

RHY Rhynie Land System

Undulating clay soil rises running in an arc from west of Saddleworth through Rhynie to west of Tarlee.

Area: 65.8 km²

Annual rainfall: 450 – 525 mm average

Geology: The Land System is underlain by fine grained shales and siltstones, calcareous in places, of the Woolshed Flat Formation, with minor beds of Undalya Quartzite. A cap of semi hard to hard calcrete has formed over calcareous rocks. Basement rock or calcrete is within 100 cm of the surface over 25% of the area. Elsewhere the parent material for most of the soils is a heavy clay which is either deeply weathered shale or a remnant Tertiary age deposit. On lower slopes and drainage depressions, clayey outwash sediments have accumulated. All rocks and sediments are mantled by fine carbonates.

Topography: The topography is predominantly undulating rises, 20 to 40 m high with slopes of 2 - 12%. There are minor steeper (up to 20% slope) rises and ridges formed on resistant quartzites. Drainage systems are well defined. In the north, watercourses flow south west and west into Woolshed Flat Creek and on into the River Wakefield. Along the eastern edge and in the south, watercourses flow east and south east into the Gilbert River.

Elevation: 350 m in the north to 200 m in the south

Relief: Maximum relief is 40 m

Soils: Clay loamy to clayey soils are characteristic of the system. Cracking clays and gradational clay loams are extensive. Texture contrast soils are also common, and these have loamy to clay loamy surfaces.

Main soils

Formed on Tertiary clay or deeply weathered rock

- C3a** Gradational clay loam
- E1a** Black cracking clay
- E2a** Red cracking clay
- E3** Brown cracking clay
- D3a** Hard loam over dispersive red clay

Minor soils

Formed on Tertiary clay or deeply weathered rock

- D2a** Hard loam over well structured red clay
- B4** Gradational clay loam over calcrete

Formed on alluvium

- C3b** Gradational clay loam
- D2b** Hard loam over well structured red clay
- D3b** Hard loam over dispersive red clay
- E1b** Black cracking clay
- E2b** Red cracking clay

Formed on basement rock

- D7** Hard loam over dispersive red clay on rock
- D1** Hard loam over red clay on rock



Main features: The Rhynie Land System is more than 95% arable and is characterized by deep clayey fertile soils. The land is potentially highly productive. The only limitations are wetness and difficulty in working the heavy soils when wet, and poor surface structure in the texture contrast soils. Boron toxicity may be a problem in places. There is some saline seepage and gully erosion in drainage depressions, but these occurrences are minor overall.

Soil Landscape Unit summary: 10 Soil Landscape Units (SLUs) mapped in the Rhynie Land System:

SLU	% of area	Main features #
DOC DOD	0.3 2.6	Low rises formed on Undalya Quartzite DOC Gentle slopes of 5-12%. DOD Rises to 30 m, with slopes of 10-20%, minor rock outcrop and up to 20% surface quartzite. Main soils: <u>hard loam over dispersive red clay on rock</u> - D7 (E) and <u>hard loam over red clay on rock</u> - D1 (E). These soils are generally fertile and moderately deep, but have poorly structured hard setting surfaces. These conditions lead to excessive runoff and associated erosion, poor workability and restricted emergence and early growth. Subsurface waterlogging due to perched water tables is also likely. DOD is only semi arable due to the slope and rock.
JAB JAE JAJ JAe	1.5 1.0 5.2 4.6	Drainage depressions formed on clayey alluvium. JAB Outwash fans with slopes of 2-3%. JAE Drainage depressions with stable water courses and little or no salinity. JAJ Drainage depressions with eroded water courses. JAe Drainage depressions with sporadic saline seepage and eroded water courses in places. Main soils: deep <u>hard loam over dispersive red clay</u> - D3b (E) and <u>hard loam over well structured red clay</u> - D2b (E) with <u>black and red cracking clay</u> - E1b/E2b (L) and <u>gradational clay loam</u> - C3b (L). Soils are deep and inherently fertile, but most are prone to hard setting, sealing surfaces. They are difficult to work and are prone to waterlogging and emergence/early growth problems. Watercourse erosion is common in some drainage depressions, and saline seepage in others. Salt levels should be monitored throughout.
TDB TDC TDH	28.3 34.9 17.5	Rises formed on Tertiary clayey sediments and deeply weathered shales and siltstones, calcareous in places. Basement rock or calcreted rock is within 100 cm of the surface over 25% of the area. TDB Very gentle slopes of 2-4%. TDC Rises to 30 m high with slopes of 4-12%. TDH Rises to 40 m high with slopes of 4-12% and eroded watercourses. Main soils: <u>black, red and brown cracking clay</u> - E1a/E2a/E3 (E), with <u>gradational clay loam</u> - C3a (C), <u>hard loam over dispersive red clay</u> - D3a (L), <u>hard loam over well structured red clay</u> - D2a (L) and <u>gradational clay loam over calcrete</u> - B4 (L) on calcareous rocks. This is typical "black and red mosaic" country with an intimate mixture of dark clays and red clay loams. The soils are generally very fertile and deep, but the cracking clays in particular are difficult to manage as they are sticky and intractable when wet. The texture contrast D3 and D2 soils have hard setting surfaces which seal over after wetting and working, causing runoff and patchy emergence. There is a high likelihood of gypsum response on these soils, and possibly on the clay soils as well. Boron toxicity is commonly associated with heavy clay soils. Crops should be monitored and appropriate varieties used. With amelioration of surface structure problems, this land has a very high productive potential. Although they resist sheet erosion very well, clayey soils are highly susceptible to erosion in channels where there is concentrated water flow. Protection of water courses is important.
TLC	4.1	Undulating rises formed on highly weathered shale or Tertiary clay. Slopes are 3-10%. Main soils: clay loamy <u>hard loam over dispersive red clay</u> - D3a (E), and <u>hard loam over wellstructured red clay</u> - D2a (E), with <u>brown and red cracking clay</u> - E3/E2a (L) and <u>gradational clay loam</u> - C3a (L). These soils are deep and moderately fertile, but most have poorly structured hard setting surfaces and dispersive subsoils. As a result they are prone to waterlogging and erosion, and patchy plant emergence/early growth.

