

RCH Rochester Land System

Undulating rises and low hills in the upper catchment of Magpie Creek

Area: 63.5 km²

Annual rainfall 400 - 475 mm average

Geology: Proterozoic sandstones and siltstones underlie the Land System but outcrops are uncommon. The rocks have been largely covered by Tertiary or Pleistocene sediments which are generally clayey, but include sandy deposits, some of which have hardened to sandstone. These sediments have given rise to silcretes and laterites in places, indicated by outcrops or surface fragments. Windblown carbonates have been leached into the soil throughout the area, and soft or rubbly subsoil carbonates are widespread. Relatively recent dissection of the landscape has resulted in the deposition of fine textured sediments on lower slopes and valley floors (Pooraka Formation).

Topography: Undulating rises and low hills (basement rock highs, covered by unconsolidated sediments) are predominant. Slopes range from 2 to 15%. In places these highs have very gently undulating upper slopes and crests. The rises and low hills grade to gently inclined outwash fans with slopes of 1 to 5%, which in turn grade to drainage depressions up to 400 m wide, with well defined, often eroded watercourses including Magpie Creek and its tributaries.

Elevation: 380 m at the highest point adjacent to the Yackamoorundie Range in the east, to 200 m where Magpie Creek flows out of the system.

Relief: The high ground is up to 60 m above the fans and drainage depressions.

Soils: No single soil dominates. There are loams over red clay, gradational loams, calcareous loams and cracking clays. Most are relatively deep over either Tertiary / Pleistocene sediments, deeply weathered rock or alluvium.

Main soils: *Over Tertiary/Pleistocene sediments or deeply weathered rock*

- D3b** Sandy loam over dispersive red clay
- C3b** Gradational loam
- E2b** Red cracking clay
- A6b** Deep calcareous loam

Minor soils: *Over alluvium*

- A6a** Deep calcareous clay loam
- C3a** Gradational loam
- D2a** Hard loam over well structured red clay
- D3a** Sandy loam over dispersive red clay
- E2a** Red cracking clay
- E3** Brown cracking clay

Over Tertiary/Pleistocene sediments or deeply weathered rock

- A2** Shallow calcareous loam on sandstone
- A4** Calcareous loam
- D2b** Hard loam over red clay on sandstone
- L1** Shallow sandy loam on silcrete



Main features: The Rochester Land System is undulating land which is almost fully arable. The characteristic feature is the range of soils. There are significant areas of hard setting texture contrast soils, gradational clay loams (calcareous and non calcareous) and cracking clays. Less common are shallow stony soils. The main management issues are correction of poor soil structure on hard setting and/or dispersive soils, maintaining fertility on calcareous soils, and using boron tolerant varieties on clayey soils. Erosion control is required on all land.

Soil Landscape Unit summary: 12 Soil Landscape Units (SLUs) mapped in the Rochester Land System

