

HOH Hoad Hill Land System

Belt of rolling low hills extending from Mount Pleasant to Harrogate

Area: 38.9 km²

Annual rainfall: 545 – 795 mm average

Geology: The land is underlain by metasiltsstones, metasandstones and schists of the Tappanappa Formation of the Kanmantoo Group. These outcrop sporadically. Pyrite bands are scattered throughout the Formation. Although minor overall, they are highly significant in the development of acid sulfate soils. On some crests are deeply weathered profiles characterized by kaolinitic clays and ferricrete (ironstone). These crests are relict land surfaces, indicating that much of the area was a plain (probably in Tertiary times) which was subsequently uplifted and extensively dissected, giving rise to the modern landscape. Also on some crests are occasional Tertiary gravel deposits. On lower slopes and drainage depressions are unconsolidated sandy to sandy clay sediments derived from localized erosion and redeposition by alluvial activity.

Topography: The landscape comprises a belt of rolling low hills with slopes of up to 30%. The landscape is the product of extensive dissection of an old Tertiary? age land surface. Relicts of the former surface are recognizable as almost flat summit surfaces, compared with the sharper crests formed on freshly weathered rock. There are no continuous ridges, but there is a tendency to north - south orientation of crests. Rocky outcrops are relatively minor (compared with other Systems formed on Kanmantoo Group rocks). There are numerous streams draining the landscape. These all have an overall eastward flow direction. The valleys that they occupy are always less than one km wide. The larger valleys are flat, but elsewhere they comprise outwash fans with slopes to 10%, grading to narrow creek flats with slopes up to 5%. Water courses are frequently eroded. There is increasing evidence of saline seepage. The Tappanappa Formation appears (as elsewhere in the ranges) to contain large amounts of connate salts which are mobilized by rising saline groundwater tables. Acid sulfate soils are associated with the seeps.

Elevation: 250 - 500 m

Relief: Up to 70 m

Typical soils: The characteristic soils are hard red loams, often with ironstone gravel, over bright red clayey subsoils grading to weathering rock. On steeper slopes, the subsoil clay may be absent. Deep sandy to sandy loam soils with variable subsoils dominate valley flats.

Main soils

Hillslopes formed on basement rock

K2	Loam over red clay on metasiltsstone	
L1	Shallow stony sandy loam	}
K3a	Sandy loam over red clay	} on Metasandstone or sandy schist
K4	Loamy sand over brown clay	}



Minor soils

Hillslopes formed on basement rock

K5 Gradational loamy sand on metasandstone or sandy schist

K3b Sandy loam over red clay on pyritic rock

Valley flats

F1 Sandy loam over brown clay

F2a Loamy sand over mottled dispersive brown clay on alluvium

F2b Loamy sand over mottled dispersive brown clay on deeply weathered rock

H3 Deep sand

M1 Gradational loamy sand

Ironstone crests

J2 Ironstone gravelly sandy loam

K1 Gradational loam

Main features:

The Hoad Hill Land System is characterized by rolling low hills with gentle to moderately steep slopes and sporadic rock outcrop. The typical soil is a hard fine sandy loam over red clay, associated with shallow stony sandy loam. Although inherent fertility is moderate, these soils are often unproductive. This may be due to a combination of acidity and waterlogging. Runoff and erosion control is critical on slopes - water course erosion is often severe. Saline seepage and associated acid sulfate soils are common on lower slopes.

