

WAG Watts Gully Land System

Rolling low hills between the South Para Reservoir and Gumeracha

Area: 41.3 km²

Annual rainfall: 675 – 825 mm average

Geology: The land system is underlain by four distinctive basement rock types. There are:

- Fine to coarse grained sandstones of the Aldgate Sandstone Formation.
- Siltstones and fine sandstones of the Saddleworth and Castambul Formations, minor lenses of which are calcareous.
- Albitized schists and gneisses of the Houghton Inlier member of the Barossa Complex.
- Veins of quartzites which usually outcrop on prominent ridges.

The Aldgate Sandstones carry a residual capping of ferricrete (ironstone), most of which has eroded away, but ironstone gravels are common on surrounding slopes. Locally derived alluvial sediments cover the basement rocks in valley flats. These are variable coarse to fine grained depending on which of the above rock types was the source.

Topography: The landscape is typically rolling low hills with occasional steeper slopes where watercourses have cut deeply into the rocks. Prominent north - south ridges occur throughout - these tend to be steep in the south, where the Mount Gould Range dominates the topography. Here, the land slopes away to the Kersbrook valley in the west and the Forreston valley in the east. Further north in the Watts Gully- South Para Reservoir area, the landscape is more subdued with only occasional steep slopes and overall drainage via broad valleys between the ridges towards the South Para River and the reservoir which cuts across the grain of the land in the north.

Elevation: 260 m at South Para Reservoir to 530 m (Mount Gould)

Relief: Up to 90 m

Soils: Most soils are shallow to moderately deep over weathering basement rock. The variety of rocks gives rise to a range of soils, some with loamy surfaces and some with sandy surfaces. Except on steep rocky slopes, most have clayey subsoils. On lower slopes and in drainage depressions, soils are deeper, usually with sandy loam surfaces and well developed clayey subsoils, but there are also deep black fine textured soils.

Main soils: *Soils formed in weathering basement rock*

- K4a** Acidic sandy loam over brown clay on sandstone
- K2** Acidic loam over red clay
- K3a** Acidic sandy loam over red clay
- K1** Acidic gradational sandy loam (**K1a**) to loam (**K1b**)
- L1** Shallow stony sandy loam (**L1a**) to loam (**L1b**)

Minor soils: *Soils formed in weathering basement rock*

- K3b** Acidic sandy loam over red sandy clay
- K4** Acidic sandy loam to loamy sand over brown clay - on schist/gneiss (**K4b**) or on quartzite (**K4c**)

Ironstone soils

- J2** Acidic deep sandy loam ironstone soil



Soils formed in alluvium

- F1** Sandy loam over brown mottled clay - on alluvium (**F1a**) or on deeply weathered rock (**F1b**)
- M1** Deep sandy loam
- M2** Deep black clay loam

Main features: The Watts Gully Land System is characterized by rolling low hills with some steep ridges and occasional steep dissection slopes. Over 70% of the land is non arable due to moderately steep to steep slopes. The soils vary according to the underlying geology. About 40% of the rising ground has loamy soils, usually with red clayey subsoils. These are moderately deep, fertile and well drained with high productive potential, although generally not arable. The rest of the slopes are formed on coarse grained rocks which usually give rise to sandy, infertile, erodible and often imperfectly drained soils with low productive potential. The exception is the occurrence of red sandy loams in the Checkers Hill area, which are fertile and potentially productive. Creek flats occupy 5-10% of the area, and although soils are deep, many are sandy and of low fertility and prone to waterlogging. However there are limited areas of deep black clay loams with high productive potential. Watercourse erosion is a problem and there are minor saline seepages.

Soil Landscape Unit summary: 14 Soil Landscape Units (SLUs) mapped in the Watts Gully Land System

