PAT Pattana Land System

Area: 131.0 km^2

Landscape: A low range trending northeast to southwest consisting of hills and rises which flank either side of the higher Kanyaka Range. Small pediments are associated and drainage is to the northeast.

Annual rainfall: 235 – 365 mm average

Geology: The land system is formed predominantly on Tapley Hill Formation calc-siltstones and shales, but also on Bunyeroo, Wonoka and Willochra Formation siltstones and fine sandstones, and Skillogalee Dolomites.

Elevation: Elevations vary between 140 and 450 m asl

Relief: Relief is as much as 70 m in the northern ranges, and is commonly 20-30 m in the southern part of the land system.

Main soils:

Shallow soils on rises formed on weathered fine grained rocks:

L1 Shallow stony loam to sandy loam
A2 Shallow calcareous loam

Minor soils:

Formed on basement rock

B2 Shallow calcareous loam on rock
C2 Gradational loam on rock
D1 Loam over clay on rock
D7 Loam over poorly structured red clay on rock
RR Rock outcrop

Formed on alluvium

A3 Deep moderately calcareous clay loam
A4 Deep (rubbly) calcareous loam
A5 Rubbly calcareous clay loam on clay
A6 Gradational calcareous clay loam
C1 Gradational sandy loam
C3 Gradational clay loam
C4 Hard gradational clay loam
D2 Loam over red clay
D3 Loam to clay loam over poorly structured red clay
D4 Loam to clay loam over pedaric red clay
E2 Red cracking clay
M1 Deep alluvial sandy loam
M3 Deep gravelly sandy loam

Summary: Steep to rolling rises and low hills on calc-siltstones mostly with shallow calcareous soils on upper slopes and crests; deeper red clay and loamy red earthy soils on pediment slopes and red texture contrast soils on low angle pediments and valley flats. Scalding and gullying are common on lower slopes and drainage lines.

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

SLU	% of area	Component	Main soils	Prop#	Notes
AAB	2.1	Rolling rises	L1	V	Rises and hills with shallow rocky calcareous soils formed on Tapley Hill or Willochra Formation calc-siltstones. **AAB** ***Rolling rises***: Relief is less than 30m, slopes are 10-30%. Main soils: shallow stony sandy loam **- L1** with loam over poorly structured clay on rock - **D7**. ***Undulating rises***: Relief is less than 30m, slopes are less than 10%. Main soils: loam over poorly structured red clay on rock - **D7** with shallow calcareous loam - **A2**. **AAC** Rolling low hills. Willochra Formation siltstone and sandstone are exposed as rocky outcrops on ridges. Relief is less than 30m slopes are 10-30%. Main soils: shallow stony loam **- L1** and gradational loam on rock - **C2**. **AAD** Steep low hills with extensive rock outcrop and very shallow, calcareous rocky sandy loam soils. Drainage lines are incised. Slopes are 30% to 60%, up to 75% in places. On some upper slopes and broader crests, slopes are less than 10%. Relief varies up to 90m. Main soil: shallow stony sandy loam **- L1**. **AAE** Steep hills with very shallow loamy soils and extensive rock outcrop. Relief is more than 90m, Slopes 30-60%. Main soils: shallow stony loam **- L1**, with shallow calcareous loam - **A2**. **AAh** Rolling rises with extensive rock outcrop and very shallow, calcareous rocky loamy soils. Relief is less than 30m, slope steepness is between 10 and 30%. Watercourses are eroded and incised. Scalding and sheet erosion are common. Main soils: shallow stony loam **- L1** and loam over poorly structured clay on rock - **D7** with shallow calcareous loam - **A2**. **AAO** Rolling low hills with slight to moderate scalding and sheet erosion with gullied areas on steeper slopes. Gullies are remnant features and are mostly inactive. Tapley Hill Formation calcareous siltstones outcrop discontinuously. Relief is 30-90m, slopes are 10-30%. Main soils: shallow stony loam **- L1** and gradational loam on rock - **C2,** which tend to be powdery and easily erodible.
		Undulating rises	D7	C	
AAC	0.2	Rolling low hills	L1C2	D	
AAD	2.3	Steep low hills	L1	D	
AAE	1.2	Steep hills	L1	D	
AAh	1.4	Rolling rises	L1D7	D	
AAO	4.9	Rolling low hills	L1C2	D	
ADB	0.4	Rolling rises	L1	V	Rises with very shallow stony loamy soils formed on Skillogalee Dolomite and calcareous fine grained rock. **ADB** Rolling rises with extensive rock outcrop on steeper ridges. Relief less than 30m, slopes 10-30%. Limited lower slope pediments. **ADH** As for ADB but with eroded drainage lines. Main soils: ***Rises:*** shallow stony sandy loam - **L1**. ***Pediment***s: gradational loam on rock - **C2** and loam over clay on rock - **D1**.
		Pediments	C2D1	L	
ADH	3.2	Rolling rises	L1	V	
		Pediments	C2D1	L	