Soil Landscape Unit summary: 7 Soil Landscape Units (SLUs) mapped in the Hoad Hill Land System:

SLU	% of area	Main features #
AoC AoI	2.0 45.3	Rolling low hills formed on metasiltsstones and schists with bands of sandier rocks and some pyritic beds. Slopes are 12-30%, but as low as 5% on crests. There is minor rock outcrop and up to 10% surface stone. AoC Isolated rises and low hills to 40 m high. AoI Low hills up to 70 m high with eroded water courses. Main soils: <u>loam over red clay</u> - K2 (E) and <u>shallow stony sandy loam</u> - L1 (C), with <u>loamy sand over brown clay</u> - K4 (L), <u>sandy loam over red clay</u> - K3a (L) and <u>gradational loamy sand</u> - K5 (L). Soils as for LTe occur in small unmappable drainage depressions and lower slopes. Soils as for ApC occur on pyritic beds. These soils are usually moderately deep (exception shallow stony soils - L1), with moderate natural fertility, and susceptible to acidification. They are poorly structured and subject to seasonal waterlogging and erosion if bare. Slopes are generally too steep for safe cropping, but relatively low amounts of rock outcrop mean that much of the land is accessible for pasture improvement. Saline seepages are a feature of this land, usually on lower slopes. Seepage areas may have acid sulphate soils if associated with pyrite beds. Saline drainage depressions are erodible, and water course erosion is common.
ApC	1.3	Low discontinuous ridges up to 20 m high formed on pyritic rocks. Slopes are variable up to 20%. There is up to 25% ferruginized sandstone on the surface. Main soils: <u>sandy loam over red clay</u> - K3b (E) and <u>shallow stony sandy loam</u> - L1 (E). These small areas are non arable but have good grazing potential. However, the significance of the pyritic rocks is their association with acid sulfate soils, which become a problem when the pyrite is oxidized.
BqD BqI	13.9 15.3	Undulating to gently rolling low hills with relief up to 50 m and slopes of 5-12%. BqD Low hills with stable water courses. BqI Low hills with some eroded water courses. Main soils: <u>loam over red clay</u> - K2 (E) and <u>sandy loam over red clay</u> - K3a (C), with <u>loamy sand over brown clay</u> - K4 (L), <u>shallow stony sandy loam</u> - L1 (L) and <u>gradational loamy sand</u> - K5 (L). Soils as for LTe occur in small unmappable drainage depressions and lower slopes. Soils as for ApC occur on pyritic beds. These soils are usually moderately deep (exception shallow stony soils - L1), with moderate natural fertility. They are prone to acidification. They are poorly structured and subject to seasonal waterlogging and erosion if bare. The moderate slopes are partly arable, but erosion control is critical. Saline seepages are a



		feature of this land, usually on lower slopes. Seepage areas may have acid sulfate soils if associated with pyrite beds. Saline drainage depressions are erodible, and water course erosion is common.
FdD	7.3	Slopes, crests and summit surfaces formed on deeply weathered, kaolinized metasandstones, metasilstones and schists. Some crests are broad and gently sloping; others are abrupt with conical peaks. Slopes are up to 20%. There is variable surface ironstone. Main soils: <u>ironstone gravelly sandy loam - J2</u> (E) and <u>gradational loam - K1</u> (E). There are minor Tertiary gravelly deposits. These soils are deep, but highly infertile, acidic and with substantial phosphate fixing capacity. The ironstone soils are prone to waterlogging. This land has very limited capacity for intensive development, but is suitable for grazing.
Lte	14.9	Creek flats, drainage depressions and lower slopes with gradients ranging from 0% to 10%, formed on sand, clayey sand and sandy clay alluvium derived from surrounding basement rock highs. The land is characterized by saline seepage, often accompanied by acid sulfate soils, and eroded water courses, a condition exacerbated by the salinity problems. Main soils: <u>sandy loam over brown clay - F1</u> (E), with <u>loamy sand over mottled clay - F2a</u> (C), <u>sandy loam over brown dispersive clay - F2b</u> (L), <u>gradational loamy sand - M1</u> (L) and <u>deep sand - H3</u> (L). These soils are deep but are generally of low fertility, prone to acidification and waterlogging, and commonly salt affected, at least in the subsoil. However, they are potentially productive, provided that i) water use efficiency in the overall catchment is improved (through improved pasture productivity and establishment of perennial vegetation), ii) soil fertility is optimized (including amelioration of acidity), and iii) appropriate pastures are established. Grazing management to control stream bank erosion is also needed.

