APPENDICES

(No. of pages including blank pages = 236)

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Note: Appendices 1 to 5 are only provided on the Project CD

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Appendix 1

Summary of Registered Groundwater Bore Details

(No. of pages including blank pages = 6)

Note: A copy of Appendix 1 is available on the Project CD

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TABLE A1: SUMMARY OF REGISTERED GROUNDWATER BORE DETAILS

Bore ID	Distance from Site (m)	Direction from Site	Registered Use	Depth (m)	Water Bearing Zones	SWL (m BTOC)	Yield (L/s)	Water Quality	Geology	East	North	Date Installed	Status	Licence Number
GW803678	1832	N	Monitoring Bore	4	-	-	-	-	Sand, Clay, Silstone, Claystone (0-4m)	614695	6395743	2008	Equiped Onservation Bore	80BL245013
GW803681	1837	N	Monitoring Bore	3.5	-	-	-	-	Sand, Clay, Silstone, Claystone (0-3.5m)	614686	6395749	2008	Equiped Onservation Bore	80BL245013
GW803682	1846	N	Monitoring Bore	3.5	-	-	-	-	Sand, Clay, Silstone, Claystone (0-3.5m)	614688	6395758	2008	Equiped Onservation Bore	80BL245013
GW803679	1848	N	Monitoring Bore	4.5	-	-	-	-	Sand, Clay, Silstone, Claystone (0-4.5m)	614680	6395761	2008	Equiped Onservation Bore	80BL245013
GW803680	1855	N	Monitoring Bore	4.5	-	-	-	-	Sand, Clay, Silstone, Claystone (0-4.5m)	614685	6395767	2008	Equiped Onservation Bore	80BL245013
GW045137	2596	ENE	Test Bore / Public Supply	12.2	-	-	-	-	-	615448	6396318	1975	Test Hole	80BL105285
GW045134	2846	S	Test Bore / Public Supply	18.3	7.3-8.5m (Sandy Clay) 16.8-18.3m (Sandy Clay)	-	0	Unknown	Topsoil (0-0.6m), Clay and sandy clay (0.6-18.3m)	614748	6396758	1975	Test Hole	80BL105282
GW037395	4516	ENE	Irrigation	4.5	3.6-4.5m (Sandy Clay)	2.1	1.26	-	Clay (0-3m) Sandy Clay (3-4.6m)	616510	6397938	Unknown	Unknown	80BL030552
GW034897	4684	NNW	Domestic Stock	1.8	1.8m (?)	-	-	-	-	612967	6398380	-	Unknown	80BL028144
GW803148	5083	NE	Town Water Supply	5.8	-	4.4	1	-	-	617498	6397983	2005	Supply Obtained	80BL242918
GW045135	5127	NE	Test Bore / Public Supply	3.7	3.0m (Sandy Clay)	0.9	0.76	Unknown	Topsoil (0-0.6m), Sandy Clay (0.6-3.1m), Silty Sand (3.1-3.6m)	617605	6397956	1975	Test Hole	80BL105283
GW045136	5533	NE	Test Bore / Public Supply	5.2	4.6-5.2m (sandy clay)	-	0	-	Clay/Sandy Clay (0-5.2m)	617792	6398324	1975	Test Hole	80BL105284
GW066562	6902	SSE	Test Bore	73	-	-	-	-	Clayey silt (0-60m), Conglomerate bedrock (60-73m)	617276	6387642	1990	Test Hole	80BL141280
GW800177	8019	NE	Test Bore	113.9	2-4.5m (Sand) 81-82.5m (Sandstone)	1	0.32	Good	Loam (0-2m), Sand (2-4.5m), Clay (4.5-81m), Sandstone (81-82.5m), Silty Clay (82.5-109.5m), Andesite/Basalt (109.5-113.9m)	619322	6400284	1995	Test Hole	80BL237099
GW801568	9874	SSE	Domestic Stock	81	-	-	-	-	Topsoil (0-0.5m), shale and silstone (0.5-81m)	619013	6385184	2002	Abandoned	80BL239686
GW012385	10749	NW	Test Bore	44.2	19.5-19.9m (Gravel Soak/Clay) 33.5-35m (Gravelly Clay)	7.3	1.14	0-500ppm	Clay (0-11m), Sandy Clay (11-14.6m), Gravel Soak/Clay (14.6-26.5m), Clay (26.5-32.6m), Gravelly Clay (32.6-35.4m), Clay (35.4-42.7m), Rock (42.7-44.2m)	605497	6399909	1959	Unknown	-
GW054594	10759	SSE	Domestic Stock	61.6	-	-	-	-	-	617018	6383487	-	Supply Obtained	80BL116653

TABLE A1: SUMMARY OF REGISTERED GROUNDWATER BORE DETAILS

Bore ID	Distance from Site (m)	Direction from Site	Registered Use	Depth (m)	Water Bearing Zones	SWL (m BTOC)	Yield (L/s)	Water Quality	Geology	East	North	Date Installed	Status	Licence Number
GW802834	10769	SSE	Test Bore	77	54-77m (Shale and silstone)	42	1.5	3900?	Sandy clay/silt (0-6m), shale and silstone (6-77m)	617229	6383531	1997	Test Hole	80BL237359
GW068651	10824	SSE	Mining	97	82.0-82.1m (Siltstone) 94.0-94.1m (Silstone)	-	-	Fresh	Silty Clay (0-20m), 20-74m (silt or weathered silstone), 74-82m (weathered silstone), 82-97m (silstone)	616478	6383302	1990	Test Hole	-
GW802842	11023	SSE	Domestic Mining Stock	83	22.5-83m (Shale and siltstone)	44	3	4400?	Topsoil/silty clay (0-4m), Gavelly clay (4-8m), Unknown (8-22m), Shale and siltstone (22-83m)	617219	6383266	1997	Supply Obtained	80BL237530
GW023198	11790	SW	Stock	48.8	36.6m (Clay)	36.6	-	14000ppm	Clay (0-6m), Sand (6-8m), Clay (8-36.6m), Sand Wash (36.6-48.8m)	605045	6386793	1965	Unknown	80BL017091
GW028886	12992	SSW	Stock	121.9	-	-	-	-	Clay (0-5.5m), Shale (5.5-52m), Basalt Green (52-121.9m)	611238	6381336	1967	Unknown	80BL023332
GW800179	13135	NE	Test Bore	48	-	-	-	-	Loam/Clay (0-8m), Clay with Sand Bands (8-33m), Sandstone with clayey bands (33-48m)	622823	6404034	1995	Test Hole	80BL237039
GW801299	13624	E	Domestic Stock	46	32-32.1m (Basalt)	14.8	0.13	Good	Basalt (0.5-46m)	627453	6397933	2001	Supply Obtained	80BL239270
GW000615	13739	NW	Stock	175.6	96.3m (Shale)	-	-	-	Clay (0-36.9m), Shale (36.9-164.9m), Rock (164.9-175.6m)	604806	6403735	1920	Unknown	-
GW027631	14035	E	Stock	53.3	42.4-44.2m (Basalt)	39.6	0.06	Unknown	Loam/Clay (0-38.1m), Basalt 38.1-53.3m)	628462	6394219	1967	Unknown	80BL021078
GW802483	14055	W	Domestic Stock	60	51-51.75m (Saprolite Bedrock)	12	0.4	Unknown	Clay (0-6m), Gravel (6-8m), Clay (8-34m), Saprolite (34-60m)	600413	6392894	2003	Supply Obtained	80BL239837
GW064394	14306	NE	Domestic Stock	85.3	-	-	-	-	Clay (0-4.6m), Granite (4.6-85.3m)	624336	6404251	1987	Unknown	80BL136484
GW066807	14599	NW	Test Bore	132	-	-	-	-	Clay with intermittent sand lenses (0-95m), Tuff (95-132m)	606397	6406120	1990	Unknown	80BL140844
GW014891	14618	NNW	Stock	125	78.6-78.9m (Gravelly Clay) 88.4-89m (Rock or gravel) 109.7-111.8m (Rock)	70.8	0.25	Salty	Clay/ Weathered Sandstone / Gravel, (0-112m), Rock (112-125m)	608656	6407359	1963	Unknown	-
GW801409	15023	NE	Domestic Stock	-	-	-	-	-	-	621013	6407434	2002	Unknown	80BL137484
GW803033	15509	S	Domestic Farming Stock	79	-	-	-	-	Clay (0-34m), Saprolite (34-50m), Weathered Rock/Rock (50-79m)	613311	6378461	2005	Abandoned	80BL242996
GW026099	15684	SSW	Domestic Poultry	49.4	-	-	-	-	Alluvium (0-49.4m)	610220	6378822	1965	Unknown	80BL014963
GW802832	15778	SSW	Test Bore	76	63-77m Shale	48.5	1.2	4820?	Topsoil/Caly (0-32m), Weathered shale (32-66m), Shale (66-76m)	609984	6378791	1997	Test Hole	80BL237357

TABLE A1: SUMMARY OF REGISTERED GROUNDWATER BORE DETAILS

Bore ID	Distance from Site (m)	Direction from Site	Registered Use	Depth (m)	Water Bearing Zones	SWL (m BTOC)	Yield (L/s)	Water Quality	Geology	East	North	Date Installed	Status	Licence Number
GW033349	17711	SSW	Stock	83.8	58.8-58.9m (Slate) 77.1m (Slate)	-	-	-	Clay (0-2.1m), Gravel (2.1-5.8m), Shale (5.8-58.8m), Slate (58.8-83.8m)	609496	6376920	1967	Unknown	80BL026573
GW056594	17900	SSW	Domestic Stock	54.2	49.4-49.7m (Slate), 51.2-51.5m (Slate)	48.8	1.26	Unknown	Topsoil/Clay (0-1.2m), Shale (1.2-33.8m), Slate (33.8-54.2m)	612689	6376115	1982	Unknown	80BL123052
GW802833	18081	SSW	Test Bore	99	88-99m (Silstone)	48	1	2960?	Topsoil/Clay (0-22m), Silstone (22-99m)	610434	6376296	1997	Test Hole	80BL237353
GW803248	18267	NE	Domestic Stock	162	-	-	-	-	Topsoil/Clay (0-22m), Sandstone (22-98m), Granite (98-162m)	627990	6406170	2006	Abandoned	80BL242547
GW033772	18464	E	Unknown	16.8	-	-	-	-	Soil (0-1.2m), Granite (1.2-16.8m)	632883	6382299	1941	Unknown	-
GW016698	19553	SSW	Irrigation Stock	76.2	-	-	-	-	-	613216	6374415	?	Supply Obtained	80BL007212
GW015879	19736	SSW	Domestic Irrigation Stock	91.4	-	-	-	-	-	611810	6374369	?	Supply Obtained	80BL007213
GW802830	19871	SSW	Test Bore	101	92-96m (Clay with major quartz veins)	38.2	1.8	1120?	Topsoil/ Clay (0-101m)	611184	6374326	1997	Test Hole	80BL237355
GW025400	19876	NE	Domestic Stock	18.3	-	-	-	-	Topsoil/Clay (0-7.6m), Granite (7.6-18.3m)	626312	6409863	1959	Unknown	80BL024067
GW803020	21114	ESE	Domestic Stock	66	32-32.2m (Granite) 50-50.1m (Granite)	28	0.7	-	Clay (0-4m), Shale (4-10m), Granite (10-66m)	634745	6388176	2005	Supply Obtained	80BL242862
GW031418	21134	SE	Stock	67.1	-	-	-	-	Clay (0-13.4m) Sandstone (13.4-48.8m), Granite (48.7-67.1m)	632831	6383535	1967	Unknown	80BL020071

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Appendix 2

Registered Groundwater Bore Work Summary Forms

(No. of pages including blank pages = 106**)**

Note: A copy of Appendix 2 is available on the Project CD

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Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Saturday, May 9, 2009

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW000615

Works Details (top)

GROUNDWATER NUMBER	GW000615
LIC-NUM	
AUTHORISED-PURPOSES	
INTENDED-PURPOSES	STOCK
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	Cable Tool
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	1920-11-01
FINAL-DEPTH (metres)	175.50
DRILLED-DEPTH (metres)	175.60
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	
GWMA	
GW-ZONE	
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6403735.00
EASTING	604806.00
LATITUDE	32 29' 55"
LONGITUDE	148 6' 56"
GS-MAP	0050A3

Groundwater Works Summary Page 2 of 2

AMG-ZONE	55
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	THE OAKS
PORTION-LOT-DP	48

Licensed (top)

no details

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
96.30	96.30	0.00	Fractured						(Unknown)

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	36.88	36.88	Clay		
36.88	70.71	33.83	Shale		
70.71	164.90	94.19	Shale Hard		
164.90	167.94	3.04	Rock		
167.94	168.55	0.61	Rock Hard		
168.55	175.56	7.01	Rock		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Saturday, May 9, 2009

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW003772

Works Details (top)

GROUNDWATER NUMBER	GW003772
LIC-NUM	
AUTHORISED-PURPOSES	
INTENDED-PURPOSES	NOT KNOWN
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	Cable Tool
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	1941-03-01
FINAL-DEPTH (metres)	16.80
DRILLED-DEPTH (metres)	16.80
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	
GWMA	
GW-ZONE	
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6393299.00
EASTING	632883.00
LATITUDE	32 35' 23"
LONGITUDE	148 24' 57"
GS-MAP	0050B3

AMG-ZONE	55
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A (top)

COUNTY	GORDON
PARISH	BELMORE
PORTION-LOT-DP	2

Licensed (top)

no details

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	1.22	1.22	Soil		
1.22	6.10	4.88	Granite Decomposed		
6.10	11.58	5.48	Boulders Granite		
11.58	12.19	0.61	Granite Hard Sloping		
12.19	16.76	4.57	Granite Hard		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Saturday, May 9, 2009

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW012385

Works Details (top)

GROUNDWATER NUMBER	GW012385
LIC-NUM	
AUTHORISED-PURPOSES	
INTENDED-PURPOSES	G/WATER XPLORE
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	Cable Tool
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	1959-10-01
FINAL-DEPTH (metres)	44.10
DRILLED-DEPTH (metres)	44.20
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	
GWMA	
GW-ZONE	
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	70 - LACHLAN
RIVER-BASIN	412 - LACHLAN RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6399909.00
EASTING	605497.00
LATITUDE	32 31' 59"
LONGITUDE	148 7' 24"
GS-MAP	0058A2

Groundwater Works Summary Page 2 of 2

AMG-ZONE	55
COORD-SOURCE	GD.,PR. MAP
REMARK	

Form-A (top)

COUNTY	FORBES
PARISH	CUMBIJOWA
PORTION-LOT-DP	166

Licensed (top)

no details

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1	1	Casing	Threaded Steel	-0.30	33.60	152			(Unknown)

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
19.50	19.80	0.30	Unconsolidated	9.10					(Unknown)
33.50	35.00	1.50	Unconsolidated	7.30		1.14			0-500 ppm

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	10.97	10.97	Clay		
10.97	14.63	3.66	Clay Sandy		
14.63	26.52	11.89	Gravel Soak Clay		
26.52	32.61	6.09	Clay		
32.61	35.36	2.75	Gravel Clay Water Supply		
35.36	42.67	7.31	Clay		
42.67	44.20	1.53	Rock		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Saturday, May 9, 2009

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW014891

Works Details (top)

GROUNDWATER NUMBER	GW014891
LIC-NUM	
AUTHORISED-PURPOSES	
INTENDED-PURPOSES	STOCK
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	Cable Tool
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	1963-06-01
FINAL-DEPTH (metres)	125.00
DRILLED-DEPTH (metres)	125.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	
GWMA	
GW-ZONE	
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8533-S
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6407359.00
EASTING	608656.00
LATITUDE	32 27' 56"
LONGITUDE	148 9' 22"
GS-MAP	0050A2

AMG-ZONE	55
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	THE OAKS
PORTION-LOT-DP	23

Licensed (top)

no details

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
78.60	78.90	0.30	Unconsolidated	73.20		0.01			Salty
88.40	89.00	0.60	(Unknown)	76.20		0.08			S.Salty
109.70	111.80	2.10	(Unknown)	70.80		0.25			Salty

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	0.61	0.61	Soil Surface		
0.61	2.44	1.83	Clay		
2.44	9.75	7.31	Clay Sandy		
9.75	14.63	4.88	Clay Red Gravel		
14.63	17.68	3.05	Clay Gravel		
17.68	50.29	32.61	Clay Yellow Swelling		
50.29	51.21	0.92	Clay Gravel		
51.21	55.47	4.26	Clay Yellow Gravel		
55.47	59.44	3.97	Clay Gravel		
59.44	68.58	9.14	Clay Red Gravel		
68.58	76.20	7.62	Clay Yellow Waddy		
76.20	78.94	2.74	Clay Red Gravel Water Supply		
78.94	79.25	0.31	Clay White Sticky		
79.25	85.95	6.70	Clay Swelling		
85.95	88.39	2.44	Clay Swelling Gravel		
88.39	89.00	0.61	Rock Stones Water Supply		
88.39	89.00	0.61	Clay Rotten		
89.00	92.66	3.66	Rock Formation/strata		
92.66	94.49	1.83	Clay Yellow Swelling		
94.49	95.10	0.61	Clay Hard		
95.10	96.01	0.91	Rock		

Groundwater Works Summary

96.01	99.67	3.66	Clay Hard Sandy
99.67	107.59	7.92	Rock Yellow
107.59	109.73	2.14	Rock Hard
109.73	111.86	2.13	Rock Water Supply
109.73	111.86	2.13	Sand Gravel Seams
111.86	112.78	0.92	Rock Hard
112.78	115.21	2.43	Rock Hard
115.21	119.48	4.27	Rock Very Hard
119.48	124.97	5.49	Rock Hard

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Saturday, May 9, 2009

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW015879

Works Details (top)

GROUNDWATER NUMBER	GW015879
LIC-NUM	80BL007213
AUTHORISED-PURPOSES	DOMESTIC IRRIGATION STOCK
INTENDED-PURPOSES	DOMESTIC IRRIGATION STOCK
WORK-TYPE	Bore
WORK-STATUS	Supply Obtained
CONSTRUCTION-METHOD	Cable Tool
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	
FINAL-DEPTH (metres)	91.40
DRILLED-DEPTH (metres)	0.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	GOWS TANK
GWMA	811 - CENTRAL WEST FRACTURED ROCKS
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-S
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6374369.00
EASTING	611810.00
LATITUDE	32 45' 46"
LONGITUDE	148 11' 37"
GS-MAP	0050A4

Groundwater Works Summary Page 2 of 2

AMG-ZONE	55
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A (top)

COUNTY	KENNEDY
PARISH	BURRILL
PORTION-LOT-DP	23//753977

Licensed (top)

COUNTY	KENNEDY
PARISH	BURRILL
PORTION-LOT-DP	23 753977

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1	1	Casing	Threaded Steel	-0.50	90.90	152			(Unknown)

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Saturday, May 9, 2009

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW016698

Works Details (top)

GROUNDWATER NUMBER	GW016698
LIC-NUM	80BL007212
AUTHORISED-PURPOSES	IRRIGATION STOCK
INTENDED-PURPOSES	IRRIGATION
WORK-TYPE	Bore
WORK-STATUS	Supply Obtained
CONSTRUCTION-METHOD	Cable Tool
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	
FINAL-DEPTH (metres)	76.20
DRILLED-DEPTH (metres)	0.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	GOWS TANK
GWMA	811 - CENTRAL WEST FRACTURED ROCKS
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-S
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6374415.00
EASTING	613216.00
LATITUDE	32 45' 44"
LONGITUDE	148 12' 31"
GS-MAP	0050A4

AMG-ZONE	55
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	MINGELO
PORTION-LOT-DP	301

Licensed (top)

COUNTY	NARROMINE
PARISH	MINGELO
PORTION-LOT-DP	301

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1	1	Casing	Threaded Steel	-0.50	75.70	152			(Unknown)

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

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Groundwater Works Summary

For information on the meaning of fields please see Glossary
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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW023198

Works Details (top)

GROUNDWATER NUMBER	GW023198
LIC-NUM	80BL017091
AUTHORISED-PURPOSES	STOCK
INTENDED-PURPOSES	STOCK
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	(Unknown)
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	1965-01-01
FINAL-DEPTH (metres)	48.80
DRILLED-DEPTH (metres)	48.80
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	BULGANDRAMINE EAST
GWMA	038 - CENTRAL WEST ALLUVIUM [REST]
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6386793.00
EASTING	605045.00
LATITUDE	32 39' 5"
LONGITUDE	148 7' 12"
GS-MAP	0050A3

AMG-ZONE	55
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	BULGANDRAMINE
PORTION-LOT-DP	148

Licensed (top)

COUNTY	NARROMINE
PARISH	BULGANDRAMINE
PORTION-LOT-DP	148

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1	1	Casing	Nil	0.00	0.00	0			(Unknown)

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
36.60	36.60	0.00	Unconsolidated	36.60					Over 14000 ppm

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	6.10	6.10	Clay		
6.10	7.92	1.82	Sand		
7.92	36.58	28.66	Clay		
36.58	48.77	12.19	Sand Wash		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW025400

Works Details (top)

GROUNDWATER NUMBER	GW025400
LIC-NUM	80BL024067
AUTHORISED-PURPOSES	DOMESTIC STOCK
INTENDED-PURPOSES	DOMESTIC STOCK
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	Rotary
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	1969-06-01
FINAL-DEPTH (metres)	18.30
DRILLED-DEPTH (metres)	18.30
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	UGUMIJIL
GWMA	811 - CENTRAL WEST FRACTURED ROCKS
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8533-S
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6409863.00
EASTING	626312.00
LATITUDE	32 26' 28"
LONGITUDE	148 20' 37"
GS-MAP	0050B2

AMG-ZONE	55
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	MOMO
PORTION-LOT-DP	17

Licensed (top)

COUNTY	NARROMINE
PARISH	MOMO
PORTION-LOT-DP	17

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	0.61	0.61	Topsoil		
0.61	7.62	7.01	Clay		
7.62	18.29	10.67	Granite		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Saturday, May 9, 2009

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW026099

Works Details (top)

GROUNDWATER NUMBER	GW026099
LIC-NUM	80BL014963
AUTHORISED-PURPOSES	DOMESTIC POULTRY (GROUNDWATER)
INTENDED-PURPOSES	GENERAL USE
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	(Unknown)
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	1965-01-01
FINAL-DEPTH (metres)	49.40
DRILLED-DEPTH (metres)	49.40
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	N/A
GWMA	811 - CENTRAL WEST FRACTURED ROCKS
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6378822.00
EASTING	610220.00
LATITUDE	32 43' 22"
LONGITUDE	148 10' 34"
GS-MAP	0050A3

AMG-ZONE	55
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	MINGELO
PORTION-LOT-DP	161

Licensed (top)

COUNTY	NARROMINE
PARISH	MINGELO
PORTION-LOT-DP	161

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	49.38	49.38	Alluvium		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Saturday, May 9, 2009

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW027631

Works Details (top)

GROUNDWATER NUMBER	GW027631
LIC-NUM	80BL021078
AUTHORISED-PURPOSES	STOCK
INTENDED-PURPOSES	STOCK
WORK-TYPE	Bore open thru rock
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	Rotary
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	1967-04-01
FINAL-DEPTH (metres)	53.30
DRILLED-DEPTH (metres)	53.30
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	MANDALAY
GWMA	811 - CENTRAL WEST FRACTURED ROCKS
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6394219.00
EASTING	628462.00
LATITUDE	32 34' 55"
LONGITUDE	148 22' 7"
GS-MAP	0050B3

AMG-ZONE	55
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	BIRIDOO
PORTION-LOT-DP	33

Licensed (top)

COUNTY	NARROMINE
PARISH	BIRIDOO
PORTION-LOT-DP	33

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1	1	Casing	Threaded Steel	-0.30	39.00	152			Driven into Hole

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
42.40	44.20	1.80	Fractured	39.60		0.06			(Unknown)

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	1.22	1.22	Loam		
1.22	7.62	6.40	Loam Clay		
1.22	7.62	6.40	Gravel		
7.62	28.96	21.34	Clay Grey		
28.96	38.10	9.14	Clay White Dry		
38.10	39.62	1.52	Basalt Broken		
39.62	42.37	2.75	Basalt		
42.37	44.20	1.83	Basalt Broken Water Supply		
44.20	53.34	9.14	Basalt Hard		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW028886

Works Details (top)

GROUNDWATER NUMBER	GW028886
LIC-NUM	80BL023382
AUTHORISED-PURPOSES	STOCK
INTENDED-PURPOSES	STOCK
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	Rotary
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	1967-09-01
FINAL-DEPTH (metres)	121.90
DRILLED-DEPTH (metres)	121.90
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	THE PINES
GWMA	811 - CENTRAL WEST FRACTURED ROCKS
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6381336.00
EASTING	611238.00
LATITUDE	32 42' 0"
LONGITUDE	148 11' 12"
GS-MAP	0050A3

AMG-ZONE	55
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	MINGELO
PORTION-LOT-DP	100

Licensed (top)

COUNTY	NARROMINE
PARISH	MINGELO
PORTION-LOT-DP	100

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	0.91	0.91	Topsoil Clay		
0.91	5.49	4.58	Clay		
5.49	51.82	46.33	Shale Coloured		
51.82	121.92	70.10	Basalt Green		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Saturday, May 9, 2009

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW031418

Works Details (top)

GROUNDWATER NUMBER	GW031418
LIC-NUM	80BL020071
AUTHORISED-PURPOSES	STOCK
INTENDED-PURPOSES	STOCK
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	Rotary
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	1967-05-01
FINAL-DEPTH (metres)	67.10
DRILLED-DEPTH (metres)	67.10
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	BELMORE
GWMA	811 - CENTRAL WEST FRACTURED ROCKS
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6383535.00
EASTING	632831.00
LATITUDE	32 40' 40"
LONGITUDE	148 25' 0"
GS-MAP	0050B3

AMG-ZONE	55
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A (top)

COUNTY	GORDON
PARISH	BELMORE
PORTION-LOT-DP	21

Licensed (top)

COUNTY	GORDON
PARISH	BELMORE
PORTION-LOT-DP	21

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	0.91	0.91	Topsoil		
0.91	4.27	3.36	Clay White		
4.27	13.41	9.14	Clay Sandy		
13.41	48.77	35.36	Sandstone Yellow		
48.77	67.06	18.29	Granite		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW033349

Works Details (top)

GROUNDWATER NUMBER	GW033349
LIC-NUM	80BL026570
AUTHORISED-PURPOSES	STOCK
INTENDED-PURPOSES	NOT KNOWN
WORK-TYPE	Bore open thru rock
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	Rotary
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	1967-09-01
FINAL-DEPTH (metres)	83.80
DRILLED-DEPTH (metres)	83.80
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	WHITTON PARK
GWMA	811 - CENTRAL WEST FRACTURED ROCKS
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6376920.00
EASTING	609496.00
LATITUDE	32 44' 24"
LONGITUDE	148 10' 7"
GS-MAP	0050A3

AMG-ZONE	55
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A (top)

COUNTY	KENNEDY
PARISH	COOKOPIE
PORTION-LOT-DP	10

Licensed (top)

COUNTY	KENNEDY
PARISH	COOKOPIE
PORTION-LOT-DP	BOUNDARY 10 & 32

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1	1	Casing	Welded Steel	-0.50	12.60	165			Driven into Hole

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
58.80	58.90	0.10	Fractured						(Unknown)
77.10	77.10	0.00	Fractured						(Unknown)

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	2.13	2.13	Clay Topsoil		
2.13	5.79	3.66	Gravel Waterworn		
5.79	58.83	53.04	Shale		
58.83	83.82	24.99	Slate Water Supply		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW034897

Works Details (top)

GROUNDWATER NUMBER	GW034897
LIC-NUM	80BL028144
AUTHORISED-PURPOSES	DOMESTIC STOCK
INTENDED-PURPOSES	DOMESTIC STOCK
WORK-TYPE	Well
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	(Unknown)
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	
FINAL-DEPTH (metres)	1.80
DRILLED-DEPTH (metres)	0.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	GUNDONGS
GWMA	811 - CENTRAL WEST FRACTURED ROCKS
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6398380.00
EASTING	612967.00
LATITUDE	32 32' 46"
LONGITUDE	148 12' 11"
GS-MAP	0050A3

AMG-ZONE	55
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	GUNDONG
PORTION-LOT-DP	156

Licensed (top)

COUNTY	NARROMINE
PARISH	GUNDONG
PORTION-LOT-DP	156

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
1.80	1.80	0.00	(Unknown)	0.00					0-500 ppm

Drillers Log (top)

no details

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Groundwater Works Summary

For information on the meaning of fields please see Glossary
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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW037395

Works Details (top)

GROUNDWATER NUMBER	GW037395
LIC-NUM	80BL030552
AUTHORISED-PURPOSES	IRRIGATION
INTENDED-PURPOSES	IRRIGATION
WORK-TYPE	Well
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	(Unknown)
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	
FINAL-DEPTH (metres)	4.50
DRILLED-DEPTH (metres)	4.60
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	N/A
GWMA	811 - CENTRAL WEST FRACTURED ROCKS
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6397938.00
EASTING	616510.00
LATITUDE	32 32' 59"
LONGITUDE	148 14' 27"
GS-MAP	0050A3

Groundwater Works Summary Page 2 of 2

AMG-ZONE	55
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	GUNDONG
PORTION-LOT-DP	1

Licensed (top)

COUNTY	NARROMINE
PARISH	GUNDONG
PORTION-LOT-DP	1 755110

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1	1	Casing	Timber	0.00	4.50	2133			Seated on Bottom

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
3.60	4.50	0.90	Unconsolidated	2.10		1.26			invalid code

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	3.05	3.05	Clay Red		
3.05	4.57	1.52	Clay Sandy Water Supply		

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Groundwater Works Summary

For information on the meaning of fields please see Glossary
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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW045134

Works Details (top)

GROUNDWATER NUMBER	GW045134
LIC-NUM	80BL105282
AUTHORISED-PURPOSES	TEST BORE
INTENDED-PURPOSES	PUBLIC/MUNICIPL
WORK-TYPE	Bore
WORK-STATUS	Test Hole
CONSTRUCTION-METHOD	Cable Tool
OWNER-TYPE	Local Govt
COMMENCE-DATE	
COMPLETION-DATE	1975-06-01
FINAL-DEPTH (metres)	18.30
DRILLED-DEPTH (metres)	18.30
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	N/A
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6396758.00
EASTING	614748.00
LATITUDE	32 33' 38"
LONGITUDE	148 13' 20"
GS-MAP	0050A3

AMG-ZONE	55
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	GUNDONG
PORTION-LOT-DP	154

Licensed (top)

COUNTY	NARROMINE
PARISH	GUNDONG
PORTION-LOT-DP	154

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
7.30	8.50	1.20	Unconsolidated			0.00			(Unknown)
16.80	18.30	1.50	Unconsolidated			0.00			(Unknown)

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	0.61	0.61	Topsoil		
0.61	3.05	2.44	Clay White		
3.05	7.32	4.27	Clay		
7.32	8.53	1.21	Clay Yellow Sandy		
8.53	13.41	4.88	Clay Yellow		
13.41	16.76	3.35	Clay		
16.76	18.29	1.53	Clay Sandy		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW045135

Works Details (top)

GROUNDWATER NUMBER	GW045135
LIC-NUM	80BL105283
AUTHORISED-PURPOSES	TEST BORE
INTENDED-PURPOSES	PUBLIC/MUNICIPL
WORK-TYPE	Bore
WORK-STATUS	Test Hole
CONSTRUCTION-METHOD	Cable Tool
OWNER-TYPE	Local Govt
COMMENCE-DATE	
COMPLETION-DATE	1975-06-01
FINAL-DEPTH (metres)	3.70
DRILLED-DEPTH (metres)	3.70
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	N/A
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6397956.00
EASTING	617605.00
LATITUDE	32 32' 58"
LONGITUDE	148 15' 9"
GS-MAP	0050B3

AMG-ZONE	55
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	GUNDONG
PORTION-LOT-DP	TS&CR 46736

Licensed (top)

COUNTY	NARROMINE
PARISH	GUNDONG
PORTION-LOT-DP	64

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1	1	Casing	Nil	0.00	0.00	0			(Unknown)
1	1	Casing	Drilled	0.00	3.70	305			(Unknown)

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
3.00	3.00	0.00	Unconsolidated	0.90		0.76			(Unknown)

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	0.61	0.61	Topsoil		
0.61	3.05	2.44	Clay White Sandy		
3.05	3.66	0.61	Sand White Silty Very Dirty Water Supply		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW045136

Works Details (top)

GROUNDWATER NUMBER	GW045136
LIC-NUM	80BL105284
AUTHORISED-PURPOSES	TEST BORE
INTENDED-PURPOSES	PUBLIC/MUNICIPL
WORK-TYPE	Bore
WORK-STATUS	Test Hole
CONSTRUCTION-METHOD	Cable Tool
OWNER-TYPE	Local Govt
COMMENCE-DATE	
COMPLETION-DATE	1975-06-01
FINAL-DEPTH (metres)	5.20
DRILLED-DEPTH (metres)	5.20
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	N/A
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6398324.00
EASTING	617792.00
LATITUDE	32 32' 46"
LONGITUDE	148 15' 16"
GS-MAP	0050B3

AMG-ZONE	55
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	GUNDONG
PORTION-LOT-DP	107

Licensed (top)

COUNTY	NARROMINE
PARISH	GUNDONG
PORTION-LOT-DP	2

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
4.60	5.20	0.60	Unconsolidated			0.00			(Unknown)

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	0.91	0.91	Topsoil		
0.91	3.05	2.14	Clay White		
3.05	4.57	1.52	Clay White Sandy		
4.57	5.18	0.61	Clay Sandy		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW045137

Works Details (top)

GROUNDWATER NUMBER	GW045137
LIC-NUM	80BL105285
AUTHORISED-PURPOSES	TEST BORE
INTENDED-PURPOSES	PUBLIC/MUNICIPL
WORK-TYPE	Bore
WORK-STATUS	Test Hole
CONSTRUCTION-METHOD	Cable Tool
OWNER-TYPE	Local Govt
COMMENCE-DATE	
COMPLETION-DATE	1975-06-01
FINAL-DEPTH (metres)	12.20
DRILLED-DEPTH (metres)	0.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	N/A
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6396318.00
EASTING	615448.00
LATITUDE	32 33' 52"
LONGITUDE	148 13' 47"
GS-MAP	0050A3

AMG-ZONE	55
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	GUNDONG
PORTION-LOT-DP	116

Licensed (top)

COUNTY	NARROMINE
PARISH	GUNDONG
PORTION-LOT-DP	116

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

For information on the meaning of fields please see Glossary
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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW054594

Works Details (top)