AGH	1.4	Rolling rises	D1L1	D	Rolling rises with shallow non-calcareous soils over Pound Quartzite and Cambrian age limestones. Relief is less than 30m, slopes are 10-30%. Main soils: loam over clay on rock - **D1**, shallow stony loam **- L1**.
AYB	6.4	Rolling rises	L1	D	Hills and rises on fine grained rocks. **AYB** Rolling rises. Relief is less than 30m, slopes are 10-30%. **AYI** Rolling low hills. Relief is 30-90m, slopes are 10-30%. Main soils: shallow stony loam **- L1** and shallow calcareous loam - **A2**.
AYI	3.9	Rolling low hills	L1A2	D	
DDC	1.4	Undulating rises	D1L1C2	D	Undulating rises with relief of 9-30m and slopes of 3-10%, formed on fine grained rocks. Main soils: loam over clay on rock- **D1**, shallow stony loam **- L1** and gradational loam on rock - **C2**, with shallow calcareous loam - **A2**. Soils are fertile, but water-holding capacity is low.
DHH	0.7	Undulating rises	D1	D	Rises formed on Cambrian age limestone. **DHH** Undulating rises. 10-20% of land is gullied. Relief is 9-30m, slopes are 10-30%. **DHn** Rolling rises with relief of less than 30m and slopes of 10-30%. Gullying affects 10-20% of land and 5-10% is scalded. Minor drainage lines are severely gullied and scalded. Main soils: ***Rises***: loam over clay on rock - **D1**, loam over poorly structured clay on rock - **D7** and shallow stony loam **- L1**, with gradational loam on rock - **C2**. ***Drainage lines***: loam over poorly structured red clay - **D3** and loam over pedaric red clay - **D4**, with gradational sandy loam - **C1** and red cracking clay - **E2**.
DHn	1.4	Rolling rises	D7L1	D	
		Drainage lines	D3D4	M	
DMB	1.2	Foot slopes	D4D3D7	D	Footslopes, pediments and valley floors formed on weathered fine grained rocks and associated outwash. **DMB** Pediment foot slopes with gravelly surface lag. Slopes are less than 1%. 5-10% gullied, 5-10% scalded. **DMC** Gently sloping pediment and fan deposits with slopes of 1-3%, relief is less than 9m. Drainage lines are incised, 5-10% gullied. Minor scalding on lower slopes. 10-20% rocky rises with extensive outcrop. **DMG** Gently undulating valley floors with incised creek lines, 5-10% gullied. Slopes are 1-3%. Main soils: ***Pediments and fans***: clay loam over pedaric red clay - **D4**, clay loam over poorly structured red clay - **D3**, loam over poorly structured clay on rock - **D7** and loam over clay on rock - **D1**, with red cracking clay - **E2**, deep gravelly sandy loam - **M3**, and deep moderately calcareous clay loam - **A3**. ***Rocky rises***: shallow stony loam **- L1**, with shallow calcareous loam - **A2**.
DMC	1.3	Pediments	D1D7 M3	V	
		Rocky rises	L1	L	
DMG	0.6	Valley floors	D3D4D1	D	
DNZ	0.4	Plateau	E2	D	Plateau surface with clayey soils formed on Brachina Shale. Surface gravel common. Main soils: red cracking clay - **E2,** with clay loam over pedaric red clay - **D4** and shallow stony loam **- L1**.
EFB	1.9	Gently undulating rises	A2L1	D	Rises on calc-siltstones, typically of the Tapley Hill Formation. Soils are loamy and marginally saline. **EFB** Gently undulating rises. Relief is 9-30m, slopes are 1-3%. **EFg** Gently undulating rises. 10-20% of land affected by
EFg	0.1	Gently undulating rises	A2A6	D	