SLU	% of area	Main features #
AxC AXD	22.7 7.7	<p>Rounded low hills formed on fine to coarse grained sandstones of the Aldgate Sandstone Formation. Slopes are mostly in the range 16-25%, but reach 50% on isolated hills and parts of the Barossa Reservoir valley. Maximum relief is 70 metres. Some crests have ferricrete (ironstone) residuals, and may exhibit "breakaway" features. Rock outcrops are sporadic, occupying a maximum of 10% of the surface. Ironstone gravel and boulders are common on ferricrete crests. Watercourses are narrow, well defined and usually unmappable.</p> <p>AxC Rolling low hills with relief to 70 m and slopes of 16-30%. Drainage depressions are narrow with well defined watercourses.</p> <p>AXD Steep rocky hillslopes with relief to 70 m and slopes of 30-50%. Drainage depressions are very narrow with well defined watercourses.</p> <p>Soils include sandy loams over brown or red clays formed on sandstone, loamy sands to loams over brown, grey and red clays on alluvium, and ironstone soils on deeply weathered rocks.</p> <p>Main soils: <u>Acidic sandy loam over brown or red clay</u> - K4a / K3a (E) on most slopes</p> <p><u>Acidic gradational sandy loam</u> - K1a (C) on upper slopes</p> <p><u>Acidic deep ironstone soil</u> - J2 (L) on residual ferricrete crests</p> <p><u>Acidic loamy sand over brown clay</u> - K4c (M) on quartzitic rocks</p> <p><u>Sandy loam with ironstone gravel over brown clay</u> - F1b (M) on lower slopes</p> <p>The soils are moderately deep but are often imperfectly drained, low in natural fertility, prone to acidification and highly erodible. The land is too steep for cultivation, but most is accessible to implements. However productive potential is low due to the combination of adverse soil conditions and unfavourable topography, and the land is mostly used for grazing.</p>
AaC AaD	14.4 4.0	<p>Rolling to steep low hills and hills, with some very steep hillslopes, formed on siltstones, fine sandstones and minor quartzites. Slopes range from 18% to 50% generally, but to 75% in places. On some upper slopes and broader crests, slopes are less than 10%. Relief varies from 40 to 90 metres. Drainage depressions are narrow with well defined watercourses. There is usually an abrupt break between creek flats and adjacent hillslopes.</p> <p>AaC Rolling low hills and slopes with relief to 80 m, slopes of 18-30% and minor surface stone.</p> <p>AaD Steep to very steep hillslopes with relief to 90 m, slopes of 30-75%, occasional rock outcrop and moderate surface stone.</p> <p>The soils are predominantly loamy with red to orange clay subsoils forming in weathering rock. On steeper slopes, loamy surface soils are formed directly in rock.</p>



		<p>Main soils: <u>Acidic loam over red clay</u> - K2 (E) <u>Shallow stony loam</u> - L1b (E) on steeper rocky slopes <u>Acidic gradational brown loam</u> - K1b (L)</p> <p>Soils vary from deep to shallow; are generally well drained and inherently fertile with high production potential. However land is too steep for cultivation. The more moderate slopes of AaC are suitable for perennial crops where water is available, but AaD is too steep for any uses other than grazing.</p>
AfC	10.3	<p>Rolling low hills with narrow valleys – relief is up to 100 m and slopes are 18-30%. Underlying rocks are albitized schists and gneisses of the Houghton Inlier member of the Barossa Complex. The soils are moderately deep red sandy loams.</p> <p>Main soils: <u>Acidic sandy loam over red sandy clay</u> - K3b (E) <u>Shallow stony sandy loam</u> - L1a (E) on steeper rocky slopes <u>Sandy loam over brown mottled clay</u> - F1a (L) on lower slopes</p> <p>These soils, although relatively sandy, are fertile and well drained. Although too steep for cultivation, the land has potential for perennial horticulture where water is available.</p>
AqC	3.3	<p>Low rocky ridges with relief to 30 m and slopes of 15-30% formed on metamorphosed sandstones and quartzites. There is a range of soils, usually with gravelly sandy to sandy clay loam surfaces and variably coloured and structured clay subsoils, formed on fresh weathering or deeply weathered and kaolinitic micaceous sandstones.</p> <p>Main soils: <u>Acidic sandy loam over brown clay</u> - K4b (E) <u>Shallow stony sandy loam</u> - L1a (C) <u>Acidic sandy loam over red clay</u> - K3a (L) <u>Acidic gradational sandy loam</u> - K1a (L)</p> <p>This land is characterized by variable depth soils which are generally low in natural fertility, imperfectly drained, prone to acidification and highly erodible, on moderately steep and often rocky slopes. Productive potential is consequently low - most of the land is used for grazing.</p>
AwC AwD	6.8 0.9	<p>Low ridges formed on fine to coarse grained sandstones and quartzites. Rocky outcrops are variable, but extensive on minor steeper slopes.</p> <p>AwC Low ridges with relief to 30 m. AwD Steep rocky ridges with relief to 60 m and slopes of 30-50%.</p> <p>Most soils are moderately deep to shallow over bedrock. Profiles vary according to the nature of the parent rock. Sandy to loamy soils over brown, yellow or red clay subsoils are predominant.</p> <p>Main soils: <u>Acidic sandy loam over brown clay</u> - K4a (E) <u>Shallow stony sandy loam</u> - L1a (E) on steeper slopes <u>Acidic gradational sandy loam</u> - K1a (C)</p> <p>These soils are mostly moderately deep but infertile, acidic and highly erodible. There is some potential for perennial horticulture where water is available, but overall productive potential is low.</p>
BED	19.7	<p>Gently rolling low hills and moderate slopes with relief to 60 m and slopes of 10-18%, formed on siltstones, fine sandstones and minor quartzites. Drainage depressions are narrow with well defined watercourses. The soils are predominantly loamy with red to orange clay subsoils forming in weathering rock. On rockier slopes, loamy surface soils are formed directly in rock.</p> <p>Main soils: <u>Acidic loam over red clay</u> - K2 (E) <u>Shallow stony loam</u> - L1b (L) on rocky slopes <u>Acidic gradational brown loam</u> - K1b (C) <u>Sandy loam over brown mottled clay</u> - F1a (L) on lower slopes</p> <p>These soils are generally moderately deep to deep, well drained and inherently fertile with high production potential. The slopes are semi arable due to the potential for erosion but are suitable for perennial crops where water is available. Pasture production potential is high.</p>
BrD	0.2	<p>Undulating to gently rolling rises with gentle lower slopes and well defined watercourses; relief is up to 30 m and slopes are 8-18%. Underlying rocks are albitized schists and gneisses of the Houghton Inlier member of the Barossa Complex. The soils are moderately deep red sandy loams.</p> <p>Main soils: <u>Acidic sandy loam over red sandy clay</u> - K3b (V) <u>Shallow stony sandy loam</u> - L1a (L) on steeper rocky slopes <u>Sandy loam over brown mottled clay</u> - F1a (L) on lower slopes</p> <p>These soils, although relatively sandy, are fertile and well drained. The land has high potential for perennial horticulture where water is available.</p>



