

# PAO Parnaroo Land System

**Area:** 217.6 km<sup>2</sup>

**Landscape:** Rocky range east of Oodlawirra and adjacent to the Porcupine Range. The ranges trend northeast to south-west with valleys and pediments draining east into Pine creek and west towards Hutton Lagoon. Named after Parnaroo property. Soils are very shallow and stony, mostly non-calcareous loams over rock. This land system is non-arable, due to both the shallowness of the soils and the difficulty in traversing the rocky terrain.

**Annual rainfall:** 255 – 325 mm average

**Geology:** The land system is underlain by Proterozoic rocks of the Adelaide Geosyncline, particularly Ulupa Siltstone, Ketchowla Siltstone and Pepuarta Tillite where the land is hilly and more strongly undulating. The gentler landscapes are underlain mostly by Enorama Shale, Tarcowie Siltstone and Tapley Hill Formation siltstones. Relatively young outwash sediments infill valley floors particularly in the northern part where broad alluvial plains are common.

**Soils:** Shallow stony loamy soils, often calcareous, dominate the rising ground, in association with outcropping rock. Deeper loamy to clay loamy soils on locally derived outwash occur on lower slopes, pediments and flats. These are also commonly calcareous.

## Main soils

### *On rock*

- L1a** Shallow stony loam
- L1b** Shallow stony loamy sand to sandy loam
- RR** Rock outcrop
- A2** Shallow calcareous loam to sandy loam

### *On outwash*

- A5** Rubbly calcareous sandy loam to clay loam on clay
- C1** Gradational sandy loam

## Minor soils

### *On rock*

- B2** Shallow calcareous loam to sandy loam on calcrete
- C2** Gradational loam on rock
- D1** Loam over clay on rock

### *On outwash*

- A3** Deep moderately calcareous loam to sandy loam
- A6** Gradational calcareous clay loam
- C3** Gradational clay loam
- D4** Loam to clay loam over pedaric red clay

**Summary:** This land system is non-arable, due to both the shallowness of the soils and the difficulty in traversing the rocky terrain.



