DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY
ENGINEERING DIVISION

DRILLING AND COMPLETION REPORT
LITTLE PARA RIVER DEEP OBSERVATION WELLS

Client: E. & W.S. Department

by

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GEOLOGIST

Rept.Bk.No. 77/125
G.S. No. 5944
D.M. No. 296/76
Eng. No. 77/46

28th October, 1977

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DEPARTMENT OF MINES
SOUTH AUSTRALIA

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DRILLING AND COMPLETION REPORT LITTLE PARA RIVER DEEP OBSERVATION WELLS

ABSTRACT

Three observation wells have been completed in the Port Willunga Formation 'A' for the Water Resources Branch of the Engineering and Water Supply Department.

These wells are located in the vicinity of the Little Para River to monitor the response of the aquifer to controlled releases of water from the Little Para Dam.

INTRODUCTION

Surface water which flows in the Little Para River plays an important role in recharge to the aquifers of the Northern Adelaide Plains. These aquifers are the prime source of groundwater for the irrigation of vegetables, fruit trees and other horticultural and viticultural practices.

The construction of the Little Para Dam will bring to a halt the natural flows of the river. Recharge to the aquifers is to be achieved by means of controlled releases of water from the dam to the river.

A number of observation wells in the vicinity of the Little Para River have been requested by the Water Resources Branch of the E. & W.S. Department to monitor the effectiveness of the controlled programme of recharge to the aquifer systems to maintain a suitable supply of

groundwater for irrigation purposes. This report presents the data obtained from three observation wells completed within Aquifer A.

SUMMARY OF WELL DETAILS

The three wells have been assigned temporary numbers LPR1, LPR2 and LPR3 respectively. The well details are summarised in Table 1 below.

TABLE 1

	LPR1	LPR2	LPR3
Hundred	Yatala	Munno Para	Munno Para
Section	858	4028	3120
Drilled Depth	175 m	137 m	125 m
Final Depth	156 m	118 m	125 m
Casing Diameter	76 mm	76 mm	76 mm
Cemented Casing	136-surf.	99-surf.	102-surf.
Slotted interval	136-150 m	99-106 m	102-108 m
Static Water Level	12 m	5 m	29 m

Drilling commenced on 14th June, 1977 and was completed on 13th July, 1977. The wells were drilled with the Mayhew 1000 RD2 rotary drilling plant. The well sketches are shown in Appendix C.

GEOPHYSICAL LOGGING

The geophysical logging details are given below in Table 2.

TABLE 2

LPR1		LPR2		LPR3	
SP	(0-174 m)	SP	(0-138 m)	SP	(0-122 m)
Point resistivity	(0-174 m)	Laterolog	(0-138 m)	Point resistivity	(0-122 m)
Gamma Ray	(1-175 m)	Gamma Ray	(0-138 m)	Gamma Ray	(0-123 m)
Neutron	(1-175 m)	Neutron	(0-138 m)	Neutron	(0-123 m)
Density	(0-175 m)	Density	(0-138 m)	Density	(0-125 m)
		Resistivity	(0-138 m)		

STRATIGRAPHY

Formation intervals have been selected with the aid of wireline geophysical logs and drill cuttings and are shown in Table 3 below.

TABLE 3

Formation	LPR1	LPR2	LPR3
Hindmarsh Clay	Surface	Surface	Surface
Carisbrooke Sand	68-116 m	53-84 m	44-99 m
Dry Creek Sand	116-146 m	84-101 m	99-118 m
Port Willunga Fm."A"	146-156 m	101-120 m	118 m
Munno Para Clay	156-160 m	120-125 m	
Port Willunga Fm. "B"	160 m	125 m	

Possible shallow aquifers within the Hindmarsh Clay and Carisbrooke Sand have been indicated by the occurrence of sand and gravel in the drill cuttings and by the geophysical logs, and are tabulated below in Table 4.

