

# MTD Martindale Land System

Rises and low hills extending from Martindale Estate through Pine Creek towards Rhynie

**Area:** 133.6 km<sup>2</sup>

**Annual rainfall:** 495 – 625 mm average

**Geology:** The western side of the land system is formed on weakly metamorphosed siltstones and shales of the Saddleworth Formation, with interbeds of Leasingham and Undalya Quartzites and minor Skillogalee Dolomites. The eastern side is formed on a long narrow arc of Rhynie Sandstone, metamorphosed to quartzite in places. The rocks are variably capped by soft carbonates deposited by wind action. Clayey sediments derived from localized erosion and reworking are common as outwash fan and alluvial flat deposits.

**Topography:** The landscape is mainly undulating rises with slopes of less than 10%. However, in the south particularly are some moderately steep to steep low hills formed on more resistant quartzitic rocks. There are scattered rocky rises throughout with significant outcrop - in the west these are narrow quartzite reefs, but elsewhere, the outcrops are irregular in shape. The northern part of the Land System is drained by the Wakefield River which flows across the System from east to west. The southern parts are drained by Rices Creek and Pine Creek, both of which eventually flow into the Wakefield south of Auburn.

**Elevation:** 490 m on a rocky low hill immediately west of Manoora, to 300 m where Pine Creek flows out of the System.

**Relief:** Maximum relief is 80 m

**Soils:** The predominant soils have texture contrast profiles, moderately deep over weathering rock, or deep over alluvium.

## Main soils

### *Soils formed on rock*

- D1** Loam over friable red clay on rock
- D7a** Sandy loam over dispersive red clay on rock
- D7b** Clay loam over dispersive red clay on rock

### *Soils formed on alluvium*

- D3** Sandy clay loam over dispersive red clay
- E2** Red cracking clay

## Minor soils

### *Soils formed on rock*

- C2** Gradational loam on rock
- L1/B3** Shallow sandy loam to loam

### *Soils formed on very deeply weathered rock*

- C3** Gradational clay loam
- E3** Brown cracking clay

### *Soils formed on alluvium*

- F2/D3** Thick sandy loam over brown mottled clay
- M4** Deep gradational sandy loam



**Main features:** The Martindale Land System comprises three distinct components. Stony ridges and low hills are scattered throughout the System, and are characteristic features of the landscape although limited in total area. They are generally too rocky (and often too steep) for cultivation, but provide useful grazing and stock shelter. The western two thirds of the System is characterized by moderately fertile loam over red clay soils. Apart from hard setting surfaces, these soils have few limitations and are potentially productive, as are the clay soils which also occur to a limited extent. Related soils with dispersive subsoils however, which are extensive, are subject to waterlogging, poor root growth and erosion. The third component, occupying the eastern third of the Land System is dominated by sodic sandy loam over clay soils with moderately low fertility and unfavourable physical properties. Cropping on these soils is less attractive than on the land to the west.