EFm	0.2	Undulating rises	L1	D	gullying, and 10- 50% is scalded. **EFm** Undulating rises with relief of 9-30m and slopes < 10%. 10-20% of land affected by gullying, and 10- 50% is scalded. Main soils: shallow calcareous loam - **A2**, gradational calcareous clay loam - **A6** and shallow stony loam **- L1**.
EHm	2.8	Undulating rises	A2L1	D	Rises with moderately shallow soils on calc-siltstones and limestones. **EHm** Undulating rises with slopes of 3-10% and relief to 30 m. 10-20% of land is gullied and 10-50% is scalded. **EHn** Rolling rises with slopes of 10-30% and relief of 9-30m. Pediments occupy 20-30% of the landscape. 10-20% of land is gullied and 10-50% is scalded. **EHW** Undulating rises. Slopes are 3-10%, relief is less than 30m. 10-50% of land is scalded. **EHw** Undulating rises. 10-20% of land is gullied and more than 50% is scalded. Main soils: ***Rises***: shallow calcareous loam - **A2** and shallow stony loam **- L1**, with loam over clay on rock - **D1**, loam over poorly structured clay on rock - **D7**, deep (rubbly) calcareous loam - **A4**, loam over pedaric red clay - **D4**, shallow calcareous loam on calcrete - **B2** and rock outcrop - **RR**. ***Pediments***: shallow calcareous loam - **A2**, with hallow calcareous loam on calcrete - **B2** and rock outcrop - **RR**.
EHn	0.1	Rolling rises	A2L1	V	
		Pediments	A2	C	
EHW	7.8	Undulating rises	A2L1	D	
EHw	0.1	Undulating rises	A2L1	D	
EOw	10.6	Undulating rises	A2L1	D	Rises with pulverulent calcareous soils formed mainly on Hawker Group Limestones. **EOw** Undulating rises. Slopes are 3-10%, relief is less than 30m. Gullying affects < 20% of land, scalding affects > 50% of land. **EOx** Rolling rises as above. Gullying affects up to 20% of land, scalding affects more than 50% of land. Main soils: shallow calcareous loam - **A2** and shallow stony loam **- L1**, with loam over poorly structured clay on rock - **D7**.
EOx	2.3	Rolling rises	A2L1	D	
EUC	0.3	Undulating rises	L1C2A2	D	**EUC** Undulating rises with relief of < 30m and slopes of 3-10%. **EUD** Rolling rises with relief of < 30m and slopes of 10-30%. Main soils: shallow stony loam **- L1**, shallow calcareous loam - **A2**, loam over red clay - **D2** and gradational loam on rock - **C2**.
EUD	3.2	Rolling rises	L1A2D2	D	
EZH	6.2	Undulating rises	C2D1	D	Undulating rises less than 30m high, with slopes of 3-10%, formed on Hawker Group limestones and associated outwash. **EZH** Rises with 0-20% of land affected by gullying. **EZm** Rises with 0-20% of land affected by gullying, and 10-50% scalded. Main soils: gradational loam on rock - **C2** and loam over clay on rock- **D1**, with shallow stony loam **- L1**.
EZm	2.5	Undulating rises	C2D1	D	
JEG	0.6	Pediment	D2	D	Plains and pediments formed on clayey alluvium. **JEG** Gently sloping pediments with slopes of 1-3% and relief of less than 9m. 5-10% of land affected by gullying. **JEu** Plains, 5-10% affected by gullying and more than 50% scalded. Main soils: clay loam over pedaric red clay - **D4** and loam over red clay - **D2**, with gradational calcareous clay loam - **A6**.
JEu	1.6	Plain	D4	D	
JFV	1.6	Pediments	D2	V	Gently sloping pediments formed on fine grained outwash with

