

MPL Mount Pleasant Land System

Undulating to rolling low hills on the eastern Mt. Lofty Ranges watershed between Pewsey Vale and Nairne

Area: 214.9 km²

Annual rainfall: 620 – 870 mm average

Geology: The System is formed on strongly metamorphosed sedimentary rocks of the Kanmantoo Group. Predominant are metasandstones, schists and gneisses of the Backstairs Passage Formation, with limited occurrences of metasiltsstones, fine grained schists and quartzites of the Tappanappa Formation. There are minor seams of pyritic rocks. The rocks are generally freshly weathered, but on upper slopes particularly rocks are deeply and kaolinized to some depth. Associated with these areas are remnants of an old land surface characterized by an ironstone (ferricrete) capping on the kaolinitic weathering rocks. There are minor Tertiary gravels and sands on these old land surfaces. Outwash sediments derived from the rocks have accumulated on lower slopes and in drainage depressions. These are typically sands to sandy clays. Salt levels in the underlying rocks are commonly high, so rising ground water tables are causing saline seepages to develop on lower slopes. Where pyritic rocks are present, these seepages have potentially acid sulfate soils.

Topography: The landscape is typically undulating to rolling, with broad rises and low hills alternating with creek flats. Rocky outcrops are a feature of the slopes, and in places are sufficient to prevent vehicular access. Slopes are in the range 3 - 25%, and occasionally up to 75% on short dissection slopes. In the north, watercourses all drain into the Mt. Lofty Ranges watershed (South Para and Torrens). In the south, watercourses drain in both directions, forming the headwaters of the Onkaparinga and Bremer systems.

Elevation: 280 m in the south to 540 m (Mt. Pleasant) in the north

Relief: 20 to 80 m

Soils: The soils are characteristically sandy (but not always) with variable subsoils. Soils are shallow to moderately deep where formed over basement rock, and usually deep where underlain by outwash sediments.

Main soils

Soils formed on fresh weathering metasandstones and schists

- L1** Shallow stony loamy sand
- K5** Gradational loamy sand
- K4a** Loamy sand over brown clay
- K3a** Sandy loam over red clay

Minor soils

Soils formed on fresh weathering basement rocks

- K4b** Sandy loam over dispersive brown clay on metasandstone
- K1a** Loam over brown silty clay loam on schist
- K2** Loam over red clay on metasiltsstone
- K3b** Sandy loam over red clay on pyritic rock
- K3c** Sandy loam over red clay on gneiss
- K4c** Loamy sand over tough brown clay on quartzite



Soils formed on deeply weathered or ferruginized basement rock

- F2a** Sandy loam over brown clay
J2 Ironstone gravelly loamy sand over clay
K1b Gradational sandy loam

Soils formed on alluvium

- F1** Sandy loam over sandy clay
F2b Loamy sand over brown dispersive clay
G3 Sand over brown sodic clay
H3 Deep sand
M1 Gradational loamy sand

Main features: The Mount Pleasant Land System is characterized by undulating to rolling low hills formed on metamorphosed rocks, outcrops of which create the unique appearance of the landscape. The soils are typically sandy surfaced with variable clayey subsoils. Many are shallow over rock. Natural fertility is moderately low, soil erodibility is high and slopes are commonly greater than 10%, so suitability for cultivated agriculture is low. However, pasture productivity potential is high provided that the issues of soil fertility and acidity are managed. Lower slopes and flats are characterized by deep sandy surfaced soils with low fertility, prone to acidification, salinization and watercourse erosion.

Soil Landscape Unit Summary: 15 Soil Landscape Units (SLUs) mapped in the Mount Pleasant Land System