SLU	% of area	Main features #
EQD	1.9	Undulating slopes of 7-15% with 10-20% silcrete outcrop, boulders and stones and eroded watercourses, formed on silcreted Tertiary sediments. Main soils: <u>hard loam over red clay on sandstone</u> - D2b (E) and <u>shallow calcareous loam on rock</u> - A2 (E), with shallow sandy loam on silcrete - L1 (L). Use of these areas is primarily limited by the extensive outcrops of silcrete and associated shallow stony soils. The remainder of the land is arable but with limitations due to erosion potential, shallow soils, fertility and highly abrasive surface stones.
HJC	19.0	Rises and low hills with relief of 20-50 m and slopes of 5-15% with surface silcrete, sandstone and ironstone, formed on Tertiary sandstones and related unconsolidated sediments. Main soils: <u>sandy loam over dispersive red clay</u> - D3b (E) and <u>deep calcareous loam</u> - A6b (E) with <u>gradational loam</u> - C3b (C) and <u>hard loam over well structured red clay</u> - D2b (M). The slopes are highly erodible due to their predominantly poorly structured soils and sandy textured surfaces. The hard setting surfaces shed water, reducing profile water storage, are difficult to work and may cause patchy emergence. Sub-optimal fertility and abrasive soils are additional limitations.
HXH	22.4	Long gently inclined (5-12%), strongly dissected slopes with eroded watercourses, formed on unconsolidated Tertiary or Pleistocene sediments, or deeply weathered basement rock. Main soils: <u>sandy loam over dispersive red clay</u> - D3b (E) and <u>gradational loam</u> - C3b (E) with <u>red cracking clay</u> - E2b (C). Half of the soils on these slopes are poorly structured (sodic and dispersive), and susceptible to poor infiltration, water erosion, surface sealing and emergence problems. Fertility is moderate. The heavier soils are more fertile and stable. Slight limitations are due to salinity, boron toxicity and waterlogging throughout. Watercourses are deeply incised into erodible sediments so there is a high potential for damage in floods.
IWB IWC	0.4 3.3	Rises formed on sandy Tertiary sediments with up to 10% surface calcrete, ironstone and sandstone. IWB Low rises up to 10 m high with slopes of 2-4%. IWC Gently inclined rises to 20 m high with slopes of 3-8%. Main soils: <u>calcareous loam</u> - A4 (V) with <u>gradational loam</u> - C3b (L) and <u>sandy loam over dispersive red clay</u> - D3b (L). The rises are fully arable and potentially productive although the mixture of soils has a variety of slight limitations including shallow root zone depth, moderate fertility (sandy and calcareous soils), and poor structure with associated waterlogging on lower slopes. Patches of ironstone cause accelerated implement wear.
IZB	3.9	Gently inclined rises to 15 m high with slopes of 2-5% formed on a complex of weathered basement rock and heavy clay. Main soils: <u>deep calcareous loam</u> - A6b (E) and <u>red cracking clay</u> - E2b (E) with <u>gradational loam</u> - C3b (L) and <u>calcareous loam</u> - A4 (L). This land is fully arable. The soils are generally medium textured and calcareous, affecting fertility (through induced nutrient deficiencies) to some extent. Subsoil boron levels are moderate to low. Poor soil structure resulting in waterlogging and difficult workability occurs on some lower slopes.
JCE JCJ	7.3 4.3	Creek flats formed on fine grained alluvium. JCE Flats with well defined water courses, some eroded sections and swampy patches. JCJ Creek flats with eroded water courses. Main soils: <u>hard loam over well structured red clay</u> - D2a (V), with mottled <u>sandy loam over dispersive red clay</u> - D3a (C) and <u>brown cracking clay</u> - E3 (L). The soils are deep and fertile; their main limitations are physical. Hard setting surfaces in most soils result in restricted workability, poor infiltration and patchy emergence. Dispersive subsoils in the D3 soils cause waterlogging, reduce water holding capacity and result in sub-optimal root growth. The clay soils are both fertile and well structured. Watercourses are prone to erosion and flooding and require protection.



KUB	25.0	Lower slopes of 1-5% formed on very fine grained alluvium. Main soils: <u>gradational loam</u> - C3a (E) and <u>red cracking clay</u> - E2a (E) with <u>sandy loam over dispersive red clay</u> - D3a (L), <u>hard loam over well structured red clay</u> - D2a (L) and <u>deep calcareous clay loam</u> - A6a (L). This land is potentially highly productive having deep, fertile, moderately well drained soils. Subsoil boron levels are marginal (15 ppm average concentration between 60-100 cm). There is also potential for the development of saline seepage.
TAB	1.5	Slopes formed on clayey sediments or weathered fine grained rocks.
TAC	5.4	TAB Slopes of 2-4%.
TAZ	5.6	TAC Slopes of 4-8%. TAZ Broad gently undulating upper slopes with gradients of up to 4%. Main soils: <u>red cracking clay</u> - E2b (E) and <u>gradational loam</u> - C3b (E), with <u>deep calcareous loam</u> - A6b (C). This land has few limitations with mainly deep, fertile, well drained soils and slight to moderate erosion potential. Boron levels average 23 ppm between 60 and 80 cm.