**Soil Landscape Unit summary:** 18 Soil Landscape Units (SLUs) mapped in the Martindale Land System:

| SLU               | % of area          | Main features #   |
|-------------------|--------------------|---|
| AKC               | 4.9                | <p>Moderately steep to steep rocky ridges and low hills formed on Undalya Quartzite or quartzitic sandstones of the Rhynie Formation. Slopes are 15-40% and relief is up to 80 m. There is up to 10% quartzite outcrop and 20-50% surface stone cover.</p> <p>Main soils: <u>shallow sandy loam - L1</u> (E), <u>sandy loam over dispersive red clay on rock - D7a</u> (E) and <u>loam over friable red clay on rock - D1</u> (E). The hills are non-arable due to the roughness of the terrain, moderate to steep slopes and shallow stony soils. Rocky outcrops and steeper slopes limit accessibility. Soils generally have low clay contents, so natural fertility levels are moderately low. Runoff is rapid and exposure is high, so a significant proportion of rainfall does not infiltrate the soil. Watercourses are particularly susceptible to erosion.</p>   |
| ARB               | 1.4                | <p>Low quartzite ridges to 10 m high with slopes of 10-25%. There is extensive surface quartzite and rocky outcrop.</p> <p>Main soils: stony <u>shallow sandy loam - L1</u> (V), with <u>loam over friable red clay on rock - D1</u> (E) and <u>shallow calcareous loam</u> (M). These small rocky reefs have little productive capacity, but being well timbered, are very useful for shelterbelts and windbreaks.</p>   |
| DHC               | 23.7               | <p>Undulating rises up to 30 m high with slopes of 5-10% formed on Rhynie Sandstone. There are up to 20% surface sandstone and quartzite fragments and up to 2% rocky outcrop. Watercourse erosion is minor.</p> <p>Main soils: <u>sandy loam over dispersive red clay on rock - D7a</u> (V) with <u>clay loam over dispersive red clay on rock - D7b</u> (L) and <u>loam over friable red clay on rock - D1</u> (L). These soils have low to moderate fertility, due to their siliceous parent rocks, and are mostly poorly structured. Surface soils are prone to hard setting and subsoils are dispersive. Perched water tables will form on these clays in wet winters. The combination of sandy texture, poor surface structure, slowly draining subsoils and slope results in a high erosion hazard. Soil acidity should be monitored.</p>  |
| DOB<br>DOC<br>DOH | 0.7<br>31.0<br>5.6 | <p>Undulating rises formed on phyllites, siltstones, quartzitic shales and minor quartzites and dolomites.</p> <p><b>DOB</b> Gentle slopes of 2-4%.<br/> <b>DOC</b> Undulating rises with slopes of 3-10% and minor watercourse erosion.<br/> <b>DOH</b> Undulating rises with slopes of 3-10% and moderate watercourse erosion.</p> <p>Main soils: <u>loam over friable red clay / gradational loam on rock - D1/C2</u> (E) and <u>clay loam over dispersive red clay on rock - D7b</u> (E), with <u>brown cracking clay - E3</u> (L), <u>shallow loam - L1/B3</u> (M), <u>gradational clay loam - C3</u> (M) and <u>sandy loam over dispersive red clay - D7a</u> (M). These soils are generally fertile and moderately deep, but have poorly structured hard setting surfaces. The D7 soils have poorly structured dispersive subsoils as well. These conditions lead to excessive runoff and associated erosion, poor workability and restricted emergence and early growth. The D7 soils are also likely to suffer from subsurface waterlogging due to perched water tables. The texture contrast soils are prone to acidification. The cracking clays, although not widespread, are usually</p> |



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|  |  | intimately interspersed with the texture contrast soils, making management difficult. They are slower to respond to opening rains, have different fertility characteristics, are usually alkaline, and difficult to traverse in winter.  |
| DSD  | 4.5  | Rocky rises with variable slopes to 20% formed on fine grained rocks with interbedded quartzites. There are up to 20% rocky reefs and 20-50% surface stone.<br><br>Main soils: <u>loam over friable red clay on rock - D1</u> (E), <u>shallow loam - L1/B3</u> (E) and <u>clay loam over dispersive red clay on rock - D7b</u> (C). Although there is a high proportion of moderately deep soils, rockiness precludes arable uses on most of this land. It has good shelterbelt value.   |
| DTD  | 5.3  | Rocky rises with variable slopes to 20% formed on coarse grained rocks with interbedded quartzites. There are up to 20% rocky reefs and 20-50% surface stone.<br><br>Main soils: <u>sandy loam over dispersive red clay on rock - D7a</u> (E) and <u>shallow sandy loam - L1</u> (E). Although there is a high proportion of moderately deep soils, rockiness precludes arable uses on most of this land. It has good shelterbelt value.   |
| DYH  | 5.0  | Complex of undulating rises with slopes of 3-8% formed on weathering fine grained rocks, and outwash fans with slopes of 2-3% formed on clayey alluvium. Watercourse erosion on outwash fans is common.<br><br>Main soils: <u>clay loam over dispersive red clay on rock - D7b</u> (C), <u>loam over friable red clay on rock - D1</u> (L) and <u>brown cracking clay - E3</u> (L) on rises, and <u>sandy clay loam over dispersive red clay - D3</u> (E) and <u>thick sandy loam over brown mottled clay - F2/D3</u> (M) on fans. This landscape is essentially a combination of DOC and JAH. Erosion control is a key management issue.  |
| JAB<br>JAC<br>JAE<br>JAG<br>JAH<br>JAJ<br>JAb<br>JAc | 4.4<br>0.8<br>3.9<br>1.7<br>1.0<br>2.0<br>1.3<br>1.0 | Outwash fans and drainage depressions formed on clayey alluvium.<br><br><b>JAB</b> Fans with slopes of 2-4%<br><b>JAC</b> Fans with slopes of 3-6%<br><b>JAE</b> Drainage depressions and creek flats.<br><b>JAG</b> Fans with slopes of 2-4% and eroded watercourses.<br><b>JAH</b> Fans with slopes of 3-8% and eroded watercourses.<br><b>JAJ</b> Drainage depressions and creek flats with eroded watercourses.<br><b>JAb</b> Fans with slopes of 2-3%, eroded watercourses and minor saline seepage.<br><b>JAc</b> Fans with slopes of 3-8%, eroded watercourses and minor saline seepage.<br><br>Main soils: deep <u>sandy clay loam over dispersive red clay - D3</u> (E), with <u>thick sandy loam over brown mottled clay - F2/D3</u> (C), <u>red cracking clay - E2</u> (L) and <u>deep gradational sandy loam - M4</u> (M). These soils are deep and fertile but usually poorly structured and prone to waterlogging and erosion. Amelioration of surface structure to improve productivity and help resist erosion is the main management requirement, together with watercourse protection. Saline seepage occurs sporadically and should be monitored, as should soil acidity. |
| JUE  | 1.8  | Flats associated with the River Wakefield. The flats are narrow, running either side of the watercourse.<br><br>Main soils: <u>thick sandy loam over brown mottled clay - F2/D3</u> (E), <u>sandy loam over dispersive red clay - D3</u> (E) and <u>deep gradational sandy loam - M4</u> (E). These soils are poorly structured and erodible. Natural fertility is moderate, and salinity may be a problem in places. Watertables commonly occur within two metres of the surface. Watercourse protection should be a major component of management.   |