**Soil Landscape Unit summary:** 47 Soil Landscape Units (SLUs) mapped in the Parnaroo Land System:

SLU	% of area	Component	Main soils	Prop#	Notes
AAA	0.1	Undulating rises	L1RRA2	D	Hills and rises with shallow rocky calcareous soils formed on fine grained rocks. Rock outcrops are common.
AAB	0.7	Rolling rises	L1RRA2	D	<b>AAA</b> Undulating rises. Relief is less than 30m, slopes are 3-10%.
AAC	20.0	Rolling low hills	L1RRA2	D	<b>AAB</b> Rolling rises. Relief is 9-30m, slopes are 10-30%.
AAD	2.0	Steep low hills	L1RRA2	D	<b>AAC</b> Rolling low hills. Relief is less than 30m, slopes are 10-30%.
					<b>AAD</b> Steep low hills. Relief is 30-90m, slopes are 30-50%. Main soils: <u>shallow stony loam</u> - <b>L1a</b> , <u>rock outcrop</u> - <b>RR</b> and <u>shallow calcareous loam</u> - <b>A2</b> .
ABC	0.2	Rolling low hills	L1RR	D	Hills and rises with linear rocky quartzite outcrops and shallow rocky sandy soils with shallow loamy soils on interbedded fine grained rocks.
ABG	1.4	Undulating rises	L1RR	D	<b>ABC</b> Rolling low hills. Relief is 30-90m, slopes are 3-10%.
ABJ	0.4	Steep low hills	L1RR	D	<b>ABG</b> Undulating rises. 10-20% gullied and eroded watercourses. Relief is less than 30m, slopes are 3-10%.
					<b>ABJ</b> Steep low hill. 10-20% gullied and eroded watercourses. Relief is 30-90m, slopes are 30-50%. Main soils: <u>shallow stony loamy sand</u> - <b>L1b</b> and <u>rock outcrop</u> - <b>RR</b> (quartzites), with <u>shallow calcareous loam</u> - <b>A2</b> (finer grained rocks).
AEA	0.8	Gently undulating rises	L1RR	D	Non arable rocky rises and low hills formed on mostly fine grained rocks, commonly calcreted.
AED	0.3	Steep rises	L1RR	D	<b>AEA</b> Gently undulating rises. Slopes are 1-3%, relief is < 30m.
AEH	0.7	Rolling rises	L1RR	D	<b>AED</b> Steep rises. 10-20% gullied and eroded watercourses. Relief is 9-30m, slopes are 30-50%.
AEI	2.3	Rolling low hills	L1RR	D	<b>AEH</b> Rolling rises. 10-20% gullied and eroded watercourses. Relief is 9-30m, slopes are 10-30%.
AEJ	5.1	Steep rises	L1RR	D	<b>AEI</b> Rolling low hills, moderately gullied (10-20% affected). Relief is 30-90m, slopes are 3-10%.
					<b>AEJ</b> Steep rises with eroded watercourses (10-20% affected). Relief is 9-30m, slopes are 30-50%. Main soils: <u>shallow stony loam</u> - <b>L1a</b> and <u>rock outcrop</u> - <b>RR</b> , with <u>shallow calcareous loam on calcrete</u> - <b>B2</b> , <u>loam over clay on rock</u> - <b>D1</b> and <u>shallow calcareous loam</u> - <b>A2</b> .
AHB	3.3	Rolling rises	L1RR	D	Rolling rises and low hills with very shallow loam over quartzite with fine grained interbeds.
AHC	1.1	Rolling low hills	L1RR	D	<b>AHB</b> Rolling rises. Relief is 9-30m, slopes are 10-30%.
					<b>AHC</b> Rolling low hills. Relief is 30-90m, slopes are 3-10%. Main soils: <u>shallow stony loam</u> - <b>L1a</b> and <u>rock outcrop</u> - <b>RR</b> .
AIA	3.2	Gently undulating rises	L1RRC2	D	Rises formed on fine grained rock.
AIB	3.4	Rolling rises	L1RRC2	D	<b>AIA</b> Gently undulating rises. Slopes are 1-3%, relief is < 30m.
					<b>AIB</b> Rolling rises. Relief is 9-30m, slopes are 10-30%. Main soils: <u>shallow stony loam</u> - <b>L1a</b> , <u>rock outcrop</u> - <b>RR</b> and <u>gradational loam on rock</u> - <b>C2</b> .
ASA	0.5	Undulating rises	L1RR	D	Gently undulating rises formed on quartzite, which often outcrops. Inter-beds are coarse grained. Slopes: 1-3%; relief <30m
					Main soils: <u>shallow stony loamy sand</u> - <b>L1b</b> and <u>rock outcrop</u> - <b>RR</b> .
AYA	0.3	Undulating rises	A2L1RR	D	Rises formed on calcareous siltstone or other fine grained rocks, with rock outcrop.