GROUNDWATER NUMBER	GW054594
LIC-NUM	80BL116653
AUTHORISED-PURPOSES	DOMESTIC STOCK
INTENDED-PURPOSES	DOMESTIC STOCK
WORK-TYPE	Bore
WORK-STATUS	Supply Obtained
CONSTRUCTION-METHOD	(Unknown)
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	
FINAL-DEPTH (metres)	61.60
DRILLED-DEPTH (metres)	0.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	GARTH
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6383487.00
EASTING	617018.00
LATITUDE	32 40' 48"
LONGITUDE	148 14' 53"
GS-MAP	0050A3

AMG-ZONE	55
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	BULGANDRAMINE
PORTION-LOT-DP	52

Licensed (top)

COUNTY	NARROMINE
PARISH	BULGANDRAMINE
PORTION-LOT-DP	52

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1	1	Casing	Threaded Steel	0.00	0.00	152			(Unknown)

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

For information on the meaning of fields please see Glossary
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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW056594

Works Details (top)

GROUNDWATER NUMBER	GW056594
LIC-NUM	80BL123052
AUTHORISED-PURPOSES	DOMESTIC STOCK
INTENDED-PURPOSES	DOMESTIC STOCK
WORK-TYPE	Bore open thru rock
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	Rotary Air
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	1982-05-01
FINAL-DEPTH (metres)	54.20
DRILLED-DEPTH (metres)	54.20
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	CEDARWOOD
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6376115.00
EASTING	612689.00
LATITUDE	32 44' 49"
LONGITUDE	148 12' 10"
GS-MAP	0050A3

AMG-ZONE	55
COORD-SOURCE	GD..ACC.MAP
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	MINGELO
PORTION-LOT-DP	482

Licensed (top)

COUNTY	NARROMINE
PARISH	MINGELO
PORTION-LOT-DP	482

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1	1	Casing	Welded Steel	-0.35	10.40	165			Driven into Hole

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
49.40	49.70	0.30	Fractured	48.80		0.63			(Unknown)
51.20	51.50	0.30	Fractured	48.80		1.26			(Unknown)

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	0.30	0.30	Topsoil		
0.30	1.20	0.90	Clay Red		
1.20	10.40	9.20	Shale Decomposed		
10.40	33.80	23.40	Shale Hard		
33.80	54.20	20.40	Slate Water Supply		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW064394

Works Details (top)

GROUNDWATER NUMBER	GW064394
LIC-NUM	80BL136464
AUTHORISED-PURPOSES	DOMESTIC STOCK
INTENDED-PURPOSES	DOMESTIC STOCK
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	Rotary Air
OWNER-TYPE	Private
COMMENCE-DATE	1987-06-14
COMPLETION-DATE	1987-06-14
FINAL-DEPTH (metres)	85.30
DRILLED-DEPTH (metres)	85.30
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	N/A
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8533-S
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6404251.00
EASTING	624336.00
LATITUDE	32 29' 31"
LONGITUDE	148 19' 24"
GS-MAP	0050B2

AMG-ZONE	55
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	TOMINGLEY
PORTION-LOT-DP	37

Licensed (top)

COUNTY	NARROMINE
PARISH	TOMINGLEY
PORTION-LOT-DP	37

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	85.30	165			Rotary Air

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	0.30	0.30	Topsoil		
0.30	4.60	4.30	Clay Reddish		
4.60	85.30	80.70	Granite Decomposed		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW066562

Works Details (top)

GROUNDWATER NUMBER	GW066562
LIC-NUM	80BL141280
AUTHORISED-PURPOSES	TEST BORE
INTENDED-PURPOSES	TEST BORE
WORK-TYPE	Bore
WORK-STATUS	Test Hole
CONSTRUCTION-METHOD	Rotary
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	1990-04-28
FINAL-DEPTH (metres)	73.00
DRILLED-DEPTH (metres)	73.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	N/A
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	Est. Contour >15M.
NORTHING	6387642.00
EASTING	617276.00
LATITUDE	32 38' 33"
LONGITUDE	148 15' 1"
GS-MAP	0050A3

AMG-ZONE	55
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	CALOMA
PORTION-LOT-DP	RD RES

Licensed (top)

COUNTY	NARROMINE
PARISH	CALOMA
PORTION-LOT-DP	RD RES

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	73.00	114			Down Hole Hammer

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	1.00	1.00	Soil		
1.00	13.00	12.00	Clayey silt		
13.00	60.00	47.00	Clay, silty		
60.00	73.00	13.00	Conglomerate, unweathered (bedrock)		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW066807

Works Details (top)

GROUNDWATER NUMBER	GW066807
LIC-NUM	80BL140844
AUTHORISED-PURPOSES	TEST BORE
INTENDED-PURPOSES	TEST BORE
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	Rotary
OWNER-TYPE	Mines
COMMENCE-DATE	1990-02-08
COMPLETION-DATE	1990-02-08
FINAL-DEPTH (metres)	132.00
DRILLED-DEPTH (metres)	132.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	N/A
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	Est. Contour >15M.
NORTHING	6406120.00
EASTING	606397.00
LATITUDE	32 28' 37"
LONGITUDE	148 7' 56"
GS-MAP	0050A2

AMG-ZONE	55
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	THE OAKS
PORTION-LOT-DP	R.D.999

Licensed (top)

COUNTY	NARROMINE
PARISH	THE OAKS
PORTION-LOT-DP	R.D.999

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	132.00	114			Rotary Air

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	10.00	10.00	Sandy gravel		
10.00	11.00	1.00	Clay		
11.00	13.00	2.00	Sand		
13.00	42.00	29.00	Clay		
42.00	46.00	4.00	Sand		
46.00	47.00	1.00	clay		
47.00	49.00	2.00	Sand		
49.00	59.00	10.00	Clay		
59.00	60.00	1.00	Sand		
60.00	89.60	29.60	Clay		
89.60	93.00	3.40	Sand		
93.00	95.00	2.00	Clay		
95.00	120.00	25.00	Weathered tuff ? [bedrock]		
120.00	132.00	12.00	Fresh tuff [bedrock]		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW068651

Works Details (top)

GROUNDWATER NUMBER	GW068651
LIC-NUM	
AUTHORISED-PURPOSES	
INTENDED-PURPOSES	MINING
WORK-TYPE	Bore
WORK-STATUS	Test Hole
CONSTRUCTION-METHOD	Rotary Air
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	1990-04-27
FINAL-DEPTH (metres)	97.00
DRILLED-DEPTH (metres)	97.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	
GWMA	
GW-ZONE	
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6383302.00
EASTING	616478.00
LATITUDE	32 40' 55"
LONGITUDE	148 14' 33"
GS-MAP	

AMG-ZONE	55
COORD-SOURCE	GD.,ACC.GIS
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	BULGANDRAMINE
PORTION-LOT-DP	L49 DP755093

Licensed (top)

no details

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
82.00	82.10	0.10							Fresh
94.00	94.10	0.10							Fresh

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	1.00	1.00			
1.00	7.00	6.00			
7.00	20.00	13.00	Silty Clay		
20.00	74.00	54.00	Silt (weathered Bedrock ?)		
74.00	82.00	8.00	Weathered Silstone (bedrock)		
82.00	97.00	15.00	Fresh Siltstone (bedrock)		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW800177

Works Details (top)

GROUNDWATER NUMBER	GW800177
LIC-NUM	80BL237099
AUTHORISED-PURPOSES	TEST BORE
INTENDED-PURPOSES	TEST BORE
WORK-TYPE	Bore
WORK-STATUS	Test Hole
CONSTRUCTION-METHOD	Rotary
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	1995-10-18
FINAL-DEPTH (metres)	113.88
DRILLED-DEPTH (metres)	113.88
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	TSR
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	1.00
SALINITY	
YIELD	0.32

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6400284.00
EASTING	619322.00
LATITUDE	32 31' 42"
LONGITUDE	148 16' 14"
GS-MAP	50AB3

Groundwater Works Summary Page 2 of 2

AMG-ZONE	55
COORD-SOURCE	Map Interpretation
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	TOMINGLEY
PORTION-LOT-DP	

Licensed (top)

COUNTY	NARROMINE
PARISH	TOMINGLEY
PORTION-LOT-DP	TSR 1986

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Backfill	Backfill	0.00	113.80				

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
2.00	4.50	2.50		1.00	0.32	5.00	1.00	Good	

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	2.00	2.00	Top soil loam		
2.00	4.50	2.50	Sand damp [250gph]		
4.50	81.00	76.50	Clay silty		
81.00	82.50	1.50	Sandstone [250gph]		
82.50	109.50	27.00	Silty clay SS band		
109.50	113.88	4.38	Andestite plus basalt		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW800179

Works Details (top)

GROUNDWATER NUMBER	GW800179
LIC-NUM	80BL237099
AUTHORISED-PURPOSES	TEST BORE
INTENDED-PURPOSES	TEST BORE
WORK-TYPE	Bore
WORK-STATUS	Test Hole
CONSTRUCTION-METHOD	Rotary
OWNER-TYPE	
COMMENCE-DATE	
COMPLETION-DATE	1995-10-19
FINAL-DEPTH (metres)	48.00
DRILLED-DEPTH (metres)	48.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	TSR
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8533-S
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6404034.00
EASTING	622823.00
LATITUDE	32 29' 39"
LONGITUDE	148 18' 26"
GS-MAP	50AB2

AMG-ZONE	55
COORD-SOURCE	Map Interpretation
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	TOMINGLEY
PORTION-LOT-DP	

Licensed (top)

COUNTY	NARROMINE
PARISH	TOMINGLEY
PORTION-LOT-DP	TSR 1986

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	48.00	152			Rotary Air
1		Backfill	Backfill	0.00	48.00	152			

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	4.00	4.00	Top soil loam		
4.00	8.00	4.00	Silty clay		
8.00	33.00	25.00	Clay plus sand bands		
33.00	48.00	15.00	Sandstone/clay bands dry + sub surface moisture in clay		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW801299

Works Details (top)

GROUNDWATER NUMBER	GW801299
LIC-NUM	80BL239270
AUTHORISED-PURPOSES	DOMESTIC STOCK
INTENDED-PURPOSES	DOMESTIC
WORK-TYPE	Bore
WORK-STATUS	Supply Obtained
CONSTRUCTION-METHOD	Rotary Air
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2001-03-26
FINAL-DEPTH (metres)	46.00
DRILLED-DEPTH (metres)	46.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	318 DILLADERRY ROAD
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	14.80
SALINITY	
YIELD	0.13

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6397933.00
EASTING	627453.00
LATITUDE	32 32' 55"
LONGITUDE	148 21' 27"
GS-MAP	

AMG-ZONE	55
COORD-SOURCE	Map Interpretation
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	BIRIDOO
PORTION-LOT-DP	82//830792

Licensed (top)

COUNTY	NARROMINE
PARISH	BIRIDOO
PORTION-LOT-DP	82 830792

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	4.60	170			Rotary Air
1		Hole	Hole	4.60	46.00	114			Rotary Air
1	1	Casing	P.V.C.	-0.50	4.60	125			Driven into Hole

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
32.00	32.10	0.10		14.80		0.13	40.00	2.00	Good

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	0.50	0.50	Topsoil		
0.50	26.20	25.70	Basalt, decomposed		
26.20	46.00	19.80	Balsalt, blue		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW801409

Works Details (top)

GROUNDWATER NUMBER	GW801409
LIC-NUM	80BL137464
AUTHORISED-PURPOSES	DOMESTIC STOCK
INTENDED-PURPOSES	DOMESTIC STOCK
WORK-TYPE	Bore
WORK-STATUS	Collapsed Bore
CONSTRUCTION-METHOD	(Unknown)
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2002-01-08
FINAL-DEPTH (metres)	
DRILLED-DEPTH (metres)	
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	PEPPIMENARTI
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8533-S
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6407434.00
EASTING	621013.00
LATITUDE	32 27' 49"
LONGITUDE	148 17' 16"
GS-MAP	50ab2

AMG-ZONE	55
COORD-SOURCE	Map Interpretation
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	TOMINGLEY
PORTION-LOT-DP	LT 1 DP 772054

Licensed (top)

COUNTY	NARROMINE
PARISH	TOMINGLEY
PORTION-LOT-DP	1 772054

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

For information on the meaning of fields please see Glossary
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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW801568

Works Details (top)

GROUNDWATER NUMBER	GW801568
LIC-NUM	80BL239686
AUTHORISED-PURPOSES	DOMESTIC STOCK
INTENDED-PURPOSES	DOMESTIC STOCK
WORK-TYPE	Bore
WORK-STATUS	Abandoned Bore
CONSTRUCTION-METHOD	Down Hole Hammer
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2002-03-30
FINAL-DEPTH (metres)	81.00
DRILLED-DEPTH (metres)	81.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	MALLE VIEW
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6385184.00
EASTING	619013.00
LATITUDE	32 39' 53"
LONGITUDE	148 16' 9"
GS-MAP	50AB3

AMG-ZONE	55
COORD-SOURCE	Map Interpretation
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	CALOMA
PORTION-LOT-DP	LT 15 DP 755095

Licensed (top)

COUNTY	NARROMINE
PARISH	CALOMA
PORTION-LOT-DP	15 755095

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	81.00	125			Down Hole Hammer

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	0.50	0.50	Topsoil		
0.50	6.40	5.90	Siltstone		
6.40	8.20	1.80	Schist		
8.20	15.80	7.60	Siltstone		
15.80	17.30	1.50	Shale		
17.30	49.60	32.30	Siltstone		
49.60	51.70	2.10	Shale		
51.70	53.50	1.80	Siltstone		
53.50	67.70	14.20	Shale		
67.70	68.10	0.40	Siltstone		
68.10	81.00	12.90	Shale		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW802483

Works Details (top)

GROUNDWATER NUMBER	GW802483
LIC-NUM	80BL239897
AUTHORISED-PURPOSES	DOMESTIC STOCK
INTENDED-PURPOSES	DOMESTIC STOCK
WORK-TYPE	Bore
WORK-STATUS	Supply Obtained
CONSTRUCTION-METHOD	Down Hole Hammer
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2003-07-03
FINAL-DEPTH (metres)	60.00
DRILLED-DEPTH (metres)	60.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	OAKLEIGH
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	12.00
SALINITY	
YIELD	0.40

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6392894.00
EASTING	600413.00
LATITUDE	32 35' 49"
LONGITUDE	148 4' 12"
GS-MAP	50AB3

AMG-ZONE	55
COORD-SOURCE	GIS - Geographic Information System
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	GILMOUR
PORTION-LOT-DP	52 721760

Licensed (top)

COUNTY	NARROMINE
PARISH	GILMOUR
PORTION-LOT-DP	52 721760

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	2.00	225			Down Hole Hammer
1		Hole	Hole	2.00	60.00	200			Down Hole Hammer
1	1	Casing	Casing Protector	0.00	2.00	225	207		(Unknown); Cemented
1	1	Casing	PVC Class 9	0.00	58.00	140	128		Glued; Seated on Bottom; Cap
1	1	Opening	Slots	46.00	52.00	140			PVC Class 9; Mechanically Slotted; SL: 75mm; A: 1mm

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
51.00	51.75	0.75		12.00		0.40			(Unknown)

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	6.00	6.00	Clay, brown, Silt & Gravel		
6.00	8.00	2.00	Gravel, small, wet		

8.00	16.00	8.00	Clay, red
16.00	24.00	8.00	Clay, white
24.00	30.00	6.00	Clay, red
30.00	34.00	4.00	Clay, tan
34.00	58.00	24.00	Saprolite, tan (Aquifer) (Weathered Bedrock)
58.00	60.00	2.00	Weathered Rock

Groundwater Works Summary

For information on the meaning of fields please see Glossary
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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW802830

Works Details (top)

GROUNDWATER NUMBER	GW802830
LIC-NUM	80BL237355
AUTHORISED-PURPOSES	TEST BORE
INTENDED-PURPOSES	TEST BORE
WORK-TYPE	Bore
WORK-STATUS	Test Hole
CONSTRUCTION-METHOD	Rotary - Air/Foam
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	1997-05-23
FINAL-DEPTH (metres)	101.00
DRILLED-DEPTH (metres)	101.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	142 WICKS RD
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	38.20
SALINITY	1120.00
YIELD	1.80

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-S
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6374326.00
EASTING	611184.00
LATITUDE	32 45' 48"
LONGITUDE	148 11' 13"
GS-MAP	50AB4

AMG-ZONE	55
COORD-SOURCE	GIS - Geographic Information System
REMARK	

Form-A (top)

COUNTY	KENNEDY
PARISH	BURRILL
PORTION-LOT-DP	23//753977

Licensed (top)

COUNTY	KENNEDY
PARISH	BURRILL
PORTION-LOT-DP	23 753977

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	101.00	140			Rotary - Air/Foam

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
92.00	96.00	4.00		38.20	1.80			1.00	1120.00

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	2.00	2.00	Topsoil, clay, brown, stiff		
2.00	4.50	2.50	Clay, orange, brown, stiff with trace Silt		
4.50	5.50	1.00	Gravelly Clay, brown, poorly sorted quartz		
5.50	20.00	14.50	Clay, red, brown		
20.00	22.00	2.00	Clayey Gravel, red, brown, coarse		
22.00	42.00	20.00	Clay, light grey, becomming white, weathered		
42.00	46.00	4.00	Clay, yellow, brown, as above, quartz vein		
46.00	76.00	30.00	Clay, yellow, brown, weakly laminated		
76.00	86.00	10.00	Clay, as above, quartz vein at 76m		
86.00	92.00	6.00	Clay, as above, minor quartz vein at 86m		
92.00	98.00	6.00	Clay, light grey, major quartz veins 92 & 96m		
98.00	101.00	3.00	Clay, yellow, brown, weakly laminated		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW802832

Works Details (top)

GROUNDWATER NUMBER	GW802832
LIC-NUM	80BL237357
AUTHORISED-PURPOSES	TEST BORE
INTENDED-PURPOSES	TEST BORE
WORK-TYPE	Bore
WORK-STATUS	Test Hole
CONSTRUCTION-METHOD	Rotary - Air/Foam
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	1997-05-27
FINAL-DEPTH (metres)	76.00
DRILLED-DEPTH (metres)	76.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	142 WICKS RD
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	48.50
SALINITY	4820.00
YIELD	1.20

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6378791.00
EASTING	609984.00
LATITUDE	32 43' 23"
LONGITUDE	148 10' 25"
GS-MAP	50AB3

AMG-ZONE	55
COORD-SOURCE	GIS - Geographic Information System
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	MINGELO
PORTION-LOT-DP	158//755113

Licensed (top)

COUNTY	NARROMINE
PARISH	MINGELO
PORTION-LOT-DP	158 755113

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	76.00	140			Rotary - Air/Foam

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
63.00	77.00	14.00		48.50	1.20			1.00	4820.00

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	1.00	1.00	Topsoil, silty clay, brown, minor calcrete		
1.00	7.00	6.00	Clay, brown, massive, stiff		
7.00	14.00	7.00	Clay, Silcrete & Clay, white,		
14.00	32.00	18.00	Clay, pale grey		
32.00	66.00	34.00	Shale, weathered, pale yellow, brown,		
66.00	76.00	10.00	Shale, black, minor mineralisation		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
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Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW802833

Works Details (top)

GROUNDWATER NUMBER	GW802833
LIC-NUM	80BL237358
AUTHORISED-PURPOSES	TEST BORE
INTENDED-PURPOSES	TEST BORE
WORK-TYPE	Bore
WORK-STATUS	Test Hole
CONSTRUCTION-METHOD	Rotary - Air/Foam
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	1997-05-25
FINAL-DEPTH (metres)	99.00
DRILLED-DEPTH (metres)	99.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	142 WICKS RD
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	48.00
SALINITY	2960.00
YIELD	1.00

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6376296.00
EASTING	610434.00
LATITUDE	32 44' 44"
LONGITUDE	148 10' 44"
GS-MAP	50AB3

Groundwater Works Summary Page 2 of 2

AMG-ZONE	55
COORD-SOURCE	GIS - Geographic Information System
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	MINGELO
PORTION-LOT-DP	321//755113

Licensed (top)

COUNTY	NARROMINE
PARISH	MINGELO
PORTION-LOT-DP	321 755113

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	99.00	140			Rotary - Air/Foam

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
88.00	99.00	11.00		48.00		1.00			2960.00

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	2.00	2.00	Topsoil, silty clay, brown		
2.00	10.00	8.00	Clay, brown to orange brown		
10.00	22.00	12.00	Clay, light grey, grey, brown		
22.00	32.00	10.00	Siltstone, light grey, partially weathered		
32.00	40.00	8.00	Siltstone, ligth grey, as above		
40.00	99.00	59.00	Siltstone, ligth grey, staining throughout		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Friday, March 27, 2009

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW802834

Works Details (top)

GROUNDWATER NUMBER	GW802834
LIC-NUM	80BL237359
AUTHORISED-PURPOSES	TEST BORE
INTENDED-PURPOSES	TEST BORE
WORK-TYPE	Bore
WORK-STATUS	Test Hole
CONSTRUCTION-METHOD	Rotary - Air/Foam
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	1997-05-25
FINAL-DEPTH (metres)	77.00
DRILLED-DEPTH (metres)	77.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	142 WICKS RD
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	42.00
SALINITY	3900.00
YIELD	1.50

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6383531.00
EASTING	617229.00
LATITUDE	32 40' 47"
LONGITUDE	148 15' 1"
GS-MAP	50AB3

AMG-ZONE	55
COORD-SOURCE	GIS - Geographic Information System
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	BULGANDRAMINE
PORTION-LOT-DP	52//755093

Licensed (top)

COUNTY	NARROMINE
PARISH	BULGANDRAMINE
PORTION-LOT-DP	52 755093

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	77.00	140			Rotary - Air/Foam

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
54.00	77.00	23.00		42.00		1.50		1.00	3900.00

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	1.00	1.00	Sandy Clay, brown, grey		
1.00	6.00	5.00	Silcrete, red, brown & grey		
6.00	10.00	4.00	Shale & Siltstone, interbedded, orange, brown to yellow		
10.00	30.00	20.00	Shale & Siltstone, interbedded, yellow, brown		
30.00	51.00	21.00	Shale & Siltstone, as above, yellow, grey to brown		
51.00	77.00	26.00	Shale & Siltstone, as above, grey to green, grey		

should be sought in interpreting and using this data.

Groundwater Works Summary

For information on the meaning of fields please see Glossary
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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW802842

Works Details (top)

GROUNDWATER NUMBER	GW802842
LIC-NUM	80BL237530
AUTHORISED-PURPOSES	DOMESTIC MINING STOCK
INTENDED-PURPOSES	DOMESTIC MINING STOCK
WORK-TYPE	Bore
WORK-STATUS	Supply Obtained
CONSTRUCTION-METHOD	Rotary
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	1997-08-07
FINAL-DEPTH (metres)	83.00
DRILLED-DEPTH (metres)	83.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	GARTH
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	44.00
SALINITY	4400.00
YIELD	3.00

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6383266.00
EASTING	617219.00
LATITUDE	32 40' 56"
LONGITUDE	148 15' 1"
GS-MAP	

Groundwater Works Summary Page 2 of 3

AMG-ZONE	55
COORD-SOURCE	GIS - Geographic Information System
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	BULGANDRAMINE
PORTION-LOT-DP	52//755093

Licensed (top)

COUNTY	NARROMINE
PARISH	BULGANDRAMINE
PORTION-LOT-DP	52 755093

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	83.00	250			Rotary
1	1	Casing	(Unknown)	0.00	83.00	250			(Unknown); (Unknown); (Unknown)
1	1	Opening	Slots	22.50	83.00	250			(Unknown); (Unknown); (Unknown)

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
22.50	83.00	60.50		43.50		3.00			4400.00

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	2.00	2.00	Topsoil, borwn, loamy, dry, very silty		
2.00	4.00	2.00	Silty Clay, light yellow/brown		
4.00	6.00	2.00	Clayey Gravel, light yellow brown		
6.00	8.00	2.00	Clayey gravel, brown to light brown		
8.00	22.50	14.50	(Unknown), loss of sample, difficult drilling		
22.50	24.00	1.50	Shale & Siltstone, light grey, weathered		
24.00	32.00	8.00	Siltstone & Shale, yellow, brown, fine		

32.00	38.00	6.00	Shale & Siltstone, yellow, brown, trace quartz
38.00	44.00	6.00	Siltstone & Shale, green, brown, fine, trace quartz
44.00	46.00	2.00	Shale & Siltstone, green, brown, fesh, hard, fine
46.00	78.00	32.00	Siltstone & Shale, grey, green, fresh, hard
78.00	83.00	5.00	Shale & Siltstone, grey, green, fresh, hard, trace quartz

Groundwater Works Summary

For information on the meaning of fields please see Glossary
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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW803020

Works Details (top)

GROUNDWATER NUMBER	GW803020
LIC-NUM	80BL242862
AUTHORISED-PURPOSES	DOMESTIC STOCK
INTENDED-PURPOSES	DOMESTIC STOCK
WORK-TYPE	Bore
WORK-STATUS	Supply Obtained
CONSTRUCTION-METHOD	Down Hole Hammer
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2005-06-14
FINAL-DEPTH (metres)	66.00
DRILLED-DEPTH (metres)	66.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	GULLEN GAMBLE
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	28.00
SALINITY	
YIELD	0.70

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6388176.00
EASTING	634745.00
LATITUDE	32 38' 9"
LONGITUDE	148 26' 11"
GS-MAP	

AMG-ZONE	55
COORD-SOURCE	GPS - Global Positioning System
REMARK	

Form-A (top)

COUNTY	GORDON
PARISH	BELMORE
PORTION-LOT-DP	12//753219

Licensed (top)

COUNTY	GORDON
PARISH	BELMORE
PORTION-LOT-DP	12 753219

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter; ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	66.00	200			Down Hole Hammer
1	1	Casing	PVC Class 9	0.00	66.00	164	150		Riveted and Glued; Driven into Hole; Open End
1	1	Opening	Slots - Vertical	30.00	36.00	164			PVC Class 9; Sawn; SL: 200mm; A: 2mm; Riveted and Glued
1	1	Opening	Slots - Vertical	48.00	54.00	164			PVC Class 9; Sawn; SL: 200mm; A: 2mm; Riveted and Glued

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
32.00	32.20	0.20		28.00		0.20		1.00	
50.00	50.10	0.10		28.00		0.50			

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	0.40	0.40	Topsoil		
0.40	4.00	3.60	Clay		
4.00	10.00	6.00	Shale		
10.00	66.00	56.00	Granite		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Saturday, May 9, 2009

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW803033

Works Details (top)

GROUNDWATER NUMBER	GW803033
LIC-NUM	80BL242996
AUTHORISED-PURPOSES	DOMESTIC FARMING STOCK
INTENDED-PURPOSES	DOMESTIC FARMING STOCK
WORK-TYPE	Bore
WORK-STATUS	Abandoned - Backfilled
CONSTRUCTION-METHOD	Down Hole Hammer
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2005-11-06
FINAL-DEPTH (metres)	79.00
DRILLED-DEPTH (metres)	79.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	COWABUNGA
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6378461.00
EASTING	613311.00
LATITUDE	32 43' 33"
LONGITUDE	148 12' 33"
GS-MAP	

AMG-ZONE	55
COORD-SOURCE	GIS - Geographic Information System
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	MINGELO
PORTION-LOT-DP	465//755113

Licensed (top)

COUNTY	NARROMINE
PARISH	MINGELO
PORTION-LOT-DP	465 755113

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	79.00	200			Down Hole Hammer
1	1	Backfill	Drilled cuttings	0.00	79.00	200			

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	34.00	34.00	Clays, red, purple, brown		
34.00	50.00	16.00	Saprolite, cream		
50.00	65.00	15.00	Weathered Rock, cream		
65.00	79.00	14.00	Rock, fresh		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW803148

Works Details (top)

GROUNDWATER NUMBER	GW803148
LIC-NUM	80BL242918
AUTHORISED-PURPOSES	TOWN WATER SUPPLY
INTENDED-PURPOSES	TOWN WATER SUPPLY
WORK-TYPE	Excavation
WORK-STATUS	Supply Obtained
CONSTRUCTION-METHOD	Other
OWNER-TYPE	Local Govt
COMMENCE-DATE	
COMPLETION-DATE	2005-05-31
FINAL-DEPTH (metres)	5.80
DRILLED-DEPTH (metres)	
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	PART TSR 28018
GWMA	811 - CENTRAL WEST FRACTURED ROCKS
GW-ZONE	-
STANDING-WATER-LEVEL	4.40
SALINITY	
YIELD	1.00

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6397983.00
EASTING	617498.00
LATITUDE	32 32' 58"
LONGITUDE	148 15' 5"
GS-MAP	

AMG-ZONE	55
COORD-SOURCE	GIS - Geographic Information System
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	GUNDONG
PORTION-LOT-DP	7002//1019911

Licensed (top)

COUNTY	NARROMINE
PARISH	GUNDONG
PORTION-LOT-DP	7002 1019911

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	5.80				Other
1	1	Casing	Lining	0.00	7.20				

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

For information on the meaning of fields please see Glossary
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Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW803248

Works Details (top)

GROUNDWATER NUMBER	GW803248
LIC-NUM	80BL242547
AUTHORISED-PURPOSES	DOMESTIC STOCK
INTENDED-PURPOSES	DOMESTIC STOCK
WORK-TYPE	Bore
WORK-STATUS	Abandoned - Backfilled
CONSTRUCTION-METHOD	Rotary Air
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2006-08-28
FINAL-DEPTH (metres)	162.00
DRILLED-DEPTH (metres)	162.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	334 BELOWRIE RD
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8533-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6406170.00
EASTING	627990.00
LATITUDE	32 28' 28"
LONGITUDE	148 21' 43"
GS-MAP	

AMG-ZONE	55
COORD-SOURCE	GIS - Geographic Information System
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	MOMO
PORTION-LOT-DP	6//718920

Licensed (top)

COUNTY	NARROMINE
PARISH	MOMO
PORTION-LOT-DP	6 718920

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	22.00	200			Rotary Air
1		Hole	Hole	22.00	162.00	171			Down Hole Hammer
1	1	Backfill	Drilled cuttings	0.00	22.00	200			
1	1	Backfill	Drilled cuttings	22.00	162.00	171			

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	0.50	0.50	Topsoil		
0.50	22.00	21.50	Clay, brown		
22.00	98.00	76.00	Sandstone, coloured		
98.00	162.00	64.00	Granite, pink		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW803678

Works Details (top)

GROUNDWATER NUMBER	GW803678
LIC-NUM	80BL245013
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Piezometer
WORK-STATUS	Equipped - bore used for obs
CONSTRUCTION-METHOD	Auger - Solid Flight
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2008-07-12
FINAL-DEPTH (metres)	4.00
DRILLED-DEPTH (metres)	5.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	TOMINGLEY BP SERVICE STATION
GWMA	038 - CENTRAL WEST ALLUVIUM [REST]
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6395743.00
EASTING	614695.00
LATITUDE	32 34' 11"
LONGITUDE	148 13' 19"
GS-MAP	

AMG-ZONE	55
COORD-SOURCE	GPS - Global Positioning System
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	GUNDONG
PORTION-LOT-DP	Rd Adj 9/12/758983

Licensed (top)

COUNTY	NARROMINE
PARISH	GUNDONG
PORTION-LOT-DP	8 758983

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	5.00	100			Auger - So Flight
1	1	Backfill	Drilled cuttings	4.00	5.00	100			
1	1	Casing	PVC Class 18	0.00	3.00	56	44		Screwed; Seated; En cap
1	1	Opening	Slots - Horizontal	3.00	4.00	56			PVC Class 18; Mechanica Slotted; Screwed
1		Annulus	Crushed Aggregate	0.00	1.50	100	56		
1		Annulus	Bentonite/Grout	1.50	2.00	100	56		
1		Annulus	Waterworn/Rounded	2.00	4.00	100	56		Graded; GS 3-5mm

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	0.30	0.30	Sand, pale brown, coase & yellow Shale Fill		
0.30	1.30	1.00	Clay, gravelly, red brown		
1.30	1.50	0.20	Siltstone, reddish yellow, weak		
1.50	4.50	3.00	Claystone, dry, pale orange brown		

4.50	4.80	0.30	Claystone/Shale, less weathered, firmer, pale yellow brown
4.80	5.00	0.20	Clay, gravelly, harder, reddish yellow, deriving from shale

Groundwater Works Summary

For information on the meaning of fields please see Glossary
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Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW803679

Works Details (top)

GROUNDWATER NUMBER	GW803679
LIC-NUM	80BL245013
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Piezometer
WORK-STATUS	Equipped - bore used for obs
CONSTRUCTION-METHOD	Auger - Solid Flight
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2008-07-12
FINAL-DEPTH (metres)	4.80
DRILLED-DEPTH (metres)	4.50
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	TOMINGLEY BP SERVICE STATION
GWMA	038 - CENTRAL WEST ALLUVIUM [REST]
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6395761.00
EASTING	614680.00
LATITUDE	32 34' 11"
LONGITUDE	148 13' 18"
GS-MAP	

AMG-ZONE	55
COORD-SOURCE	GPS - Global Positioning System
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	GUNDONG
PORTION-LOT-DP	B//919940

Licensed (top)

COUNTY	NARROMINE
PARISH	GUNDONG
PORTION-LOT-DP	8 758983

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	4.80	100			Auger - So Flight
1	1	Backfill	Drilled cuttings	4.00	4.80	100			
1	1	Casing	PVC Class 18	0.00	3.00	56	44		Screwed; Seated; En cap
1	1	Opening	Slots - Horizontal	3.00	4.00	56			PVC Class 18; Mechanica Slotted; Screwed
1		Annulus	Crushed Aggregate	0.00	1.50	100	56		
1		Annulus	Bentonite/Grout	1.50	2.00	100	56		
1		Annulus	Waterworn/Rounded	2.00	4.00	100	56		Graded; G 3-5mm

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	0.40	0.40	Clayey Sand, dark brown, coarse, to Gravelly Clay		
0.40	1.10	0.70	Clay, dark reddish brown, medium, strongly pedal, moist		
1.10	2.00	0.90	Clay, red, medium, minor dull yellow Shale		

			fragments
2.00	2.50	0.50	Shale, hard, yellow, non-laminar
2.50	4.50	2.00	Claystone/Shale, less weathered, firmer, pale yellow brown

Groundwater Works Summary

For information on the meaning of fields please see Glossary
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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW803680

Works Details (top)

GROUNDWATER NUMBER	GW803680
LIC-NUM	80BL245013
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Piezometer
WORK-STATUS	Equipped - bore used for obs
CONSTRUCTION-METHOD	Auger - Solid Flight
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2008-07-12
FINAL-DEPTH (metres)	4.50
DRILLED-DEPTH (metres)	4.50
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	TOMINGLEY BP SERVICE STATION
GWMA	038 - CENTRAL WEST ALLUVIUM [REST]
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6395767.00
EASTING	614685.00
LATITUDE	32 34' 11"
LONGITUDE	148 13' 18"
GS-MAP	

