SDW Saddleworth Land System

Undulating rises and valley flats of the Gilbert River Valley, from north of Manoora to Stockport

Area: 294.2 km²

Annual rainfall: 425 – 525 mm average

Geology: The land system is almost entirely underlain by siltstones of the Saddleworth Formation,

with a narrow strip of Bethel Shale along the eastern margin, and a discontinuous strip of Undalya Quartzite along the western side. Calcareous or dolomitic strata are interbedded with the siltstones in places. The rocks are mostly mantled by aeolian carbonates which have accumulated in the lower soil profile. In places, especially where there are calcareous rocks, these usually soft carbonates have hardened into thin calcrete sheets overlying the basement siltstones. Extensive erosion and reworking of the soft basement rocks has resulted in large areas of alluvium, forming valley floors or outwash fans between the

basement highs.

Topography: The land system represents a significant proportion of the Gilbert River valley above

Stockport. The eastern boundary is clearly defined by a continuous and abrupt quartzite ridge. The River catchment extends beyond the western boundary which is defined by the edge of the Saddleworth Formation. The System has a remarkably consistent pattern of undulating rises and gently inclined outwash fans all draining toward the Gilbert which flows in a southerly direction near the western side of the System. Slopes on the rises rarely exceed 10%, while on the fans, 8% is the maximum. Water course erosion is common on fans and in drainage depressions, and saline seepage is common in places on the Gilbert

River flats.

Elevation: 500 m at the northern end to 160 m at Stockport

Relief: Maximum relief is 60 m, but is commonly 20 - 40 m

Soils: Characteristic features of the soils include loamy to clay loamy surfaces with well structured

red clayey subsoils. Soils which are clayey throughout are common.

Main soils: D1a Hard loam over red clay on rock - extensive (rises)

D1b Hard loam over red clay on highly calcareous rock - extensive (rises)

C2a Shallow gradational red loam - limited (rises)

D3 Hard loam over dispersive red clay - common (alluvial outwash fans and flats)

Minor soils: Soils formed over weathering / deeply weathered basement rock on rises

A2 Calcareous loam

B4 Shallow friable loam over calcrete

C3a Deep red clay loamC2b Shallow friable loam

D7 Hard loam over dispersive red clay on rock

E3 Brown to red cracking clayL1 Shallow stony loam over rock

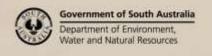
Soils formed over clayey alluvium on outwash fans and flats

C3b Deep gradational red loam

D2 Hard loam over well structured red clay

E2/E3 Red / brown cracking clay

M2 Deep red clay loam





Main features:

The Saddleworth Land System is characterized by medium to fine textured soils derived from siltstone parent rocks, in an undulating landscape. The soils are inherently fertile, moderately deep to deep and well drained. All land is arable except some minor steep rocky slopes and some wet saline flats associated with the Gilbert River. The main soil limitation is poor surface structure, mainly in texture contrast soils. This leads to excessive runoff and erosion, working difficulties and problems with emergence/early crop growth. However, the use of gypsum and modifications to surface management techniques can largely overcome this condition. Minor problems include water course erosion and waterlogging, salinity and boron toxicity on some flats and lower slopes. Overall, productivity potential is high.