TABLE 4

LPR1	LPR2	LPR3
68 - 73	30 - 36	14 - 17
76 - 88	55 - 76	38 - 42
		50 - 99

Drill sample descriptions are contained in Appendix A. The composite log for LPR1 and the geophysical logs for LPR2 and LPR3 are contained in Appendix B.

APPENDIX A

DRILL SAMPLE DESCRIPTIONS

DRILL SAMPLE DESCRIPTIONS

LPR1

(m)	
0 - 6	CLAY: brown silty, soft and plastic
6 - 42	CLAY: mottled brown and pale grey, soft and plastic, slightly sandy and silty with approximately 5% medium to coarse quartz sand.
42 - 68	CLAY: mottled red-brown and pale grey, soft and plastic, silty and sandy throughout with sand content ranging from 10 to 30%. Generally firmer than above. Occasional thin gravelly beds.
68 - 74	CLAY: as above, with abundant coarse sand; becoming gravelly in part with quartz grains up to 4 mm in size.
74 - 76	CLAY: as for 42 to 68 m
76 - 88	SANDY CLAY: mottled red-brown and grey, firm with up to 40% medium to coarse, poorly sorted quartz sand. Occasional quartz and lithic fragments of gravel size.
88 - 96	SAND: fine to coarse grained, poorly sorted, angular to well rounded. Some gravel size material of clear to white quartz and lithic fragments up to 5 mm in diameter. Abundant clay matrix material.
96 -102	SANDY CLAY: Khaki brown, mottled with pale brown, and pale grey, firm. Contains approximately 30% fine to coarse grained, poorly sorted quartz.
102-106	CLAYEY SAND: buff coloured, firm and stiff, essentially as above but containing 50-60% fine to coarse grained, poorly sorted quartz.
106-116	CLAY: mottled dark grey to black and pink-brown, soft and plastic, slightly marly, weakly calcareous. 30-40% fine, well sorted quartz sand.

116-122 CLAY: essentially as above, marly, occasional bryozoal fragments.

122-128 CALCARENITE: medium brown, clayey and marly, grading in part to calcisiltite, abundant fine to medium grained, angular quartz; rare glauconite.

128-146 CALCARENITE: Yellow to yellow brown, common well cemented fragments; abundant fine to medium, moderately sorted, subangular to subrounded quartz, with common well rounded coarse grains. Abundant shell fragments and bryozoa sticks.

146-156 CALCARENITE: essentially as above but becoming finer grained, more silty and softer.

156-160 CLAY: dark grey, soft and plastic, silty, glauconitic.

160-175 LIMESTONE: pale grey to buff, abundant fine to coarse, angular to subrounded quartz, shell fragments and bryozoa. Common medium grey, marly material.

END OF HOLE175 m

LPR2

0 - 6	CLAY: medium brown, silty and sandy, soft.
6 - 30	CLAY: mottled medium brown and pale grey, silty and sandy throughout, firm to soft. Contains approximately 5-20% quartz.
30 - 36	GRAVEL: medium brown, clayey; quartz and lithic fragments up to 3 mm in size with abundant medium to coarse, moderately sorted quartz sand.
38 - 46	CLAY: red brown, mottled with pale grey, soft and plastic. Contains abundant (up to 50%) well rounded coarse grained quartz sand and gravel.
46 - 52	CLAY: red brown mottled with pale grey, slightly sandy and silty, firm and stiff.
52 - 76	CLAYEY SAND: pale to medium brown, soft and puggy. Dominantly fine to medium, subangular to subrounded, moderately sorted quartz sand with common coarse well rounded grains.
76 - 84	CLAY: dark grey to black, soft and plastic, some pale brown mottling, silty and sandy with approximately 30% fine to medium quartz sand.
84 - 94	CALCISILTITE: dark grey-green, soft and puggy, containing common bryozoal and shell fragments, rare glauconitic and abundant fine to medium grained, subangular to subrounded, moderately sorted quartz sand and common well rounded, coarse quartz grains. Grading in part to calcarenite.
94 -101	CALCISILTITE: essentially as above but more argillaceous and less sandy.
101-120	CALCARENITE: medium grey, dirty and marly,

fine to coarse grained, poorly sorted quartz sand with abundant bryozoal and shell fragments.