		Foot slopes	D4D3	C	20-30% severely scalded and gullied footslopes. Less than 10% of pediments are scalded. Main soils: ***Pediments***: clay loam over red clay - **D2**, with rubbly calcareous loam on clay - **A5** and red cracking clay - **E2**. ***Footslopes***: clay loam over pedaric red clay - **D4** and clay loam over poorly structured red clay - **D3**, with rubbly calcareous loam on clay - **A5** and red cracking clay - **E2**.
JMl	1.0	Pediments	D2	V	Pediments formed on medium to fine grained outwash, with abundant surface and topsoil quartz gravel. **JMl** Gently sloping pediments with 20-30% rises formed on Tapley Hill Formation calc-siltstones. Slopes are 1-3%. 10-20% of pediments are gullied, and 10-50% of land is scalded. Rises are not significantly affected. **JMm** Undulating pediments with slopes of 3-10%. Gullying affects 10-20% of land and 5-10% is scalded. **JMV** Gently inclined pediment foot slopes with slopes of 1-3%. 10-50% of land is scalded. Main soils: ***Pediments***: clay loam over red clay - **D2**, loam over pedaric red clay - **D4** and gradational calcareous clay loam - **A6**, with gradational sandy loam - **C1** and hard gradational sandy clay loam - **C4**. ***Rises:*** shallow stony loam - **L1** and loam over clay on rock - **D1**, with loam over poorly structured clay on rock - **D7**.
		Gently undulating rises	L1D1	C	
JMm	1.7	Pediments	D2	D	
JMV	1.6	Pediment foot slopes	D2D4A6	D	
JXG	3.1	Pediments	D1D2	D	Pediments formed on fine grained weathered rocks and outwash, with minor rocky rises. Pediment slopes are 1-3%. 10-20% of land is affected by gullying. Main soils: ***Pediments***: loam over clay on rock - **D1** and clay loam over red clay - **D2**, with gradational calcareous clay loam - **A6**. ***Rises***: shallow stony loam - **L1**, loam over clay on rock - **D1** and shallow calcareous loam - **A2**, with loam over poorly structured clay on rock - **D7**.
		Undulating rises	L1D1A2	M	
JZl	2.2	Plains	D4C4	D	Gently sloping plains formed on clayey sediments, with minor rocky rises. Slopes are 1-3%. 10-20% of plains are affected by gullying and 10-50% are scalded. Main soils: ***Plains***: clay loam over pedaric red clay - **D4** and hard gradational clay loam - **C4**. ***Rises***: shallow stony loam - **L1**, loam over clay on rock - **D1** and shallow calcareous loam - **A2**, with loam over poorly structured clay on rock - **D7**.
		Gently undulating rises	L1D1A2	M	
KAH	0.8	Valley flats	C3A2	D	Valley flats formed on clayey outwash sediments and fine grained weathering rock. 10-20% of land affected by gullying. Main soils: gradational clay loam - **C3** and shallow calcareous loam - **A2**, with clay loam over pedaric red clay - **D4**.
KBC	6.4	Pediments	A4E2	D	Pediments formed on fine to medium grained outwash sediments. Slopes are 3-10%. Main soils: deep (rubbly) calcareous loam - **A4** and red cracking clay - **E2**.
KIB	0.2	Pediments	C1A2D2	D	Pediments formed on outwash sediments, with up to 20% rocky rises formed on fine grained rocks.
KIl	1.0	Pediments	C1A2	V	

