SPA Spalding Land System

Valley between Ward Hill Range and Bundaleer Reservoir Hills, extending from Washpool to Spalding.

Area: 36.2 km^2

Annual rainfall: 425 – 475 mm average

Geology: Siltstones of the Saddleworth Formation, and associated fine grained alluvial sediments deposited between the rises of basement rock. Both rocks and sediments are mantled by a veneer of fine aeolian carbonate.

Topography: The land system is a valley formed in softer rocks between the more resistant rocks of the Ward Hill and Bundaleer Reservoir Land Systems. The land surface has been eroded down to produce an undulating landscape of rises with slopes generally less than 10%, and outwash fans with slopes of less than 8%. There are two watersheds in the valley, directing stream flow south westwards into Cut Creek, southwards into Freshwater Creek, and north westwards into Baderloo Creek.

Elevation: 410 m in the north to 290 m at Spalding

Relief: Maximum relief is 40 m, but generally relief is less than 20 m

Soils: Most soils are deep over alluvium, with loamy to clay loamy surfaces and red clayey subsoils; differences between soils attributable to variations in structure and layer distinctness. On rises, soils are similar but shallower, and there are also loamy profiles without clayey subsoils. These are often calcareous throughout.

Main soils

Soils formed over alluvium on outwash fans and flats

D2 Hard loam over red clay
D3 Hard loam over dispersive red clay
M2 Gradational clay loam

Soils formed over basement rock on rises

A2 Shallow calcareous loam

Minor soils

Soils formed over basement rock on rises

D1 Hard loam over red clay on rock
L1 Shallow stony loam
C2 Gradational loam on rock

Main features: The Spalding Land System is fully arable in a reliable, moderately high rainfall area. Soils are generally deep, fertile and well drained with high production potential. The main limitations are related to the poor surface structure of many of the texture contrast soils (ie loam over clay types). These soils seal over and shed excess water, leading to erosion and loss of plant available water. They are also prone to working difficulty and emergence problems. However these limitations can be overcome through sound surface management and the use of ameliorants such as gypsum.

Soil Landscape Unit summary: 8 Soil Landscape Units (SLUs) mapped in the Spalding Land System:

SLU	% of area	Main features #
DCB DCC	2.0 12.5	Rises formed on siltstones of the Saddleworth Formation. **DCB** Very gently undulating rises, 10 to 20 m high with slopes of up to 3%. **DCC** Gently undulating rises 20-40 m high with slopes of 3-10%. Main soils: hard loam over red clay on rock - **D1** (E) with shallow calcareous loam - **A2** (C) and gradational loam on rock - **C2** (L). Shallow stony loam - **L1** (L) occurs where rock strata are hard. These soils are moderately fertile, well drained and have moderately high waterholding capacities. The slopes are mostly arable (except for minor rocky outcrops). Gradients are moderate with a consequent potential for water erosion. This is exacerbated by the predominant hard setting, poorly structured soil types which tend to seal over and shed water. Other limitations caused by poor structure are difficulty in working and patchy emergence.
EGC	9.8	Gently sloping rises formed on siltstones of the Saddleworth Formation. Rises are up to 20 m high with slopes of 5-10%. Main soils: shallow calcareous loam - **A2** (V) with hard loam over red clay on rock - **D1** (L) and gradational loam on rock - **C2** (L). The land is fully arable (except for minor outcrop), but because most of the soils are relatively shallow, moisture shortages may limit crops in dry finishes. Reduction of water loss and erosion through runoff is the main management issue, together with fertility maintenance. "Lime-induced" nutrient deficiencies are possible on calcareous soils.
ESD	0.7	Moderately steep slopes formed on siltstones with significant outcropping rock. Slopes are 10-20%. Main soils: shallow stony loam - **L1** (E), gradational loam on rock - **C2** (E) and shallow calcareous loam - **A2** (E). Rocky reefs, shallow stony soils and moderate slopes limit cropping of these areas. The arable land is generally confined to strips between the reefs of rock. Water erosion is a potential problem because of the high runoff from the shallow soils and rocky areas.
EZC	8.3	Complex of basement rock rises (75% of area) and outwash fans formed on alluvium (25% of area). Rises are about 10 m high with slopes of 4-8%. Fans have slopes of 2-5%. Main soils: shallow calcareous loam - **A2** (E) and shallow stony loam - **L1** (E) on rises, and hard loam over dispersive red clay - **D3** (L), with hard loam over red clay - **D2** (M) and gradational clay loam - **M2** (M) on fans. Despite the variability of soils, the land is potentially productive. Poor surface structure is the main problem, particularly on fans. Shallow soils on some rises may not perform well in dry finishes.
JEA JEB JEC	13.7 31.6 21.4	Outwash fans formed on alluvial sediments. **JEA** Fans with slopes of 1-2% **JEB** Fans with slopes of 2-4%. **JEC** Fans with slopes of 3-8%. Main soils: hard loam over red clay - **D2** (E), hard loam over dispersive red clay - **D3** (E) and gradational clay loam - **M2** (C). The soils have moderate to high waterholding capacities, are deep, inherently fertile and generally moderately well drained. The main limitations are poor surface (and subsurface in places) structure. Poor surface structure causes reduced water infiltration resulting in increased erosion potential and surface waterlogging, working difficulty and seedling emergence problems. Dispersive subsoils in the D3 soils cause more prolonged waterlogging. There is no evidence of salinity, but it is likely that at least subsoil levels of salt are moderate.

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 (Paralithic, Calcic / Lithocalcic Calcarosol)
Calcareous loam over soft to rubbly carbonate grading to weathering siltstone within 50 cm.

C2 Gradational loam on rock (Hypercalcic, Red Dermosol)
Loam to clay loam grading to a well structured red clay, highly calcareous with depth, over weathering siltstone within 100 cm.

D1 Hard loam over red clay on rock (Calcic, Red Chromosol)
Medium thickness hard loam abruptly overlying a red well structured clay, calcareous with depth grading to weathering siltstone within 100 cm.

D2 Hard loam over red clay (Calcic, Red Chromosol)
Medium thickness hard massive loam to clay loam abruptly overlying a well structured red clay grading to soft carbonate merging with alluvium from 100 cm.

D3 Hard loam over dispersive red clay (Calcic, Red Sodosol)
Medium thickness hard sandy loam to clay loam sharply overlying a poorly structured dispersive red clay, calcareous with depth, merging with alluvium from 100 cm.

L1 Shallow stony loam (Lithic, Leptic Tenosol / Rudosol)
Shallow stony loam grading to hard basement rock within 50 cm. Soft carbonate commonly occurs in rock fissures.

M2 Gradational clay loam (Calcic, Red Dermosol)
Medium thickness loam to light clay grading to a well structured red clay with soft (occasionally rubbly) carbonate at depth, merging with alluvium from 100 cm.

Further information: DEWNR Soil and Land Program