120-124 CLAY: dark grey, moderately firm, silty, rare traces of glauconite.

124-138 LIMESTONE: pale to medium grey, marly in part, commonly silty, abundant fine to medium and coarse, poorly sorted quartz sand, shell and bryozoa fragments.

END OF HOLE 138 m

LPR3

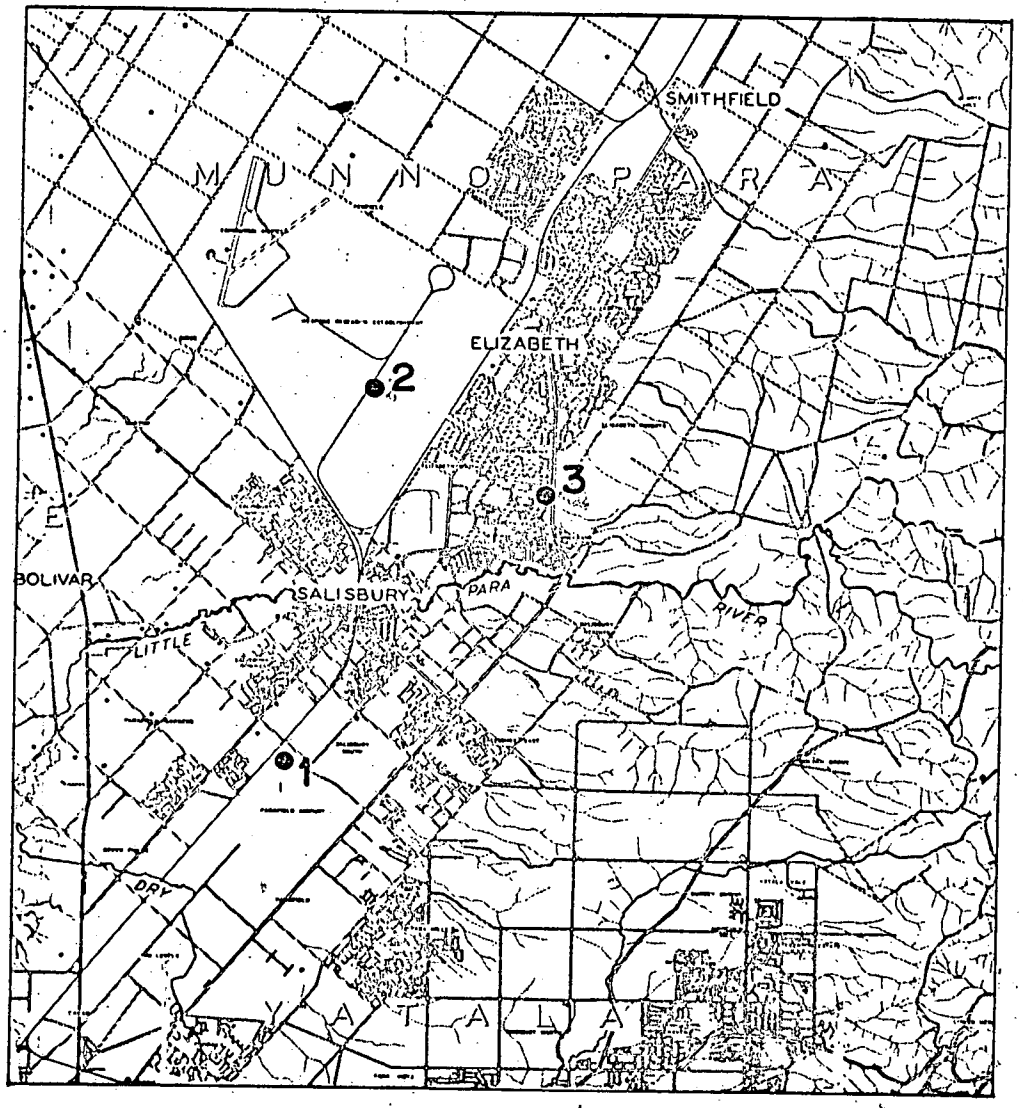
0 - 6	CLAY: red brown, silty, sandy with abundant coarse grained quartz.
6 - 14	CLAY: red-brown, stiff and firm, silty
14 - 16	GRAVEL: yellow-brown mottled with grey, clayey, consists of angular whitish quartz and lithic fragments up to 5 mm. Some medium to coarse moderately rounded quartz sand.
16 - 28	CLAY: mottled brown and grey, sandy and silty with common coarse grained quartz, occasional gravel fragments. Generally soft and plastic.
28 - 36	CLAY: mottled brown and pale grey, firm and stiff, silty and sandy.
36 - 40	CLAY: as above, more sandy with common fine to medium grained quartz.
40 - 44	CLAY: mottled, firm and stiff, silty, less sandy.
44 - 50	GRAVEL: medium brown, clayey; consists of angular to subangular quartz sand and lithic fragments with abundant coarse grained sand
50 - 66	CLAY: mottled, generally soft and plastic, containing abundant sand and gravel.
66 - 84	CLAY: mottled red-brown and grey, firm and stiff, sandy with dominantly medium grained and occasionally coarse grained quartz.
84 - 98	CLAY: mottled pink-brown and cream, soft and plastic, silty and sandy, containing up to 50% fine to very fine sand.
98 -106	SILTSTONE: dark grey to black, partly mottled with pale brown argillaceous material, generally soft and puggy, argillaceous, lignitic. Contains abundant fine to medium grained well sorted sand