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:

- B4** Gradational clay loam over calcrete (Petrocalcic, Red Dermosol)
15 - 20 cm well structured clay loam to light clay grading to a red well structured medium clay abruptly overlying hard calcrete at between 30 and 60 cm. This becomes softer with depth and grades to weathering calcareous rock.
- C3a** Gradational clay loam (Hypercalcic, Red Dermosol)
10 - 40 cm well structured clay loam to light clay grading to a red well structured medium to heavy clay with abundant fine carbonate from about 65 cm, overlying clay (or highly weathered shale within 100 cm in 25% of profiles).
- C3b** Gradational clay loam (Hypercalcic, Red Dermosol)
10 - 40 cm well structured clay loam to light clay grading to a red well structured medium to heavy clay with abundant fine carbonate from about 65 cm, overlying clayey alluvium.
- D1** Hard loam over red clay on rock (Hypercalcic, Red Chromosol)
20 - 40 cm hard loam to clay loam abruptly overlying a red well structured clay, grading to fine carbonate at about 60 cm, overlying weathering rock within a metre.
- D2a** Hard loam over well structured red clay (Hypercalcic, Red Chromosol)
20 - 40 cm hard loam to clay loam abruptly overlying a red well structured clay, grading to fine carbonate at about 60 cm, overlying clay or very highly weathered rock.
- D2b** Hard loam over well structured red clay (Hypercalcic, Red Chromosol)
20 - 40 cm hard loam to clay loam abruptly overlying a red well structured clay, grading to fine carbonate at about 60 cm, overlying clayey alluvium.
- D3a** Hard loam over dispersive red clay (Hypercalcic, Red Sodosol)
20 - 40 cm hard loam to clay loam abruptly overlying a red coarsely structured and dispersive clay grading to soft carbonate at about 60 cm, overlying clay or very highly weathered rock.
- D3b** Hard loam over dispersive red clay (Hypercalcic, Red Sodosol)
20 - 40 cm hard loam to clay loam abruptly overlying a red coarsely structured and dispersive clay grading to soft carbonate at about 60 cm, overlying clayey alluvium.
- D7** Hard loam over dispersive red clay on rock (Hypercalcic, Red Sodosol)
20 - 40 cm hard loam to clay loam abruptly overlying a red coarsely structured and dispersive clay grading to fine carbonate at about 60 cm, overlying weathering rock within a metre.
- E1a** Black cracking clay (Epipedal / Self-mulching, Black Vertosol)
10 - 30 cm well structured dark seasonally cracking light to medium clay grading to a coarsely structured black heavy clay with fine carbonate from about 55 cm, although 40% are calcareous throughout. Orange or red slickensided heavy clay continues below 100 cm.
- E1b** Black cracking clay (Epipedal / Self-mulching, Black Vertosol)
10 - 30 cm well structured dark seasonally cracking light to medium clay grading to a coarsely structured black heavy clay with fine carbonate from about 55 cm, grading to clayey alluvium.
- E2a** Red cracking clay (Epipedal, Red Vertosol)
10 - 30 cm well structured dark reddish brown seasonally cracking light to medium clay grading to a coarsely structured red heavy clay with fine carbonate from about 55 cm, although 40% are calcareous throughout. Orange or red slickensided heavy clay continues below 100 cm.
- E2b** Red cracking clay (Epipedal, Red Vertosol)
10 - 30 cm well structured dark reddish brown seasonally cracking light to medium clay grading to a coarsely structured red heavy clay with fine carbonate from about 55 cm grading to clayey alluvium.
- E3** Brown cracking clay (Epipedal, Brown Vertosol)
10 - 30 cm coarsely structured dark grey seasonally cracking light to medium clay grading to a coarsely structured brown or greyish brown heavy clay with fine carbonate from about 55 cm, although 40% are calcareous throughout. Orange or red slickensided heavy clay continues below 100 cm.

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