AYB	5.0	Rolling rises	A2L1RR	D	<b>AYA</b> Undulating rises. Relief is < 30m, slopes are 3-10%. <b>AYB</b> Rolling rises. Relief is < 30m, slopes are 10-30%. Main soils: <u>shallow calcareous loam</u> - <b>A2</b> , <u>shallow stony loam</u> - <b>L1a</b> and <u>rock outcrop</u> - <b>RR</b> .
DaB	0.5	Gently undulating pediments	D1D4 C2	D	Gently sloping pediment plains formed on weathering rock or associated outwash. Slopes 1-3%, relief is < 9m. Main soils: <u>clay loam over pedaric red clay</u> - <b>D4</b> , <u>loam over (pedaric) red clay on rock</u> - <b>D1</b> and <u>gradational loam on rock</u> - <b>C2</b> .
ERH	5.2	Undulating rises	A2L1RR	D	Undulating rises formed on calc-siltstones, with extensive outcropping rock. Relief <30m, slopes 3-10%. Main soils: <u>shallow calcareous loam</u> - <b>A2</b> , <u>shallow stony loam</u> - <b>L1a</b> and <u>rock outcrop</u> - <b>RR</b> .
EVB	1.0	Gently und. rises	A2	V	Rises formed on calc-siltstones with 20-30% rocky outcrops and calcareous loamy soils.
		Rocky outcrops	RR	C	<b>EVB</b> Gently sloping rises. Slopes 1-3%, relief is < 30m.
EVC	0.7	Undulating rises	A2	V	<b>EVC</b> Undulating rises. Relief is < 30m, slopes are 3-10%.
		Rocky outcrops	RR	C	<b>EVD</b> Rolling rises. Relief is <30m, slopes are 10-30%. <b>EVH</b> Undulating rises. Moderately gullied. Relief is less than 30m, slopes are 3-10%.
EVD	1.3	Rolling rises	A2	V	Main soils:
		Rocky outcrops	RR	C	<b>Rises:</b> <u>shallow calcareous loam</u> - <b>A2</b> , with <u>rubbly calcareous loam on clay</u> - <b>A5</b> and <u>shallow calcareous loam on calcrete</u> - <b>B2</b> . <b>Rocky areas:</b> <u>rock outcrop</u> - <b>RR</b> , with <u>shallow stony loam</u> - <b>L1a</b> .
EVH	2.6	Und. rises	A2	V	
		Rocky outcrops	RR	C	
EZB	0.4	Gently undulating rises	A2A5 B2	V	Rises formed on calc-sandstones with 20-30% rocky outcrops and calcareous sandy loam soils.
		Rocky outcrops	RR	C	<b>EZB</b> Gently undulating rises. Slopes 1-3%, relief < 30m. <b>EZC</b> Undulating rises. Relief < 30m, slopes are 3-10%.
EZC	0.7	Undulating rises	A2A5 B2	V	Main soils:
		Rocky outcrops	RR	C	<b>Rises:</b> <u>shallow calcareous sandy loam</u> - <b>A2</b> , <u>rubbly calcareous sandy loam on clay</u> - <b>A5</b> , <u>shallow calcareous sandy loam on calcrete</u> - <b>B2</b> . <b>Rocky outcrops:</b> <u>rock outcrop</u> - <b>RR</b> , with <u>shallow stony sandy loam</u> - <b>L1b</b> and <u>shallow calcareous sandy loam on calcrete</u> - <b>B2</b> .
JLB	0.8	Pediments	D4	D	Gently sloping pediments formed on fine grained outwash. Slopes are 1-3%, relief is less than 9m. Main soils: <u>loam over pedaric red clay</u> - <b>D4</b> and <u>deep moderately calcareous loam</u> - <b>A3</b> .
JPoo	3.2	Creek flats	D4A5	D	Creek flats formed on clayey alluvium. Severely gullied and moderately scalded. Main soils: <u>clay loam over pedaric red clay</u> - <b>D4</b> and <u>rubbly calcareous clay loam on clay</u> - <b>A5</b> , with <u>gradational clay loam</u> - <b>C3</b> .
JZB	1.8	Pediment	D4A5	V	Pediments formed on fine grained outwash with 20-30% rocky outcrops.
		Rocky outcrops	RR	C	<b>JZB</b> Gently sloping pediments. Slopes 1-3%, relief < 9m.
JZH	2.0	Pediment	D4A5	V	<b>JZH</b> Undulating pediments. Moderately gullied. Slopes are 3-10%, relief is less than 9m.
		Rocky outcrops	RR	C	Main soils: <b>Pediments:</b> <u>clay loam over pedaric red clay</u> - <b>D4</b> and <u>rubbly calcareous clay loam on clay</u> - <b>A5</b> , with <u>deep moderately calcareous loam</u> - <b>A3</b> . <b>Rocky rises:</b> <u>rock outcrop</u> - <b>RR</b> with <u>shallow stony loam</u> - <b>L1a</b> .
KLA	0.7	Plains	A5	D	Plains formed on fine grained outwash, weathering rock or calcrete. Slopes are less than 1%.