and common subrounded to rounded coarse grained quartz and lithic material.

106-114 CALCISILTITE: dark grey, soft and puggy, sandy with common coarse grained quartz, bryozoal and shell fragments.

114-124 CALCARENITE: pale to medium grey, marly; contains approximately 40-50% fine to coarse grained, poorly sorted, subangular to subrounded quartz. Abundant bryozoal and shell fragments.

END OF HOLE 125 m



KILOMETRES

0 5 10

FIG. 1

	DEPARTMENT OF MINES – SOUTH AUSTRALIA	SCALE 1:125000
COMPILED: G.J.W.B.	LITTLE PARA RIVER RECHARGE INVESTIGATION	DATE:
DRN: G.J.T. CKD.	LOCATION OF DRILLHOLES	PLAN NUMBER: S 13043

DEPARTMENT OF MINES - SOUTH AUSTRALIA
ENGINEERING DIVISION

COMPOSITE WELL LOG - GROUNDWATER

HOLE No.	L.P.R. 1
UNIT/STATE No.	728085805
SERIAL No.	1068/77
FOLDER No.	
DRG. No.	77-683 R
SHEET	1 OF 1

CONSTRUCTION DETAILS

DRILLING TECHNIQUE: Botary
CIRCULATION: Mud
START: 14.6.77
FINISH: 21.6.77
TOTAL DEPTH: 175 m

	Inches	m.m	From(m)	To(m)
HOLE DIAMETER	3	127	0	156
CASING DIAMETER (Cemented)	3	76	0	136
CASING DIAMETER (Uncemented)				
SCREEN DETAILS Make / Model Dimensions		80 mm slotted black steel	136	149·8