		Gently undulating rises	L1C1A2	L	**KIB** Gently sloping pediments with slopes 1-3%. No rocky rises. **KIl** Gently sloping pediments with slopes of 1-3%, and 10-20% rocky rises. Gullying affects 10-20% of land and 10-50% is scalded. Rocky rises are not eroded. **KIm** Undulating pediments with slopes of 3-10%, and 10-20% rocky rises. Gullying affects 10-20% of land and 10-50% is scalded. Rocky rises are not eroded. Main soils: ***Pediments***: gradational sandy loam - **C1**, shallow calcareous loam - **A2**, loam over poorly structured red clay - **D3** and loam over red clay - **D2**. ***Rises***: shallow stony loam - **L1**, shallow calcareous loam - **A2**, gradational loam on rock - **C2**, and loam over clay on rock - **D1**, with loam over poorly structured clay on rock - **D7**.
KIm	1.3	Pediments	C1A2D3	V	
		Gently undulating rises	L1A2D1	L	
KMB	0.3	Pediments	A6A5	D	Pediments formed on outwash sediments, with slopes of 1-3%. Main soils: gradational calcareous clay loam - **A6** and rubbly calcareous loam on clay - **A5**, with loam over red clay - **D2**.
XJJ	3.7	Floodplains	M3M1	D	Creek flats of Mt Arden creek with well defined watercourses and gravelly alluvial soils. Prone to flooding. Main soils: deep gravelly sandy loam - **M3** and deep alluvial sandy loam - **M1**, with sandy loam over red clay - **D2**.
XKN	0.4	Watercourses	M1	D	Part of Willochra Creek watercourse formed on coarse textured and gravelly alluvial sediments. Prone to flooding. Main soils: deep alluvial sandy loam - **M1**, with deep gravelly sandy loam - **M3**.

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 (Paralithic, Hypercalcic / Lithocalcic Calcarosol)
Calcareous stony loam grading to soft or rubbly carbonate over weathering dolomite or calc-siltstone within 50 cm.

A3 Deep moderately calcareous clay loam (Regolithic, Calcic Calcarosol)
Calcareous clay loam grading to a moderately calcareous red to brown sandy clay loam to clay, over alluvium.

A4 Deep (rubbly) calcareous loam (Regolithic, Hypercalcic / Lithocalcic Calcarosol)
Calcareous loam grading to a very highly calcareous sandy clay loam to light clay with variable rubble, continuing below 120 cm.

A5 Rubbly calcareous clay loam on clay (Regolithic, Supracalcic / Hypercalcic Calcarosol)
Calcareous 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 on calcrete (Petrocalcic, Calcic / Lithocalcic Calcarosol)
Stony calcareous 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.

C4 Hard gradational clay loam (Sodic, Hypercalcic, Red Dermosol)
Hard setting loam to clay loam grading to a coarsely structured dispersive red clay, highly calcareous with depth, over clayey alluvium. Includes eroded former texture contrast soils.

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.

D2 Loam over red clay (Calcic / Hypercalcic, Red Chromosol)
Hard setting loam (with variable quartzite stones) abruptly overlying a well structured red clay with soft Class I carbonate at depth.

D3 Loam to clay loam over poorly structured red clay (Calcic, Red Sodosol)
Medium thickness hard loam to clay loam with up to 50% quartzite stones over a coarsely prismatic dispersive red clay, calcareous with depth over stony and clayey alluvium.

D4 Loam to clay loam over crumbly (pedaric) red 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.

D7 Loam over poorly structured red clay on rock (Calcic / Hypercalcic, Red Sodosol)
Medium to thick hard loam sharply overlying a coarsely structured dispersive red clay, calcareous with depth, grading to highly weathered kaolinized siltstone or quartzite.

E2 Red cracking clay (Epicalcareous, Epipedal, Red Vertosol)
Dark strongly structured clay grading to a well structured red calcareous medium to heavy clay continuing below 100 cm. Often containing gypsum segregations in subsoil.

L1 Shallow stony loam to sandy loam (Paralithic, Leptic Tenosol)
Shallow stony loam to sandy loam, often calcareous with depth, overlying weathering fine grained rock shallower than 50 cm.

M1 Deep alluvial sandy loam (Calcareous, Regolithic, Brown-Orthic Tenosol)
Very thick brown loamy sand to sandy loam, usually calcareous with depth, continuing below 100 cm.

M3 Deep gravelly sandy loam (Basic, Fluvic, Clastic Rudosol OR Basic, Regolithic, Red-Orthic Tenosol)
Thick to very thick sandy loam with more than 50% quartzite stones overlying boulder beds.

Further information: DEWNR Soil and Land Program