					Main soils: <u>rubbly calcareous loam on clay</u> - <b>A5</b> , with <u>shallow calcareous loam</u> - <b>A2</b> , <u>gradational loam on rock</u> - <b>C2</b> and <u>shallow calcareous loam on calcrete</u> - <b>B2</b> .
KNC	0.3	Undulating pediment plains	A5D4	D	Undulating pediment plains formed on fine grained outwash. Slopes are 3-10%, relief is less than 9m. Main soils: <u>rubbly calcareous loam on clay</u> - <b>A5</b> and <u>loam over pedaric red clay</u> - <b>D4</b> , with <u>gradational clay loam</u> - <b>C3</b> .
KQB	8.3	Pediments	A5	V	Complex of pediments formed on clayey outwash and 20-30% rises formed on fine grained rock. <b>KQB</b> Gently undulating pediments. Slopes 1-3%, relief is < 9m. <b>KQC</b> Undulating pediments and rises. Slopes 3-10%, relief < 9m. Main soils: <b>Pediments:</b> <u>rubbly calcareous clay loam on clay</u> - <b>A5</b> , with <u>clay loam over pedaric red clay</u> - <b>D4</b> . <b>Low rises:</b> <u>shallow calcareous loam</u> - <b>A2</b> , with <u>shallow calcareous loam on calcrete</u> - <b>B2</b> and <u>rock outcrop</u> - <b>RR</b> .
		Low rises	A2	C	
KQC	1.1	Pediments	A5	V	
		Low rises	A2	C	
KVB	0.5	Gently sloping plain	A6	D	Gently sloping plains formed on fine grained outwash. Slopes are 1-3%, relief is less than 9m. Main soils: <u>gradational calcareous clay loam</u> - <b>A6</b> , with <u>rubbly calcareous clay loam on clay</u> - <b>A5</b> and <u>deep moderately calcareous loam</u> - <b>A3</b> .
KXB	2.7	Pediment	C1	D	Pediments and creek flats formed on medium grained alluvium with sandy loam soils. <b>KXB</b> Gently sloping pediments with slopes of 1-3%. <b>KXC</b> Undulating pediments with slopes of 3-10%. <b>KXG</b> Gently sloping pediments. Moderately gullied (10-20%). Slopes are 1-3%. <b>KXoo</b> Creek flats. Severely gullied (>20%) and moderately scalded (10-50%). Main soils: <u>gradational sandy loam</u> - <b>C1</b> , with <u>rubbly calcareous sandy loam on clay</u> - <b>A5</b> and <u>deep moderately calcareous sandy loam</u> - <b>A3</b> .
KXC	0.3	Pediment	C1	D	
KXG	7.9	Pediment	C1	D	
KXoo	2.9	Creek flat	C1	D	
KZB	0.2	Gently undulating pediment	A5C1	D	Pediments formed on medium grained outwash. <b>KZB</b> Gently undulating pediments. Slopes 1-3%. <b>KZC</b> Undulating pediments. Slopes 3-10%.
KZC	0.2	Undulating pediment	A5C1	D	Main soils: <u>rubbly calcareous sandy loam on clay</u> - <b>A5</b> and <u>gradational sandy loam</u> - <b>C1</b> , with <u>deep moderately calcareous sandy loam</u> - <b>A3</b> .
KcB	0.7	Gently undulating pediment	A5D4 C1	D	Pediments formed on clayey outwash <b>KcB</b> Gently sloping pediments. Slopes are 1-3%. <b>KcC</b> Undulating pediments. Slopes are 3-10%.
KcC	0.6	Undulating pediment	A5D4 C1	D	<b>KcH</b> Undulating pediments. Moderately gullied (10-20%). Slopes are 3-10%. Main soils: <u>rubbly calcareous clay loam on clay</u> - <b>A5</b> , <u>clay loam over pedaric red clay</u> - <b>D4</b> and <u>gradational sandy loam</u> - <b>C1</b> .
KcH	0.4	Undulating pediment	A5D4 C1	D	
KdG	0.4	Gently undulating pediment	C3	D	Pediments and flats formed on clayey outwash. 10-20% gullied. <b>KdG</b> Gently undulating pediments. Slopes 1-3%. <b>Kdo</b> Creek flats. Moderately gullied (10-20%) and scalded (10-50%).
Kdo	1.8	Creek flat	C3	D	Main soils: <u>gradational clay loam</u> - <b>C3</b> , with <u>clay loam over pedaric red clay</u> - <b>D4</b> and <u>gradational calcareous clay loam</u> - <b>A6</b> .