PROJECT LITTLE PARA DAM RECHARGE MONITORING SYSTEM

LOCATION PARAFIELD AGRICULTURAL RESEARCH CENTRE
SECTION 858 HUNDRED YATALA
CO-ORDINATES

LOGGED BY J. Bowering
REFERENCE ELEV. DATE
SURFACE ELEV. TRACED BY P. Durand
DATUM DATE

TYPE OF LOG	16 IN NORMAL	64 IN NORMAL	6FT LATERAL	S P	POINT RESISTIVITY	NEUTRON	GAMMA RAY	TEMPERATURE
DATE OF RUN				20·6·77	20·6·77	20·6·77	20·6·77	
FIRST READING (m)				0	0	1	1	
LAST READING (m)				174	174	175	175	
INTERVAL MEASURED (m)				174	174	174	174	
CASING : LOGGER (m)								
CASING : DRILLER (m)								
DEPTH REACHED (m)				174	174	175	175	
BOTTOM : DRILLER (m)				175	175	175	175	
MUD TYPE				Bentonite with Hydropol and Rotrol				
MUD RESISTIVITY				0·76 SLM	0·76 SLM	0·76 SLM	0·76 SLM	
RECORDED BY				R Turner	R. Turner	R Turner	R. Turner	

WELL SYMBOLS

CONSTRUCTION LOG
- Casing seal
- Casing shoe
- Wire wound screen
- Slotted casing
- Cemented Interval
- Gravel packed Interval

HYDROGEOLOGICAL LOG
- Core Interval
- Aq Aquifer
- Cb Confining bed
- T Transmissivity m²/day (m³)
- S Storage Coefficient/Specific Yield
- θ Porosity
- K Hydraulic conductivity m/day

DEPTH TO WATER (m)	DEPTH TO S.W.L. (m)	YIELD m³/day	YIELD Method of Test	TOTAL DISSOLVED SOLIDS mg/litre	TOTAL DISSOLVED SOLIDS Analysis W No
156	12	350	Air Lift	1467	4650/77

REMARKS Drilled for E&WS Department. To monitor recharge by releases from Little Para Dam

CONSTRUCTION LOG | WATER CUT (m) | WATER LEVEL (m) | CORE | HYDRO. DATA | AGE | UNIT | LITHOLOGY DESCRIPTION | LITHO LOG | DEPTH (m) | SELF POTENTIAL 12·5 millivolts | POINT RESISTIVITY 50 ohms | GAMMA 50 counts | NEUTRON 50 counts

PLEISTOCENE – RECENT — HINDMARSH CLAY

0-6m. Clay: brown, silty, soft and plastic.

6-42m. Clay: mottled red-brown and pale grey, soft and plastic, silty and slightly sandy, containing approximately 5% of medium to coarse quartz sand.

S.W.L. 12m

42-68m Clay mottled red-brown and pale grey, soft and plastic, silty and sandy throughout with sand content ranging from 10-30%. Generally firmer than above. Occasional thin gravelly beds.

PLIOCENE? — EARLY PLEISTOCENE — CARISBROOKE SAND — Confined Aquifer

68-74m. Clay: as above with abundant coarse sand, becoming gravelly in part.

74-76m Clay: as for 42m-68m.

76-88m. SANDY CLAY: mottled red-brown and grey, firm with up to 40% medium to coarse quartz sand. Occasional gravel fragments.

88-96m SAND: fine to coarse grained, poorly sorted, angular to well rounded, some gravel sized material of clear to white quartz and lithic fragments. Argillaceous.

96-102m. SANDY CLAY: khaki brown, mottled pale brown and pale grey. Approximately 30% fine to coarse grained quartz.

102-106m. CLAYEY SAND: buff coloured; essentially as above but with 50-60% fine to coarse quartz.

106-116m. CLAY: mottled dark grey to black and pink brown, soft and plastic, marly, weakly calcareous. 30-40% fine sand.

116-122m Clay essentially as above, marly, occasional bryozoal fragments.

Aquifer 'A' confined — LOWER MIOCENE — PORT WILLUNGA FORMATION 'B' — DRY CREEK SAND — UPPER PLIOCENE

122-128m. CALCARENITE: medium brown, clayey and marly, grading to calci-siltite; abundant fine to medium angular quartz. Rare glauconite.

128-146m. CALCARENITE: yellow to yellow brown, common well cemented fragments; abundant fine to medium quartz with common well rounded coarse grains. Abundant shell fragments and bryozoa sticks.