AMG-ZONE	55
COORD-SOURCE	GPS - Global Positioning System
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	GUNDONG
PORTION-LOT-DP	B//919940

Licensed (top)

COUNTY	NARROMINE
PARISH	GUNDONG
PORTION-LOT-DP	8 758983

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	4.50	100			Auger - So Flight
1	1	Backfill	Drilled cuttings	4.00	4.50	100			
1	1	Casing	PVC Class 18	0.00	3.00	56	44		Screwed; Seated; En cap
1	1	Opening	Slots - Horizontal	3.00	4.00	56			PVC Class 18; Mechanica Slotted; Screwed
1		Annulus	Crushed Aggregate	0.00	1.30	100	56		
1		Annulus	Bentonite/Grout	1.30	1.80	100	56		
1		Annulus	Waterworn/Rounded	1.80	3.80	100	56		Graded; GS 3-5mm

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	0.20	0.20	Clayey Sand & Pebbles, dark brown, coarse		
0.20	0.70	0.50	Clay, dark reddish brown, medium		
0.70	1.10	0.40	Clay, red, medium		
1.10	2.50	1.40	Shale, weathered, dull yellow brown		

2.50	3.50	1.00	Sandy Clay, dark yellowish brown, little moist
3.50	4.50	1.00	Clay, gravelly, hydrocarbon odour at 3.5m

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Thursday, January 7, 2010

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW803681

Works Details (top)

GROUNDWATER NUMBER	GW803681
LIC-NUM	80BL245013
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Piezometer
WORK-STATUS	Equipped - bore used for obs
CONSTRUCTION-METHOD	Auger - Solid Flight
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2008-07-14
FINAL-DEPTH (metres)	3.50
DRILLED-DEPTH (metres)	4.50
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	TOMINGLEY BP SERVICE STATION
GWMA	038 - CENTRAL WEST ALLUVIUM [REST]
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6395749.00
EASTING	614686.00
LATITUDE	32 34' 11"
LONGITUDE	148 13' 18"
GS-MAP	

AMG-ZONE	55
COORD-SOURCE	GPS - Global Positioning System
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	GUNDONG
PORTION-LOT-DP	B//919940

Licensed (top)

COUNTY	NARROMINE
PARISH	GUNDONG
PORTION-LOT-DP	8 758983

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	4.50	100			Auger - So Flight
1	1	Backfill	Drilled cuttings	3.50	4.50	100			
1	1	Casing	PVC Class 18	0.00	3.00	56	44		Screwed; Seated; En cap
1	1	Opening	Slots - Horizontal	2.50	3.50	56			PVC Class 18; Mechanica Slotted; Screwed
1		Annulus	Crushed Aggregate	0.00	1.00	100	56		
1		Annulus	Bentonite/Grout	1.00	1.50	100	56		
1		Annulus	Waterworn/Rounded	1.50	3.50	100	56		Graded; G 3-5mm

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	1.00	1.00	Clayey Sand & Pebbles, dark brown, coarse, 10-20mm		
1.00	1.30	0.30	Clay, dull reddish brown, medium		
1.30	2.00	0.70	Shale, weathered, dull yellow brown		

2.00	3.50	1.50	Shale, weathered, dark yellowish brown
3.50	4.50	1.00	Clay, gravelly, olive brown, from weathered Shale

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Thursday, January 7, 2010

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW803682

Works Details (top)

GROUNDWATER NUMBER	GW803682
LIC-NUM	80BL245013
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Piezometer
WORK-STATUS	Equipped - bore used for obs
CONSTRUCTION-METHOD	Auger - Solid Flight
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2008-07-14
FINAL-DEPTH (metres)	3.50
DRILLED-DEPTH (metres)	4.50
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	TOMINGLEY BP SERVICE STATION
GWMA	038 - CENTRAL WEST ALLUVIUM [REST]
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	80 - MACQUARIE-WESTERN
RIVER-BASIN	421 - MACQUARIE RIVER
AREA-DISTRICT	
CMA-MAP	8532-N
GRID-ZONE	55/3
SCALE	1:50,000
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6395758.00
EASTING	614688.00
LATITUDE	32 34' 11"
LONGITUDE	148 13' 18"
GS-MAP	

AMG-ZONE	55
COORD-SOURCE	GPS - Global Positioning System
REMARK	

Form-A (top)

COUNTY	NARROMINE
PARISH	GUNDONG
PORTION-LOT-DP	B//919940

Licensed (top)

COUNTY	NARROMINE
PARISH	GUNDONG
PORTION-LOT-DP	8 758983

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	4.50	100			Auger - So Flight
1	1	Backfill	Drilled cuttings	3.50	4.50	100			
1	1	Casing	PVC Class 18	0.00	3.00	56	44		Screwed; Seated; En cap
1	1	Opening	Slots - Horizontal	2.30	3.30	56			PVC Class 18; Mechanica Slotted; Screwed
1		Annulus	Crushed Aggregate	0.00	0.80	100	56		
1		Annulus	Bentonite/Grout	0.80	1.30	100	56		
1		Annulus	Waterworn/Rounded	1.30	3.30	100	56		Graded; GS 3-5mm

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	0.70	0.70	Clayey Sand, reddish brown, coarse		
0.70	1.30	0.60	Clay, dull reddish brown, medium		
1.30	2.00	0.70	Shale, weathered, reddish yellow, some dull yellow fragments		

2.00	4.50	2.50	Shale, weathered, dark yellowish brown

Appendix 3

Special Supplement to the Water Act 1912, Groundwater Licence Embargo

(No. of pages including blank pages = 4)

Note: A copy of Appendix 3 is available on the Project CD

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6. Water supply for Aboriginal cultural purposes provided that the annual extraction does not exceed 10 megalitres per annum.
7. Bores on property where there is an existing licence under Part 5 of the Water Act 1912 and there is no increase in entitlement.
8. Bores providing water supply for emergency services including, but not limited to fire fighting.
9. Conversion to a test bore licence where a test bore licence is currently in force and was granted on or before 1 July 2007. This exemption expires on 30 June 2009.
10. Bores required for integrated development where general terms of approval with respect to such bores have been provided by the Department of Water and Energy prior to the commencement of this Order and for which a development consent has been granted.
11. Water supply for a person where the Minister determines that a failure to supply the water would cause a prohibitively high social, economic or national security cost and the supply of the water will cause no more than minimal environmental harm to any aquifer, or its dependent ecosystems.
12. A dewatering activity provided that the annual extraction does not exceed 10 megalitres per annum.
13. Water supply for the purpose of dust suppression in the construction of a public road provided that the annual extraction does not exceed 10 megalitres per annum.
14. Bores for the use of saline water where the salinity level exceeds 14,000 milligrams per litre (ppm).
15. Water supply for teaching purposes up to 3 megalitres per annum.

SCHEDULE 3

Dictionary

Development consent: has the same meaning as defined in the Environmental Planning and Assessment Act 1979;

Domestic consumption: has the same meaning as defined in section 52 of the Water Management Act 2000;

Groundwater management areas: Area defined by maps held by the Department of Water and Energy and for the purposes of this order includes all groundwater below the ground surface within these mapped boundaries;

Integrated development: has the same meaning as defined in the Environmental Planning and Assessment Act 1979;

Murray Darling Basin: has the same meaning as defined in section 4 of the Water Act 2007 (Cth);

Public land: has the same meaning as defined in the Local Government Act 1993 Dictionary;

Public road: has the same meaning as defined in the Roads Act 1993;

Recreational facilities: includes, but is not limited to parks, playgrounds, ovals, sporting grounds, golf courses and gymnasiums but excludes any commercial operations relating to those activities;

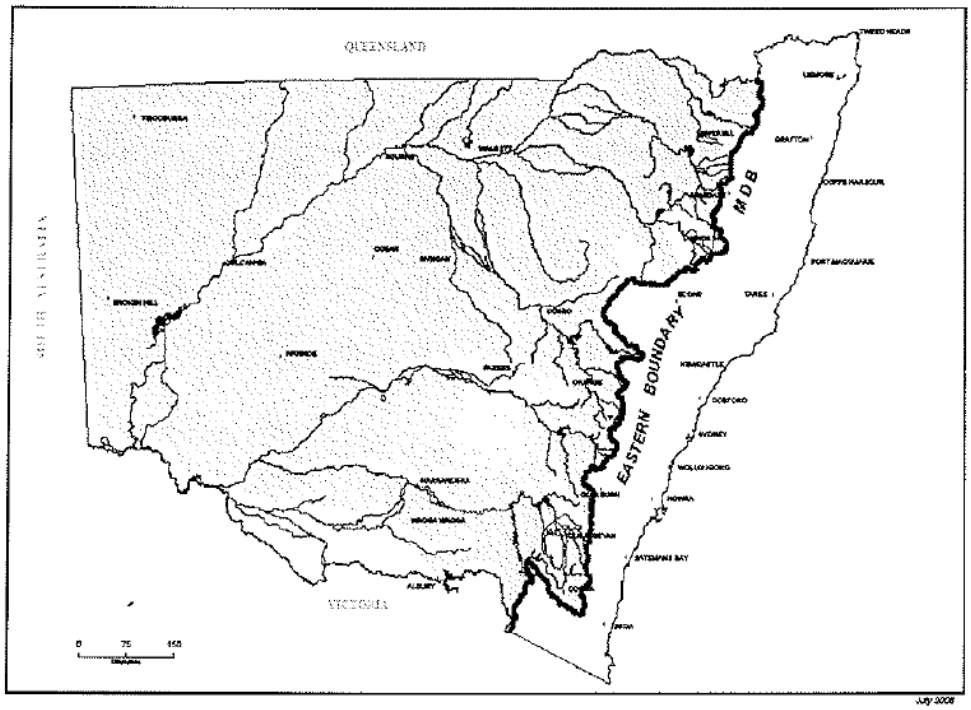
Stock watering: has the same meaning as defined in section 52 of the Water Management Act 2000;

Table 1

Ground Water Management Area (GWMA)	GMMA No.
Peel Valley Alluvium	005
Upper Macquarie Alluvium	009
Cudgegong Valley Alluvium	10
Upper Lachlan Alluvium	11
Mid Murrumbidgee Alluvium	13
Billabong Creek Alluvium	14
Upper Murray Alluvium	15
Lower Murray Alluvium (d/s Corowa)	16 (shallow)
Coolaburragundy-Talbrager Valley	19
Bell Valley Alluvium	20
Belubula Valley Alluvium	21
Border Rivers Alluvium	22
Miscellaneous Alluvium of Barwon Region	23
Lower Darling Alluvium	45
Upper Darling Alluvium	46

Bungendore Alluvium	54
Great Artesian Basin Alluvial	63
Castlereagh Alluvium	66
Orange Basalt	801
Young Granite	802
Yass Catchment	806
Peel Valley Fractured Rock	819
Parishes	
The Parishes of Goran, Brothers, Howes Hill, Calala, Merrigula, Tamarang, Trinkey, Coolanbilla, Springfield, Weston, Doona, Mema, Rodd, Pringle, Lawson, Moredevil, Coomoo Coomoo, Yarraman and Kickerbell in the County of Pottinger, all being within the Oxley Basin.	Part 608
The Parishes of Windy, Telford, Hudson and Moan in the County of Bucklan, all being within the Oxley Basin.	Part 608
The Parishes of Galambine, Wilbertree, Eurundury and Bumberra in the County of Phillip, all being within the Lachlan Fold Belt.	Part 811

Map 1



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Appendix 4

Hydrogeological Assessment, "Woodlands", Narromine, NSW

(No. of pages including blank pages = 88)

Note: A copy of Appendix 4 is available on the Project CD

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HYDROGEOLOGICAL ASSESSMENT
14 DAY AQUIFER PUMPING TEST
~
TEST BORE 6
"WOODLANDS", NARROMINE, NSW

FOR

ALKANE RESOURCES LIMITED

Submitted to: Mr Michael Sutherland
Alkane Resources Ltd
Second Floor
21 Church Street
DUBBO NSW 2830

Ph: 02 6882 2866
Fx: 02 6882 9282
msutherland@alkane.com.au

Submitted By: Mr James Morrow
The Impax Group
PO Box 6157
3 Crick Street
DUBBO NSW 2830

Ph: 02 6885 5536
Fx: 02 6885 3382
james@theimpaxgroup.com.au

9 September 2009

2008-0013 TB6 PT RP3 9/09/2009

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LIST OF ANNEXURES

Executive Summary

A 14 day aquifer pumping test was conducted at "Woodlands", a rural property located approximately 6km east of Narromine.

Alkane resources Limited wish to purchase right to abstract 1000ML/year from the property owner, Mr Stuart Boland. Preliminary testing indicates that a test bore installed at the site in January 2009 is suitable for the extraction of 1000ML/year of groundwater. However, the NSW DWE require a hydrogeological assessment to assess the potential impacts on surrounding water users of extracting an additional 1000ML of groundwater at the property. NSW DWE requested that a 14 day aquifer pumping test be conducted to assess the potential impacts on the aquifer.

The NSW DWE indicated that it would assess any future licence application against the following criteria:

- After 10 years of pumping the drawdown 200m from the production bore can not exceed 40% of the saturated thickness of the alluvium, and
- After 10 years of pumping the additional drawdown at the nearest neighbouring bore (screened in the same aquifer) does not exceed 5% of the saturated thickness of the alluvium, or a maximum of 3m.

The objective of the pumping test was to measure the hydrogeological properties of the aquifer, which would allow modelling of drawdown due to long term pumping at the site.

Test Bore 6 was pumped at an average rate of 38.47L/s for a period of 14 days.

Aquifer drawdown was observed at the pumping bore and at 7 locations within 2.5km of the pumping bore.

Aquifer drawdown results were assessed using a range of methods. The average transmissivity was estimated to be $668m^2$/day and the average storativity was estimated to be 8.2×10^{-3}.

The estimates of transmissivity and storativity were used to model drawdown that would result from pumping Test Bore 6 at a rate of 32L/s for a period of 10 years.

The predicted drawdown 200m from Test Bore 6 after 5260000 minutes (approximately 10 years) of pumping at a rate of 32L/s is approximately 2.65m. This less than 40% of the saturated thickness of alluvium in the vicinity of Test Bore 6, which was estimated to be 36m.

The Theis and Hantush Jacob equations predict that drawdown 200m from Test Bore 6 after 5260000 minutes (approximately 10 years) of pumping at a rate of 32L/s will be 3.2m and 2.50m respectively. Both estimates are significantly lower than the NSW DWE assessment criteria (40% of the saturated thickness of alluvium).

Using the Theis Analysis, the predicted drawdown at GW036519 (equivalent to drawdown at the nearest neighbouring bore) after 5260000 minutes (approximately 10 years) of pumping at a rate of 32L/s is estimated to be 2.05m. This estimate of drawdown exceeds the assessment criteria of 1.8m.

Using the Hantush Jacob analysis, the predicted drawdown 1200m from the pumping bore is estimated to be 1.33m. This estimate of drawdown is less than the assessment criteria of 1.8m.

A qualitative assessment of the pumping test data indicates that drawdown trends at the site are not consistent with those predicted by the Theis equation. Plots of observed drawdown vs time flatten earlier than expected indicating a source of groundwater recharge at the site. The observed recharge condition may be due to leakage from aquifers above and/or below the pumped aquifer, recharge from the Macquarie River and/or indicative of seasonal recharge after the summer irrigation season. Hantush and Jacob (1955) provide a method of accounting for recharge from leaky aquifers. As such, the estimate of drawdown 10 years after commencement of pumping using the Hantush Jacob method is less than that predicted by the Theis equation and is likely to better indicate long term steady state drawdown conditions in the aquifer.

Based on these results it can be concluded that long term pumping at a rate of 32L/s from Test Bore 6 would not cause an unacceptable level of additional drawdown in Zone 6 of the lower Macquarie River alluvium.

1 Introduction

The Impax Group was commissioned by Alkane Resources Limited to monitor and assess the results of a 14 day aquifer pumping test conducted at "Woodlands", Narromine, NSW. "Woodlands" is a rural property located on the Mitchell Highway, approximately 6 km to the east of Narromine.

The location of "Woodlands" is shown in *Figure 1* of *Annex A*.

"Woodlands" is located within groundwater Zone 6 in the lower Macquarie River alluvium groundwater system. Groundwater licence conditions within this system are outlined in the 2003 Water Sharing Plan for the Lower Macquarie Groundwater Sources.

The property owner, Mr Stuart Boland, currently holds Water Access Licence WAL11689, which entitles him to 1996 water shares in Zone 6 of the lower Macquarie River alluvium (equivalent to 1996ML/year at the time this report was prepared). Mr Boland currently uses approximately 900ML/year of groundwater for irrigation of seasonal fodder and cereal crops. Alkane Resources Limited wish to purchase 1000 groundwater shares from Mr Boland. This groundwater would be piped to Tomingley (approximately 40km to the south of "Woodlands") where it would be used by a proposed mining development, and to supply potable water to the town.

Several test bores were installed at "Woodlands" between 2007 and 2009 to assess the feasibility of obtaining a 1000ML/year groundwater supply on the property. The most recently installed bore 'Test Bore 6' was installed in January 2009. Preliminary testing of Test Bore 6 indicated that it was capable of supplying 1000ML/year of groundwater, however the sustainability of this pumping rate, and potential affects on standing water levels at neighbouring bores were not known.

Under the Water Management Act 2000, a groundwater bore cannot be used unless it has been approved as a 'water supply work' by the NSW Department of Water and Energy (DWE). The water supply work approval would stipulate the volume of water that can be pumped from the water supply work. The NSW DWE indicated that they could not issue a water supply work approval for the abstraction of 1000ML/year without a detailed hydrogeological assessment. The NSW DWE requested that a 14 day aquifer pumping test be conducted at Test Bore 6 to assess the sustainable yield of the aquifer and the potential effects of pumping on standing water levels at neighbouring properties.

The NSW DWE indicated that it would assess any future licence application against the following criteria:

- After 10 years of pumping the drawdown 200m from the production bore can not exceed 40% of the saturated thickness of the alluvium, and
- After 10 years of pumping the additional drawdown at the nearest neighbouring bore (screened in the same aquifer) does not exceed 5% of the saturated thickness of the alluvium, or a maximum of 3m.

A 14 day aquifer pumping and recovery test was conducted at "Woodlands" between 15 June 2009 and 11 July 2009. This report outlines the test methodology, and uses the test results to assess aquifer properties and the effects of long term pumping on standing water levels in the vicinity of "Woodlands".

1.1 Pumping Test Objectives

The objective of the pumping test was to obtain data which could be used to assess the hydrogeological properties of the aquifer, and estimate aquifer drawdown after 10 years of pumping at the proposed abstraction rate.

More specifically the objectives were to:

- Use measured drawdown from several observation bores to estimate the transmissivity and storativity of the aquifer; and
- Use estimated aquifer transmissivity and storativity value(s) to predict drawdown 200m from the pumping bore, and at the nearest neighbouring groundwater bores, after 10 years of pumping at a rate of 32L/sec (equivalent to 1000ML/year).

1.2 Scope of Work

In order to meet the objectives of the pumping test The Impax Group completed the following work:

- Installed a data logging water level sensor in the pumping bore prior to the test commencing to observe drawdown;
- Installed data logging water level sensors in seven observation bores to observe drawdown during the pumping and recovery test;
- Manually gauged the observation bores every day during the pumping and recovery test to collect real time data and backup data in case of logger failure;
- Uploaded and collated drawdown data from the pumping bore and observation bore network;
- Used the observed drawdown data to estimate the aquifer transmissivity and storativity using a range of analytical methods;
- Used the estimated aquifer properties to predict aquifer drawdown after 10 years of pumping at a rate of 32L/sec; and
- Prepared this report outlining the pumping test methodology, the results of the test and predictions of drawdown under the proposed pumping regime.

The pumping test was conducted by Western Bore Testing who completed the following works:

- Installed a turbine pump into the pumping bore;
- Installed piping to dispose of the pumped groundwater from the immediate vicinity of the pumping bore;
- Installed a flow meter to gauge pumping rates throughout the pumping test;
- Operated the pump for a period of 14 days; and
- Used a data logger to record the pumping rate throughout the test.

1.3 Limitations of this Report and Authorisation

The findings of this report are based on the Scope of Work outlined in *Section 1.2*. The Impax Group performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environmental consulting profession. No warranties, express or implied are made.

The results of this assessment are based upon the information documented and presented in this report. All conclusions and recommendations regarding the subject bore are the professional opinion of The Impax Group personnel involved with the project, subject to the qualifications made above. While normal assessments of data reliability have been made, The Impax Group assumes no responsibility or liability for errors in any data obtained from regulatory agencies, statements from sources outside of The Impax Group, or developments resulting from situations outside the scope of this project.

The Impax Group's assessment is limited strictly to assessing the properties of the lower Macquarie River alluvium aquifer within the confines of the observation bore network. The results of this assessment are based on the data collected during a pumping and recovery test conducted at "Woodlands" between 15 June 2009 and 11 July 2009.

The Impax Group is not engaged in environmental consulting and reporting for the purpose of advertising sales promoting, or endorsement of any client interests, including raising investment capital, recommending investment decisions, or other publicity purposes.

Signed:

Mr James Morrow
Environmental Engineer
The Impax Group
9 September 2009

2 Pumping Test Methodology

2.1 Pumping Test Timing

The pumping test was conducted in winter to minimise potential for other aquifer users to cause interference during the test. Potential sources of interference identified prior to the commencement of the test included:

- Operation of existing irrigation bores at "Woodlands"; and
- Operation of irrigation bores located approximately 3km to the south of "Woodlands".

The irrigation bores at "Woodlands" did not operate during the test. It is our understanding that irrigation bores located to the south of "Woodlands" were not used during the test.

2.2 The Pumping Bore - Test Bore 6

Test Bore 6 was used as the pumping bore during the test. Test Bore 6 was installed in January 2009 using a cable tool drilling rig. The bore was installed into a 350mm diameter borehole that was advanced to a depth of approximately 49.5m below ground level.

The upper 12m of the borehole consisted of clay and sandy clay. The borehole was clayey gravel between 12 and 16m below ground level. Sand, gravelly sand and sandy gravel was encountered from 16 to 47m below ground level. There was a thin (0.2m thick) clay layer encountered at a depth of approximately 28m below ground level. Gravelly clay and sandy clay was present from 47 to 49.5m below ground level.

The bore was constructed with a 2 metres sump constructed of 225mm diameter Class 12 PVC. The bore was screened between 35 and 47m below ground level with 225 mm diameter stainless steel screen (2mm slots). The remainder of the hole was cased with 225mm diameter Class 12 PVC. The annulus was gravel packed to a depth of approximately 29m below ground level. A bentonite/cement slurry seal between 27 and 29m below ground level. The remainder of the annulus was backfilled with drill cuttings.

A schematic diagram showing the construction of Test Bore 6 and a borelog showing the lithology encountered during drilling is presented in *Annex B*.

A concrete plinth was installed around the head of the bore to allow the pump to be mounted above the bore.

2.3 Observation Bores

The Impax Group used several bores to observe aquifer drawdown and residual drawdown during the pumping and recovery test. The observation bores used are shown on *Figure 2* of *Annex A* and are listed below:

- **GW096080** - Located approximately 100m east of Test Bore 6. GW096080 is not screened within the targeted aquifer. However, results of the pumping test indicate that there is connectivity between the well screen and the pumping bore;

- **Test Bore 4** - Located approximately 600m north of Test Bore 6. This bore is believed to be screened within the targeted aquifer;

- **GW036533** - Located approximately 860m west north west of Test Bore 6. This bore is believed to be screened within the targeted aquifer. Three piezometers are present at GW036533. The Impax Group monitored groundwater levels in the piezometer (2), which is screened between 40-43m below ground level;

- **GW008464** - Located approximately 650m o the west south west of Test Bore 6. This bore is used for irrigation water supply to the centre pivot irrigator on the southern portion of "Woodlands". This bore is believed to be screened within the targeted aquifer;;

- **GW036519** - Located approximately 1200m to the south south west of Test Bore 6. This bore is believed to be screened within the targeted aquifer;

- **Test Bore 5** - Located approximately 1350m to the west south west of Test Bore 6. This bore is believed to be screened within the targeted aquifer; and

- **GW036534** - Located approximately 2300m to the south of Test Bore 6. This bore is believed to be screened within the targeted aquifer. Three piezometers are present at GW036534. The Impax Group monitored groundwater levels in the piezometer (1), which is screened between 55-58m below ground level;

Where available, groundwater bore work summary forms for the observation bores are presented in *Annex B*.

Whilst there were several other bores within the observation area these were not considered suitable for observing drawdown for one or more of the following reasons:

- They were located on private land and gaining access would involve cooperation of the landholder;

- Most of the bores were in use for stock and domestic purposes. As such, it would be difficult to measure standing water levels in these wells and the standing water level would be influenced by pumping for stock and domestic usage; and

- Many of the bores are not screened in the targeted aquifer.

2.4 Observing and Recording Drawdown

2.4.1 Test Bore 6 - Pumping Bore

Test Bore 6 was equipped with an In-Situ LevelTROLL 500 vented water level data logger. The logger was installed to a depth of approximately 47m below ground level prior to the installation of the turbine pump. A 50m vented cable allowed communication and control of the water level logger from the surface, and automatically corrected water level data for changes in air pressure.

The water level logger recorded the water level in the pumping bore at 1 minute intervals throughout the pumping and recovery phase of the test.

2.4.2 Observation Bores

Each observation bore was equipped with an Onset Hobo water level logger. The loggers were suspended from stainless steel cable attached to the well head. The loggers recorded the water

level in each of the observation bores at 3 minute intervals throughout the pumping and recovery phase of the test.

The Onset Hobo water level loggers were not vented. An additional logger was placed above the water table at GW096080 to measure changes in barometric pressure. Measurements of barometric pressure from this logger were used to correct the water level measurements in all of the observation bores.

The Impax Group conducted manual gauging daily at each observation bore to obtain real time data on the progress of the pumping test and to protect against data logger failure. Bores were manually gauged using an electronic dip meter.

2.5 Pumping Equipment

Test Bore 6 was pumped using an Everflow 75kw 180 RH line shaft turbine through 39m of 125mm diameter column and sockets. The pump inlet was set approximately 40.2m below ground level. The pump motor speed was controlled using a Danfoss 75kw Variable Flow Drive (VFD).

Power was supplied by a 125kva generator which was fuelled and monitored over the test period.

2.6 Pumping Rate Measurement

The target pumping rate was set at approximately 38.5L/sec. This pumping rate was selected with the aim of achieving maximum drawdown in the pumping bore without dropping the water level below the pump intake. This pumping rate is equivalent to 120% of the desired flow rate from the bore, which is 32L/sec.

Pumped groundwater was discharged through 160mm diameter poly into the 150mm flow meter equipped with a data logger to record the flow rate. The data logger recorded the flow rate at 30 minute intervals throughout the test.

2.7 Pumping Rate

The pumping test commenced at 11.00am on 15 July 2009. Pumping continued through until 11.15am on 29 July 2009, making the total pumping period 14 days and 15 minutes, or 20175 minutes.

Flow meter data indicated that a total of 46 570 000L of groundwater was pumped from Test Bore 6 over the pumping period. This equates to an average pumping rate of 38.47L/sec.

Measured daily average pumping rates are presented in *Table 1*.

As shown in Table 1, the average pumping rate fell by approximately 1L/sec during the second week of pumping.

Table 1: Daily Average Pumping Rates

Day Number	Average Pumping Rate (L/Sec)
1	38.49
2	38.68
3	38.65
4	38.72
5	38.80
6	38.87
7	38.84
8	38.63
9	38.47
10	38.33
11	38.25
12	38.05
13	38.02
14	37.79
Overall Average	**38.47**

2.8 Disposal of Pumped Water

The pumped groundwater was directed to a low lying area located approximately 250 - 350m to the north of Test Bore 6 through 150mm diameter lay flat hose. The water spread across the low lying area and infiltrated into the subsurface.

3 Pumping Test Conditions

3.1 Weather Conditions

Weather data collected for the months of June and July 2009 at the nearest Bureau of Meteorology automated weather station (situated at Dubbo Airport) is presented in Annex C.

The data indicates that there was approximately 55mm of rainfall between 1 and 7 June 2009. There was no significant rainfall in the week prior to the commencement of pumping or during the first week pumping. Approximately 10mm of rainfall fell during the second week of the pumping test. The biggest daily fall during this period was 5.2mm on 22 June 2009 which indicates the rain during the test was relatively light, and is unlikely to have resulted in significant aquifer recharge.

Temperatures during the test ranged from 1 to 19^{0}C.

3.2 Pre-Test Aquifer Conditions

Water level data loggers were placed in the observation bores 5 days before the commencement of the test. The data loggers recorded increases of approximately 0 - 0.1m in standing water levels in the days preceding the test. The logger placed in GW096080 recorded a standing water level rise of 0.1m in the 5 days preceding the pumping test. The observed increase in standing water levels may have been due to recharge from a significant rainfall event in the first 7 days of June, may be indicative of aquifer recovery from summer irrigation pumping or a combination of both factors.

4 Pumping Test Analysis

Drawdown and recovery data was analysed using a range of numerical methods. These are discussed in the following sections.

4.1 Drawdown and Recovery vs Time

Drawdown and recovery in the pumping and observation bores are plotted vs time on the charts presented as *Annex D*.

The maximum drawdown in the pumping bore (Test Bore 6) was approximately 18.7m after approximately 7 days of pumping. Approximately 97% of drawdown in the pumping bore occurred on Day 1 of the pumping test. As discussed in *Section 3.3*, the pumping rate dropped by approximately 1L/sec during the second week of the pumping test. This resulted in a slight recovery in the pumping bore during the second week of the pumping test. There was approximately 18.5m of drawdown in the pumping bore at cessation of pumping.

The recovery of Test Bore 6 was similar to the drawdown curve. Test Bore 6 achieved approximately 97% recovery during the first day of recovery.

The maximum drawdown in GW096080 was approximately 1.35m, which was achieved after 10 days of pumping. Drawdown in GW096080 was relatively constant for the last 4 days of pumping.

The maximum drawdown in GW008464 was approximately 1.18m, which was achieved after 10 days of pumping. Drawdown in GW008464 was relatively constant for the last 4 days of pumping.

The maximum drawdown in Test Bore 4 was approximately 0.97m, which was achieved after 8 days of pumping. Drawdown in Test Bore 4 was relatively constant for the last 6 days of pumping.

The maximum drawdown in GW036533 was approximately 1.02m, which was achieved after 10 days of pumping. Drawdown in Test Bore 4 was relatively constant for the last 4 days of pumping.

The maximum drawdown in Test Bore 5 was approximately 0.05m, which was achieved after 8 days of pumping. In general drawdown in Test Bore 5 was minimal. This result may indicate that pumping at Test Bore 6 has little effect on standing water levels at Test Bore 5. However, the results may also indicate that Test Bore 5 is not directly connected to the pumped aquifer. Drawdown data from Test Bore 5 was not suitable for numerical analysis and was not used to estimate the aquifer properties.

The maximum drawdown in GW036519 was approximately 0.22m, which was achieved at the cessation of pumping. The drawdown trended downward at a relatively constant rate throughout the test. The relatively slow reaction of standing water levels may indicate that pumping at Test Bore 6 has little effect on the aquifer at GW036519. It may also indicate that GW036519 does not have a good connection to part of the aquifer that was being pumped. Drawdown data from GW036519 was not suitable for numerical analysis and was not used to estimate the aquifer properties.

Standing water levels in GW036534 were relatively stable during the pumping test. The standing water level at GW036534 rose by approximately 0.06m during the test. These results indicate that pumping at Test Bore 6 does not directly impact on standing water levels within the aquifer at GW036534. However, it may also indicate that GW036534 is not directly connected to the aquifer

that was pumped. Drawdown data from GW036534 was not suitable for numerical analysis and was not used to estimate the aquifer properties.

4.2 Assumptions and Limitations of Numerical Analysis

The methods used to assess the results of the pumping test rely on the following assumptions:

- The aquifer is confined;
- The aquifer is homogeneous and isotropic;
- The pumping and observation bores have fully penetrated the aquifer;
- Pumping occurred at a constant rate throughout the pumping test;
- There is no interference from extraction of water from the aquifer at other locations;
- The aquifer is infinite in radial extent; and
- There is no recharge in the vicinity of the pumping bore.

In reality these assumptions are incorrect. Available borelogs show that the aquifer is not isotropic and is not infinite in extent. In addition, the Macquarie River is located approximately 1.4km to the north west of the pumping bore is likely to act as a significant source of groundwater recharge.

The current understanding of Zone 6 of the lower Macquarie River alluvium indicates that it follows a relatively narrow palaeochannel which heads in a southerly direction from the site. In this case the aquifer is likely to have boundaries that are relatively close to the pumping bore. Whilst this is the case the patterns of observed drawdown indicate that aquifer drawdown did not reach the aquifer boundaries during the pumping, or that recharge from the Macquarie River was able to compensate for enhanced drawdown that would have otherwise occurred due to the presence of boundary conditions within the extent of the cone of depression.

4.3 Qualitative Assessment

The Impax Group compared a plot of the observed drawdown vs a standard Theis drawdown curve. The observed drawdown plot flattens (reaches steady state) more rapidly than expected under ideal conditions. This observation indicates the presence of a recharge condition at the site. The observed recharge condition is likely to be associated with one or more of the following:

- Aquifer recharge from the Macquarie River;
- Leakage of groundwater from groundwater stored in alluvium above and below the pumped aquifer; and/or
- Seasonal groundwater recharge due to cessation of irrigation over winter period.

It should also be noted that the pumping rate dropped by approximately 1L/s during the later5 stages of the pumping test. This is also likely to have contributed to the observed recovery at the pumping bore and reduced drawdown in the second week of the test.

4.4 Theis Analysis

The observed drawdown in Test Bore 5, GW036519 and GW036534 was not appropriate for analysis so data from these wells was not used to assess aquifer parameters.

Aquifer Test Pro software (version 4.2) was used to conduct a Theis curve fitting analysis on the drawdown curve of Test Bore 6, Test Bore 4, GW096080, GW036533 and GW008464.

As outlined in Section 4.3, the observed drawdown was inconsistent with standard Theis curves, most likely due to the presence of a recharge condition at the site. The effect of a recharge condition is not as great at the commencement of the test as additional drawdown (and pressure gradients) are not as great. As such, the observed drawdown in the early stages of the test provide the most accurate assessment of the aquifer properties.

The Theis analysis was performed on drawdown data from the first 48 hours of the pumping test only.

Results of the Theis Analysis are presented in *Table 2* and plots showing curve matching are presented in *Annex E*.

