

## Appendix 4 – Darling Geological Basin Stratigraphic Profiles

This appendix contains summary stratigraphic profiles for the Pondie Range, Bancannia, Blantyre and Menindee Troughs, which represent the four sub-basins of the Darling Geological Basin that occur within 150 km of Broken Hill. These summarised profiles have been constructed from information derived from petroleum exploration well reports. Additionally, the profile for the Pamamaroo Well in the vicinity of the Menindee Lakes is also included here.

**PONDIE RANGE TROUGH**

<u>STRATIGRAPHY, PONDIE RANGE TROUGH</u>			<u>POROSITY</u>					
			<b>Booligal Creek-1</b>		<b>Gnalta-1</b>		<b>Pondie Range-1</b>	
<u>Unit</u>	<u>Age</u>	<u>Desc.</u>	<b>Depth (m)</b>	<b>Porosity (%)</b>	<b>Depth (m)</b>	<b>Porosity (%)</b>	<b>Depth (m)</b>	<b>Porosity (%)</b>
Darling River system		Unconsolidated and soft. Loose coarse-grained sands.						
Sandstone	Tert.	Poorly consolidated sand and minor clay. Variable porosity.						
Mulga Downs Group	Dev.	Uniform sequence of sandstone with minor conglomerates and siltstone beds, Fe-oxide cement, generally well-sorted. Good to excellent visible porosity and permeability.	238-618	“Excellent”			1374-2073	12.5
			707-761.4	“Excellent”			2073-3002	8.4
							3002-3038	11.4
Basement (volcanics?)	Precambrian (?)	Diagenetically altered, hard, dense sandstones and orthoquartzite; considerably metamorphosed compared to overlying strata.						

<b>STRATIGRAPHY, BANCANNIA TROUGH</b>			<b>POROSITY</b>					
			<b>Bancannia South-1</b>		<b>Bancannia North-1</b>		<b>Jupiter-1</b>	
<b><u>Unit</u></b>	<b><u>Age</u></b>	<b><u>Desc.</u></b>	<b>Depth (m)</b>	<b>Porosity (%)</b>	<b>Depth (m)</b>	<b>Porosity (%)</b>	<b>Depth (m)</b>	<b>Porosity (%)</b>
Sand and clay	Tert.-Recent							
Shale and sand	Lower Cret.	Interbedded sandstone and shale.					213-292	24
Shale, siltstone, sandstone	Upper Dev.	Red shale grading to interlaminated siltstone, sandstone, shale.	166-614	16.9	343-411 411-785	33.7 14.2	292-582	10
Sandstone, minor siltstone and shale	Mid-Upper Dev.	Porous sandstone unit grading to siltstone; hard, pebbly, poorly-sorted sandstone, minor shale	614-1219 1219-1566 1566-b'ment	12.3 8.5 5.3	785-1149	14.5	582-862 862-1358	13.6 12.2
Sandstone and shale	Mid.-Dev.	Sandstone and shale: grades from slightly calcareous to conglomeritic to quartzitic with depth.						

<b><u>STRATIGRAPHY, BLANTYRE TROUGH</u></b>			<b><u>POROSITY</u></b>	
			<b>Blantyre-1</b>	
<b><u>Unit</u></b>	<b><u>Age</u></b>	<b><u>Desc.</u></b>	<b>Depth (m)</b>	<b>Porosity (%)</b>
Interbedded sand, sandstone, clay and minor lignite	Tert.	Sand and sandstone, poorly consolidated, poorly sorted.		
Interbedded shale and minor sandstone	Perm.	Sand and sandstones unconsolidated, medium grained. Soft clayey shale.		
Conglomerate	Carb.	Poorly consolidated pebbles, sandy clay matrix. Minor interbeds of shale		
Shale, siltstone, sandstone and minor oolitic limestone	Upper Dev.	Moderately soft, slightly sandy. Minor sandstone interbeds.		
Shale and siltstone	Upper Dev.	Predominantly interbedded shale and siltstone. Minor sandstone and limestone.		
Sandstone and shale	Upper Dev.	Thin sandstone interbeds at top of unit; thicken with depth. Fine grained. Soft shales.		
Shale, siltstone and sandstone	Upper Dev.	Hard, blocky shale. Very fine grained siltstone.	1912-1916	19
Sandstone, shale and siltstone	Upper Dev.	Fine to medium grained sandstone, minor hard shale.	1960-2290.5 1976-2013	11-14 18

<u>STRATIGRAPHY, MENINDEE TROUGH</u>			<u>POROSITY</u>	
<u>Unit</u>	<u>Age</u>	<u>Desc.</u>	<u>Depth (m)</u>	<u>Porosity (%)</u>
-	Holocene	Sandy, medium to coarse, rounded, moderately sorted.		
Wunghnu Group	QT – Late Tert.	Fine to medium grained unconsolidated sandstone. Porosity generally fair to good; clay matrix sometimes evident.		
Murray Group	Early-Mid Mioc.	Sandstone with minor siltstone, poorer porosity due to clay matrix. Abundant carbonaceous matter and fossil fragments – marine depositional environment. More calcareous with depth; limestone (?) present (marl); correlative of Morgan Limestone or Mannum formation.	-	“Poor”
Renmark Group	Eocene	Primarily non-calcareous claystone; cycles with poorly consolidated sandstone (stacking of fluvial sediments?). Fine to medium grained; good porosity except for when dispersive clay matrix present. Siltstone present at depth. Gamma ray curve suggests meandering stream origin, best porosity of Renmark Group developed in lower coarser-grained channel lag facies of meandering stream.	-	“Good visual”

Millewa Group	Aptian	Thick sandstone unit overlain by dominantly claystone marine unit containing marine microplankton. Porosity generally good.		
Merreti Member	Aptian	Sequence dominated by claystone, minor sandstone and shale. Microflora present. Grades in part to siltstone.		
Pyap Member	Aptian	Predominantly sandstone, mostly medium-grained, well-sorted, loose and occasionally consolidated with calcitic cement. Generally good porosity (except in presence of clay matrix).	-	"Good visual"
Cape Jarvis Beds	Permo-Carb.	Sandstone: increases from 10% in lower beds (claystone and siltstone) to 100% at top of bed. Porosity at top visibly good. Limestone is trace amounts. Finer grain size with depth, claystone and siltstone (some sandstone). Shale at depth; porosity is poor and clay-choked.	-	"Good visual"
Mulga Downs Group	Mid-Early Dev- Early Carb.	Monotonous sequence of interbedded sandstones, siltstones, shales. Medium to coarse grained, well sorted. Variable porosity.	-	"Variable"

**PAMAMAROO**

<u>UNIT</u>	<u>AGE</u>	<u>DESC.</u>
Renmark Group	Tert.	Poorly consolidated sandstones and clays.
Cape Jervis Beds	Perm.-Carb.	Sandstone with minor conglomerate bands and erratics. Some interbedded siltstone and clay at depth.
Mulga Downs Group	Devonian	Predominantly sandstone, minor siltstone and mudstone.
Mootwingee Group, Rowena Formation	Ord.	Massive and thinly bedded sandstone, shales, siltstone and claystone.
Mootwingee Group, Bynguano Quartzite	Ord.	Predominantly sandstone, thickly bedded, fine to medium grained. Well sorted.
-	Lower Camb.	Muscovite schistose phyllite with interbeds of volcanics.