapley Hill and Appila Tillite Formations. There is up to 10% surface siltstone and quartzite, and sporadic rocky reefs (less than 5% overall).</p> <p>DBB Low rises with slopes of 2-4%. DBC Rises with slopes of 4-12%. DBH Undulating footslopes of 3-10%, dissected by eroded watercourses.</p> <p>Main soils: <u>hard loam over friable red clay on rock</u> - D1 (V), with <u>shallow stony sandy loam</u> - L1 (L) and <u>hard sandy loam over dispersive red clay on rock</u> - D7 (L). This land is mostly arable except for minor rocky reefs. The soils are moderately fertile, well drained and have moderately high water holding capacities. The main limitations are poor surface structure in the D1 and D7 soils which leads to excessive runoff and erosion, and shallow stony profiles (L1 soils) with low waterholding capacities.</p> |



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| DHC DHH | 2.2 8.6 | <p>Undulating rises formed on mixed silty and sandy rocks of Appila Tillite.</p> <p>DHC Rises and gentle slopes of 3-10% with up to 10% surface siltstone and sandstone. There is less than 2% rock outcrop.</p> <p>DHH Irregular slopes of 4-12% with 5-10% rocky outcrop and well defined watercourses which are often eroded.</p> <p>Main soils: <u>hard sandy loam over dispersive red clay on rock</u> - D7 (V) with <u>hard loam over friable red clay on rock</u> - D1 (L) and <u>shallow stony sandy loam</u> - L1 (L) on harder rock strata. Although the predominant soils are moderately deep, they have moderately low fertility and 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.</p> |
| DSD DSI | 8.9 0.5 | <p>Gently rolling rises and low hills formed on mixed sandy and silty rocks of the Appila Formation. Slopes are 10-20% and there is 10-20% rocky outcrop.</p> <p>DSD Slopes with well defined but generally stable watercourses.</p> <p>DSI Slopes with eroded watercourses.</p> <p>Main soils: <u>hard loam over friable red clay on rock</u> - D1 (E), <u>hard sandy loam over dispersive red clay on rock</u> - D7 (E) and <u>shallow stony sandy loam</u> - L1 (C). This land is moderately steep and rocky, so cropping is restricted. Although the predominant soils are moderately deep and fertile, they are poorly structured, have low infiltration rates, poor workability and unfavourable root growth conditions. Erosion potential is high due to the combination of moderate slope and high soil erodibility.</p> |
| ESD | 4.0 | <p>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.</p> <p>Main soils: shallow <u>hard loam over friable red clay on rock</u> - D1 (V) with <u>shallow stony sandy loam</u> - L1 (C) in rocky areas on harder rocks. Rocky reefs, shallow stony soils and sometimes moderate slopes limit cropping of these areas. Arable land is generally confined to strips between the reefs of rock. Water erosion is a potential problem because of high runoff from shallow soils and rocky areas.</p> |
| ETD ETI | 4.6 2.6 | <p>Rocky slopes and rises to 50 m high with slopes of 10-20%. There is 10-20% rocky outcrop and up to 50% surface quartzite and sandstone.</p> <p>ETD Slopes with mainly stable watercourses.</p> <p>ETI Slopes with significant water course erosion.</p> <p>Main soils: <u>shallow stony sandy loam</u> - L1 (E) and <u>hard sandy loam over dispersive red clay on rock</u> - D7 (E). The extent of rocky outcrop and the moderate slopes limit cropping potential of this land. Soils are generally shallow and erosion potential is high. Whilst useful arable areas occur, overall this is grazing country.</p> |
| JBG JBH | 2.7 2.0 | <p>Outwash fans formed on clayey and sandy outwash sediments. Water courses are commonly eroded.</p> <p>JBG Slopes of 2-4%.</p> <p>JBH Slopes of 3-12%.</p> <p>Main soils: <u>hard sandy loam over dispersive clay</u> - D3 (V) with <u>hard gradational red clay loam</u> - C4 (C) and <u>hard gradational sandy loam</u> - M4 (L). These soils are poorly structured, shed water readily and are highly erodible. JBH is subject to considerable run on water from adjacent steep slopes, so control of water flow and maintenance of surface cover are critical.</p> |
| JCA JCB | 2.0 2.8 | <p>Outwash fans formed on mixed outwash sediments from adjacent ranges.</p> <p>JCA Slopes of 1% or less.</p> <p>JCB Slopes of 1-3%.</p> <p>Main soils: <u>hard sandy loam over dispersive clay</u> - D3 (V), with <u>red / brown cracking clay</u> - E2/E3 (L), <u>hard gradational red clay loam</u> - C4 (L) and <u>hard gradational sandy loam</u> - M4 (L). These soils are deep and inherently fertile, but generally poorly structured. Except for the cracking clays, surface soils seal and set hard, creating workability problems and unfavourable emergence / early growth conditions. Waterlogging is also likely, even on higher ground. However, the land is potentially productive if surface structure problems are overcome. Salinity and acidity should be monitored.</p> |



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| JUe | 0.4 | Flats associated with the Wakefield River and larger tributaries. The flats are narrow, running either side of the watercourses which are commonly eroded. There are sporadic saline patches in sections (2-10% overall). Main soils: <u>hard sandy loam over dispersive clay</u> - D3 (E) and <u>hard gradational sandy loam</u> - M4 (E). These soils are poorly structured and erodible. Natural fertility is moderate, and salinity is a problem in places. Watercourse protection against stream bank erosion and salinity should be a major component of management. |
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PROPORTION codes assigned to soils within Soil Landscape Units (SLU):

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| (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:

- C4** Hard gradational red clay loam (Calcic, Red Dermosol)
Hard clay loam to light clay grading to a strongly structured red heavy clay, calcareous with depth.
- D1** Hard loam over friable red clay on rock (Calcic, Red Chromosol)
25 - 35 cm hard siltstone gravelly 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 red clay, calcareous with depth, grading to weathering tillite, sandstone or quartzitic shale.
- E2** Red cracking clay (Red Vertosol)
Seasonally cracking dark strongly structured clay grading to a coarsely structured red, brown or black heavy clay, highly calcareous from about 50 cm overlying deeply weathered rock.
- E2/E3** Red / brown cracking clay (Red / Brown Vertosol)
Medium thickness blocky to self-mulching red brown to grey brown light clay grading to a coarse blocky red to dark brown or grey brown heavy clay with soft carbonate at variable depth over alluvium.
- 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.
- M4** Hard gradational sandy loam (Brown Kandosol)
30 - 60 cm hard gritty sandy loam to sandy clay loam grading to a weakly structured brown mottled sandy clay to clay.

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