Table 2: Results of the Theis Analysis - 48 Hour Drawdown

Observation Bore	Transmissivity (m^2/day)	Storativity
Test Bore 6	290	NA
GW096080	434	3.56×10^{-2}
GW008464	675	8.84×10^{-4}
Test Bore 4	964	4.57×10^{-4}
GW036533	606	6.54×10^{-4}

4.5 Cooper and Jacob Analysis

The Cooper and Jacob Straight line method was used to assess the transmissivity and storativity of the aquifer based on observed drawdown in Test Bore 6, Test Bore 4, GW096080, GW036533 and GW008464.

The Cooper and Jacob analysis was performed on drawdown data from the first 48 hours of the pumping test only.

Results of the Cooper Jacob Analysis are presented in *Table 3* and plots showing the straight line analysis are presented in *Annex F*.

Table 3: Results of the Cooper and Jacob Analysis - 48 Hour Drawdown

Observation Bore	Transmissivity (m^2/day)	Storativity
Test Bore 6	213	NA
GW096080	550	2.66×10^{-2}
GW008464	769	6.83×10^{-4}
Test Bore 4	986	3.96×10^{-4}
GW036533	753	4.79×10^{-4}

4.6 Theis Recovery Analysis

Bore recovery data was assessed using the Theis Recovery method. This method provides an estimate of transmissivity only.

Results of the Theis Recovery analysis are presented in *Table 4* and plots showing recovery analysis are presented in *Annex G.*

Table 4: Results of the Theis Recovery Analysis

Observation Bore	Transmissivity (m^2/day)
Test Bore 6	761
GW096080	541
GW008464	815
Test Bore 4	946
GW036533	710

4.7 Distance Drawdown Analysis

A distance drawdown analysis was conducted using observed drawdown for the observation bores GW096080, GW008464, Test Bore 4 and GW036533. The drawdown in each observation bore at various stages of the test were plotted vs distance on a semi-log chart. In theory, the observed drawdown in all of the observation bores should form a straight line. The gradient of the line (measured in drawdown per cycle of the log scale) can be used to estimate the transmissivity using an equation adapted from the Theis solution.

$$KD = \frac{2.3Q}{2\pi}\Delta s$$

Where:

KD = transmissivity (m2/day)

Q = pumping rate (m3/day)

Δs = change in drawdown per log cycle of distance

The Impax Group analysed data at various times during the pumping tests. Analysis of various time data indicated the change in drawdown per log cycle ranging from 0.8m to 1.6m.

Substituting this value into the equation provides an estimate of transmissivity of between 760 and 1520m^2/day.

Using data at time = 2000minutes (1.4 days) the calculated Transmissivity is 1350m^2/day.

Storativity can then be calculated using the following equation:

$$S = \frac{2.25KDt}{r_o^{\,2}}$$

Where:

S = Storativity

KD = transmissivity (m^2/day)

T = time since pumping started (days)

r_o = radius (m) at which there is zero drawdown (where the straight line on the distance drawdown plot intersects the 0 drawdown axis)

The estimated distance of zero drawdown was approximately 6500m. Substituting Transmissivity and this distance into the equation gives an estimate of storativity of 1.01×10^{-4}.

A plot of Distance vs Drawdown at 2000min is presented in Annex H.

4.8 Aquifer Properties

The estimates of transmissivity obtained using the Theis, Cooper and Jacob, and Theis Recovery analyses ranged from 213 and 986m^2/day.

The average of the transmissivity estimates presented in *Tables 2-4* is 668m^2/day.

The estimates of storativity obtained using the Theis Analysis and Cooper and Jacob Analysis ranged from 3.9×10^{-4} to 3.56×10^{-2}.

The average of the storativity estimates is 8.2×10^{-3}.

5 Drawdown Modelling

5.1 NSW DWE Assessment Criteria

The NSW DWE has indicated that they will assess any future licence application against the following criteria:

1. After 10 years of pumping the drawdown 200m from any production bore can not exceed 40% of the saturated thickness of the alluvium, and

2. After 10 years of pumping the additional drawdown at the nearest neighbouring bore (screened in the same aquifer) does not exceed 5% of the saturated thickness of the alluvium, or a maximum of 3m.

5.1.1 Saturated Thickness of Alluvium

Test Bore 6 was advanced to a depth of approximately 49.5m below ground level and did not encounter bedrock.

The Impax Group reviewed NSW DWE Groundwater Bore Work Summary forms for GW096080, GW036533, GW036519 and GW036534 to assess the thickness of the alluvium within the study area.

The driller's log for GW096080 indicates that bedrock was encountered at a depth of approximately 49m below ground level.

The driller's log for GW036533 indicates that the borehole was advanced to a depth of 76m below ground level and did not encounter bedrock.

The driller's log for GW036519 indicates that the borehole was advanced to a depth of 94m below ground level and did not encounter bedrock.

The driller's log for GW036534 indicates that bedrock was encountered at a depth of approximately 93.5m below ground level.

Based on these observations it is assumed that the alluvium is approximately 50m deep adjacent to Test Bore 6 and greater than 90 m deep at GW036519, which is assumed to represent conditions at the nearest neighbouring bore.

At the commencement of the pumping test the standing water level at Test Bore 6 was approximately 14m below ground level. Based on the observed standing water level and the estimated depth of alluvium it is assumed that the saturated thickness of alluvium in the vicinity of Test Bore 6 is 36m.

During preliminary discussions with the NSW DWE it indicated that the saturated aquifer thickness should be assumed to be 36m thick across the study area.

40% of the saturated thickness of alluvium is estimated to be 14.4m. Based on these calculations the NSW DWE assessment criteria will allow 14.4m of drawdown at a distance of 200m from the production bore (Test Bore 6) after 10 years of pumping.

5% of the saturated thickness of alluvium is estimated to be 1.8m. Based on these calculations and the assessment criteria, the NSW DWE will allow an additional drawdown of up to 1.8m at the nearest neighbouring bore after 10 years of pumping from Test Bore 6.

5.2 Abstraction of 1000ML/Year - Theis Analysis

The calculated transmissivity and storativity values, and the proposed pumping rate can be substituted into the Theis equation to predict t drawdown around the pumping bore.

Modelling of aquifer drawdown was completed using Aquifer Test Pro software (Version 4.2). This software uses the known (or assumed) values transmissivity, storativity and the pumping rate in the Theis equation to calculate drawdown at any distance from the pumping bore.

This method of drawdown prediction is based on the same assumptions as those outlined in Section 4.2. As such, it predicts uniform drawdown around the pumping bore. In reality, the aquifer is not isotropic, not infinite in extent, and is likely to be recharged from the Macquarie River, so the predictions are theoretical in nature.

The calculated transmissivity and storativity values were used in the Theis equation to predict drawdown at a dummy bore location 200m from the production bore (Test Bore 6) and at the nearest neighbouring bore (GW036519 was used to represent the nearest neighbouring bore, or a a location 1200m from the pumping bore). The simulation assumed Test Bore 6 was pumped at a rate of 32L/s (equivalent to 1000ML/year) for a period of 10 years (or 5260000 minutes).

The predicted drawdown 200m from Test Bore 6 after 5260000 minutes (10 years) of pumping at a rate of 32L/s was approximately 3.20m.

The predicted drawdown at GW036519 (assumed to be the nearest neighbouring bore) after 5260000 minutes (10 years) of pumping at a rate of 32L/s was approximately 2.05m.

The modelled drawdown at all observation wells is plotted vs time in the charts presented as *Annex I.*

5.3 Abstraction of 1000ML/Year - Hantush Jacob Analysis

Hantush and Jacob (1955) developed an equation to approximate drawdown in leaky aquifers (Kruseman and DeRidder 2000). The drawdown in a leaky system is less than that expected in a confined aquifer as leakage (recharge) from aquifers above and below the pumped aquifer replenishes the pumped aquifer.

Hantush and Jacob (1955) found that steady state drawdown in a leaky aquifer can be approximated by the following equation:

$$S \approx \frac{2.3Q}{2\pi KD}\left(\log 1.12\frac{L}{r}\right)$$

Where:

S = estimated steady state drawdown (m)

Q = pumping rate (m^3/day)

KD = transmissivity (m^2/day)

L = leakage factor

r = radius (distance) from pumping bore

The transmissivity is calculated using the distance drawdown straight line analysis (the same method outlined in *Section 4.7*). Data from the pumping test at 20000min was plotted. The slope of the straight line was 0.9m. The pumping rate during the test was 3323m^3/day. Substituting into the equation in *Section 4.7* gives a transmissivity value of 1350m^2/day.

The leakage factor is estimated using:

$$1.12\frac{L}{r_o} = 1$$

Where:

r_o = radius at which there is zero drawdown (where the straight line on the distance drawdown plot intersects the 0 drawdown axis)

From the plot of distance-drawdown for the pumping test data r_o is estimated to be 9000m. Substituting this value into the above equation gives a leakage factor of 8036m.

Using:

KD = 1350m^2/day

Q = 2765m^3/day

L = 8036m

The calculated steady state drawdown 200m from the pumping bore (at r = 200m) is 1.24m.

The calculated steady state drawdown 1200m (representing the nearest neighbouring bore) from the pumping bore (at r= 1200m) is 0.66m.

Using:

KD = 668m^2/day

Q = 2765m^3/day

L = 8036m

The calculated steady state drawdown 200m from the pumping bore (at r = 200m) is 2.50m.

The calculated steady state drawdown 1200m (representing the nearest neighbouring bore) from the pumping bore (at r= 1200m) is 1.33m.

Hantush and Jacob indicated this method is only suitable to estimate drawdown where r/L < 0.05. Based on data from the pumping test this method would only be suitable to estimate drawdown within 400m of the pumping bore. However, Kruseman and DeRidder (2000) indicate that this method can be used with a greater degree of error. Kruseman and DeRidder (2000) indicate that using this method 1200m from the pumping bore (r/L = 0.15) introduces 2% error to the calculation. It should be noted that the potential error associated with estimating the average aquifer transmissivity introduces more uncertainty to the calculated drawdown than the attributed to the approximations in the Hantush Jacob (1955) method.

5.4 Discussion of Results

Using the Theis analysis, the predicted drawdown 200m from Test Bore 6 after 5260000 minutes (approximately 10 years) of pumping at a rate of 32L/s is estimated to be 3.20m.

Using the Hantush Jacob analysis, the predicted drawdown 200m from the pumping bore is estimated to be 2.50m.

Both methods of drawdown prediction estimate that drawdown 200m of the pumping bore would be less than 40% of the saturated thickness of alluvium.

Using the Theis Analysis, the predicted drawdown at GW036519 (equivalent to drawdown at the nearest neighbouring bore) after 5260000 minutes (approximately 10 years) of pumping at a rate of 32L/s is estimated to be 2.05m. This estimate of drawdown exceeds the assessment criteria of 1.8m.

Using the Hantush Jacob analysis, the predicted drawdown 1200m from the pumping bore is estimated to be 1.33m. This estimate of drawdown is less than the assessment criteria of 1.8m.

A qualitative assessment of the pumping test data indicates that drawdown trends at the site are not consistent with those predicted by the Theis equation. Plots of observed drawdown vs time flatten earlier than expected indicating a source of groundwater recharge at the site. The observed recharge condition may be due to leakage from aquifers above and/or below the pumped aquifer, recharge from the Macquarie River and/or indicative of seasonal recharge after the summer irrigation season. Hantush and Jacob (1955) provide a method of accounting for recharge from leaky aquifers. As such, the estimate of drawdown 10 years after commencement of pumping using the Hantush Jacob method is less than that predicted by the Theis equation and is likely to better indicate long term steady state drawdown conditions in the aquifer.

Based on these results it can be concluded that long term pumping at a rate of 32L/s from Test Bore 6 would not cause an unacceptable level of drawdown in Zone 6 of the lower Macquarie River alluvium.

It should be noted that the modelling is based on very general and broad assumptions that are known to be incorrect for the study area. In particular that the aquifer is infinite and isotropic. In order to assess the accuracy of the modelled drawdown The Impax Group assessed drawdown predictions for the pumping test scenario against actual drawdown observations from the pumping test. That is, the model was used to predict drawdown after pumping Test Bore 6 at a rate of 38.47L/s for a period of 20175 minutes. Transmissivity was assumed to be $668m^2$/day and storativity was assumed to be 8.2×10^{-3}.

The actual drawdown observations at the conclusion of the pumping test are compared to the modelled drawdown for a simulation of the pumping test in *Table 5*. Modelled drawdown vs time for the simulated pumping test are presented as *Annex J*.

The modelled drawdown at Test Bore 6 is significantly less than that observed during the test. The modelled drawdown at GW096080 is greater than the observed drawdown in that bore. The modelled drawdown at GW008464, test bore 4 and GW036533 (bores located between 570-850m from the pumping bore) are less than those observed during the pumping test. The modelled drawdown at GW036519, Test Bore 5 and GW036534 (bores located between 1200-2560m from the pumping bore) is greater than that observed during the pumping test.

Table 5: Actual Drawdown vs Modelled Drawdown - 14 Day Pumping Test

Bore ID	Approximate Distance from Pumping Bore (m)	Actual Drawdown	Modelled Drawdown - Theis Analysis
Test Bore 6	0	18.70m	5.90m
GW096080	110	1.38m	1.75m
GW008464	570	1.19m	0.70m
Test Bore 4	650	0.97m	0.60m
GW036533	850	1.03m	0.50m
GW036519	1200	0.25m	0.30m
Test Bore 5	1370	0.06m	0.25m
GW036534	2560	-0.07m	0.05m

These results indicate that applying average aquifer properties in the Theis equation provides underestimates of actual aquifer drawdown between 570-850m from the pumping bore and overestimates drawdown at distances greater than 1200m from the pumping bore.

These results indicate that the estimated aquifer drawdown at the nearest neighbouring bore (ie distances greater than 1200m from the pumping bore) are greater than the actual observed drawdown. Based on the pumping test results the observed drawdown at GW036519 is only 84% of the predicted drawdown.

Applying the same error to the Theis estimate of 10yr drawdown reduces the predicted drawdown from 2.05m to 1.71m, which is less than the assessment criteria of 1.8m.

There are several reasons why the modelled drawdown does not accurately reflect the actual observed drawdown during the pumping test, which include:

- The aquifer is not infinite in extent;
- The aquifer is not isotropic; and/or
- The Macquarie River is likely to act as a significant source of aquifer recharge in the vicinity of "Woodlands".

6 Conclusions

Observed drawdown data from several observation bores was used to estimate the average transmissivity and storativity of the alluvium aquifer in the vicinity of Test Bore 6.

The average of the transmissivity of the aquifer was estimated to be 668m^2/day and the average storativity was estimated to be 8.2 x 10^{-3}.

These aquifer properties were used to model drawdown assuming a production bore (Test Bore 6) was pumped at a continuous rate of 32L/s for 10 years.

The Theis and Hantush Jacob equations predict that drawdown 200m from Test Bore 6 after 5260000 minutes (approximately 10 years) of pumping at a rate of 32L/s will be 3.2m and 2.50m respectively. Both estimates are significantly lower than the NSW DWE assessment criteria (40% of the saturated thickness of alluvium).

Using the Theis Analysis, the predicted drawdown at GW036519 (equivalent to drawdown at the nearest neighbouring bore) after 5260000 minutes (approximately 10 years) of pumping at a rate of 32L/s is estimated to be 2.05m. This estimate of drawdown exceeds the assessment criteria of 1.8m.

Using the Hantush Jacob analysis, the predicted drawdown 1200m from the pumping bore is estimated to be 1.33m. This estimate of drawdown is less than the assessment criteria of 1.8m.

A qualitative assessment of the pumping test data indicates that drawdown trends at the site are not consistent with those predicted by the Theis equation. Plots of observed drawdown vs time flatten earlier than expected indicating a source of groundwater recharge at the site. The observed recharge condition may be due to leakage from aquifers above and/or below the pumped aquifer, recharge from the Macquarie River and/or indicative of seasonal recharge after the summer irrigation season. Hantush and Jacob (1955) provide a method of accounting for recharge from leaky aquifers. As such, the estimate of drawdown 10 years after commencement of pumping using the Hantush Jacob method is less than that predicted by the Theis equation and is likely to better indicate long term steady state drawdown conditions in the aquifer.

Based on these results it can be concluded that long term pumping at a rate of 32L/s from Test Bore 6 would not cause an unacceptable level of additional drawdown in Zone 6 of the lower Macquarie River alluvium.

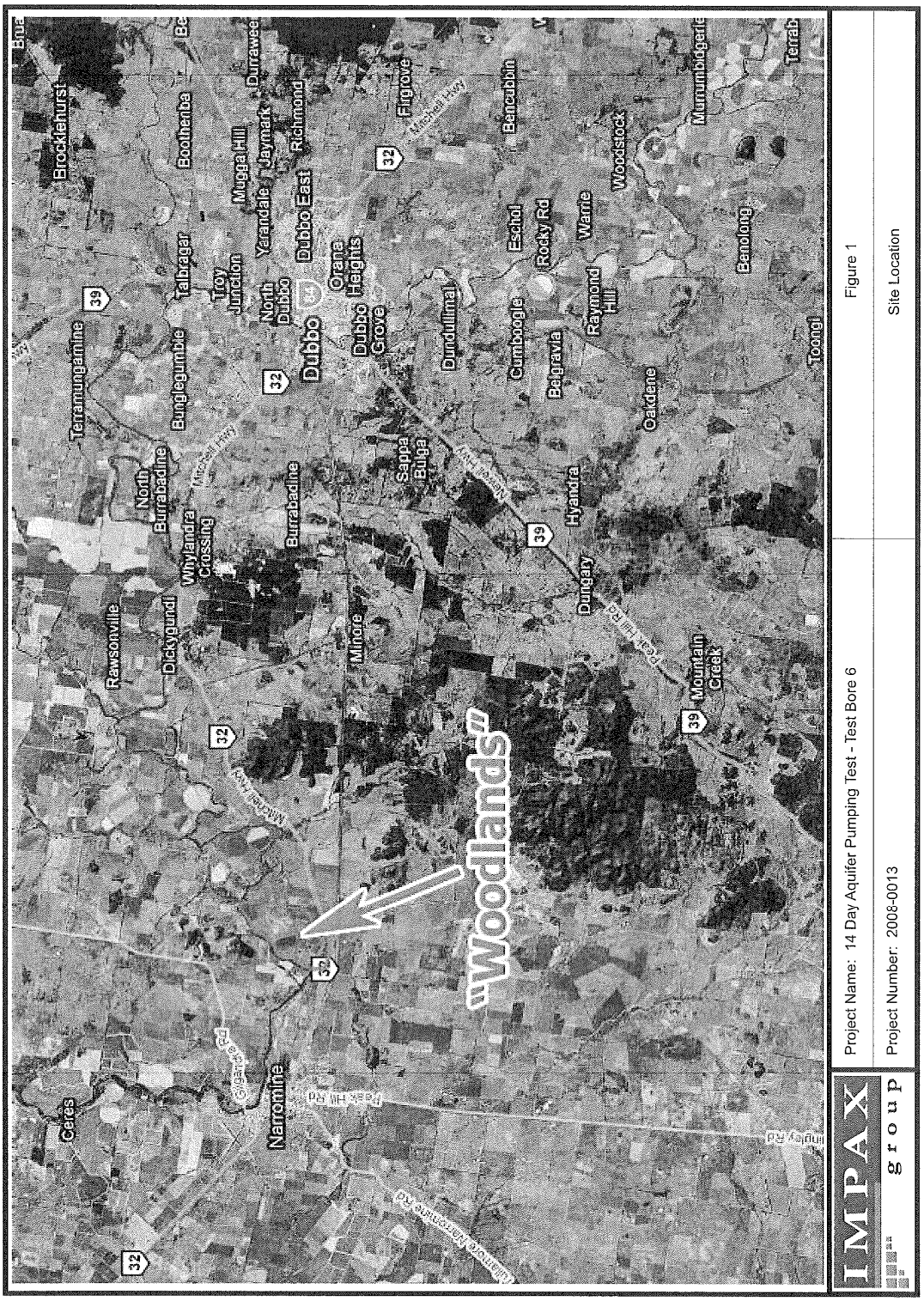
7 References

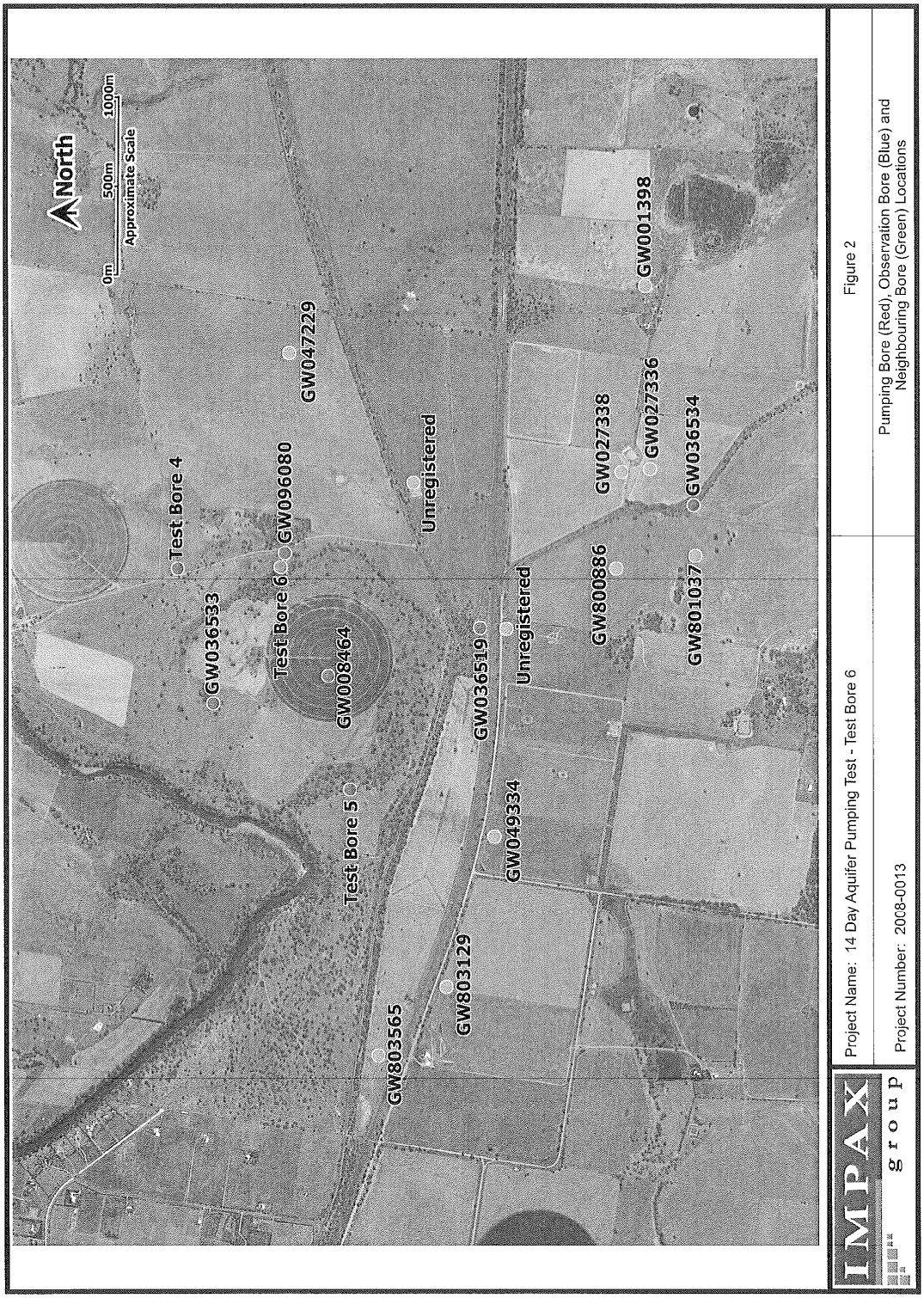
Kruseman G.P., De Ridder N.A. (2000) , *'Analysis and Evaluation of Pumping Test Data - Second Edition'*, International Institue for Land Reclaimation and Improvement, Reprinted 2000.

Sterret R.J. (2007), *'Groundwater and Wells - Third Edition'*, Johnson Screens, Reprinted 2007.

Annex A:

Figures


Woodlands
Dubbo
Narromine
Ceres
Brocklehurst
Boothenbe
Mugga Hill
Jaymark
Durrawee
Richmond
Firgrove
Talbragar
Troy Junction
Yarrandale
Dubbo East
Orana Heights
North Dubbo
Dubbo Grove
Bunglegumble
Terramungamine
North Burrabadine
Burrabadine
Whylandra Crossing
Sappa Bulga
Dundullimal
Eschol
Rocky Rd
Warrie
Woodstock
Benolong
Gumbogie
Belgrawia
Raymond Hill
Oakdale
Hyandra
Dungary
Rawsonville
Dickyburdi
Minore
Mountain Creek
Toongi
Figure 1
Site Location
Project Name: 14 Day Aquifer Pumping Test - Test Bore 6
Project Number: 2008-0013
IMPAX group


North
0m
500m
1000m
Approximate Scale
Test Bore 4
GW036533
Test Bore 6
GW096080
GW047229
GW008464
Unregistered
Test Bore 5
GW036519
Unregistered
GW800886
GW027338
GW027336
GW001398
GW036534
GW801037
GW803565
GW803129
GW049334
IMPAX group
Project Name: 14 Day Aquifer Pumping Test - Test Bore 6
Project Number: 2008-0013
Figure 2
Pumping Bore (Red), Observation Bore (Blue) and Neighbouring Bore (Green) Locations

Annex B:

Borehole Logs

Bore No: Test Bore 4
Coordinates:
Location: "Woodlands" - Adjacent to Main Access Road
Logged by: B. Katon
Logged from: Cable Tool Drill Cuttings
Date: 21/05/2008

From	To	Description	Comments
0	1	Topsoil	
1	5	Clay, Brown	
5	10	Sandy Clay, Brown	
10	12	Silty Sand	
12	17	Gravel and Sand (Dirty)	
17	22.5	Gravel and Clay	
22.5	29	sand and gravel, white	Good
29	30	Clayey Sand with some Gravel, Grey	
30	33.7	Clay, Grey	
33.7	45.5	Gravel, White, washed	
45.5	46	Clay	
46	46.5	Clay, Grey	

Construction	Depth
Blank	0-22.5m
Screen	22.5-29m
Blank	29-34m
Screen	34-45.5m
Blank	45.5-46.5m

Bore No: Test Bore 5
Coordinates:
Location: "Woodlands" - Western Side of Cowal
Logged by: B. Katon
Logged from: Cable Tool Drill Cuttings
Date: 14/07/2008

From	To	Description	Comments
0	0.5	Topsoil	
0.5	5	Clay, Brown	
5	12	Sandy Clay, Brown	
12	13.5	Clay (Multic)	
13.5	18	Gravel (Big) and Clay	
18	20.5	Yellow Clay / Gravel / Sand	
20.5	21	Gravel Rounded	Good
21	21.3	Decomposed Wood, Black	
21.3	26.7	Gravel Rounded, and Decomposed Wood	Good
26.7	27	Clay, Grey	
27	32	Gravel and Clay, Bands of Wood	Good
32	35	Gravel and Clay, Grey	
35	37	Clay with some Gravel, Grey	
37	38	Silty Sandy Clay, Grey	
38	41.5	Gravel, Rounded (5-10mm)	
41.5	44	Clay and Gravel, Grey	

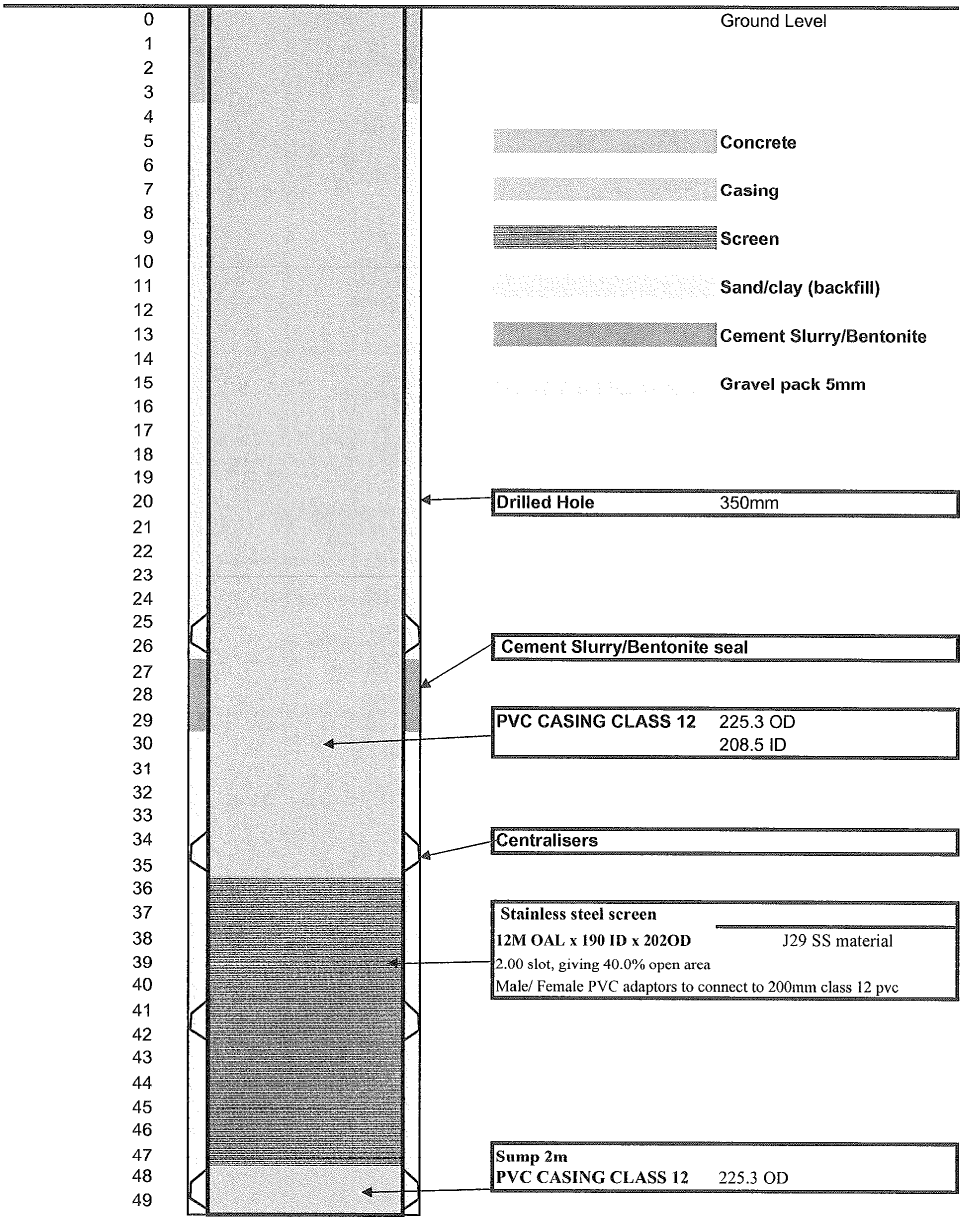
Proposed Bore Construction	Depth
Blank	0-20m
Screen	20-32m
Blank	32-38m
Screen	38-41.5m
Blank	41.5-44m

Bore No: Test Bore 6
Coordinates:
Location: "Woodlands" - 100m west of GW096080
Logged by: J Morrow
Logged from: Cable Tool Drill Cuttings
Date: 20/01/2009

From	To	Description	Comments
0	0.5	Topsoil	
0.5	12	Clay and Sandy Clay, Brown	
12	16	Clayey Gavel / Gavelly Clay, Brown	
16	22	Sandy Gravel, Light Yellow, Well Graded	
22	27	Sand and Gravel, Yellow	
27	36	Sand and Gravel, Yellow and Light Yellow	
(28)		0.2m thick clay band at approx 28m	
36	47	Gravel with sand, Grey/White	
47	49.5	Sandy Clay Grading to Clay, Dark Grey/Black, wood encountered at 48m.	
49.5		Dark Grey/Black Clay	

IMPAX group

Bore Design "Woodlands" Test Bore # 6



Total Depth 49m

DEPARTMENT OF LAND & WATER CONSERVATION
Work Summary

GW096080 - Lower Macquarie Stage 2 ,1999

License :

Authorised Purpose(s) **Intended Purpose(s)**
MONITORING BORE

Work Type : Bore
Work Status : Equipped - bore used for obs
Construct. Method : Percussion
Owner Type : D.W.R.