CtD	4.2	<p>Gently rolling low hills with relief to 40 m and slopes of 8-16%. Drainage depressions are up to 100 m wide with well defined watercourses. Underlying rocks are fine to coarse grained sandstones of the Aldgate Sandstone Formation. Some crests have ferricrete (ironstone) residuals, and may exhibit "breakaway" features. Ironstone gravel and boulders are common. Watercourses are narrow, well defined and usually unmappable. Soils include sandy loams over brown or red clays formed on sandstone, loamy sands to loams over brown, grey and red clays on alluvium, and ironstone soils on deeply weathered rocks.</p> <p>Main soils: <u>Acidic sandy loam over brown or red clay</u> - K4a / K3a (E) on most slopes <u>Acidic gradational sandy loam</u> - K1a (L) on upper slopes <u>Acidic deep ironstone soil</u> - J2 (L) on residual ferricrete crests <u>Acidic loamy sand over brown clay</u> - K4c (M) on quartzitic rocks <u>Sandy loam with ironstone gravel over brown clay</u> - F1b (M) on lower slopes</p> <p>The soils are moderately deep but are often imperfectly drained, low in natural fertility, prone to acidification and highly erodible. Productive potential is low due to the adverse soil conditions, so the land is mostly used for grazing.</p>
LeE	1.6	<p>Broad, shallow drainage depressions, and gently undulating to undulating lower slopes of up to 10% formed on very deeply weathered basement siltstones, shales, phyllites and schists, or on alluvium derived from them.</p> <p>LeE Shallow drainage depressions with slopes of 0-10%.</p> <p>The soils have sandy to loamy surfaces over mottled brown, yellow and grey clay subsoils. Variations are due to drainage conditions, grain size of the parent sediments and ironstone gravel content.</p> <p>Main soils: <u>Sandy loam over brown clay</u> - F1c (E) on alluvium <u>Loam to sandy loam over brown clay</u> - F1a/F1b (E) on deeply weathered rock</p> <p>These soils are deep, fertile and moderately well to imperfectly drained. Productive potential is high provided that temporary waterlogging is managed.</p>
LtE LtJ	0.8 3.4	<p>Creek flats formed on a range of alluvial sediments derived from the adjacent hillslopes. Watercourses are well defined and variably eroded. There is minor saline seepage.</p> <p>LtE Flats with mainly stable watercourses.</p> <p>LtJ Flats with watercourses which are commonly eroded.</p> <p>The soils are deep but highly variable depending on the source of parent sediments.</p> <p>Main soils: <u>Sandy loam over brown mottled clay</u> - F1a (E) <u>Deep sandy loam</u> - M1 (E) <u>Deep black clay loam</u> - M2 (M)</p> <p>Most soils are waterlogged during winter and would present drainage problems under irrigation. Fertility varies from low (sandy loams) to high (black clay loams). Pasture productivity potential is high. Control of watercourse erosion is a significant issue.</p>