MID MIOCENE — PT WILLUNGA FM 'A'

146-156m. CALCARENITE as above becoming finer grained more silty and softer.

M-L MIOC — MARINO BARA CLAY — Aquiclude

156-160m. CLAY: dark grey soft and plastic, silty glauconitic.

Aquifer 'B' confined

160-175m. LIMESTONE: pale grey to buff; abundant fine to coarse, angular to rounded quartz, shell fragments and bryozoa. Common medium grey marly material.

End of hole 175 metres.

To surface

75m PVC cemented from 136m - 0m. Slotted from 136m - 149·8m

Plugged back to 156m.

DEPTH (m): 0, 20, 40, 60, 80, 100, 120, 140, 160

DEPARTMENT OF MINES - SOUTH AUSTRALIA
ENGINEERING DIVISION

COMPOSITE WELL LOG - GROUNDWATER

HOLE No.	
UNIT/STATE No.	6628220WW03057
SERIAL No.	902/78
FOLDER No.	053104
DRG. No.	77-682 R
SHEET	1 OF 1

CONSTRUCTION DETAILS

DRILLING TECHNIQUE: Rotary
CIRCULATION: Mud
START: 23·6·77
FINISH: 1·7·77
TOTAL DEPTH: 138 metres

	Inches	mm	From (m)	To (m)
HOLE DIAMETER				
CASING DIAMETER (Cemented)		76	0	99
CASING DIAMETER (Uncemented)				
SCREEN DETAILS Make / Model Dimensions				

PROJECT LITTLE PARA DAM RECHARGE MONITORING SYSTEM

LOCATION
SECTION 4028 HUNDRED MUNNO PARA
CO-ORDINATES

LOGGED BY B. Troeger
REFERENCE ELEV.
DATE
SURFACE ELEV.
TRACED BY R. Durand
DATUM
DATE

TYPE OF LOG	16 IN NORMAL	64 IN NORMAL	6FT LATERAL	S.P	POINT RESISTIVITY	NEUTRON	GAMMA RAY	TEMPERATURE	DENSITY
DATE OF RUN			30·6·77	30·6·77	30·6·77	30·6·77	29·6·77		29·6·77
FIRST READING (m)			0	0	0	0	0		0
LAST READING (m)			138	138	138	138	138		138
INTERVAL MEASURED (m)			138	138	138	138	138		138
CASING : LOGGER (m)									
CASING : DRILLER (m)									
DEPTH REACHED (m)			138	138	138	138	138		138
BOTTOM : DRILLER (m)			138	138	138	138	138		138
MUD TYPE			Hydropol	Rotrol					
MUD RESISTIVITY				0·175 ohm metres		at 17°C			
RECORDED BY	A. Young								

WELL SYMBOLS

CONSTRUCTION LOG
- Casing seat
- Casing shoe
- Wire wound screen
- Slotted casing
- Cemented interval
- Gravel packed interval

HYDROGEOLOGICAL LOG
- Core interval
- Aq Aquifer
- Cb Confining bed
- T Transmissivity m²/day (m⁻¹)
- S Storage Coefficient/Specific Yield
- θ Porosity
- K Hydraulic conductivity m/day

DEPTH TO WATER (m)	DEPTH TO S.W.L. (m)	YIELD m³/day	YIELD Method of Test	TOTAL DISSOLVED SOLIDS mg / litre	TOTAL DISSOLVED SOLIDS Analysis W. No
102	5m	60	Air Lift	2300	4816/77

REMARKS: Drilled for E & W.S Department. To monitor recharge by release from Little Para Dam.