# PROPORTION codes assigned to Soil Landscape Unit (SLU) components:

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:

- A2** Shallow calcareous loam to sandy loam (Paralithic, Hypercalcic / Lithocalcic Calcarosol)  
Calcareous stony loam to sandy loam grading to soft or rubbly carbonate over weathering dolomite or calc-siltstone within 50 cm.
- A3** Deep moderately calcareous loam to sandy loam (Regolithic, Calcic Calcarosol)  
Calcareous loam to sandy loam grading to a loamy to clayey subsoil without a significant carbonate accumulation in the subsoil, grading to medium to fine grained alluvium.
- A5** Rubbly calcareous sandy loam to clay loam on clay (Regolithic, Supracalcic / Hypercalcic Calcarosol)  
Calcareous sandy loam to clay loam grading to a very highly calcareous rubbly sandy clay loam to light clay, over a clayey substrate deeper than 60 cm, but within 120 cm.
- A6** Gradational calcareous clay loam (Pedal, Hypercalcic / Supracalcic Calcarosol)  
Calcareous clay loam grading to a well structured very highly calcareous (sometimes rubbly) clay, over a red clayey substrate within 120 cm.
- B2** Shallow calcareous loam to sandy loam on calcrete (Petrocalcic, Calcic / Lithocalcic Calcarosol)  
Stony calcareous loam to sandy loam, often with a very highly calcareous more clayey subsoil, over sheet calcrete within 50 cm. This grades to rubbly carbonate over weathering basement rock within 150 cm.
- C1** Gradational sandy loam (Hypercalcic, Red Kandosol)  
Friable sandy to loamy topsoil grading to massive red-brown alkaline loamy to clay loamy subsoil, highly calcareous with depth, over alluvium.
- C2** Gradational loam on rock (Calcic / Hypercalcic Red Dermosol)  
Loam grading to a friable red clay with soft Class I carbonate within 50 cm, grading to weathering rock within 100 cm.
- C3** Gradational clay loam (Calcic / Hypercalcic Red Dermosol)  
Friable clay loam grading to a friable red clay with abundant soft Class I carbonate within 50 cm, overlying alluvium within 100 cm.
- D1** Loam over clay on rock (Hypercalcic / Calcic, Red Chromosol)  
Medium thickness hard gravelly loam over a friable and finely structured red clay, calcareous with depth, grading to weathering basement rock within 100 cm.
- D4** Loam to clay loam over red friable clay (Calcic, Pedaric, Red Sodosol)  
Thin to medium thickness loam to clay loam over a finely structured friable red clay, calcareous from about 50 cm, grading to fine or medium grained alluvium.
- L1a** Shallow stony loam (Paralithic, Leptic Tenosol)  
Shallow stony loam, often calcareous with depth, over weathering fine grained rock shallower than 50 cm.
- L1b** Shallow stony loamy sand to sandy loam (Paralithic, Leptic Tenosol)  
Shallow stony sandy loam, often calcareous with depth, over sandstone or quartzite shallower than 50 cm.
- RR** Rock outcrop

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