SLU	% of area	Main features #
AIC	0.9	<p>Rolling low hills formed on quartzitic metasandstones. Relief is up to 40 m and slopes are 10-25%. There is 10-20% surface quartzite, sandstone and ironstone.</p> <p>Main soils: <u>shallow stony loamy sand - L1</u> (E) and <u>loamy sand over tough brown clay - K4c</u> (E) formed on basement rock. <u>Deep sand - H3</u> (M) and <u>sandy loam over sandy clay - F1</u> (M) occur in watercourses. These soils are shallow to moderately deep and generally infertile and acidic. The K4c soils with tight clay subsoils are imperfectly drained. Most soils are highly erodible due to poorly structured sandy surfaces. Watercourse erosion is common. There is extensive waterlogging and minor saline seepage in drainage depressions.</p>
AmC AmY	29.6 1.0	<p>Rolling low hills and summit surfaces formed on metasandstones and coarse grained schists and gneisses of the Backstairs Passage Formation. Slopes 3% up to 25% and relief ranges from around 20 metres up to 60 metres. These landscapes are associated with AnC which is significantly rockier.</p> <p>AmC Rolling low hills with relief to 60 m, slopes of 12-25% and up to 10% rocky outcrop. AmY Broad rounded crests, slopes 3% on central crests; 15% on margins. < 5% rocky outcrop.</p> <p>There is a range of soils, depending on the nature of the underlying rock. <u>Shallow stony loamy sand - L1</u> (E) occurs where underlying rocks are hard and relatively unweathered. <u>Loamy sand over brown clay - K4a</u> (C), <u>gradational loamy sand - K5</u> (L), <u>sandy loam over red clay - K3a</u> (L) and <u>sandy loam over dispersive brown clay - K4b</u> (L) formed on weathering rock account for most of the remainder of the area. On the western side there are lenses of finer grained rocks with <u>loam over brown silty clay loam - K1a</u> (M). On the eastern side are bands of gneiss with <u>sandy loam over red clay - K3c</u> (M). There are minor deep <u>loamy sand over brown dispersive clay - F2b</u>, <u>sandy loam over sandy clay - F1</u> and <u>gradational loamy sand - M1</u> in drainage depressions. The soils, although sandy, are moderately fertile, most having clayey subsoils to prevent excessive leaching. Some, mainly on lower slopes, are imperfectly drained. Surface soils are highly erodible, so maintenance of protective vegetative cover is an important management consideration. Rocky outcrops are limiting in places, but overall are not a major restriction on land use. Drainage depressions are characterized by well defined and sometimes eroded watercourses, and sporadic saline seepage and waterlogged areas. These may be associated with acid sulfate conditions.</p>