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

SLU	% of	Main features #
JLU	area	Main reactics "
AAI	0.3	Non arable rocky slopes of 15-25% with eroded watercourses.
		Main soils: shallow friable loam - C2b/L1 (V) and calcareous loam - A2 (C). These slopes are exposed,
		with shallow stony soils. Agricultural uses are restricted to grazing.
DEB	9.8	Undulating rises formed on siltstones of the Saddleworth Formation.
DEC	43.4	DEB Low rises and very gentle slopes of 2-3%.
		DEC Rises and gentle slopes of 3-10%.
		Main soils: hard loam over red clay on rock - D1a/D1b (E), shallow gradational red loam - C2a (C), and
		shallow friable loam over calcrete - B4 (C), with deep red clay loam to clay - C3a/E3 (L), hard loam
		over dispersive red clay on rock - D7 (M) and calcareous loam - A2 (M). These soils are generally
		moderately deep, inherently fertile and well drained. Hard setting sealing surfaces are widespread,
		particularly in the texture contrast soils (D1 and D7), and these result in excessive runoff and erosion,
		as well as workability difficulties and emergence/early growth problems. The gradational loams are
		well structured, and represent the best soils, although some B4 soils are shallow. The clayey soils are
		very fertile, but difficult to work, and are often slow to respond to rain due to their high wilting points.
		Boron toxicity is associated with some soils on lower slopes. Overall, provided that erosion is
		controlled, this land is potentially highly productive.
DOC	0.6	Low ridges formed on Undalya Quartzite.
DOD	2.0	DOC Slopes are 5-12%.
		DOD Slopes are 10-20% with minor rock outcrop and up to 20% surface quartzite.
		Main soils: hard loam over red clay on rock - D1a/D1b (E) and hard loam over dispersive red clay on
		rock - D7 (E), with shallow friable loam - C2b/L1 (C) and shallow friable loam over calcrete - B4 (L).
		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. Much of the
EJD	0.9	land is only semi arable due to the slope and stone cover. Rises to 30 m high with slopes of 10-20% formed on calcareous rocks. There is up to 20% rocky
EJD	0.9	, , ,
		outcrop. Main soils: shallow friable loam - C2b/L1 (E), with hard loam over red clay on rock - D1a/D1b (C) and
		shallow friable loam over calcrete - B4 (L). This land is semi arable due to moderate slopes and rocky
		outcrops with associated shallow soils.
ESD	2.8	Moderately steep semi arable rises and footslopes with slopes of 10-20% and up to 10% rocky
LSD	2.0	outcrop. Main soils: hard loam over red clay on rock - D1a/D1b (E) and shallow friable loam - C2b/L1
		(E). This land is too steep and stony for extensive cropping, although gentler slopes are similar to
		DEC , with productive potential. Elsewhere the land is useful for grazing or establishment of woodlots
		or shelter belts.
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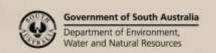
JAA	6.2	Flats and outwash fans formed on fine grained alluvium.
JAB	10.8	JAA Flats of the Gilbert River.
JAC	2.2	JAB Fans with slopes of 2-3%.
JAG	9.4	JAC Fans with slopes of 3-6%.
JAH	3.1	JAG Fans with slopes of 2-4% and eroded water courses.
JAJ	1.5	JAH Fans with slopes of 3-8% and eroded water courses.
JAK	1.1	JAJ Drainage depressions with slopes of 2-6% and severely eroded water courses.
JAO	0.4	JAK Flats of the Gilbert River with sporadic saline seepage.
JAP	1.5	JAO Drainage depressions with sporadic saline seepage.
		JAP Wet flats of the Gilbert River, with moderate to high levels of salinity.
		Main soils: <u>hard loam over dispersive red clay</u> - D3 (E), <u>hard loam over well structured red clay</u> - D2 (C)
		and deep gradational red loam to clay loam - C3b/M2 (C), with red / brown cracking clay - E2/E3 (L).
		The Gilbert River flats have less clayey soils than the fans and drainage depressions. These soils are
		deep and inherently fertile, but are prone to hard setting, sealing surfaces. These shed water, are
		difficult to work and cause emergence/early growth problems. They are also erodible. The D3 soils,
		with poorly structured and dispersive subsoils as well, are the most difficult to manage - the C3 soils
		are the best. Although the clays are well structured, they are prone to waterlogging and become sticky
		and intractable when wet. Water course erosion is common on many fans, so runoff control measures
		are required. Salinity has been a long term condition in the main river valley, but salt levels should be
		monitored throughout this land as minor seepages are developing. Boron toxicity tends to be
		associated with salinity.
JXC	2.2	Outwash fans with slopes of 3-8% formed on a complex of fine grained alluvium and basement
JXH	1.8	siltstones (JXC). In JXH there is minor water course erosion.
		Main soils: hard loam over dispersive red clay - D3 (E), hard loam over well structured red clay - D2 (L)
		and deep gradational red loam to clay loam - C3b/M2 (L) with red / brown cracking clay - E2/E3 (M)
		on outwash fans, and <u>hard loam over red clay on rock</u> - D1a/D1b (C), <u>shallow gradational red loam</u> -
		C2a (M), and shallow friable loam over calcrete - B4 (M) on rises. This land has features similar to
		JAC/JAH on the fans and DEC on the rises.
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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** Calcareous loam (Paralithic / Petrocalcic Calcarosol)
 - Calcareous loam to clay loam over brown soft or rubbly carbonate on a calcrete pan at 30 cm (35% of profiles) grading to weathering siltstone from about 70 cm.
- Shallow friable loam over calcrete (Petrocalcic, Red Dermosol / Petrocalcic, Leptic Tenosol)
 20 30 cm friable loam to clay loam grading to a red well structured clay loam in 70 % of profiles, and overlying hard calcrete at about 45 cm.
- C2a Shallow gradational red loam (Hypercalcic, Red Dermosol)
 - 20 35 cm clay loam to loam grading to a well structured red clay with soft carbonate from about 50 cm, over weathering siltstone from about 100 cm.
- **C2b** Shallow friable loam (Hypercalcic, Red Kandosol)
 - 20 30 cm friable loam grading to a red clay loam overlying highly calcareous weathering siltstone at about 45 cm.
- C3a Deep red clay loam to clay (Hypercalcic, Red Dermosol)
 - 15 25 cm brown crumbly light to medium clay grading to a well structured red or black heavy clay, with soft carbonate from about 60 cm grading to weathering siltstone from 60 cm to more than 100 cm.