Commenced Date : 21-Oct-1999 **Final Depth :** 90.00 m
Completion Date : 03-Nov-1999 **Drilled Depth :** 96.00 m

Contractor Name :
Driller : 1753 Weston, Anthony James

Property : **Standing Water Level :** 10.45 m
GWMA : **Salinity :** 601.60 mg/L
GW Zone : **Yield :** 1.50 L/s 96080/2

Site Details

Site Chosen By **County** **Parish** **Portion/Lot DP**
Form A : NARROMINE NARROMINE
Licensed :

Region : 80 - MACQUARIE-WESTERN **CMA Map :** 8533-N NARROMINE
River Basin : 421 - MACQUARIE RIVER **Grid Zone :** 55/3 **Scale :** 1:50,000
Area / District :

Elevation : **Northing :** 6431468 **Latitude (S) :** 32° 14' 47"
Elevation Source : **Easting :** 624322 **Longitude (E) :** 148° 19' 11"

GS Map : 0051AB1 **AMG Zone :** 55 **Coordinate Source :** GPS - Global Positioning System

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1		Hole	Hole	0.00	14.00	170			Percussion
1	1	Casing	PVC Class 12	-1.00	14.00	80	74		Glued; Seated on Bottom; Cap
1	1	Opening	Slots - Horizontal	11.00	14.00	80		1	(Unknown); PVC Class 12; Sawn; SL: 200mm; A: 2mm
1		Annulus	Waterworn/Rounded	0.00	14.00	170			Graded; GS: 3-7mm
2		Hole	Hole	0.00	96.00	170			Rotary Mud
2	2	Casing	PVC Class 12	-1.00	86.00	80	74		C: 62-65m; Glued; Seated on Bottom; Cap
2	2	Opening	Slots - Horizontal	72.00	84.00	80		2	(Unknown); PVC Class 12; Sawn; SL: 100mm; A: 3mm
2		Annulus	Waterworn/Rounded	0.00	62.00	170	170		Graded; GS: 5-7mm; Q: 1.4m³
2		Annulus	Waterworn/Rounded	65.00	96.00	170			Graded

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
11.00	14.00	3.00	Unconsolidated	10.48		0.20	14.00	1.00	1241.00
13.00	31.00	18.00	Unconsolidated	10.45		1.50			601.60
31.10	46.00	14.90	Unconsolidated						
53.40	62.50	9.10	Consolidated						
65.80	91.00	25.20	Consolidated						

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
0.00	1.00	1.00	Black Topsoil	Topsoil	
1.00	10.30	9.30	Brown Clay	Clay	
10.30	13.00	2.70	Dry Gravel and Clay	Gravel	
13.00	19.00	6.00	Dirty Gravel	Gravel	water bearing
19.00	31.00	12.00	Sand & gravel	Sand	water bearing
31.00	31.10	0.10	Yellow Sandy Clay	Sandy Clay	
31.10	46.00	14.90	Grey Coarse Sand	Sand	water bearing
46.00	49.00	3.00	Multi Coloured Clay	Clay	
49.00	53.40	4.40	Grey Shale	Shale	
53.40	62.50	9.10	Grey sandstone	Sandstone	water bearing
62.50	65.80	3.30	Grey Shale	Shale	
65.80	91.00	25.20	Grey Sandstone	Sandstone	water bearing
91.00	93.00	2.00	Grey green , hard, sandstone	Sandstone	
93.00	96.00	3.00	green decomposed Granite	Granite	

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Summary Details Found)

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

DEPARTMENT OF LAND & WATER CONSERVATION
Work Summary

GW096080 - Lower Macquarie Stage 2 ,1999

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

*** End of GW096080 ***

DEPARTMENT OF LAND & WATER CONSERVATION
Work Summary

GW008464 *Converted From HYDSYS*

License :

Work Type : Bore
Work Status : (Unknown)
Construct. Method : Cable Tool
Owner Type : Private

Authorised Purpose(s) **Intended Purpose(s)**
IRRIGATION

Commenced Date : **Final Depth :** 18.20 m
Completion Date : 01-Aug-1955 **Drilled Depth :** 18.30 m

Contractor Name :
Driller :

Property : **Standing Water Level :**
GWMA : **Salinity :** 0-500 ppm
GW Zone : **Yield :**

Site Details

Site Chosen By **County** **Parish** **Portion/Lot DP**
Form A : NARROMINE NARROMINE 3
Licensed :

Region : 80 - MACQUARIE-WESTERN **CMA Map :** 8533-N NARROMINE
River Basin : 421 - MACQUARIE RIVER **Grid Zone :** 55/3 **Scale :** 1:50,000
Area / District :

Elevation : **Northing :** 6431230 **Latitude (S) :** 32° 14' 55"
Elevation Source : (Unknown) **Easting :** 623650 **Longitude (E) :** 148° 18' 45"

GS Map : 0050B1 **AMG Zone :** 55 **Coordinate Source :** GD.,ACC.MAP

Construction

Negative depths indicate Above Ground Level;H-Hole,P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1	1	Casing	Threaded Steel	-0.40	14.80	203			Suspended in Clamps
1	1	Opening	Screen	14.40	17.90	177		1	Copper Alloy; SL: 0mm; A: 2.54mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
13.70	18.20	4.50	Unconsolidated	7.60		25.77			0-500 ppm

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
0.00	3.05	3.05	Clay	Clay	
3.05	17.98	14.93	Gravel Water Supply	Gravel	
17.98	18.29	0.31	Clay	Clay	

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By
Single-Rate Pumping Test	29-Aug-1955	10.00	7.60	10.90	25.77	13.00	Turbine Pump, shaft d			

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

***** End of GW008464 *****

DEPARTMENT OF LAND & WATER CONSERVATION
Work Summary

GW036533 *Converted From HYDSYS*

License :

Work Type : Bore
Work Status : Test Hole
Construct. Method : Cable Tool
Owner Type : D.W.R.

Authorised Purpose(s) **Intended Purpose(s)**
G/WATER XPLORE

Commenced Date : **Final Depth :** 63.00 m
Completion Date : 01-Nov-1984 **Drilled Depth :** 76.00 m

Contractor Name :
Driller :

Property : **Standing Water Level :**
GWMA : **Salinity :** (Unknown)
GW Zone : **Yield :**

Site Details

Site Chosen By **County** **Parish** **Portion/Lot DP**
Form A : NARROMINE NARROMINE 3
Licensed :

Region : 80 - MACQUARIE-WESTERN **CMA Map :** 8533-N NARROMINE
River Basin : 421 - MACQUARIE RIVER **Grid Zone :** 55/3 **Scale :** 1:50,000
Area / District :

Elevation : **Northing :** 6431460 **Latitude (S) :** 32° 14' 48"
Elevation Source : (Unknown) **Easting :** 623560 **Longitude (E) :** 148° 18' 42"

GS Map : 0050B1 **AMG Zone :** 55 **Coordinate Source :** GD.,ACC.MAP

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Componcat	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1		Backfill	Backfill	63.00	76.00	0			
1	1	Casing	P.V.C.	-1.00	36.50	69			Seated on Bottom
1	2	Casing	P.V.C.	-1.00	48.00	69			Seated on Bottom
1	3	Casing	P.V.C.	-1.00	63.00	69			Seated on Bottom
1		Casing	Casing Protector	0.00	7.10	203			(Unknown)
1	1	Opening	Slots - Horizontal	27.50	30.50	69		1	Mechanically Slotted; SL: 0mm; A: 3mm
1	2	Opening	Slots - Horizontal	40.00	43.00	69		2	Mechanically Slotted; SL: 0mm; A: 3mm
1	3	Opening	Slots - Horizontal	54.00	57.00	69		3	Mechanically Slotted; SL: 0mm; A: 3mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
12.00	31.00	19.00	Unconsolidated						(Unknown)
37.50	43.50	6.00	Unconsolidated						(Unknown)
52.00	58.20	6.20	Unconsolidated						(Unknown)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
0.00	12.00	12.00	Clay Silty	Clay	
12.00	16.00	4.00	Sand Gravel Water Bearing	Sand	
16.00	16.50	0.50	Clay Water Bearing Wood	Clay	
16.50	20.10	3.60	Sand Silty Gravel Water Bearing	Sand	
20.10	20.50	0.40	Clay Grey Water Bearing	Clay	
20.50	22.80	2.30	Sand Gravel Water Bearing	Sand	
22.80	24.20	1.40	Clay Grey Water Bearing	Clay	
24.20	31.00	6.80	Sand Gravel Water Bearing	Sand	
31.00	33.00	2.00	Clay Grey	Clay	
33.00	34.00	1.00	Clay Silty	Clay	
34.00	35.00	1.00	Clay Sandy	Clay	
35.00	37.50	2.50	Sand Clayey	Sand	
37.50	43.50	6.00	Sand Gravel Water Bearing	Sand	
43.50	45.50	2.00	Clay Grey	Clay	
45.50	52.00	6.50	Clay Grey Sandy	Clay	
52.00	58.20	6.20	Sand Gravel Water Bearing	Sand	
58.20	61.00	2.80	Clay Dark Grey	Clay	
61.00	62.00	1.00	Clay Dark Grey Wood	Clay	
62.00	65.00	3.00	Sand Claycy	Sand	
62.00	65.00	3.00	Gravel Wood	Gravel	
65.00	68.00	3.00	Clay Silty	Clay	
68.00	69.00	1.00	Clay Grey	Clay	
69.00	76.00	7.00	Clay Multicoloured	Clay	

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Summary Details Found)

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

DEPARTMENT OF LAND & WATER CONSERVATION
Work Summary

GW036533 *Converted From HYDSYS*

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

EAST NARROMINE 3 PVC'S IN ONE HOLE

*** End of GW036533 ***

DEPARTMENT OF LAND & WATER CONSERVATION
Work Summary

GW036519 *Converted From HYDSYS*

License :

Work Type : Bore
Work Status : Test Hole
Construct. Method : Cable Tool
Owner Type : D.W.R.

Authorised Purpose(s) **Intended Purpose(s)**
G/WATER XPLORE

Commenced Date : **Final Depth :** 53.00 m
Completion Date : 01-Nov-1984 **Drilled Depth :** 94.00 m

Contractor Name :
Driller :

Property :
GWMA :
GW Zone :

Standing Water Level :
Salinity : (Unknown)
Yield :

Site Details

Site Chosen By **County** **Parish** **Portion/Lot DP**
Form A : NARROMINE NARROMINE 20
Licensed :

Region : 80 - MACQUARIE-WESTERN **CMA Map :** 8533-S SAPPA BULGA
River Basin : 421 - MACQUARIE RIVER **Grid Zone :** 55/3 **Scale :** 1:50,000
Area / District :

Elevation :
Elevation Source : (Unknown)

Northing : 6430450 **Latitude (S) :** 32° 15' 21"
Easting : 623750 **Longitude (E) :** 148° 18' 49"

GS Map : 0050B2 **AMG Zone :** 55 **Coordinate Source :** GD.,ACC.MAP

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1		Backfill	Backfill	53.00	94.00	0			
1	1	Casing	P.V.C.	-1.00	31.00	64			Seated on Bottom
1	2	Casing	P.V.C.	-1.00	53.00	64			Seated on Bottom
1		Casing	Casing Protector	0.00	5.00	203			(Unknown)
1	1	Opening	Slots - Horizontal	24.00	27.00	64		1	Mechanically Slotted; SL: 0mm; A: 3mm
1	2	Opening	Slots - Horizontal	43.00	49.00	64		2	Mechanically Slotted; SL: 0mm; A: 3mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
15.50	29.00	13.50	Unconsolidated						(Unknown)
39.00	49.00	10.00	Unconsolidated						(Unknown)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
0.00	1.00	1.00	Topsoil	Topsoil	
1.00	11.00	10.00	Clay Red	Clay	
11.00	14.50	3.50	Clay Red Sandy	Clay	
14.50	15.50	1.00	Clay Sandy	Clay	
15.50	19.50	4.00	Sand Gravel Water Bearing	Sand	
19.50	29.00	9.50	Clay Sandy Gravel Water Bearing	Clay	
29.00	39.00	10.00	Clay Grey	Clay	
39.00	49.00	10.00	Sand Gravel Water Bearing	Sand	
49.00	57.00	8.00	Clay Sticky	Clay	
57.00	76.00	19.00	Clay Multicoloured	Clay	
76.00	94.00	18.00	Clay	Clay	

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Summary Details Found)

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

DEPARTMENT OF LAND & WATER CONSERVATION
Work Summary

GW036519 *Converted From HYDSYS*

(No Development Details Found)

Remarks

EAST NARROMINE ROADSIDE ADJ TO PORTION 20 2 PVC'S IN ONE HOLE

*** **End of GW036519** ***

DEPARTMENT OF LAND & WATER CONSERVATION
Work Summary

GW036534 *Converted From HYDSYS*

License :

Work Type : Bore
Work Status : Test Hole
Construct. Method : Cable Tool
Owner Type : D.W.R.

Authorised Purpose(s)

Intended Purpose(s)
G/WATER XPLORE

Commenced Date :
Completion Date : 01-Dec-1984

Final Depth : 95.00 m
Drilled Depth : 95.50 m

Contractor Name :
Driller :

Property :
GWMA :
GW Zone :

Standing Water Level :
Salinity : (Unknown)
Yield :

Site Details

Site Chosen By

County
Form A : NARROMINE
Licensed :

Parish
NARROMINE

Portion/Lot DP
54

Region : 80 - MACQUARIE-WESTERN
River Basin : 421 - MACQUARIE RIVER
Area / District :

CMA Map : 8533-S SAPPA BULGA
Grid Zone : 55/3 **Scale :** 1:50,000

Elevation :
Elevation Source : (Unknown)

Northing : 6429070 **Latitude (S) :** 32° 16' 5"
Easting : 624570 **Longitude (E) :** 148° 19' 21"

GS Map : 0050B2 **AMG Zone :** 55 **Coordinate Source :** GD.,ACC.MAP

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1		Backfill	Backfill	95.00	95.50	0			
1	1	Casing	P.V.C.	-1.00	59.50	64			Seated on Bottom
1	2	Casing	P.V.C.	-1.00	86.80	64			Seated on Bottom
1	3	Casing	P.V.C.	-1.00	95.00	64			Seated on Bottom
1		Casing	Casing Protector	0.00	5.50	203			(Unknown)
1	1	Opening	Slots - Horizontal	55.00	58.00	64		1	Mechanically Slotted; SL: 0mm; A: 3mm
1	2	Opening	Slots - Horizontal	78.00	84.00	64		2	Mechanically Slotted; SL: 0mm; A: 3mm
1	3	Opening	Slots - Horizontal	90.00	93.00	64		3	Mechanically Slotted; SL: 0mm; A: 3mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
32.00	37.00	5.00	Unconsolidated						(Unknown)
52.00	60.00	8.00	Unconsolidated						(Unknown)
65.00	66.00	1.00	Unconsolidated						(Unknown)
70.00	71.00	1.00	Unconsolidated						(Unknown)
77.00	84.00	7.00	Unconsolidated						(Unknown)
90.00	93.50	3.50	Unconsolidated						(Unknown)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
0.00	0.50	0.50	Loam	Loam	
0.50	5.00	4.50	Clay Silty	Clay	
5.00	18.00	13.00	Clay Silty Gravel	Clay	
18.00	19.00	1.00	Clay Light Brown Sandy Gravel	Clay	
19.00	20.00	1.00	Light Brown Moist	(Unknown)	
20.00	23.00	3.00	Clay Light Brown	Clay	
23.00	26.00	3.00	Clay Very Sandy Silty Gravel	Clay	
26.00	30.00	4.00	Clay Gravel Silty	Clay	
30.00	32.00	2.00	Clay Silty	Clay	
32.00	37.00	5.00	Clay Very Sandy Gravel Silty Water Supply	Clay	
37.00	43.00	6.00	Clay	Clay	
43.00	52.00	9.00	Clay Sticky	Clay	
52.00	60.00	8.00	Clay Gravel Sandy Water Bearing	Clay	
60.00	62.00	2.00	Clay Sandy Silty	Clay	
62.00	64.00	2.00	Silt Claybound Gravel Sandy	Silt	
64.00	65.00	1.00	Silt Claybound	Silt	
65.00	66.00	1.00	Silt Gravel Sandy Water Bearing	Silt	
66.00	67.00	1.00	Silt Gravel	Silt	
67.00	70.00	3.00	Gravel	(Unknown)	
70.00	71.00	1.00	Silt Grey Gravel Sandy Clay Bands Water Bearing	Silt	
71.00	72.00	1.00	Silt Grey Gravel Sandy	Silt	
72.00	73.00	1.00	Silt Grey Sandy	Silt	
73.00	77.00	4.00	Silt Grey Sandy Fine Bands	Silt	
73.00	77.00	4.00	Siltstone Grey Bands Grey Clay Bands Fine	Siltstone	
77.00	84.00	7.00	Sand Grey Fine Silt Water Supply	Sand	
84.00	90.00	6.00	Clay Grey Sticky Silty	Clay	
90.00	91.00	1.00	Silt Grey Gravel Sandy Water Bearing	Silt	
91.00	93.50	2.50	Gravel Silty Sandy Water Bearing	Gravel	
93.50	94.50	1.00	Siltstone Green	Siltstone	
94.50	95.50	1.00	Slate Green Fine Fractured	Slate	

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

DEPARTMENT OF LAND & WATER CONSERVATION
Work Summary

GW036534 *Converted From HYDSYS*

(No Pumping Test Summary Details Found)

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

EAST NARROMINE ROADSIDE ADJ TO PORTION 54 3 PVC'S IN ONE HOLE

*** End of GW036534 ***

Annex C:

Weather Data

June 2009

Date	Day	Temps Min °C	Temps Max °C	Rain mm	Evap mm	Sun hours	Max wind gust Dir	Max wind gust Spd km/h	Max wind gust Time local	9:00 AM Temp °C	9:00 AM RH %	9:00 AM Cld 8th	9:00 AM Dir	9:00 AM Spd km/h	9:00 AM MSLP hPa	3:00 PM Temp °C	3:00 PM RH %	3:00 PM Cld 8th	3:00 PM Dir	3:00 PM Spd km/h	3:00 PM MSLP hPa
1	Mo	10.8	13.8	1.8			E	54	1:58	11.5	86		E	22	1030.6	12.7	79		E	22	1027.7
2	Tu	11.3	15.3	5.4			E	33	5:17	12.3	89		E	20	1027.7	13.2	90		ENE	19	1025.8
3	We	12	13.9	9.2			ESE	35	2:22	12.9	94		ENE	13	1024.1	13.7	99		NE	15	1021.2
4	Th	11.2	14.9	24.6			E	20	1:16	13.3	96		ENE	11	1020.5	14.7	92		WNW	9	1017.2
5	Fr	6.4	16	9.8			WNW	20	14:59	9.5	100		SSW	2	1018.2	15.9	59		W	13	1015.8
6	Sa	3.6	17.7	0.2			W	44	20:24	6.7	99		SE	9	1016.3	16.9	55		NW	9	1011.7
7	Su	6.6	15.5	4.8			WNW	43	15:19	10.9	97		NW	15	1010.6	14.1	65		WNW	24	1009.7
8	Mo	9.8	16.5	0.4			W	43	14:33	12.2	85		WNW	19	1013.9	14.8	58		W	30	1012.2
9	Tu	5.7	13.1	0			WNW	48	14:23	9	94		WNW	17	1016.3	11.7	61		WNW	28	1013.2
10	We	4.2	10.9	1.6			WSW	41	15:36	6.7	82		WSW	22	1019.8	10	54		W	31	1019.9
11	Th	-0.9	10.8	0			WSW	37	15:05	5	90		W	11	1024.7	10.4	49		SW	24	1023
12	Fr	-2.4	13.6	0			W	17	14:30	3.5	91		SSE	7	1025.6	13.1	50		NNW	9	1021.6
13	Sa	1.9	16.5	0			NNW	39	13:16	6.8	84		ESE	9	1019.6	16	35		N	22	1015.5
14	Su	5.9	19	0			N	43	15:26	9.9	61		SE	9	1014.9	17	41		N	24	1010.5
15	Mo	3.7	17.2	0			N	28	14:51	8.8	87		ENE	6	1014.2	16.4	38		WNW	20	1012.1
16	Tu	3.5	17.2	0			SSE	30	11:23	8.6	76		SE	17	1020.4	16.9	46		S	15	1020.1
17	We	4.4	18.1	0			SE	30	13:01	9.4	74		SSE	24	1027	17.8	45		E	17	1024.8
18	Th	5	18.3	0			ESE	43	10:34	9.3	80		SE	20	1028.2	17.5	46		E	22	1025.4
19	Fr	5.6	18.1	0			ESE	48	14:51	10.2	74		SSE	19	1027.7	16.1	57		E	33	1024.9
20	Sa	9.2	18.8	0			E	43	10:34	13.4	76		E	24	1025	17.6	58		E	22	1021.1
21	Su	11.7	17.3	0.2			ENE	26	0:11	13.1	89		Calm		1023.1	15.6	83		ENE	9	1019.3
22	Mo	7.5	18	5.2			SE	30	11:14	11.4	100		ENE	11	1020.4	17.7	66		ENE	15	1018.5
23	Tu	4.4	20	0.4			NNW	26	14:29	8.1	99		SSE	9	1020.8	18.5	54		NW	15	1017.1
24	We	6	17.7	1.2			WNW	61	2:22	11.6	82		NNW	11	1015.9	17.2	41		WNW	20	1013.6
25	Th	2.5	15.9	0			NW	30	13:47	7.5	83		E	9	1016.9	14.1	57		WNW	13	1014.1
26	Fr	1.2	16.4	0			NE	26	23:11	7.6	90		ESE	9	1012.8	15.1	45		N	13	1008.5
27	Sa	7.6	15	1.8			NNW	24	11:01	10.3	99		ENE	9	1007.6	12.9	83		SW	9	1005.4
28	Su	9	14.1	0.4			WSW	33	10:48	10.6	92		W	17	1009.1	12.3	80		W	17	1008.3
29	Mo	4.1	17.3	0.4			NW	30	12:48	8.2	100		NE	6	1015.9	17	59		NNW	19	1013.1
30	Tu	7.9	20.2	0			N	52	19:54	14.8	66		N	22	1015	19.6	38		N	35	1010.5

Annex C - Weather Data

July 2009

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9:00 AM							3:00 PM					
		Min	Max				Dir	Spd	Time	Temp	RH	Cld	Dir	Spd	MSLP	Temp	RH	Cld	Dir	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	8th		km/h	hPa	°C	%	8th		km/h	hPa
1	We	9.5	18.1	0			NW	44	13:27	12.6	73		NW	11	1011.2	17	38		WNW	30	1010.1
2	Th	0.5	16.1	0			W	44	13:03	4.8	89		NNW	6	1014.3	14.4	53		W	26	1012
3	Fr	4.8	12.8	0			WSW	54	13:02	9.6	73		WSW	28	1015	11.9	59		W	33	1012.6
4	Sa	2.1	12	0			SW	39	9:55	7.4	86		SW	22	1018.9	11.4	68		SW	22	1018
5	Su	4.3	13.3	0			WSW	28	13:01	8.1	99		WNW	11	1020.7	12	55		SW	17	1019.4
6	Mo	-1	13.5	0.2			SSE	22	10:06	4.7	91		SE	13	1021.9	12.1	57		WNW	7	1019.2
7	Tu	3.2	16.5	0			E	46	10:58	5.5	80		SSE	17	1022.7	16	48		E	30	1021.2
8	We	3.3	16.7	0			E	43	10:32	9.5	77		ESE	17	1027.4	16.4	41		ENE	22	1025.4
9	Th	3.5	17.3	0			ENE	39	12:17	8.5	79		SSE	17	1026.4	16.8	43		ENE	24	1026.4
10	Fr	1	17.8	0			ENE	46	11:54	8.7	81		SE	20	1027.3	17	39		ENE	24	1022.4
11	Sa	5.4	18.2	0			E	35	10:12	8.8	92		E	19	1021.8	16.8	43		N	17	1017.3
12	Su	5	18.9	0			NNW	41	14:32	10.6	76		NE	9	1015.3	18.4	41		NNW	28	1011.3
13	Mo	8.8	13.2	3			NNW	24	14:57	9.6	99		NW	7	1011.7	12.6	77		NNW	19	1009.8
14	Tu	3.3	14.7	0.8			W	54	15:02	7.7	90		NNW	15	1010.5	12.8	63		NW	26	1008
15	We	4.9	10.5	4.6			N	24	10:35	7.7	98		NNE	15	1010	9.5	94		NNW	11	1008.8
16	Th	6	12.8	6.6			SW	31	15:42	7.5	99		W	9	1014.7	11.2	62		SW	22	1013.8
17	Fr	-0.1	15.3	0			S	22	12:25	5.1	99		NE	7	1022	15.2	52		WNW	11	1020.2
18	Sa	0.3	15	0			WNW	26	13:36	3.5	99		SE	9	1024.2	14.4	51		WNW	15	1020.5
19	Su	-0.9	15.7	0.2			W	22	13:50	4.8	93		SE	7	1024.7	15.6	45		WNW	11	1022.9
20	Mo	0.7	17.4	0			NNW	31	14:49	5.9	87		SE	11	1027.1	16.8	40		N	22	1022.6
21	Tu	0.7	20.8	0			N	37	23:31	9.3	76		SE	11	1022.1	19.7	44		NNW	17	1017.7
22	We	9.3	20.3	0			N	50	11:41	16.7	62		NNW	28	1015.3	15.1	89		N	33	1010.7
23	Th	4.5	13.5	6.8			WSW	43	11:56	9.4	87		W	11	1017.5	11.4	62		SW	20	1019.2
24	Fr	-0.3	15.6	0			SE	26	12:07	6.2	88		SE	9	1027.2	14.9	52		SSE	13	1025.1
25	Sa	-0.3	17	0.2			NW	31	12:44	5.9	87		ESE	9	1027	16.5	49		WNW	13	1022.7
26	Su	5.6	13.1	1.6			SW	31	20:32	9.5	94		E	9	1019	12.9	78		ENE	7	1013.9
27	Mo	2.2	11.2	1			W	31	11:36	7.7	84		WSW	11	1021	9.8	72		WSW	24	1021.9
28	Tu	1.6	16.1	0			W	37	13:51	6.4	99		NNW	4	1026.5	15	56		SW	19	1024
29	We	3.9	16.1	0			SW	30	13:48	7.6	99		WSW	6	1028	14.4	54		WSW	19	1025.9
30	Th	2.8		0						5.2	99		SE	6	1027.7	15.4	48		SSW	19	1023.8

Annex C - Weather Data

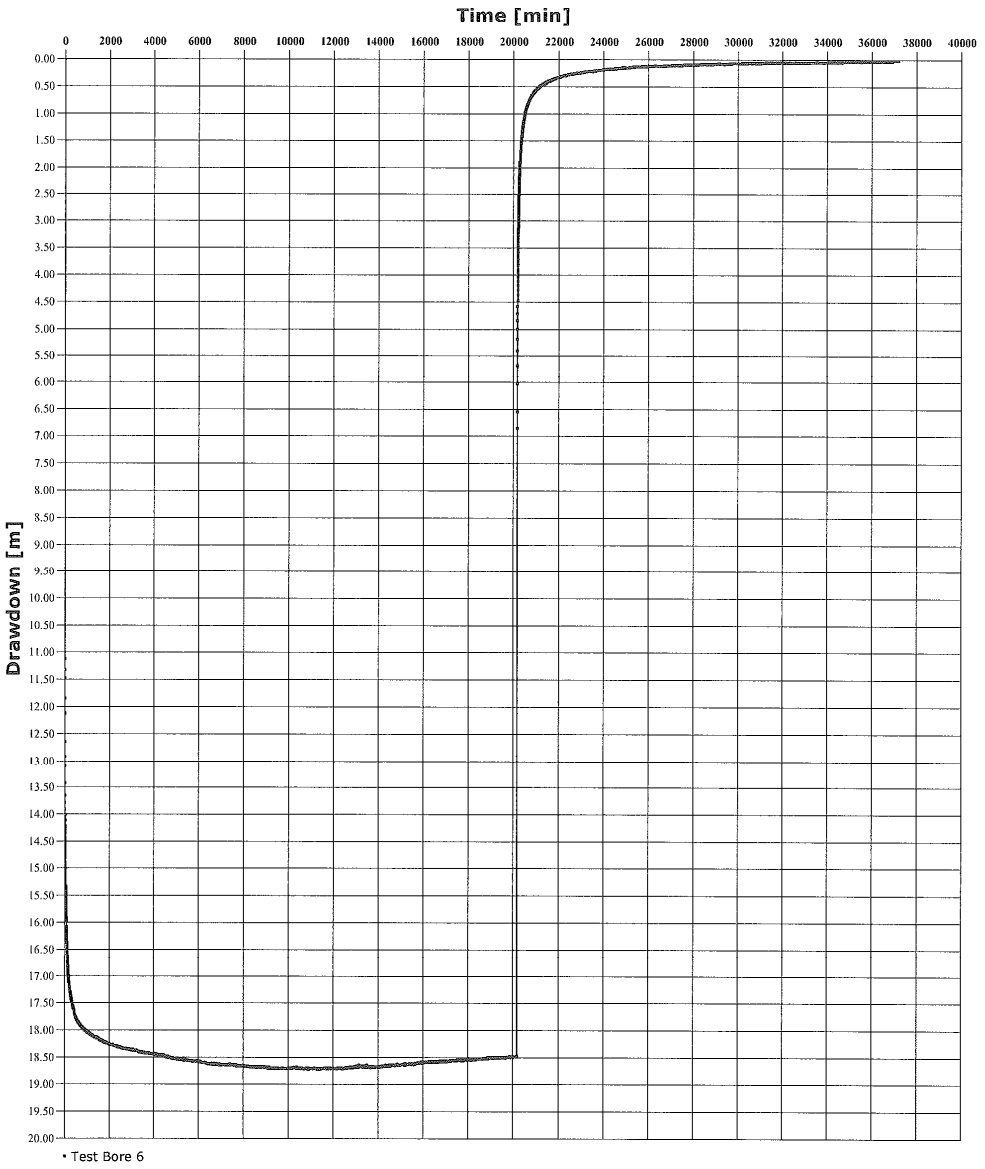
Annex D:

Time vs Drawdown Plots

IMPAX group

Pumping Test Analysis Report	D
Project: 14 Day Pumping Test - Test Bore 6	
Number: 2008-0013	
Client: Alkane Resources Limited	

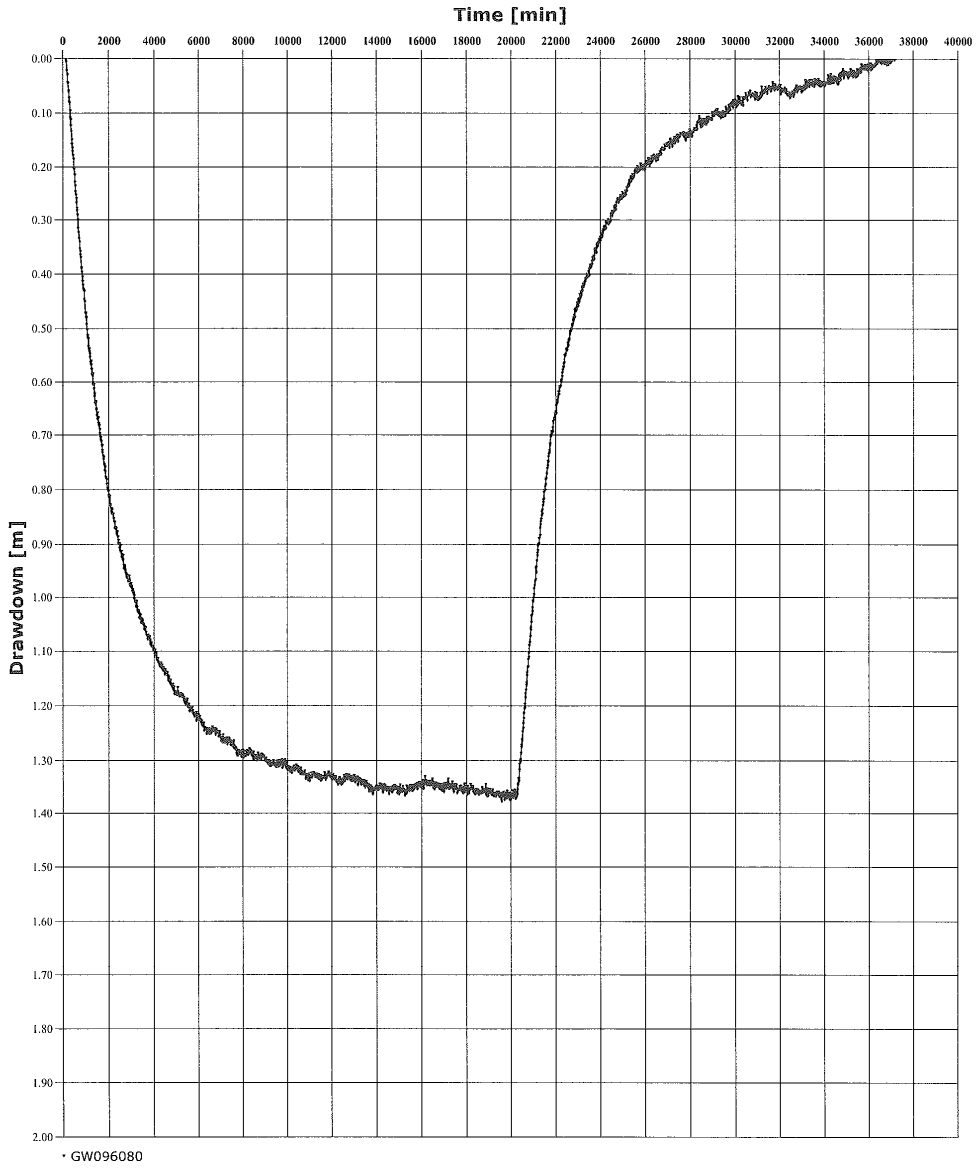
Location: "Woodlands", Narromine, NSW	Pumping Test: Test Bore 6 Pumping Test	Pumping Well: Test Bore 6
Test Conducted by: James Morrow		Test Date: 29/07/2009
Analysis Performed by: James Morrow	Drawdown vs Time	Analysis Date: 29/07/2009
Aquifer Thickness: 38.00 m	Discharge: variable, average rate 32 [l/s]	



IMPAX group

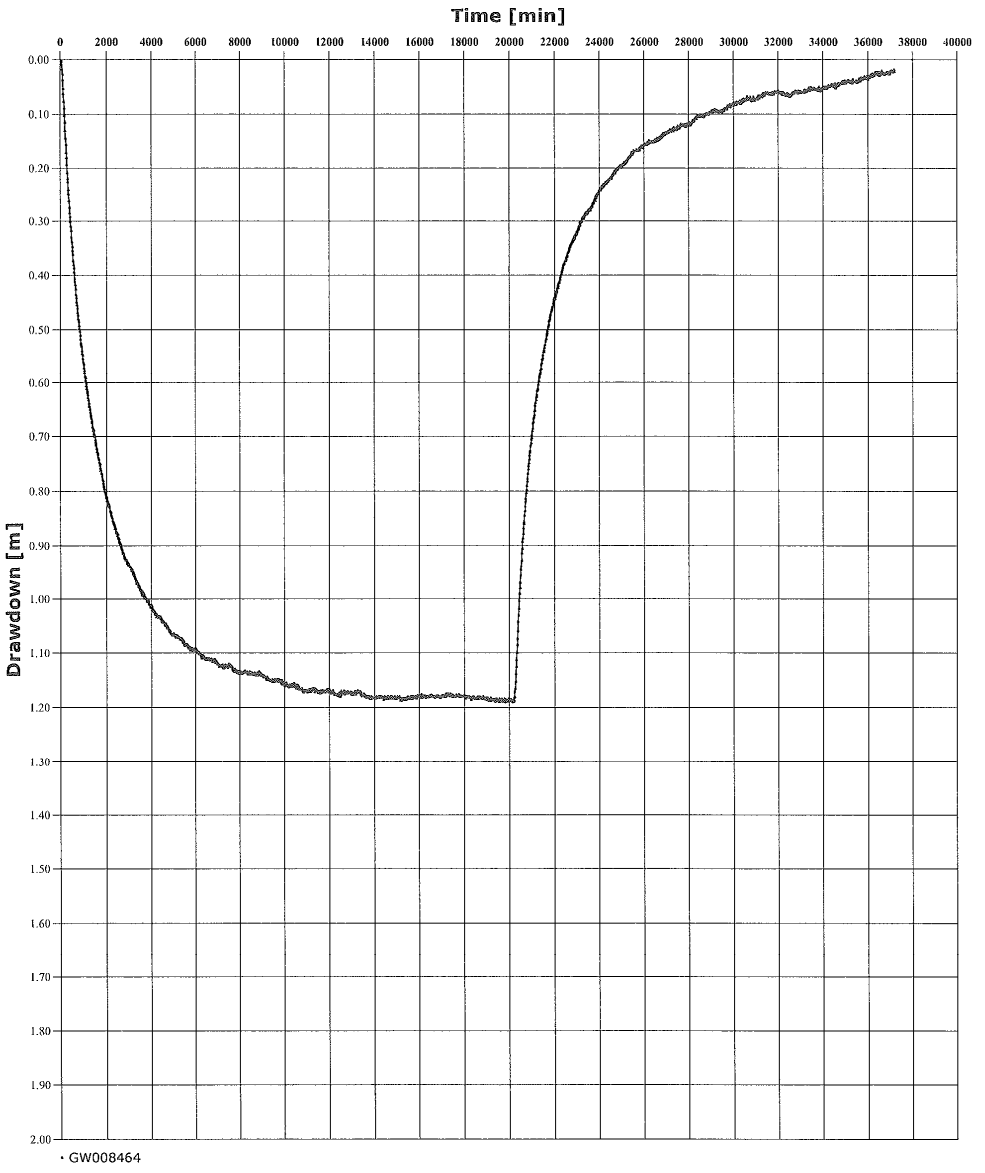
Pumping Test Analysis Report	D
Project: 14 Day Pumping Test - Test Bore 6	
Number: 2008-0013	
Client: Alkane Resources Limited	