# 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:**

- C2** Gradational loam on rock (Calcic, Red Dermosol)  
Medium thickness hard setting red brown loam to clay loam grading to a well structured red clay, calcareous from 50 cm, over weathering siltstone by 100 cm.
- C3** Gradational clay loam (Hypercalcic, Red Dermosol)  
Medium thickness granular clay loam grading to a well structured red clay with abundant fine carbonate from about 50 cm over alluvium.
- D1** Loam over friable red clay on rock (Calcic, Red Chromosol)  
Medium thickness hard setting red brown loam to clay loam abruptly overlying a well structured red clay, calcareous from 50 cm, grading to weathering siltstone by 100 cm.
- D3** Sandy clay loam over dispersive red clay (Calcic, Red / Brown Sodosol)  
Thick reddish brown to grey brown sandy loam to clay loam, often with a bleached A2 layer, sharply overlying a red or brown (sometimes black) mottled coarsely structured clay, calcareous from 80 cm, grading to alluvium.
- D7a** Sandy loam over dispersive red clay on rock (Calcic, Red Sodosol)  
Medium to thick grey brown gravelly sandy loam to sandy clay loam, often with a bleached A2 layer, abruptly overlying a red (sometimes brown or black) mottled coarsely structured clay, calcareous from 60 cm in 75% of profiles, over sandstone.
- D7b** Clay loam over dispersive clay on rock (Calcic / Eutrophic, Red / Brown / Black Sodosol)  
Medium thickness red brown loam to clay loam sharply overlying a coarsely structured red (sometimes brown mottled or black) heavy clay, calcareous from 50 cm in 50% of profiles, grading to phyllite, siltstone or quartzitic shale within 100 cm.
- E2** Red cracking clay (Red Vertosol)  
Black or red cracking clay, self-mulching to blocky at the surface, coarse blocky and calcareous with depth, formed over alluvium.
- E3** Brown cracking clay (Epipedal, Brown Vertosol)  
Brown cracking clay, self-mulching to blocky at the surface, coarse blocky and calcareous with depth, formed over deeply weathered rock.
- F2/D3** Thick sandy loam over brown mottled clay (Hypocalcic, Brown / Red Sodosol)  
Thick hard sandy loam with a pink or bleached A2 layer, sharply overlying a coarsely structured dispersive brown and red mottled clay, weakly calcareous with depth, grading to medium grained alluvium from about 100 cm. Watertable common between 100 and 200 cm.
- L1/B3** Shallow sandy loam to loam (Paralithic / Petrocalcic, Leptic Tenosol)  
Medium to thick sandy loam to loam overlying either weathering basement rock, or calcreted rock.
- M4** Deep gradational sandy loam (Eutrophic, Red Kandosol)  
Thick red brown sandy loam becoming more clayey with depth and containing variable sandy and silty lenses.

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