C3b <u>Deep gradational red loam (Hypercalcic, Red Dermosol)</u>

20 cm crumbly clay loam to light clay grading to a well structured red clay, with soft carbonate from about 50 cm over alluvium.

D1a Hard loam over red clay on rock (Calcic, Red Chromosol)

20 - 35 cm hard loam to clay loam abruptly overlying a well structured red clay with minor to moderate amounts of soft and occasionally hard carbonate from about 50 cm. 20% of profiles have no carbonate. The soil overlies weathering siltstone at about 100 cm.

D1b Hard loam over red clay on highly calcareous rock (Hypercalcic, Red Chromosol)

15 - 30 cm hard loam to clay loam abruptly overlying a well structured red clay with abundant fine carbonate from about 50 cm. The soil overlies weathering siltstone at between 100 and 150 cm.

Hard loam over well structured red clay (Calcic, Red Chromosol)

35 - 45 cm hard silty loam to clay loam abruptly overlying a well structured red clay with soft carbonate from about 60 cm, over alluvium.

D3 Hard loam over dispersive red clay (Calcic, Red Sodosol)

30 - 40 cm hard silty loam to clay loam, often with a bleached A2 layer, abruptly overlying a red or brown coarsely structured clay with soft carbonate from about 80 cm (may be absent), over alluvium.

Pard loam over dispersive red clay on rock (Calcic, Red Sodosol)

20 cm hard quartz gravelly sandy loam to clay loam sharply overlying a red or brown coarsely structured dispersive clay with soft carbonate from about 40 cm, grading to quartzitic shale or sandstone, or quartz gravel from about 65 cm.

Brown to red cracking clay (Epipedal, Brown Vertosol)

Well structured dark clay (seasonally cracking) grading to a coarsely structured dark brown to red clay with variable fine carbonate, grading to very highly weathered rock deeper than 200 cm.

E2/E3 Red / brown cracking clay (Epipedal, Red / Brown Vertosol)

10 - 30 cm well structured, seasonally cracking red to dark brown clay, becoming more clayey and coarser structured with depth, with soft carbonate from 55 cm, grading to clayey alluvium.

L1 Shallow stony loam over rock (Calcareous, Paralithic, Leptic Tenosol)

Up to 30 cm stony loam overlying weathering siltstone or quartzite with fine carbonate in fissures.

M2 <u>Deep red clay loam (Calcic, Red Dermosol)</u>

Well structured brown loam to clay loam grading to a well structured red clay, weakly calcareous with depth, over alluvial clay.

Further information: DEWNR Soil and Land Program