Location: "Woodlands", Narromine, NSW	Pumping Test: Test Bore 6 Pumping Test	Pumping Well: Test Bore 6
Test Conducted by: James Morrow		Test Date: 29/07/2009
Analysis Performed by: James Morrow	Drawdown vs Time	Analysis Date: 29/07/2009
Aquifer Thickness: 38.00 m	Discharge Rate: 38.47 [l/s]	



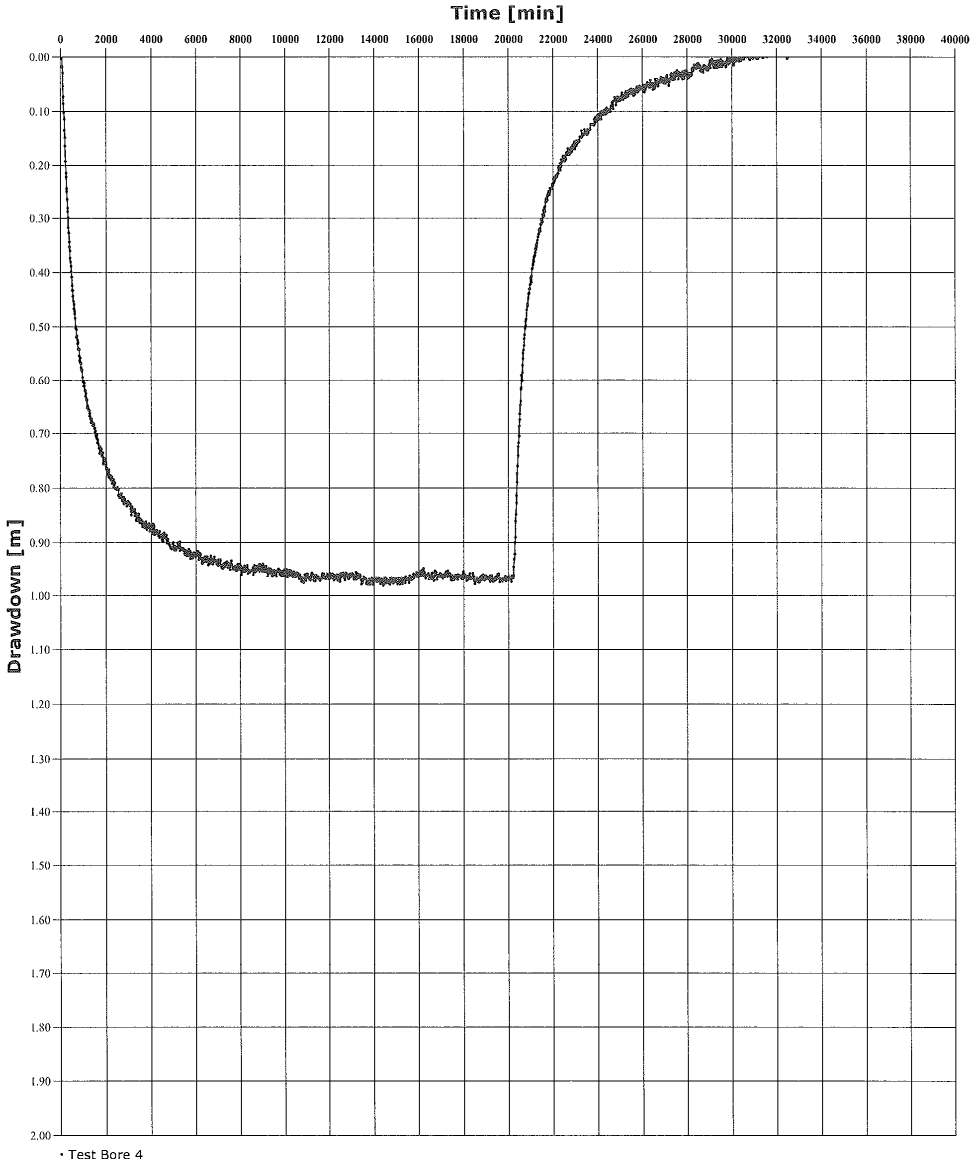
IMPAX group

Pumping Test Analysis Report		D
Project: 14 Day Pumping Test - Test Bore 6		
Number: 2008-0013		
Client: Alkane Resources Limited		
Location: "Woodlands", Narromine, NSW	Pumping Test: Test Bore 6 Pumping Test	Pumping Well: Test Bore 6
Test Conducted by: James Morrow		Test Date: 29/07/2009
Analysis Performed by: James Morrow	Drawdown vs Time	Analysis Date: 29/07/2009
Aquifer Thickness: 38.00 m	Discharge Rate: 38.47 [l/s]	



IMPAX group

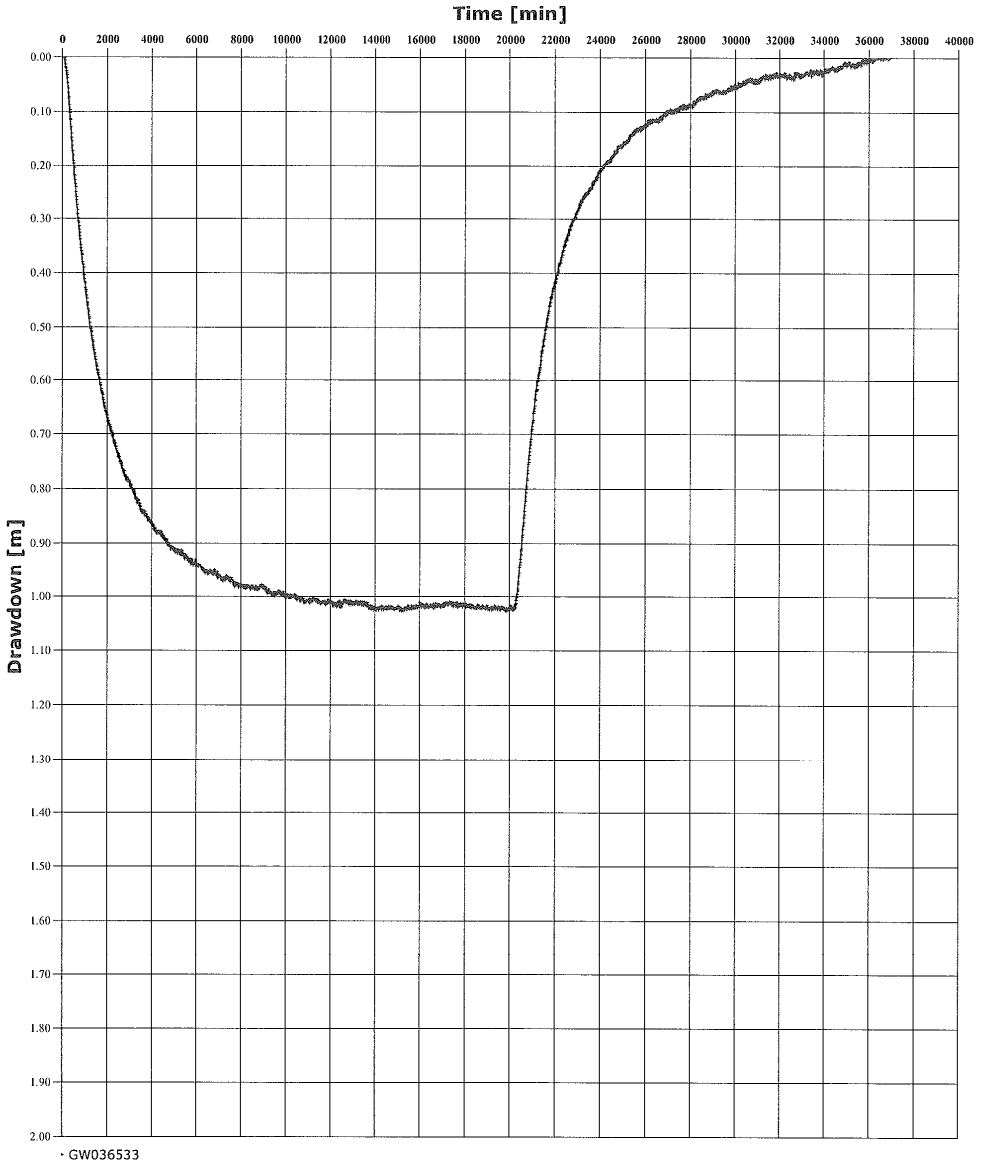
Pumping Test Analysis Report		D
Project: 14 Day Pumping Test - Test Bore 6		
Number: 2008-0013		
Client: Alkane Resources Limited		
Location: "Woodlands", Narromine, NSW	Pumping Test: Test Bore 6 Pumping Test	Pumping Well: Test Bore 6
Test Conducted by: James Morrow		Test Date: 29/07/2009
Analysis Performed by: James Morrow	Drawdown vs Time	Analysis Date: 29/07/2009
Aquifer Thickness: 38.00 m	Discharge Rate: 38.47 [l/s]	



IMPAX group

Pumping Test Analysis Report	D
Project: 14 Day Pumping Test - Test Bore 6	
Number: 2008-0013	
Client: Alkane Resources Limited	

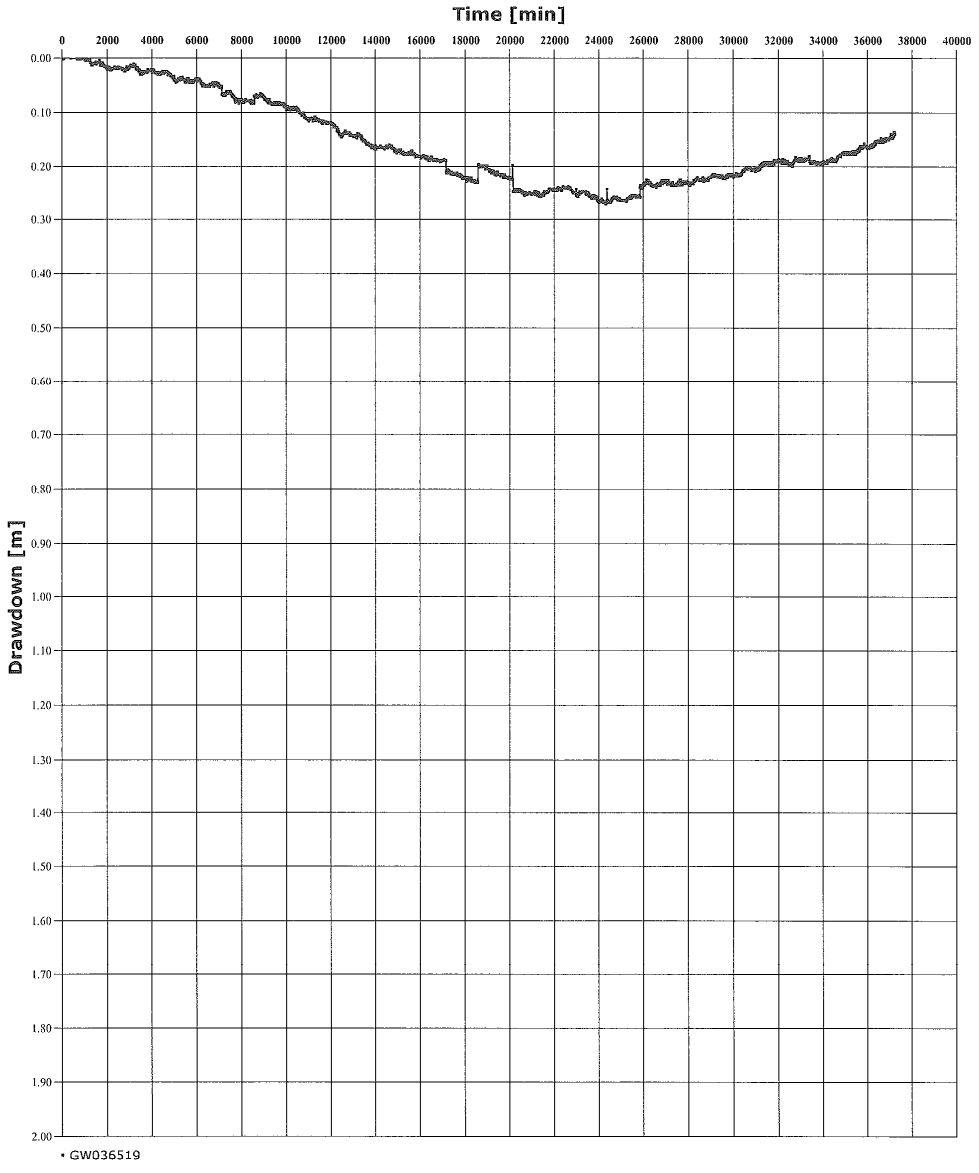
Location: "Woodlands", Narromine, NSW	Pumping Test: Test Bore 6 Pumping Test	Pumping Well: Test Bore 6
Test Conducted by: James Morrow		Test Date: 29/07/2009
Analysis Performed by: James Morrow	Drawdown vs Time	Analysis Date: 29/07/2009
Aquifer Thickness: 38.00 m	Discharge Rate: 38.47 [l/s]	



IMPAX group

Pumping Test Analysis Report	D
Project: 14 Day Pumping Test - Test Bore 6	
Number: 2008-0013	
Client: Alkane Resources Limited	

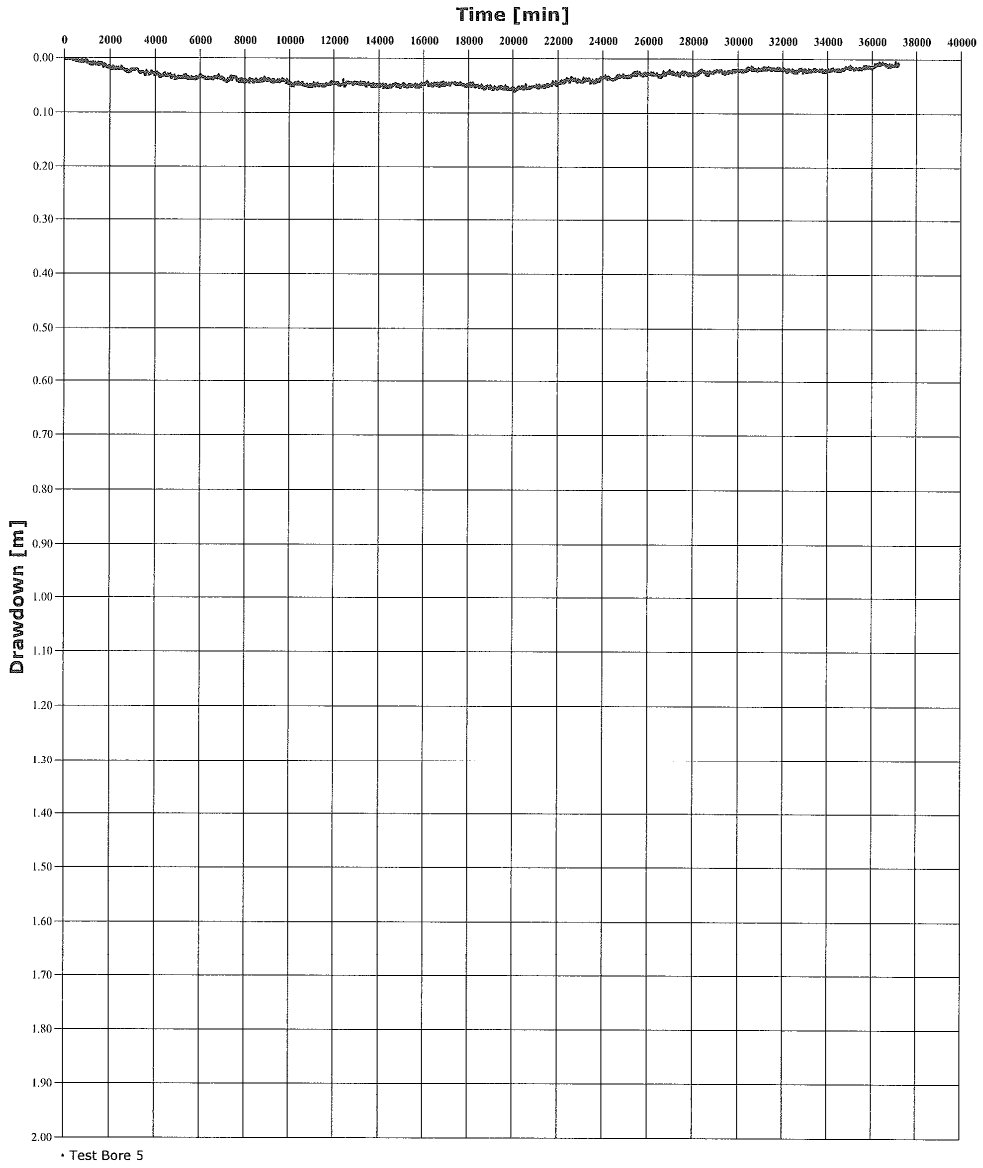
Location: "Woodlands", Narromine, NSW	Pumping Test: Test Bore 6 Pumping Test	Pumping Well: Test Bore 6
Test Conducted by: James Morrow		Test Date: 29/07/2009
Analysis Performed by: James Morrow	Drawdown vs Time	Analysis Date: 29/07/2009
Aquifer Thickness: 38.00 m	Discharge Rate: 38.47 [l/s]	



IMPAX group

Pumping Test Analysis Report	D
Project: 14 Day Pumping Test - Test Bore 6	
Number: 2008-0013	
Client: Alkane Resources Limited	

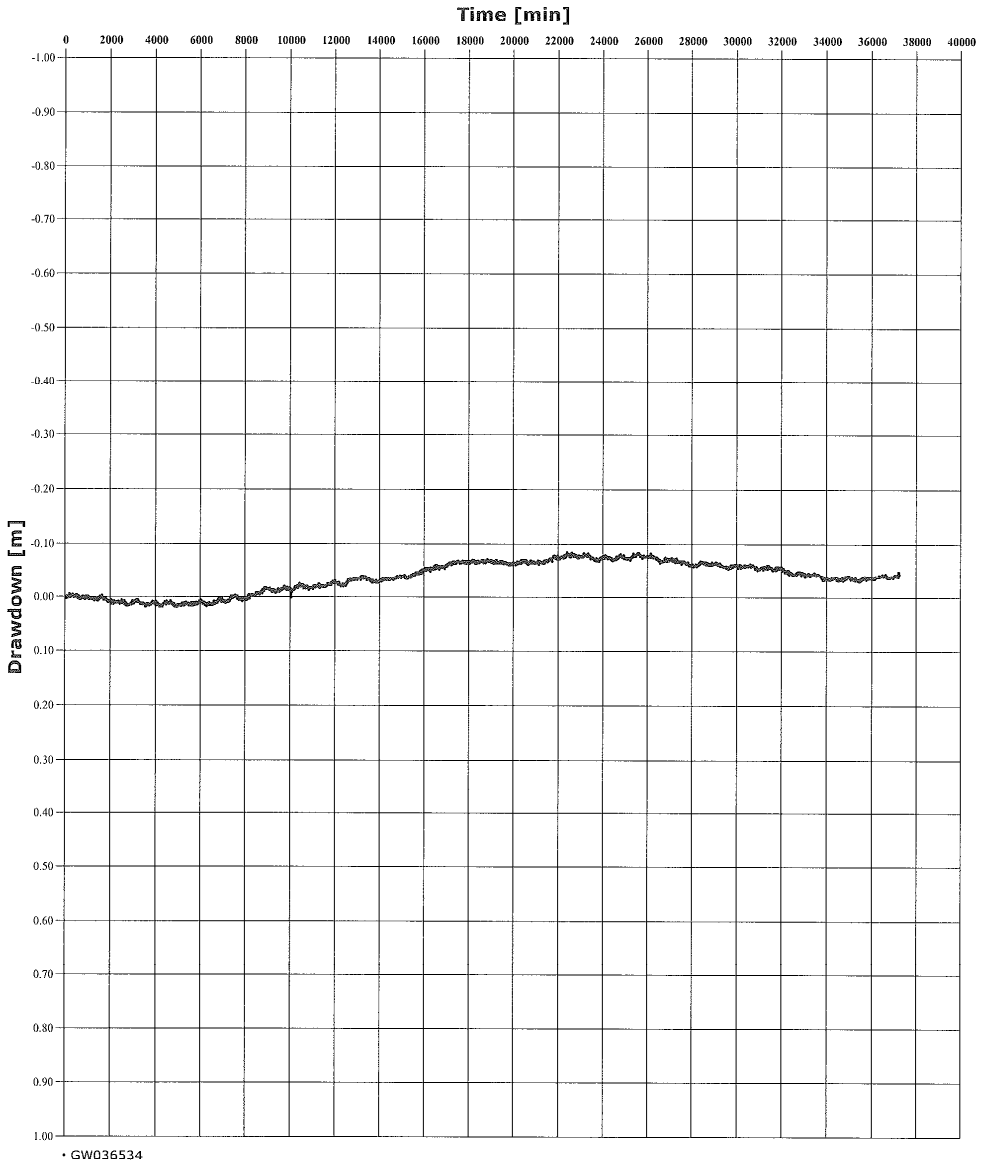
Location: "Woodlands", Narromine, NSW	Pumping Test: Test Bore 6 Pumping Test	Pumping Well: Test Bore 6
Test Conducted by: James Morrow		Test Date: 29/07/2009
Analysis Performed by: James Morrow	Drawdown vs Time	Analysis Date: 29/07/2009
Aquifer Thickness: 38.00 m	Discharge Rate: 38.47 [l/s]	



IMPAX group

Pumping Test Analysis Report	D
Project: 14 Day Pumping Test - Test Bore 6	
Number: 2008-0013	
Client: Alkane Resources Limited	

Location: "Woodlands", Narromine, NSW	Pumping Test: Test Bore 6 Pumping Test	Pumping Well: Test Bore 6
Test Conducted by: James Morrow		Test Date: 29/07/2009
Analysis Performed by: James Morrow	Drawdown vs Time	Analysis Date: 29/07/2009
Aquifer Thickness: 38.00 m	Discharge Rate: 38.47 [l/s]	



Annex E:

Theis Analysis Plots

IMPAX group

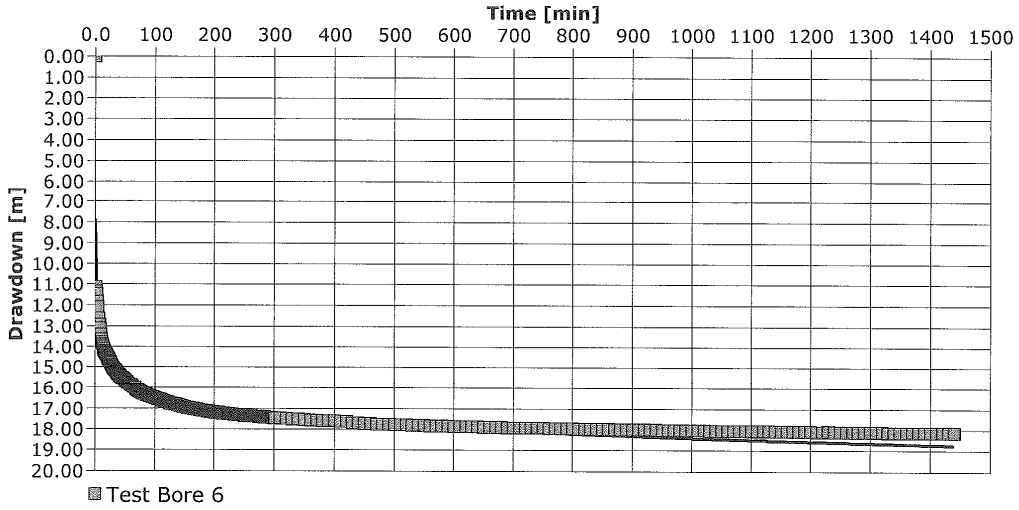
Pumping Test Analysis Report B

Project: 14 Day Pumping Test - Test Bore 6

Number: 2008-0013

Client: Alkane Resources Limited

Location: "Woodlands", Narromine, NSW	Pumping Test: Test Bore 6 Pumping Test	Pumping Well: Test Bore 6
Test Conducted by: James Morrow		Test Date: 29/07/2009
Analysis Performed by: James Morrow	Theis	Analysis Date: 29/07/2009
Aquifer Thickness: 38.00 m	Discharge Rate: 38.47 [l/s]	



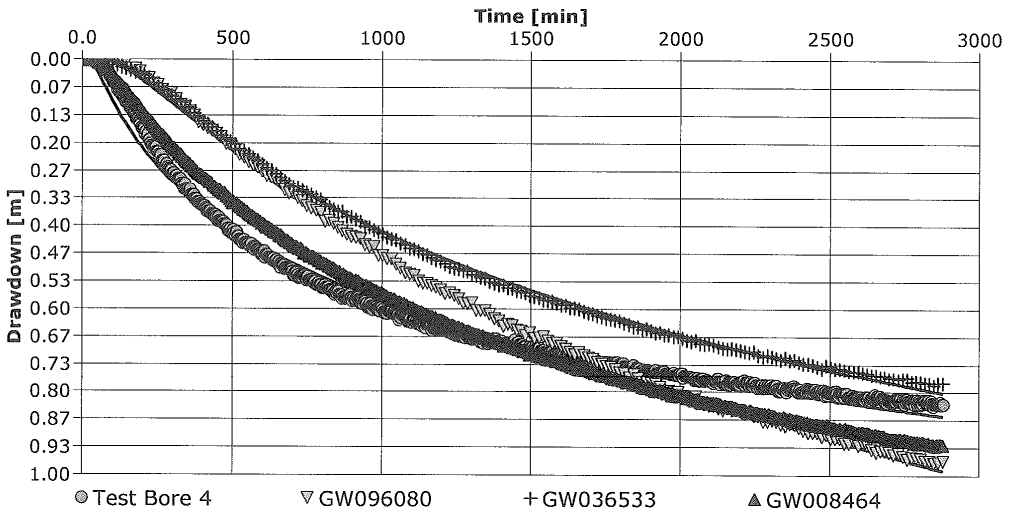
Calculation after Theis

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]
Test Bore 6	2.90×10^{2}	7.63×10^{0}	1.80×10^{-5}	0.21

IMPAX group

Pumping Test Analysis Report	B
Project: 14 Day Pumping Test - Test Bore 6	
Number: 2008-0013	
Client: Alkane Resources Limited	

Location: "Woodlands", Narromine, NSW	Pumping Test: Test Bore 6 Pumping Test	Pumping Well: Test Bore 6
Test Conducted by: James Morrow		Test Date: 29/07/2009
Analysis Performed by: James Morrow	Theis	Analysis Date: 29/07/2009
Aquifer Thickness: 38.00 m	Discharge Rate: 38.47 [l/s]	



Calculation after Theis

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
Test Bore 4	9.64×10^{2}	2.54×10^{1}	4.57×10^{-4}	652.15	
GW096080	4.34×10^{2}	1.14×10^{1}	3.56×10^{-2}	110.45	
GW036533	6.06×10^{2}	1.60×10^{1}	6.54×10^{-4}	852.09	
GW008464	6.75×10^{2}	1.78×10^{1}	8.84×10^{-4}	572.45	
Average	6.70×10^{2}	1.76×10^{1}	9.39×10^{-3}		

Annex F:

Cooper and Jacob Analysis Plots

IMPAX group

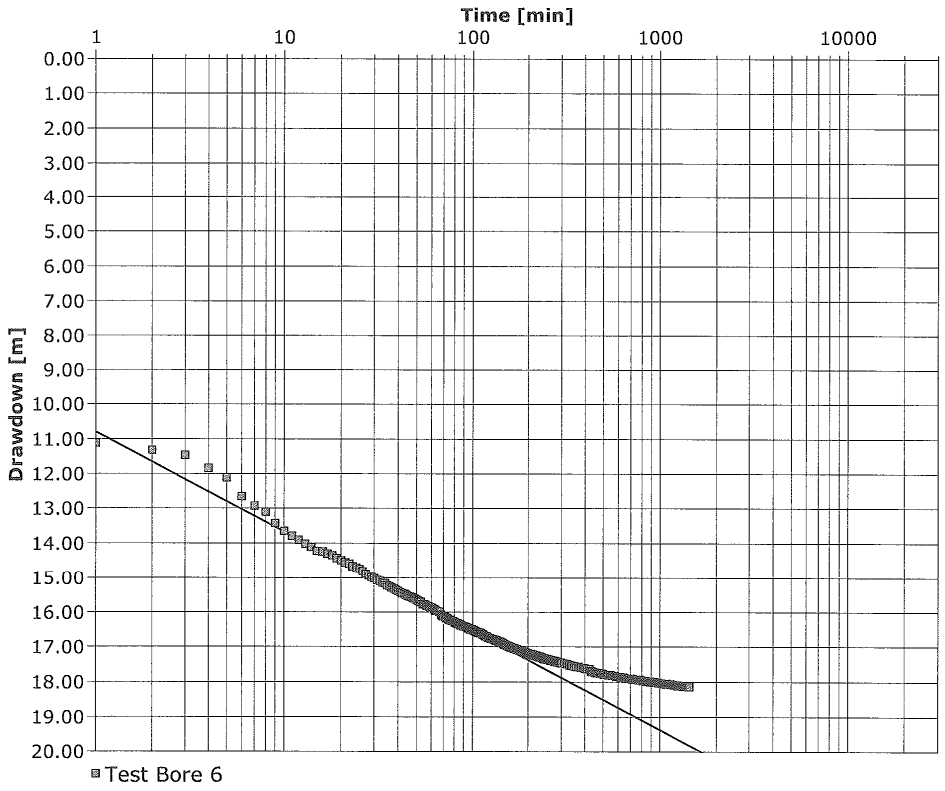
Pumping Test Analysis Report C

Project: 14 Day Pumping Test - Test Bore 6

Number: 2008-0013

Client: Alkane Resources Limited

Location: "Woodlands", Narromine, NSW	Pumping Test: Test Bore 6 Pumping Test	Pumping Well: Test Bore 6
Test Conducted by: James Morrow		Test Date: 29/07/2009
Analysis Performed by: James Morrow	Cooper and Jacob Method	Analysis Date: 29/07/2009
Aquifer Thickness: 38.00 m	Discharge Rate: 38.47 [l/s]	



Calculation after Cooper & Jacob

Observation Well	Transmissivity [m^2/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]
Test Bore 6	2.13×10^{2}	5.60×10^{0}	1.29×10^{-3}	0.21

IMPAX group

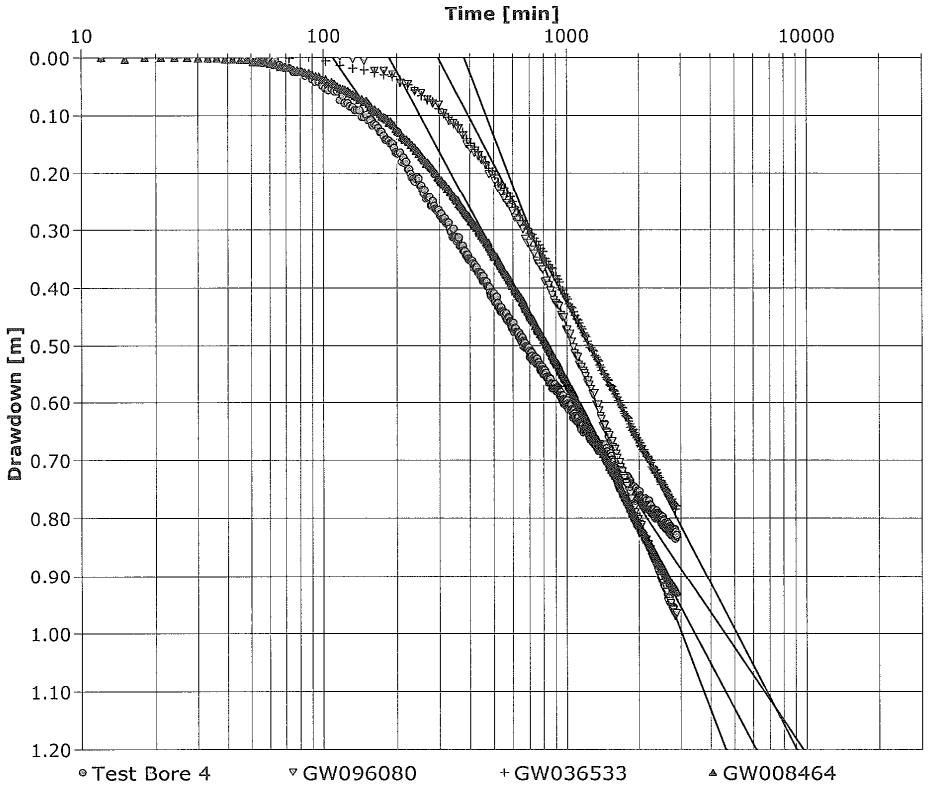
Pumping Test Analysis Report C

Project: 14 Day Pumping Test - Test Bore 6

Number: 2008-0013

Client: Alkane Resources Limited

Location: "Woodlands", Narromine, NSW	Pumping Test: Test Bore 6 Pumping Test	Pumping Well: Test Bore 6
Test Conducted by: James Morrow		Test Date: 29/07/2009
Analysis Performed by: James Morrow	Cooper and Jacob Method	Analysis Date: 29/07/2009
Aquifer Thickness: 38.00 m	Discharge Rate: 38.47 [l/s]	



Calculation after Cooper & Jacob

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
Test Bore 4	9.86×10^{2}	2.59×10^{1}	3.96×10^{-4}	652.15	
GW096080	5.50×10^{2}	1.45×10^{1}	2.66×10^{-2}	110.45	
GW036533	7.53×10^{2}	1.98×10^{1}	4.79×10^{-4}	852.09	
GW008464	7.69×10^{2}	2.02×10^{1}	6.83×10^{-4}	572.45	
Average	7.64×10^{2}	2.01×10^{1}	7.04×10^{-3}		