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:

Soils formed in weathering basement rock

- K1a** Acidic gradational sandy loam (Bleached, Mesotrophic, Brown Kandosol)
Medium thickness sandy loam with a pale and gravelly A2 horizon, overlying a yellow and brown sandy clay loam grading to a clay loam or light clay subsoil formed in soft weathering sandstone.
- K1b** Acidic gradational brown loam (Eutrophic, Brown Dermosol)
Medium thickness loamy surface soil, becoming clay loamy and gravelly with depth, overlying an orange friable clay subsoil, grading to soft shale or siltstone.
- K2** Acidic loam over red clay (Eutrophic, Red Kurosol)
Medium thickness reddish loam to clay loam with a gravelly and paler coloured A2 horizon, overlying a red very well structured clay grading to weathering siltstone from about 100 cm.



- K3a** Acidic sandy loam over red clay (Bleached, Eutrophic, Red Kurosol)
Thick, brown loamy sand to sandy loam with a gravelly and bleached A2 horizon, overlying a red coarsely structured clay, stony and browner with depth, grading to weathering metasandstone by 100 cm.
- K3b** Acidic sandy loam over red sandy clay (Eutrophic, Red Chromosol)
Thick to very thick coarse sandy loam, with a paler coloured and gravelly A2 layer, overlying a reddish brown well structured sandy clay, grading to weathering gneiss before 100 cm.
- K4a** Acidic sandy loam over brown clay (Bleached, Mesotrophic, Brown Kurosol)
Medium to thick gravelly loamy sand to sandy loam surface soil, with a bleached and very gravelly A2 horizon, overlying a yellowish brown, red and brown sandy clay to clay subsoil grading to weathering medium to fine sandstone by 100 cm.
- K4b** Acidic sandy loam over brown clay (Bleached-Mottled, Eutrophic, Brown Kurosol)
Thick gravelly sandy loam to sandy clay loam with a bleached A2 horizon, overlying a yellowish brown, red and greyish brown coarsely prismatic clay subsoil, grading to weathering metasandstone, schist or gneiss below 100 cm.
- K4c** Acidic loamy sand over brown clay (Bleached-Mottled, Eutrophic, Brown Chromosol)
Thick loamy sand, with a bleached and quartz gravelly A2 horizon, overlying a very firm, brownish yellow heavy clay derived from the weathering of quartzitic rocks.
- L1a** Shallow stony sandy loam (Acidic, Lithic, Bleached-Leptic Tenosol)
Thick greyish very gravelly loamy sand to sandy loam with a bleached A2 horizon, grading to hard metasandstone by 50 cm.
- L1b** Shallow stony loam (Acidic, Paralithic, Leptic Tenosol)
Thick stony loam, forming in weathering siltstone at 50 cm or less.

Ironstone soils

- J2** Acidic deep ironstone soil (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.

Soils formed in alluvium

- F1a** Sandy loam over brown mottled clay (Bleached-Mottled, Eutrophic, Brown Chromosol)
Thick sandy loam to sandy clay loam, with a bleached and gravelly A2 horizon, overlying a yellowish brown, brown and red mottled firm coarsely structured sandy to medium clay.
- F1b** Sandy loam with ironstone gravel over brown clay (Bleached-Mottled, Mesotrophic, Brown Kurosol)
Thick, greyish loamy sand to sandy clay loam with a bleached and ironstone gravelly A2 horizon, overlying a brownish yellow, brown and red well structured clay, grading to kaolinitic and ironstone gravelly clay continuing below 200 cm.
- M1** Deep sandy loam (Regolithic, Brown-Orthic Tenosol)
Thick brown sandy loam to loamy sand, overlying a reddish brown clayey coarse sand to silty sand, grading to variable sandy and gritty alluvial sediments.
- M2** Deep black clay loam (Melanic, Eutrophic, Black Dermosol)
Thick black silty loam to clay loam with strong granular structure, overlying a black to dark brown clay with strong blocky structure, becoming yellow and grey mottled with depth.

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