AnC	11.8	<p>Rough rolling low hills formed on metasandstones and coarse grained schists of the Backstairs Passage Formation. Relief: <100m; slopes: 8-30%. Extensive rock outcrop is the outstanding feature. Main soils: <u>shallow stony loamy sand</u> - L1 (E), <u>gradational loamy sand</u> - K5 (E) and <u>loamy sand over brown clay</u> - K4a (L). <u>Deep sand</u> - H3 (M) and <u>gradational loamy sand</u> - M1 (M) derived from localized erosion are characteristic of lower slopes.</p> <p>Land is dominated by moderate to steep rocky slopes. Although deep soils occur, the extent of surface stone effectively limits land use due to accessibility and general operational problems. Land widely used for grazing, and deeper soils potentially productive. However, the shallow stony types tend to dry out early in spring. Fertility moderately low; acidification potential high. Drainage depressions are narrow, with well defined and occasionally eroded watercourses. Sporadic saline seepage in depressions and adj. lower slopes. These may be associated with acid sulfate conditions.</p>
AoC	1.2	<p>Rolling low hills 20-80 m high formed on metasiltstones and schists; bands of sandier rocks and some pyritic beds. Slopes 10-25%, but 5% on crests. Minor rock outcrop. < 10% surface stone. Main soils: <u>loam over red clay</u> - K2 (E) and <u>shallow stony sandy loam</u> - L1 (E), with <u>loamy sand over brown clay</u> - K4a (M), <u>sandy loam over dispersive brown clay</u> - K4b (M) and <u>gradational loamy sand</u> - K5 (M). Soils as for LTe occur in small unmappable drainage depressions and lower slopes. <u>Sandy loam over red clay</u> - K3b (M) occurs on pyritic beds. These soils are usually moderately deep (exception L1 soils), with moderate natural fertility, and are susceptible to acidification. They are poorly structured and subject to seasonal waterlogging and erosion if bare. There is potential for the development of acid sulfate conditions in seepage areas and creek flats. 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.</p>
COC COD	8.9 29.1	<p>Undulating to rolling low hills formed on metasandstones, schists and gneisses of the Backstairs Passage Formation. Slopes range from 3% to 12% and relief is up to 60 m.</p> <p>COC Undulating low rises with relief to 20 m slopes of 3-6%.</p> <p>COD Gently rolling low hills with relief to 60 m and slopes of 6-12%.</p> <p>Many soils characterized by sandy surfaces with more clayey subsoils forming in weathering rock. Main soils: <u>loamy sand over brown clay</u> - K4a (E), <u>gradational loamy sand</u> - K5 (C), <u>sandy loam over red clay</u> - K3a (L). <u>Shallow stony loamy sand</u> - L1 (L) occurs where rock is shallow and outcropping. <u>Loam over red clay</u> - K2 (M), and <u>loam over brown silty clay loam</u> - K1a (M) occur on some upper slopes and where basement rocks are fine grained. <u>Sandy loam over red clay on gneiss</u> - K3c (M) occurs on gneissic rock bands in the east. Deep <u>loamy sand over brown dispersive clay</u> - F2a/F2b (M), <u>sandy loam over sandy clay</u> - F1 (M) and <u>gradational loamy sand</u> - M1 (M) occur in drainage depressions. The soils, although sandy, are moderately fertile, most having clayey subsoils to prevent excessive leaching. All soils are susceptible to acidification. Some, mainly on lower slopes are imperfectly drained. Although most of the land is arable, surface soils are highly erodible, so maintenance of protective vegetative cover is an important management consideration. There are occasional rocky outcrops, but overall they are not a major restriction on land use. Drainage depressions are characterized by well defined and sometimes eroded watercourses, and sporadic saline seepage and waterlogged areas. These may be associated with acid sulfate conditions.</p>
CRD	0.5	<p>Rises and low hills to 40 m high formed on quartzitic basement rocks. There is 2-10% surface quartzite, sandstone and ironstone, but little rock outcrop. Slopes are 10-20%.</p> <p>Main soils: <u>loamy sand over tough brown clay</u> - K4c (E) and <u>shallow stony loamy sand</u> - L1 (E) formed on basement rock. <u>Deep sand</u> - H3 (M) and <u>sandy loam over sandy clay</u> - F1 (M) occur in watercourses. Moils moderately deep and generally infertile and acidic. K4c soils with tight clay subsoils are imperfectly drained. Most soils are highly erodible due to poorly structured sandy surfaces. Watercourse erosion common. Ext. waterlogging and minor saline seepage in drainage depressions.</p>
FdD FdZ	0.2 1.2	<p>Upper slopes, crests and summit surfaces formed on deeply weathered, kaolinized metasandstones, metasiltstones and schists. There is variable surface ironstone. In places are massive ferricrete boulders (eg Mt. Pleasant).</p> <p>FdD Moderately steep upper slopes and abrupt conical peaks with slopes of up to 20%.</p> <p>FdZ Broad and gently sloping crests and summit surfaces with slopes of less than 10%.</p> <p>Main soils: <u>ironstone gravelly loamy sand over clay</u> - J2 (E) and <u>gradational sandy loam</u> - K1b (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.</p>



LEe	0.6	Broad alluvial flats formed on sand, clayey sand and sandy clay alluvium derived from the erosion of coarse grained metamorphic rocks. There is little microrelief and slopes less than 2%. The soils are predominantly sandy, with most profiles having clayey subsoils, many of which are sodic (<u>loamy sand over brown dispersive clay</u> - F2b (E) and <u>sand over brown sodic clay</u> - G3 (C). There are also <u>deep sand</u> - H3 (L) and <u>sandy loam over sandy clay</u> - F1 (L). These flats are imperfectly drained, mildly saline and naturally infertile. However, with suitable species, pasture productivity potential is high.
LTB LTG LTJ LTe	0.5 0.6 1.0 12.9	<p>Creek flats, drainage depressions and lower slopes, with slopes 0-10%, formed on sand, clayey sand and sandy clay alluvium derived from the erosion of coarse grained metamorphic rocks.</p> <p>LTB Gentle lower slopes with a complex of outwash sediments and low basement rock rises. Slopes are less than 5%.</p> <p>LTG As for LTB, but with eroded watercourses.</p> <p>LTJ Creek flats with eroded watercourses.</p> <p>LTe Creek flats, drainage depressions and lower slopes with gradients of 0-10%. Watercourse erosion and saline seepages are common.</p> <p>A variety of sandy surfaced soils occur. Differences largely due to texture and structure of subsoils. Main soils on the slopes of LTB and LTG: <u>loamy sand over brown dispersive clay</u> - F2b (E), <u>sandy loam over sandy clay</u> - F1 (E) and <u>deep sand</u> - H3 (L). On creek flats, main soils are <u>loamy sand over brown dispersive clay</u> - F2b (E), <u>sandy loam over sandy clay</u> - F1 (E) and <u>gradational loamy sand</u> - M1 (C) on alluvium. <u>Loamy sand over brown clay</u> - K4a / K4b (M) occurs on basement highs. The soils have low natural fertility and are subject to waterlogging, salinization, acidification and compaction. However, with suitable species and grazing management, pasture productivity potential is moderately high. Watercourse management is an additional consideration in these landscapes, due to past stream bank erosion and high soil erodibility.</p>