Annex G:

Theis Recovery Analysis Plots

IMPAX group

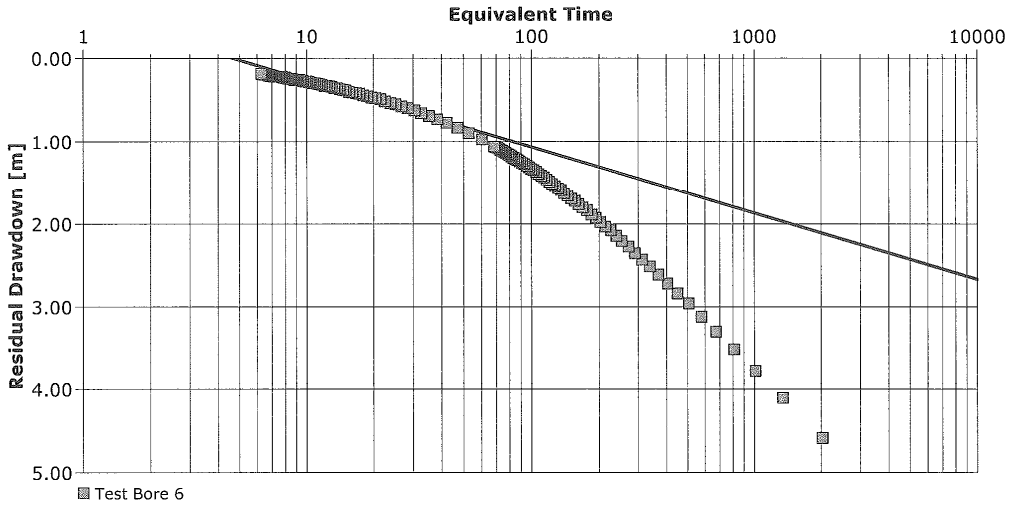
Pumping Test Analysis Report D

Project: 14 Day Pumping Test - Test Bore 6

Number: 2008-0013

Client: Alkane Resources Limited

Location: "Woodlands", Narromine, NSW	Pumping Test: Test Bore 6 Pumping Test	Pumping Well: Test Bore 6
Test Conducted by: James Morrow		Test Date: 29/07/2009
Analysis Performed by: James Morrow	Theis Recovery	Analysis Date: 29/07/2009
Aquifer Thickness: 38.00 m	Discharge Rate: 38.47 [l/s]	



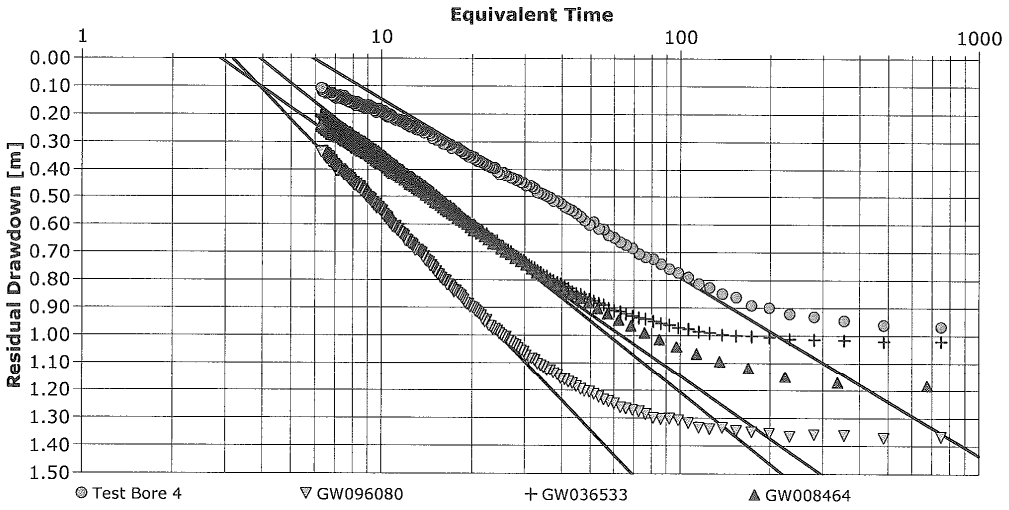
Calculation after Theis & Jacob

Observation Well	Transmissivity [m^2/d]	Hydraulic Conductivity [m/d]	Radial Distance to PW [m]	
Test Bore 6	7.61×10^2	2.00×10^1	0.21	

IMPAX group

Pumping Test Analysis Report	D
Project: 14 Day Pumping Test - Test Bore 6	
Number: 2008-0013	
Client: Alkane Resources Limited	

Location: "Woodlands", Narromine, NSW	Pumping Test: Test Bore 6 Pumping Test	Pumping Well: Test Bore 6
Test Conducted by: James Morrow		Test Date: 29/07/2009
Analysis Performed by: James Morrow	Theis Recovery	Analysis Date: 29/07/2009
Aquifer Thickness: 38.00 m	Discharge Rate: 38.47 [l/s]	

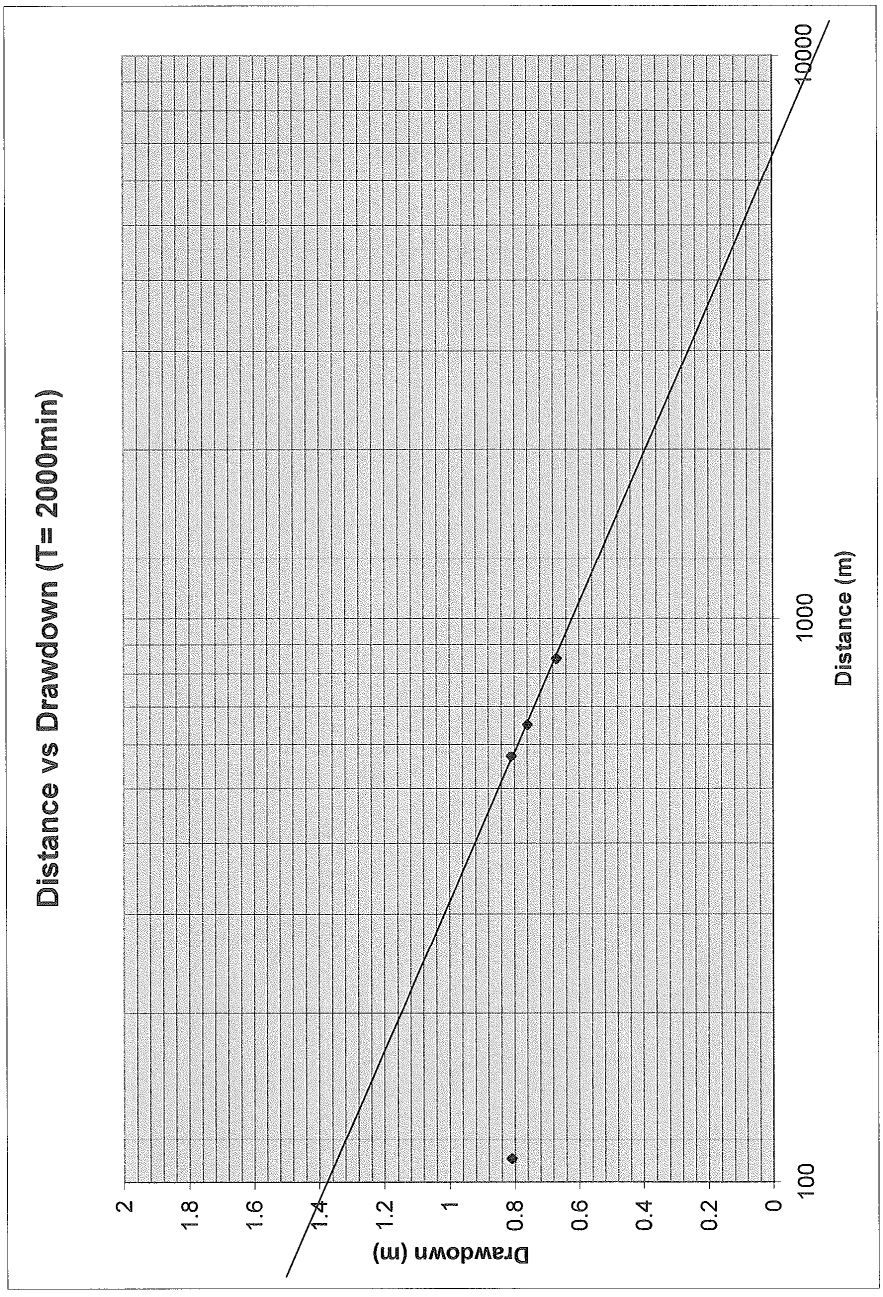


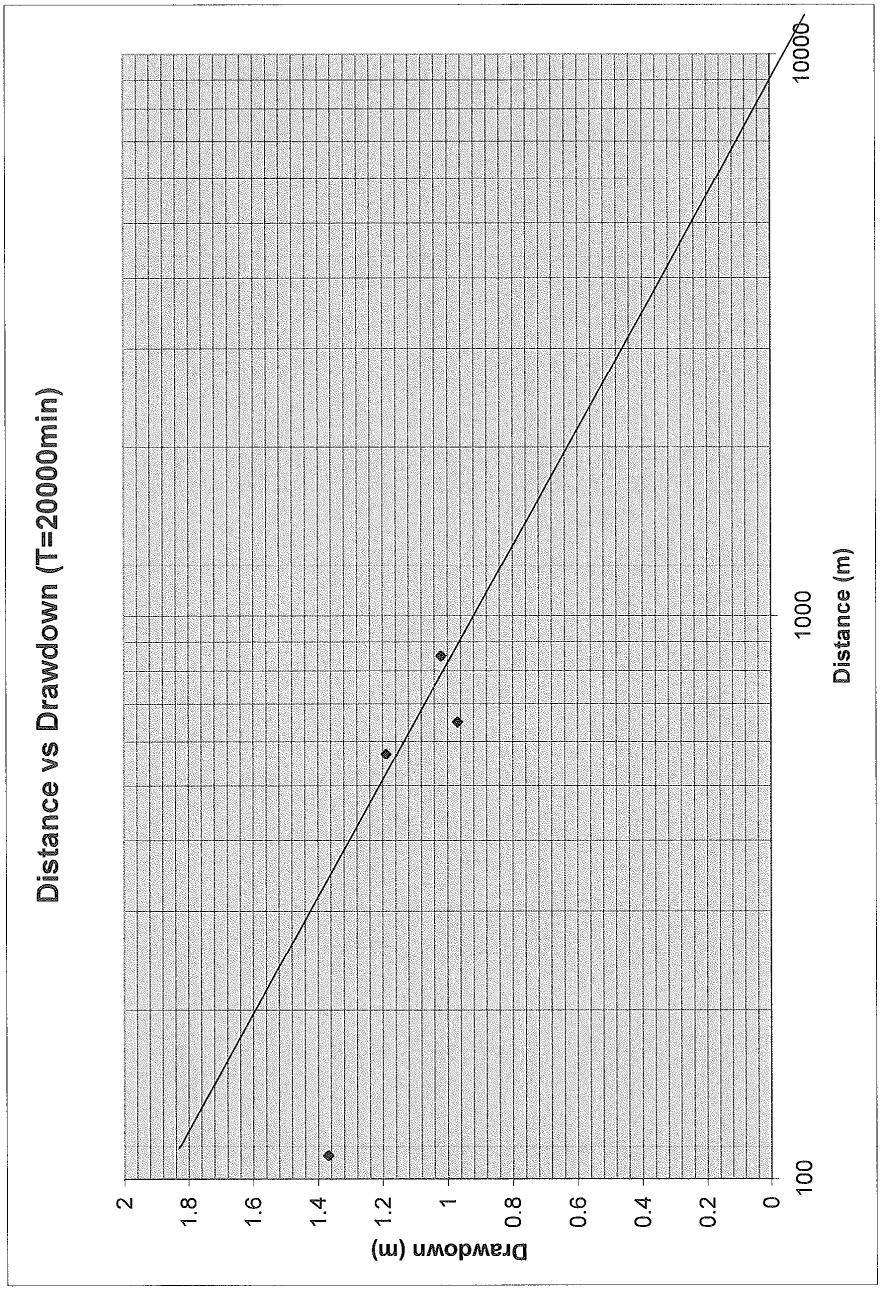
Calculation after Theis & Jacob

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Radial Distance to PW [m]	
Test Bore 4	9.46×10^2	2.49×10^1	652.15	
GW096080	5.41×10^2	1.42×10^1	110.45	
GW036533	7.10×10^2	1.87×10^1	852.09	
GW008464	8.15×10^2	2.15×10^1	572.45	
Average	7.53×10^2	1.98×10^1		

Annex H:

Distance vs Drawdown Plots


Distance vs Drawdown (T= 2000min)
Drawdown (m)
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
100
1000
10000
Distance (m)


Distance vs Drawdown (T=20000min)
Drawdown (m)
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
100
1000
10000
Distance (m)

Annex I:

Predicted Drawdown - Long Term Pumping

IMPAX group

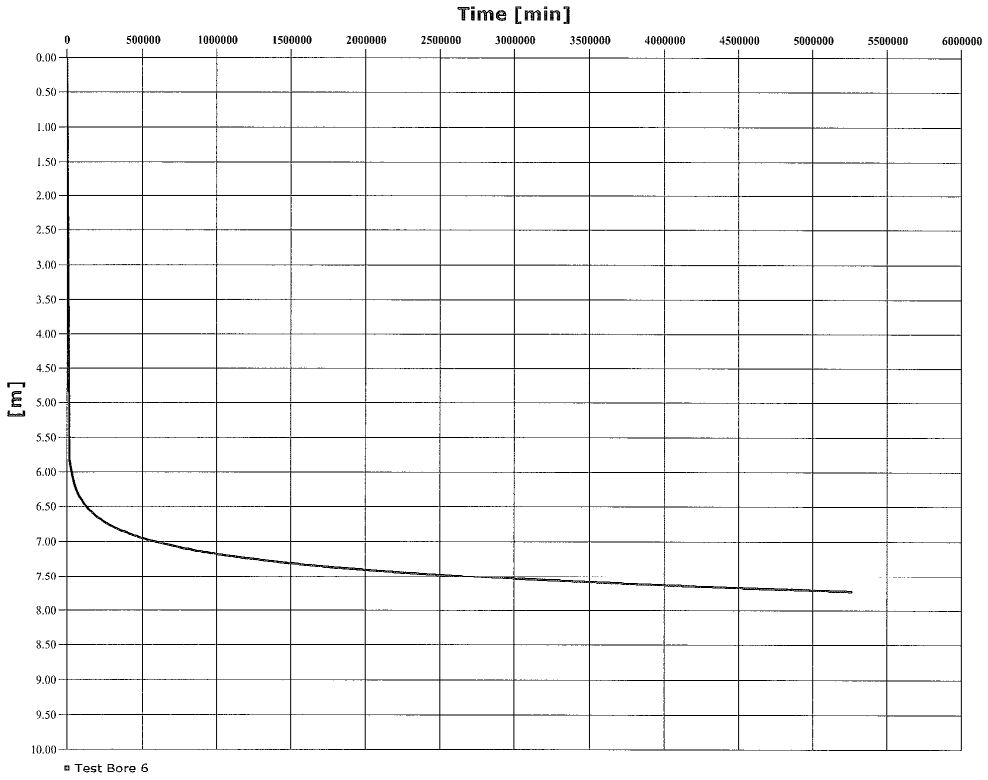
Pumping Test Analysis Report

Project: 14 Day Pumping Test - Test Bore 6

Number: 2008-0013

Client: Alkane Resources Limited

Location: "Woodlands", Narromine, NSW	Pumping Test: Test Bore 6 Pumping Test	Pumping Well: Test Bore 6
Test Conducted by: James Morrow		Test Date: 29/07/2009
Analysis Performed by: James Morrow	Drawdown vs Time	Analysis Date: 29/07/2009
Aquifer Thickness: 38.00 m	Discharge Rate: 32 [l/s]	



Calculation after Theis

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
Test Bore 6	6.68×10^{2}	1.76×10^{1}	8.20×10^{-3}	0.21	

IMPAX group

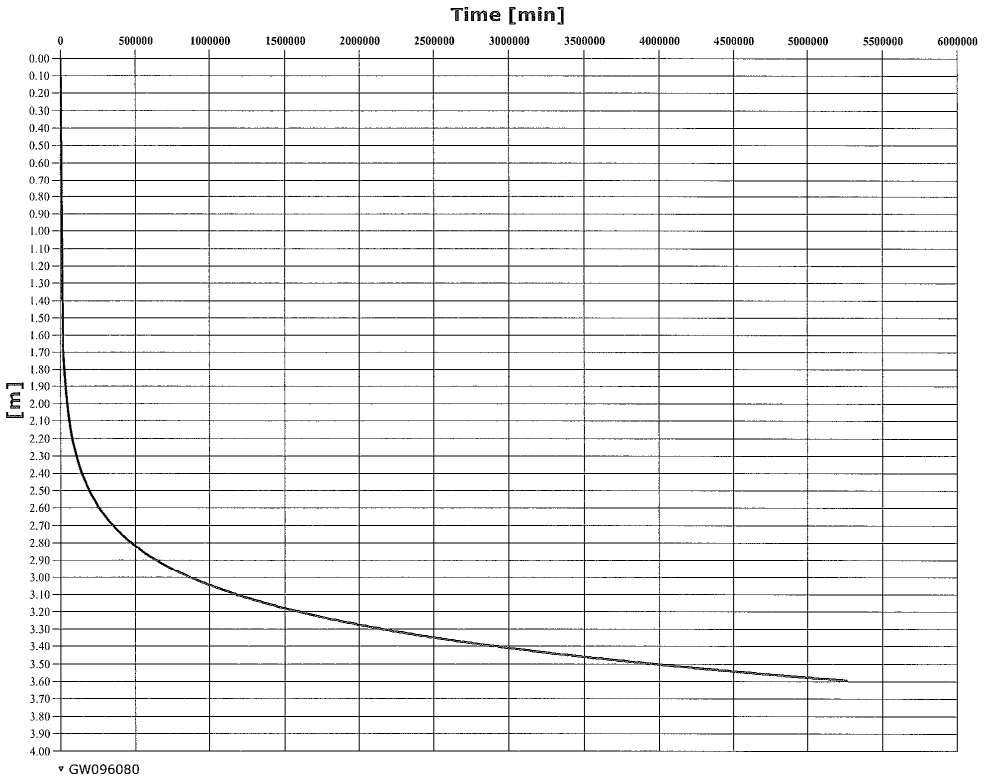
Pumping Test Analysis Report I

Project: 14 Day Pumping Test - Test Bore 6

Number: 2008-0013

Client: Alkane Resources Limited

Location: "Woodlands", Narromine, NSW	Pumping Test: Test Bore 6 Pumping Test	Pumping Well: Test Bore 6
Test Conducted by: James Morrow		Test Date: 29/07/2009
Analysis Performed by: James Morrow	Drawdown vs Time	Analysis Date: 29/07/2009
Aquifer Thickness: 38.00 m	Discharge Rate: 32 [l/s]	



Calculation after Theis

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
GW096080	6.68×10^{2}	1.76×10^{1}	8.20×10^{-3}	110.45	

IMPAX group

Pumping Test Analysis Report

Project: 14 Day Pumping Test - Test Bore 6

Number: 2008-0013

Client: Alkane Resources Limited

Location: "Woodlands", Narromine, NSW	Pumping Test: Test Bore 6 Pumping Test	Pumping Well: Test Bore 6
Test Conducted by: James Morrow		Test Date: 29/07/2009
Analysis Performed by: James Morrow	Drawdown vs Time	Analysis Date: 29/07/2009
Aquifer Thickness: 38.00 m	Discharge Rate: 32 [l/s]	

Calculation after Theis

Observation Well	Transmissivity [m^2/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
200m Bore	6.68×10^{2}	1.76×10^{1}	8.20×10^{-3}	200.0	

IMPAX group

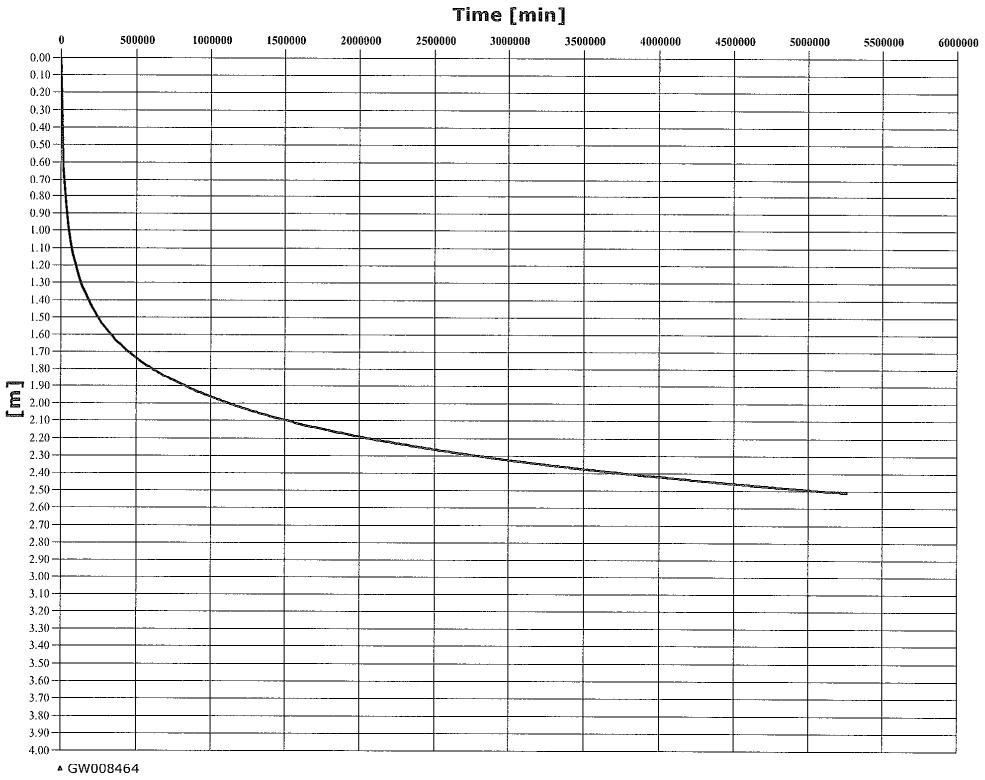
Pumping Test Analysis Report I

Project: 14 Day Pumping Test - Test Bore 6

Number: 2008-0013

Client: Alkane Resources Limited

Location: "Woodlands", Narromine, NSW	Pumping Test: Test Bore 6 Pumping Test	Pumping Well: Test Bore 6
Test Conducted by: James Morrow		Test Date: 29/07/2009
Analysis Performed by: James Morrow	Drawdown vs Time	Analysis Date: 29/07/2009
Aquifer Thickness: 38.00 m	Discharge Rate: 32 [l/s]	



Calculation after Theis

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
GW008464	6.68×10^{2}	1.76×10^{1}	8.20×10^{-3}	572.45	

IMPAX group

Pumping Test Analysis Report

Project: 14 Day Pumping Test - Test Bore 6

Number: 2008-0013

Client: Alkane Resources Limited

Location: "Woodlands", Narromine, NSW	Pumping Test: Test Bore 6 Pumping Test	Pumping Well: Test Bore 6
Test Conducted by: James Morrow		Test Date: 29/07/2009
Analysis Performed by: James Morrow	Drawdown vs Time	Analysis Date: 29/07/2009
Aquifer Thickness: 38.00 m	Discharge Rate: 32 [l/s]	

Calculation after Theis

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
Test Bore 4	6.68×10^{2}	1.76×10^{1}	8.20×10^{-3}	652.15	

IMPAX group

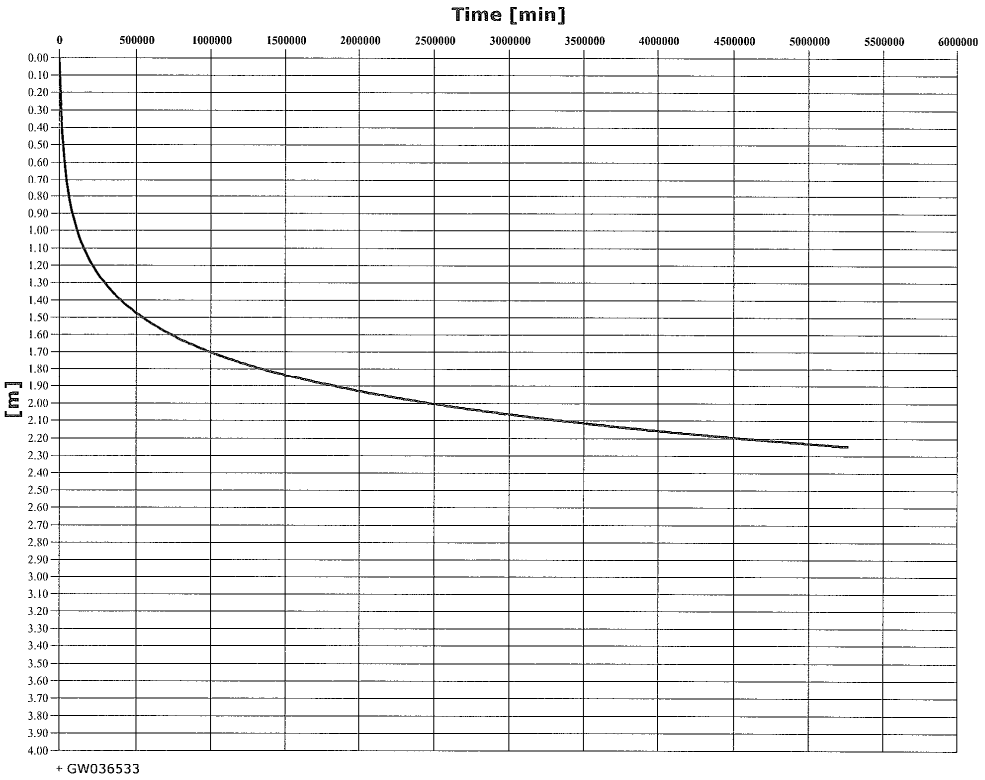
Pumping Test Analysis Report

Project: 14 Day Pumping Test - Test Bore 6

Number: 2008-0013

Client: Alkane Resources Limited

Location: "Woodlands", Narromine, NSW	Pumping Test: Test Bore 6 Pumping Test	Pumping Well: Test Bore 6
Test Conducted by: James Morrow		Test Date: 29/07/2009
Analysis Performed by: James Morrow	Drawdown vs Time	Analysis Date: 29/07/2009
Aquifer Thickness: 38.00 m	Discharge Rate: 32 [l/s]	



Calculation after Theis

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
GW036533	6.68×10^{2}	1.76×10^{1}	8.20×10^{-3}	852.09	

IMPAX group

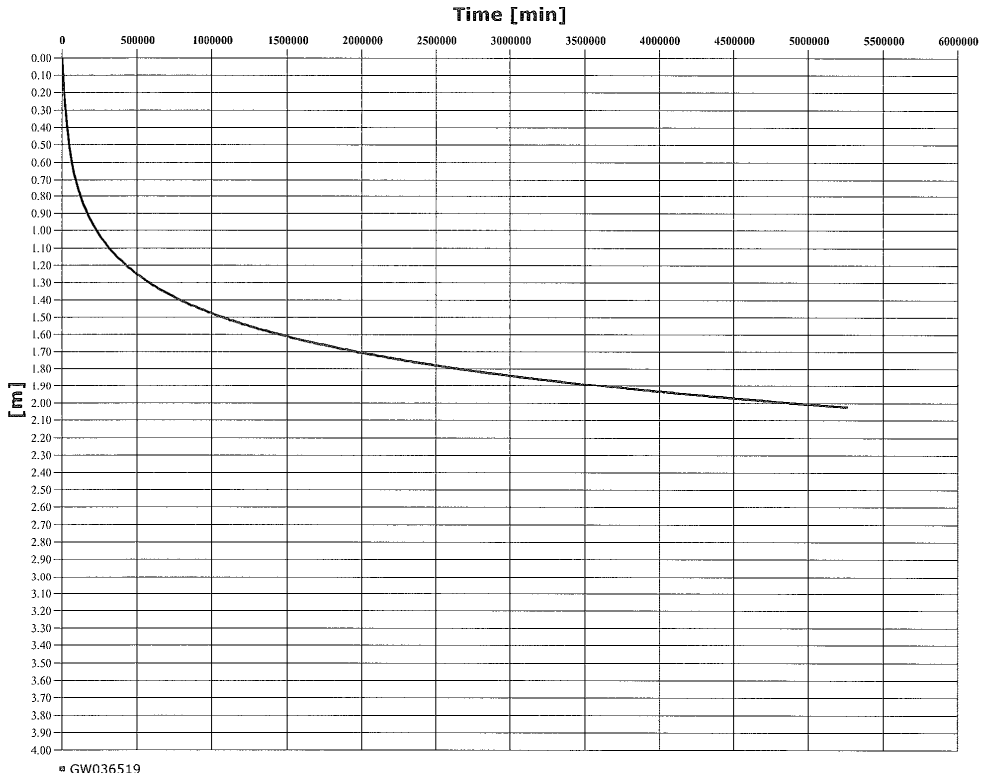
Pumping Test Analysis Report I

Project: 14 Day Pumping Test - Test Bore 6

Number: 2008-0013

Client: Alkane Resources Limited

Location: "Woodlands", Narromine, NSW	Pumping Test: Test Bore 6 Pumping Test	Pumping Well: Test Bore 6
Test Conducted by: James Morrow		Test Date: 29/07/2009
Analysis Performed by: James Morrow	Drawdown vs Time	Analysis Date: 29/07/2009
Aquifer Thickness: 38.00 m	Discharge Rate: 32 [l/s]	



Calculation after Theis

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
GW036519	6.68×10^{2}	1.76×10^{1}	8.20×10^{-3}	1199.05	

IMPAX group

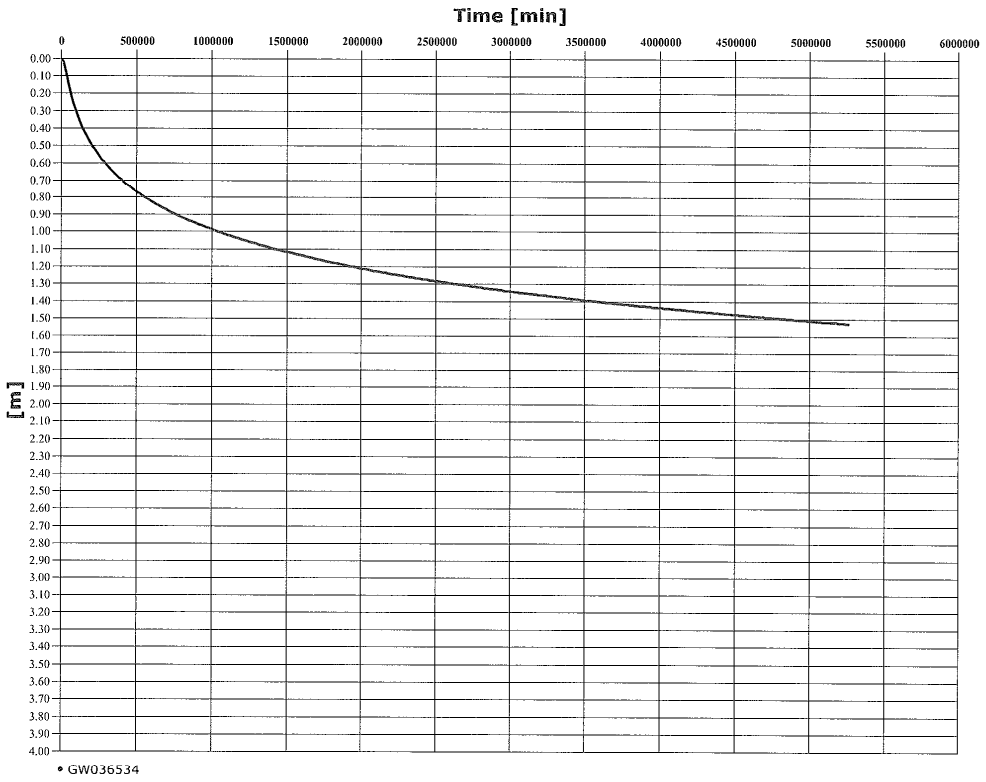
Pumping Test Analysis Report

Project: 14 Day Pumping Test - Test Bore 6

Number: 2008-0013

Client: Alkane Resources Limited

Location: "Woodlands", Narromine, NSW	Pumping Test: Test Bore 6 Pumping Test	Pumping Well: Test Bore 6
Test Conducted by: James Morrow		Test Date: 29/07/2009
Analysis Performed by: James Morrow	Drawdown vs Time	Analysis Date: 29/07/2009
Aquifer Thickness: 38.00 m	Discharge Rate: 32 [l/s]	



Calculation after Theis

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
GW036534	6.68×10^{2}	1.76×10^{1}	8.20×10^{-3}	2554.65	

IMPAX group

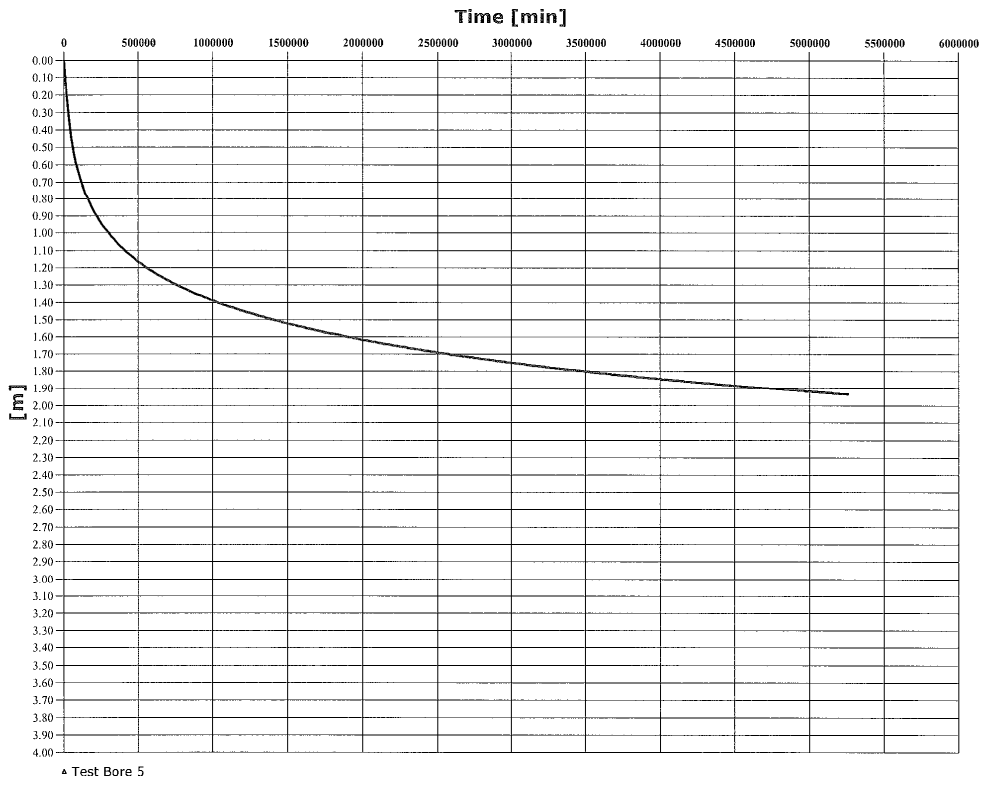
Pumping Test Analysis Report I

Project: 14 Day Pumping Test - Test Bore 6

Number: 2008-0013

Client: Alkane Resources Limited

Location: "Woodlands", Narromine, NSW	Pumping Test: Test Bore 6 Pumping Test	Pumping Well: Test Bore 6
Test Conducted by: James Morrow		Test Date: 29/07/2009
Analysis Performed by: James Morrow	Drawdown vs Time	Analysis Date: 29/07/2009
Aquifer Thickness: 38.00 m	Discharge Rate: 32 [l/s]	