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:

Hillslopes underlain by metasilstones

K2 Loam over red clay (Bleached-Sodic, Eutrophic, Red Chromosol)

Medium thickness massive hard brown loam with a paler coloured and gravelly A2 horizon, overlying a red clay with strong, coarse blocky structure grading to weathering metasilstone by 100 cm.

Hillslopes underlain by metasandstones and sandy schists

K4 Loamy sand over brown clay (Bleached-Sodic, Eutrophic, Brown Kurosol / Chromosol)

Thick grey brown loamy sand with a bleached and gravelly A2 horizon, overlying a dark brown, yellow and red mottled clay with strong fine blocky structure, grading to weathered sandy schist or micaceous sandstone by 100 cm.

L1 Shallow stony sandy loam (Paralithic, Leptic Rudosol)

Thick dark brown sandy loam, with up to 50% rock fragments, overlying sandy schist or metasandstone at about 50 cm.

K3a Sandy loam over red clay (Eutrophic, Red Chromosol)

Medium thickness brown massive sandy loam, with a paler coloured, sandier and quartz gravelly A2 horizon, overlying a red coarse blocky clay with quartz fragments, grading to weathered metasandstone between 50 and 100 cm.



- K5** Gradational loamy sand (Bleached-Acidic, Mesotrophic, Brown Kandosol)
Medium thickness grey sand to sandy loam with up to 50% rock fragments, overlying a massive brown silty clay loam with abundant rock fragments, grading to weathering schist by 100 cm.

Hillslopes underlain by pyritic rocks

- K3b** Sandy loam over red clay (Eutrophic, Red Chromosol)
Medium thickness reddish brown fine sandy loam with a paler coloured A2 horizon, sometimes with ironstone gravel, overlying a red clay up to a metre thick, with blocky structure and ferruginous rock fragments throughout.

Valley flats

- F1** Sandy loam over brown clay (Sodic, Brown Chromosol)
Thick brown sandy loam with a quartz gravelly paler coloured sandy loam to sandy clay loam A2 horizon, overlying a greyish brown and yellowish brown mottled sandy clay to clay with weak coarse prismatic structure, over a mottled clayey sand from 125 cm.
- F2a** Loamy sand over mottled clay (Bleached-Mottled, Natric, Brown Kurosol)
Thick massive grey loamy sand to loam with a bleached and quartz gravelly A2 horizon, overlying a yellow brown and grey brown sandy clay to clay with prismatic structure, grading to medium to fine textured stony alluvium from about 100 cm.
- F2b** Sandy loam over brown dispersive clay (Eutrophic, Brown Sodosol)
Thick massive grey loamy sand to loam with a bleached and gravelly A2 horizon, overlying a grey brown, red and yellow brown mottled clay with prismatic structure, grading to silty alluvium or deeply weathered soft schist.
- H3** Deep sand (Basic, Arenic, Bleached-Orthic Tenosol)
Very deep greyish brown massive sand, grading to white sand, overlying layers of brown, yellow and grey sand to clayey sand.
- M1** Gradational loamy sand (Bleached, Brown Kandosol)
Very thick brown sand with bleached and rusty mottles, overlying a massive brown clayey sand to light sandy clay loam at about 100 cm, grading to coarse textured alluvium.

Ironstone crests

- J2** Ironstone gravelly sandy loam (Bleached-Ferric, Mesotrophic, Brown Kurosol)
Medium thickness grey brown loamy sand with a bleached A2 horizon containing over 50% ironstone gravel, overlying a yellow brown clay with soft red inclusions of weathered ironstone, grading to a greyish silty clay forming in weathering schist or micaceous sandstone deeper than 200 cm.
- K1** Gradational loam (Mesotrophic, Red Kandosol)
Medium thickness red brown loam grading to a red massive clay loam with ferruginized siltstone fragments, overlying a red clay grading to grey kaolinitic clay forming in soft weathering metasiltstone, deeper than 200 cm.

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