PROPORTION codes assigned to soils within Soil Landscape Units (SLU):

(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:

Soils formed on fresh weathering basement rocks

- K1a** Loam over brown silty clay loam (Eutrophic, Brown Dermosol)
Thick gravelly brown loam, overlying a dark brown and yellow micaceous coarsely prismatic silty clay loam.
silty clay, grading to weathering schist from about 100 cm.
- 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 metasiltstone by 100 cm.
- K3a** Sandy loam over red clay (Bleached-Sodic, Eutrophic, Red Chromosol)
Medium thickness massive brown sandy loam to loam with a pale coloured and gravelly A2 layer, over a red to orange clay with strong coarse blocky structure grading to weathering fine sandstone or schist by 100 cm.
- 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.
- K3c** Sandy loam over red clay on gneiss (Bleached, Eutrophic, Red / Brown Chromosol)
Medium to thick gritty coarse sandy loam with a bleached subsurface layer over a red and brown mottled gravelly clay grading to coarse grained metamorphic rock.
- K4a** Loamy sand over brown clay (Bleached-Sodic, Eutrophic, Brown Chromosol / Kurosol)
Thick grey brown loamy sand with a bleached and gravelly A2 horizon, overlying a dark brown, yellow and red mottled clay with strong blocky structure, grading to weathered sandy schist or micaceous sandstone by 100 cm. The rock is commonly deeply weathered and kaolinized.



- K4b** Sandy loam over dispersive brown clay (Mesotrophic, Brown Sodosol)
Medium thickness brown loamy sand to loam, with a bleached quartz gravelly A2 horizon, overlying a brown, yellow and grey mottled columnar structured clay grading to kaolinitic micaceous sandstone at about 100 cm.
- K4c** Loamy sand over tough brown clay (Bleached-Mottled, Mesotrophic, Brown Kurosol)
Thick grey loamy sand with a bleached and quartz gravelly A2 horizon, overlying a yellowish brown and grey mottled clay with coarse blocky structure, grading to quartzitic sandstone.
- K5** Gradational loamy sand (Mesotrophic, Grey Kandosol)
Medium thickness grey sand to sandy loam with up to 50% rock fragments, overlying a massive grey brown silty clay loam with abundant rock fragments, grading to weathering schist by 100 cm.
- L1** Shallow stony loamy sand (Paralithic, Leptic Rudosol)
Thick dark brown loamy sand, with up to 50% rock fragments, overlying sandy schist or micaceous sandstone at about 50 cm.

Soils formed on deeply weathered or ferruginized basement rock

- F2a** Sandy loam over brown 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.
- J2** Ironstone gravelly loamy sand over clay (Bleached-Ferric, Mesotrophic, Brown Kurosol)
Medium thickness grey brown loamy sand with a bleached A2 layer 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.
- K1b** Gradational sandy loam (Mesotrophic, Red Kandosol)
Red brown sandy loam merging with 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.

Soils formed on alluvium

- F1** Sandy loam over sandy clay (Sodic, Grey / Brown Chromosol)
Thick brown sandy loam with a quartz gravelly, paler coloured light sandy clay loam A2 horizon, over a greyish brown and yellowish brown mottled sandy clay loam to medium clay with weak coarse prismatic structure, grading to a mottled clayey sand from 125 cm.
- F2b** Loamy sand over brown dispersive clay (Mesotrophic, Brown Sodosol)
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 textured, stony alluvium from 100 cm.
- G3** Sand over brown sodic clay (Mesotrophic, Brown Sodosol)
Thick grey sand with a bleached A2 horizon, overlying a yellow brown, dark brown and grey mottled sandy clay to clay with coarse prismatic structure, grading to a sandier sediment below 100 cm.
- H3** Deep sand (Regolithic, 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.

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