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** Shallow calcareous loam on sandstone (Paralithic, Hypercalcic / Lithocalcic Calcarosol)
Calcareous sandy loam to clay loam grading to Class III A or rubbly Class III B/C carbonate from between 30 and 50 cm, over sandstone at depths between 50 and 100 cm.
- A4** Calcareous loam (Regolithic, Hypercalcic / Lithocalcic Calcarosol)
Calcareous sandy loam to clay loam grading to Class III A or rubbly Class III B/C carbonate from between 30 and 50 cm, over Tertiary sandstone at depths between 50 and 100 cm.
- A6a** Deep calcareous clay loam (Pedal, Hypercalcic Calcarosol)
Calcareous clay loam to light clay grading to a well structured clay with soft Class I carbonate from between 35 and 50 cm over clayey alluvium continuing below 100 cm.
- A6b** Deep calcareous loam (Pedal, Hypercalcic / Supracalcic Calcarosol)
Calcareous loam to light clay grading to a well structured clay with soft Class I (or sometimes rubbly Class III B) carbonate from between 35 and 50 cm over clayey sediments continuing below 100 cm.
- C3a** Gradational loam (Calcic / Lithocalcic, Red Dermosol)
Medium thickness loam to clay loam grading to a well structured red clay with soft Class I carbonate at about 30 - 50 cm, grading to alluvial clay.
- C3b** Gradational loam (Calcic / Lithocalcic, Red Dermosol)
Medium thickness loam to clay loam grading to a well structured red clay with soft Class I or (less commonly) rubbly Class III B or III C carbonate at about 40-50 cm. The soil is moderately shallow over Tertiary sandstone at 80-100 cm on rises, or deep (more than 100 cm) over clayey sediments on gentler slopes.
- D2a** Hard loam over well structured red clay (Calcic, Red Chromosol)
Medium thickness hard sandy loam to clay loam abruptly overlying a well structured red clay with soft Class I carbonate at about 50 cm, grading to alluvium.



- D2b** Hard loam over red clay on sandstone (Calcic, Red Chromosol)
Medium thickness hard sandy loam to clay loam abruptly overlying a well structured red clay with soft Class I carbonate at about 50 cm, grading to sandstone or deeply weathered basement rock within 100 cm.
- D3a** Sandy loam over dispersive red clay (Calcic, Red Sodosol)
Medium to thick hard setting sandy loam to sandy clay loam with a pronounced A2 layer, sharply overlying a coarsely structured dispersive red clay with soft Class I carbonate at between 30 and 60 cm, grading to alluvial clay.
- D3b** Sandy loam over dispersive red clay (Calcic / Lithocalcic, Red Sodosol)
Medium to thick hard setting loamy sand to sandy clay loam with a pronounced A2 layer, sharply overlying a coarsely structured dispersive red clay with soft Class I or rubbly Class III B or III C carbonate at between 30 and 60 cm, grading to Tertiary sandstone or clayey sediments within 100 cm. Mottled versions occur where drainage is impeded.
- E2a** Red cracking clay (Self-mulching, Red Vertosol)
Well structured, seasonally cracking clayey surface, more clayey and calcareous with depth, overlying heavy clay alluvial sediments.
- E2b** Red cracking clay (Epipedal, Red Vertosol)
Deep seasonally cracking clay with a well structured surface grading to a coarsely structured red heavy clay with variable soft Class I carbonate.
- E3** Brown cracking clay (Epipedal, Brown Vertosol)
Deep seasonally cracking clay with a well structured surface grading to a coarsely structured brown heavy clay alluvium with variable soft Class I carbonate.
- L1** Shallow sandy loam on silcrete (Silpanic, Leptic Tenosol)
Up to 30 cm sandy loam with a paler coloured and gravelly subsurface layer over silcrete.

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