DEPARTMENT OF MINES - SOUTH AUSTRALIA
ENGINEERING DIVISION

COMPOSITE WELL LOG - GROUNDWATER

HOLE No.	L.P.R. 3
UNIT/STATE No.	6628220WW03093
SERIAL No.	903/78
FOLDER No.	053105
DRG. No.	77-681 R
SHEET	1 OF 1

CONSTRUCTION DETAILS

DRILLING TECHNIQUE: Rotary
CIRCULATION: Mud
START: 5-7-77
FINISH: 9-7-77
TOTAL DEPTH: 125.5 m

	Inches	m.m	From(m)	To(m)
HOLE DIAMETER				
CASING DIAMETER (Cemented)		76	0	102
CASING DIAMETER (Uncemented)				
SCREEN DETAILS Make / Model Dimensions				

PROJECT LITTLE PARA DAM RECHARGE MONITORING SYSTEM.

LOCATION
SECTION 3121 HUNDRED MUNNO PARA
CO-ORDINATES

LOGGED BY
REFERENCE ELEV.
DATE
SURFACE ELEV.
TRACED BY P. Durand
DATUM
DATE

TYPE OF LOG	16 IN. NORMAL	64 IN NORMAL	6FT. LATERAL	S.P.	POINT RESISTIVITY	NEUTRON	GAMMA RAY	TEMPERATURE	DENSITY
DATE OF RUN				8-7-77	8-7-77	8-7-77	8-7-77		8-7-77
FIRST READING (m)				0	0	0	0		0
LAST READING (m)				122	122	123	123		125.5
INTERVAL MEASURED(m)				122	122	123	123		125.5
CASING : LOGGER (m)									
CASING : DRILLER (m)									
DEPTH REACHED (m)				123	123	123	123		125.5
BOTTOM : DRILLER (m)				125.5	125.5	125.5	125.5		125.5
MUD TYPE		Super	Gel						
MUD RESISTIVITY	10 ohm-metres at 18°C								
RECORDED BY	B. Traeger								

WELL SYMBOLS

CONSTRUCTION LOG

- Casing seal
- Casing shoe
- Wire wound screen
- Slotted casing
- Cemented Interval
- Gravel packed Interval

HYDROGEOLOGICAL LOG

- Core Interval
- Aq Aquifer
- Cb Confining bed
- T Transmissivity m²/day (m³)
- S Storage Coefficient/Specific Yield
- θ Porosity
- K Hydraulic conductivity m/day

DEPTH TO WATER (m)	DEPTH TO S.W.L. (m)	YIELD m³/day	YIELD Method of Test	TOTAL DISSOLVED SOLIDS mg/litre	TOTAL DISSOLVED SOLIDS Analysis W No.
102	29	100	Air Lift	2970	4017/77

REMARKS Drilled for E.&W.S. Department. To monitor recharge by release from Little Para Dam.

CONSTRUCTION LOG | WATER CUT (m) | WATER LEVEL (m) | CORE | HYDRO. DATA | AGE | UNIT | LITHOLOGY DESCRIPTION | LITHO. LOG | DEPTH (m)

0-14m CLAY, red-brown silty to sandy

14-16m GRAVEL, clayey

16-28m CLAY, mottled, red-brown, soft.

S.W.L. 25m.

28-44m CLAY, mottled, red-brown, firm

44-50m GRAVEL, medium brown, clayey.

50-84m CLAY, mottled red-brown, soft, gravelly

84-98m CLAY, mottled, pink-brown and cream.

98-106m SILTSTONE, dark grey to black, soft, lignitic.

106-114m SILTSTONE, calcareous, dark grey, soft, bryozoal.

114-124m LIMESTONE, sandy, pale to medium grey, marly.

End of Hole 125.5m.

76mm
102m
108m

Recent — Pleistocene — Hindmarsh Clay — Confining Bed
Pliocene ? — Early Pleistocene — Carisbrooke Sand — Aquifer 'A' confined
Upper Pliocene — Dry Creek Sands
Mid Miocene — Port Willunga Formation 'A'

NEUTRON 20cs | DENSITY 50cps | POINT RESISTIVITY 4Ω.m | SELF POTENTIAL 4mV | GAMMA 4cs

0 20 40 60 80 100 120