Calculation after Theis

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
Test Bore 5	6.68×10^{2}	1.76×10^{1}	8.20×10^{-3}	1372.42	

Annex J:

Predicted Drawdown - 14 Day Pumping Test

IMPAX group

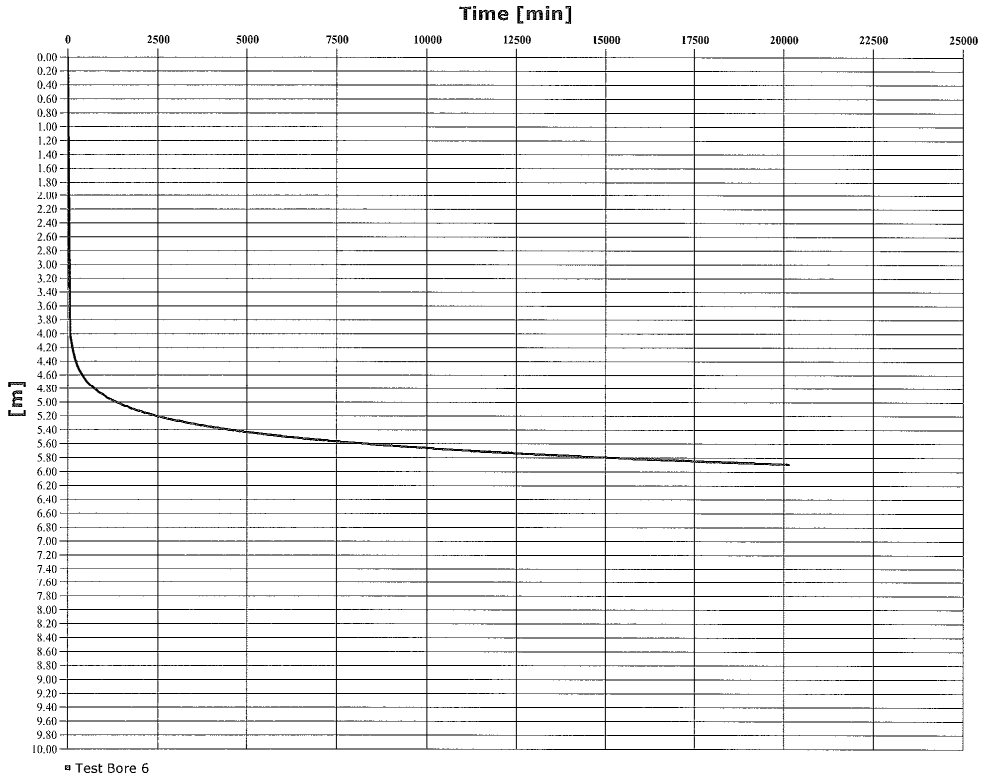
Pumping Test Analysis Report J

Project: 14 Day Pumping Test - Test Bore 6

Number: 2008-0013

Client: Alkane Resources Limited

Location: "Woodlands", Narromine, NSW	Pumping Test: Test Bore 6 Pumping Test	Pumping Well: Test Bore 6
Test Conducted by: James Morrow		Test Date: 29/07/2009
Analysis Performed by: James Morrow	Drawdown vs Time	Analysis Date: 29/07/2009
Aquifer Thickness: 38.00 m	Discharge Rate: 32 [l/s]	



Calculation after Theis

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
Test Bore 6	6.68×10^{2}	1.76×10^{1}	8.20×10^{-3}	0.21	

IMPAX group

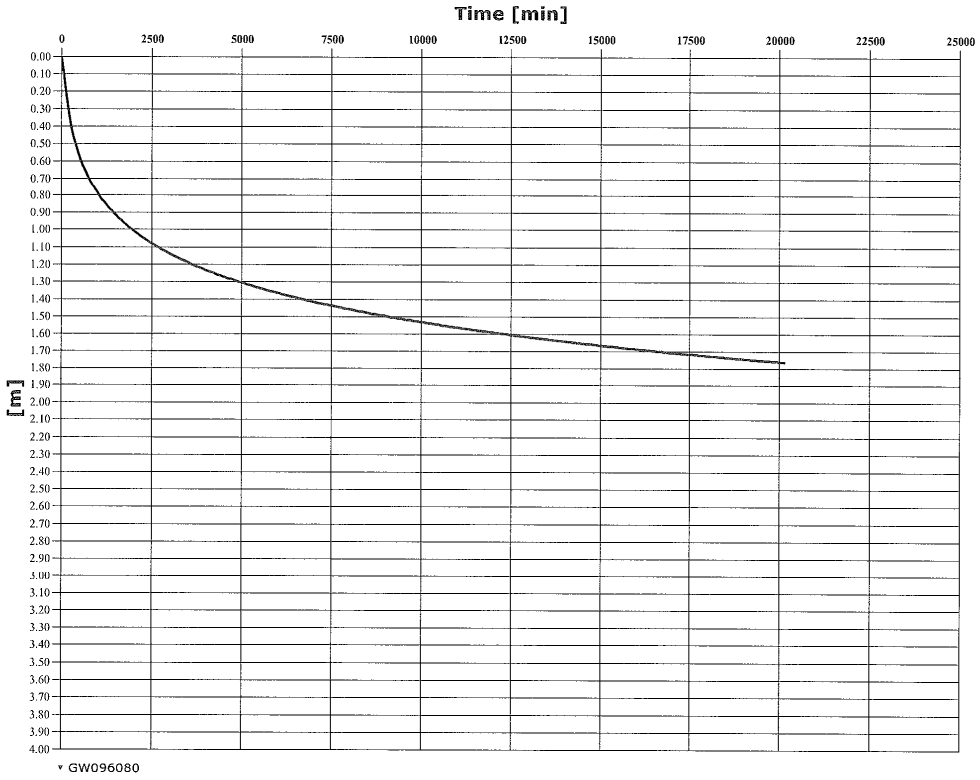
Pumping Test Analysis Report J

Project: 14 Day Pumping Test - Test Bore 6

Number: 2008-0013

Client: Alkane Resources Limited

Location: "Woodlands", Narromine, NSW	Pumping Test: Test Bore 6 Pumping Test	Pumping Well: Test Bore 6
Test Conducted by: James Morrow		Test Date: 29/07/2009
Analysis Performed by: James Morrow	Drawdown vs Time	Analysis Date: 29/07/2009
Aquifer Thickness: 38.00 m	Discharge Rate: 32 [l/s]	



Calculation after Theis

Observation Well	Transmissivity [m^2/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
GW096080	6.68×10^{2}	1.76×10^{1}	8.20×10^{-3}	110.45	

IMPAX group

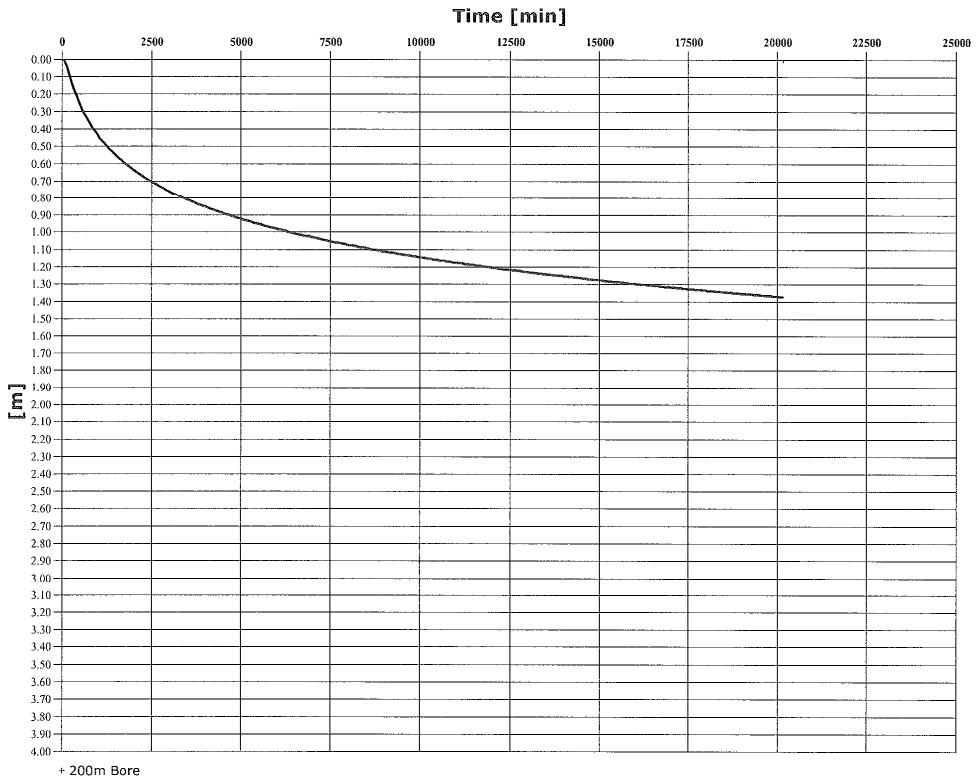
Pumping Test Analysis Report I

Project: 14 Day Pumping Test - Test Bore 6

Number: 2008-0013

Client: Alkane Resources Limited

Location: "Woodlands", Narromine, NSW	Pumping Test: Test Bore 6 Pumping Test	Pumping Well: Test Bore 6
Test Conducted by: James Morrow		Test Date: 29/07/2009
Analysis Performed by: James Morrow	Drawdown vs Time	Analysis Date: 29/07/2009
Aquifer Thickness: 38.00 m	Discharge Rate: 32 [l/s]	



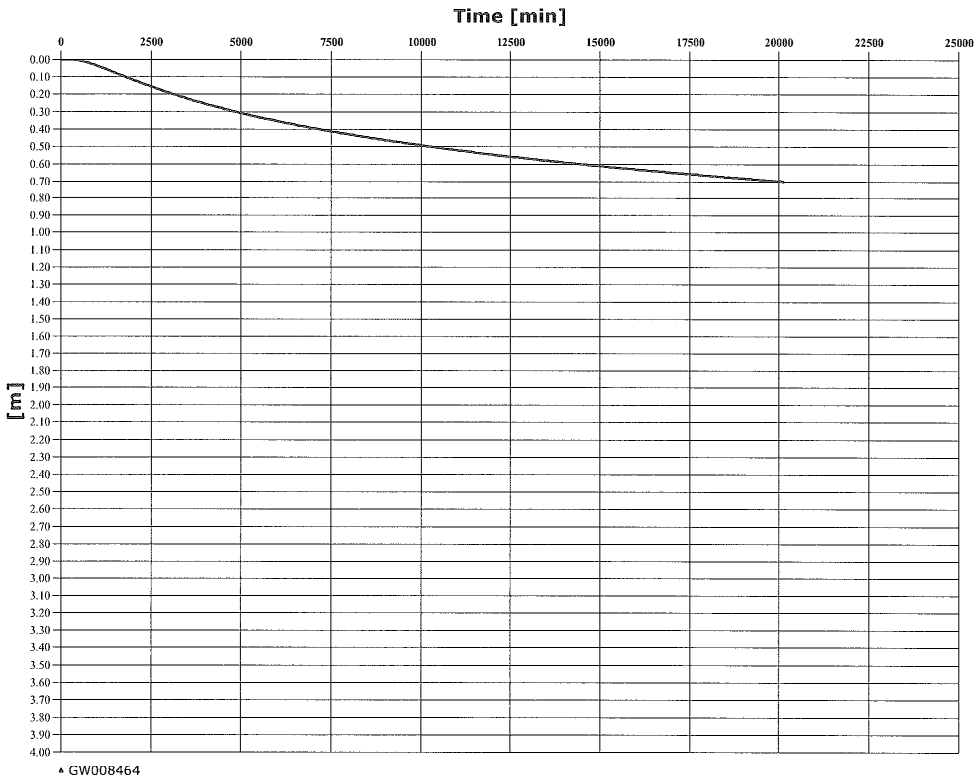
Calculation after Theis

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
200m Bore	6.68×10^{2}	1.76×10^{1}	8.20×10^{-3}	200.0	

IMPAX group

Pumping Test Analysis Report	J
Project: 14 Day Pumping Test - Test Bore 6	
Number: 2008-0013	
Client: Alkane Resources Limited	

Location: "Woodlands", Narromine, NSW	Pumping Test: Test Bore 6 Pumping Test	Pumping Well: Test Bore 6
Test Conducted by: James Morrow		Test Date: 29/07/2009
Analysis Performed by: James Morrow	Drawdown vs Time	Analysis Date: 29/07/2009
Aquifer Thickness: 38.00 m	Discharge Rate: 32 [l/s]	



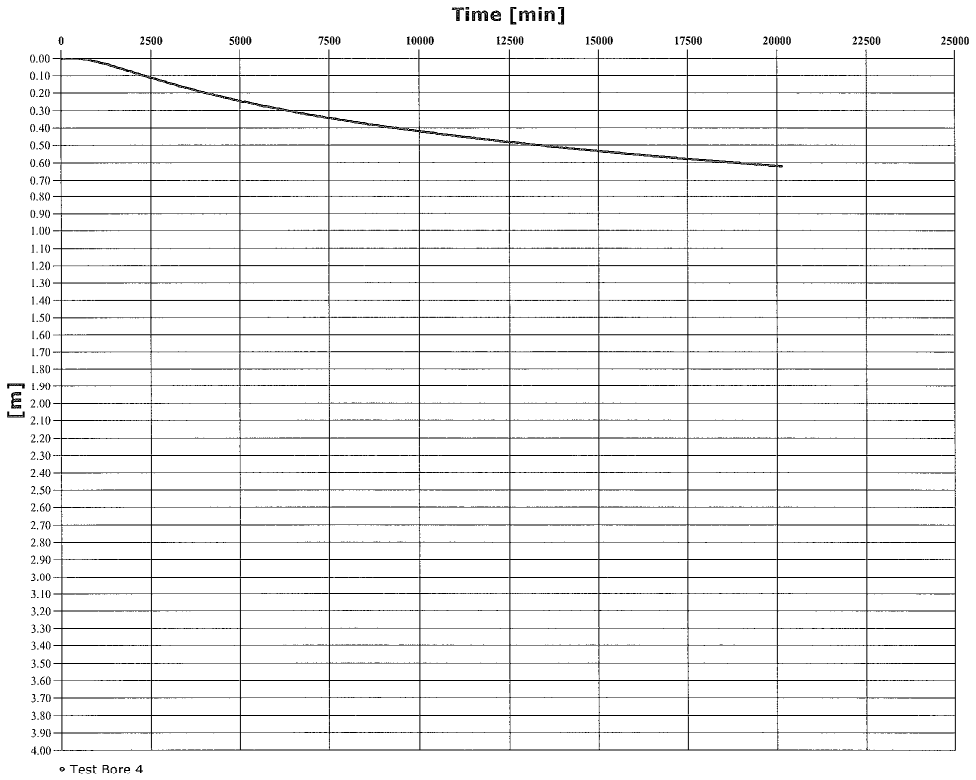
Calculation after Theis

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
GW008464	6.68×10^{2}	1.76×10^{1}	8.20×10^{-3}	572.45	

IMPAX group

Pumping Test Analysis Report	J
Project: 14 Day Pumping Test - Test Bore 6	
Number: 2008-0013	
Client: Alkane Resources Limited	

Location: "Woodlands", Narromine, NSW	Pumping Test: Test Bore 6 Pumping Test	Pumping Well: Test Bore 6
Test Conducted by: James Morrow		Test Date: 29/07/2009
Analysis Performed by: James Morrow	Drawdown vs Time	Analysis Date: 29/07/2009
Aquifer Thickness: 38.00 m	Discharge Rate: 32 [l/s]	



Calculation after Theis

Observation Well	Transmissivity [m^2/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
Test Bore 4	6.68×10^{2}	1.76×10^{1}	8.20×10^{-3}	652.15	

IMPAX group

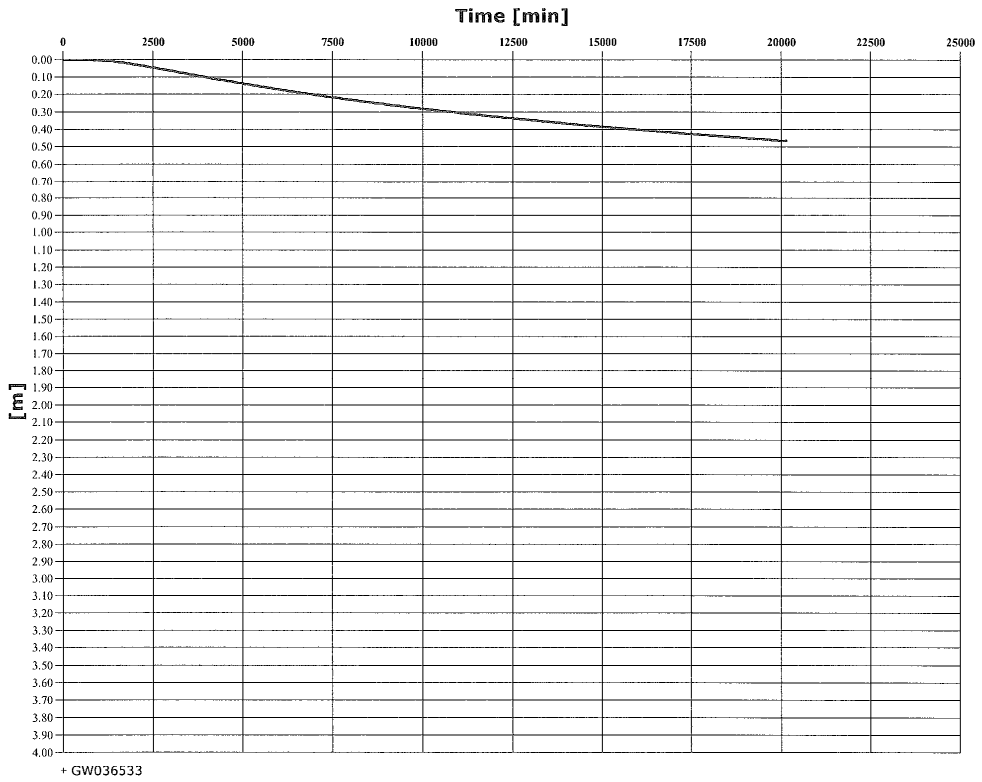
Pumping Test Analysis Report J

Project: 14 Day Pumping Test - Test Bore 6

Number: 2008-0013

Client: Alkane Resources Limited

Location: "Woodlands", Narromine, NSW	Pumping Test: Test Bore 6 Pumping Test	Pumping Well: Test Bore 6
Test Conducted by: James Morrow		Test Date: 29/07/2009
Analysis Performed by: James Morrow	Drawdown vs Time	Analysis Date: 29/07/2009
Aquifer Thickness: 38.00 m	Discharge Rate: 32 [l/s]	



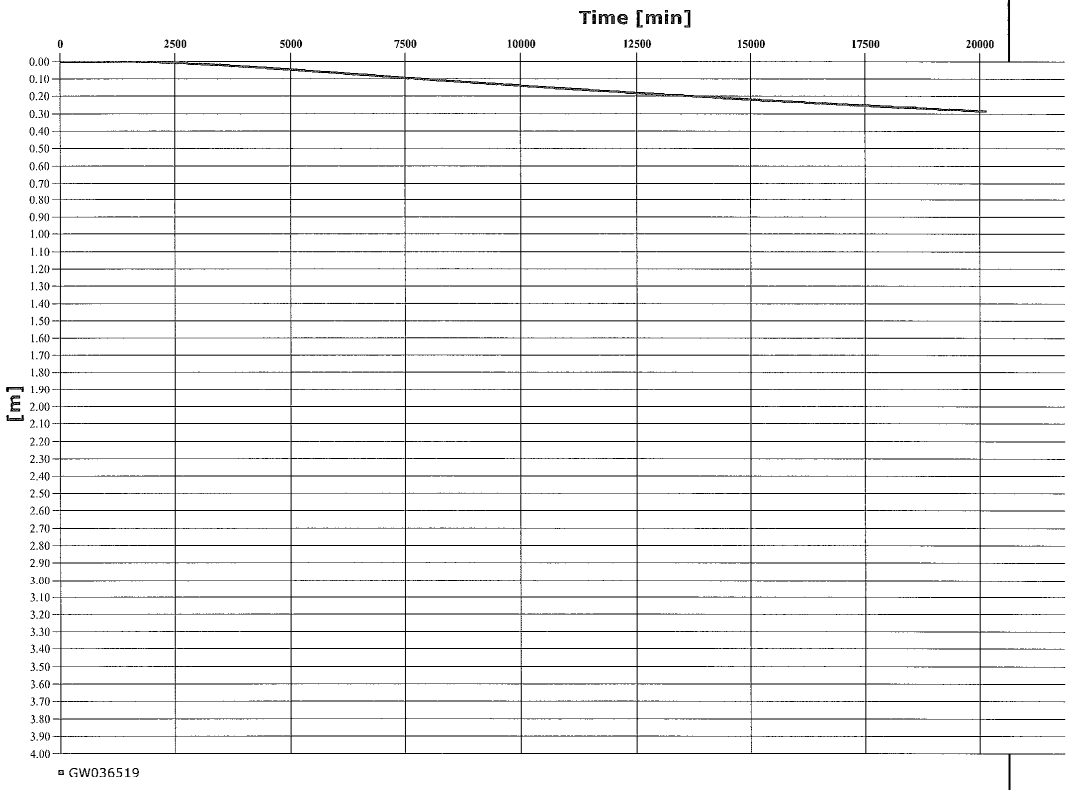
Calculation after Theis

Observation Well	Transmissivity [m^2/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
GW036533	6.68×10^{2}	1.76×10^{1}	8.20×10^{-3}	852.09	

IMPAX group

Pumping Test Analysis Report	J
Project: 14 Day Pumping Test - Test Bore 6	
Number: 2008-0013	
Client: Alkane Resources Limited	

Location: "Woodlands", Narromine, NSW	Pumping Test: Test Bore 6 Pumping Test	Pumping Well: Test Bore 6
Test Conducted by: James Morrow		Test Date: 29/07/2009
Analysis Performed by: James Morrow	Drawdown vs Time	Analysis Date: 29/07/2009
Aquifer Thickness: 38.00 m	Discharge Rate: 32 [l/s]	



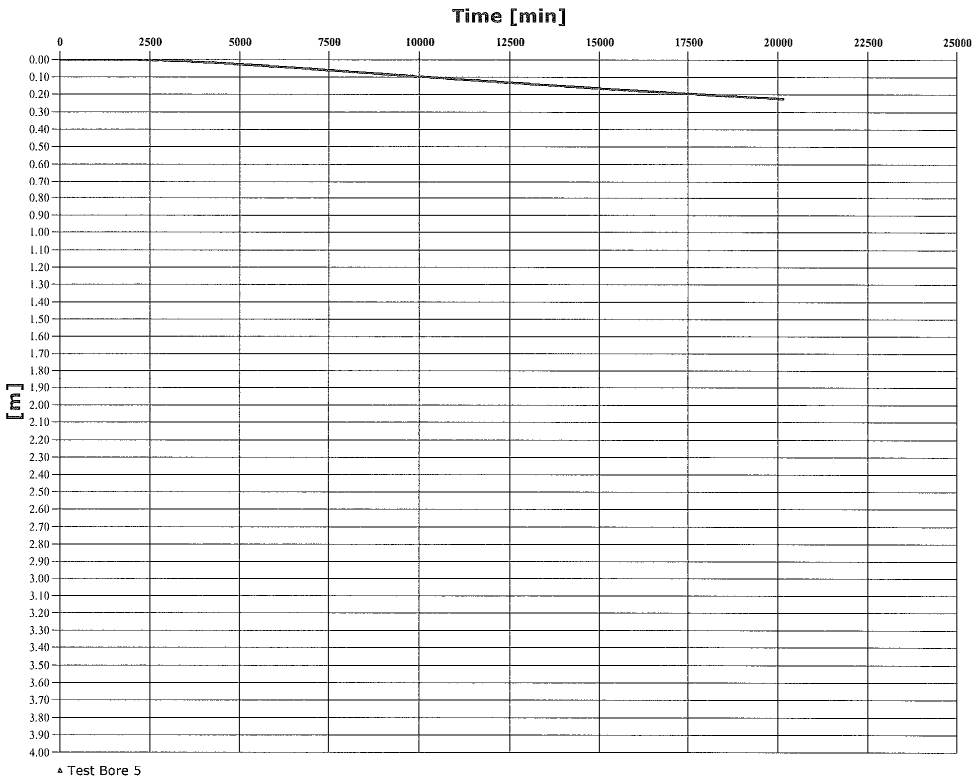
Calculation after Theis

Observation Well	Transmissivity [m^2/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
GW036519	6.68×10^{2}	1.76×10^{1}	8.20×10^{-3}	1199.05	

IMPAX group

Pumping Test Analysis Report	J
Project: 14 Day Pumping Test - Test Bore 6	
Number: 2008-0013	
Client: Alkane Resources Limited	

Location: "Woodlands", Narromine, NSW	Pumping Test: Test Bore 6 Pumping Test	Pumping Well: Test Bore 6
Test Conducted by: James Morrow		Test Date: 29/07/2009
Analysis Performed by: James Morrow	Drawdown vs Time	Analysis Date: 29/07/2009
Aquifer Thickness: 38.00 m	Discharge Rate: 32 [l/s]	



Calculation after Theis

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
Test Bore 5	6.68×10^{2}	1.76×10^{1}	8.20×10^{-3}	1372.42	

IMPAX group

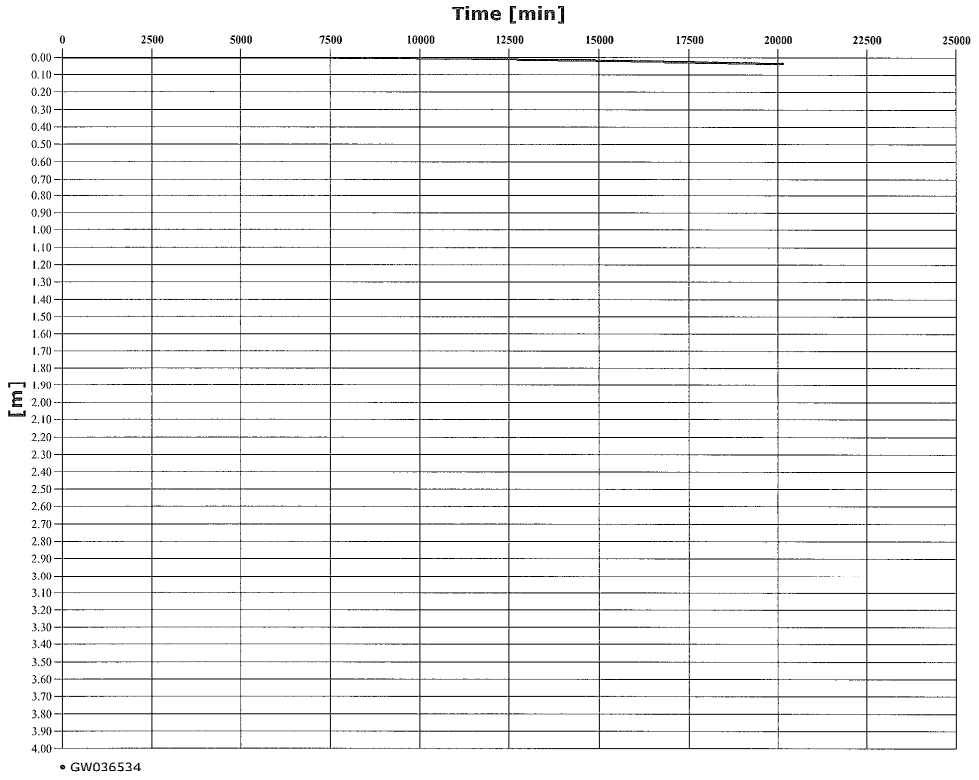
Pumping Test Analysis Report J

Project: 14 Day Pumping Test - Test Bore 6

Number: 2008-0013

Client: Alkane Resources Limited

Location: "Woodlands", Narromine, NSW	Pumping Test: Test Bore 6 Pumping Test	Pumping Well: Test Bore 6
Test Conducted by: James Morrow		Test Date: 29/07/2009
Analysis Performed by: James Morrow	Drawdown vs Time	Analysis Date: 29/07/2009
Aquifer Thickness: 38.00 m	Discharge Rate: 32 [l/s]	



Calculation after Theis

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]
GW036534	6.68×10^{2}	1.76×10^{1}	8.20×10^{-3}	2554.65

Appendix 5

Recovery Charts

(No. of pages including blank pages = 8)

Note: A copy of Appendix 5 is available on the Project CD

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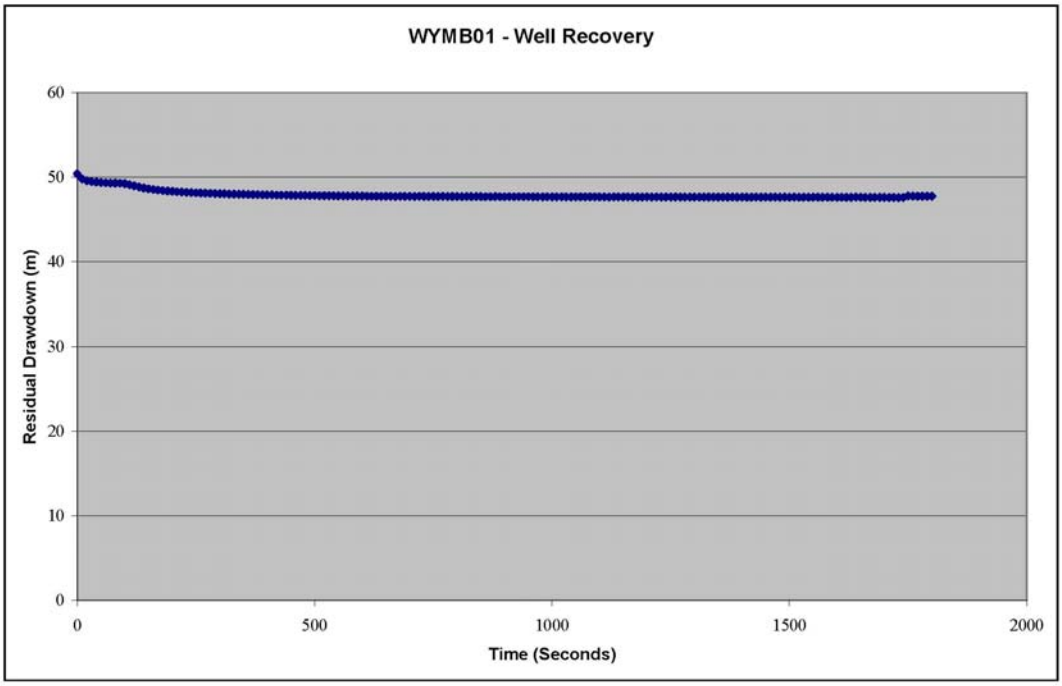
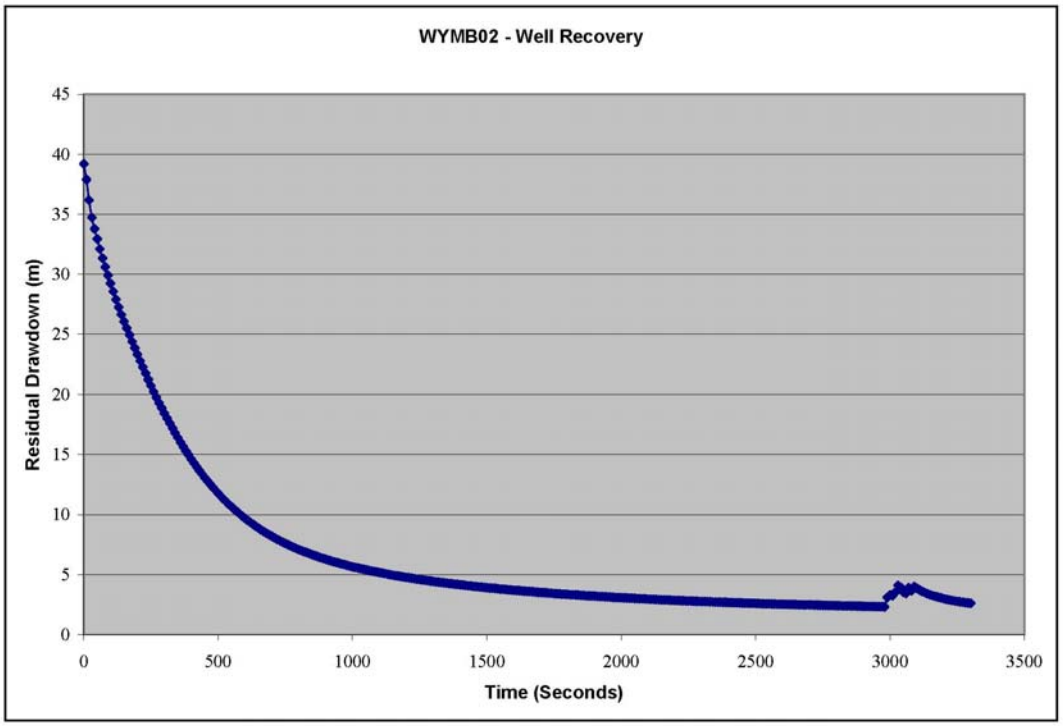
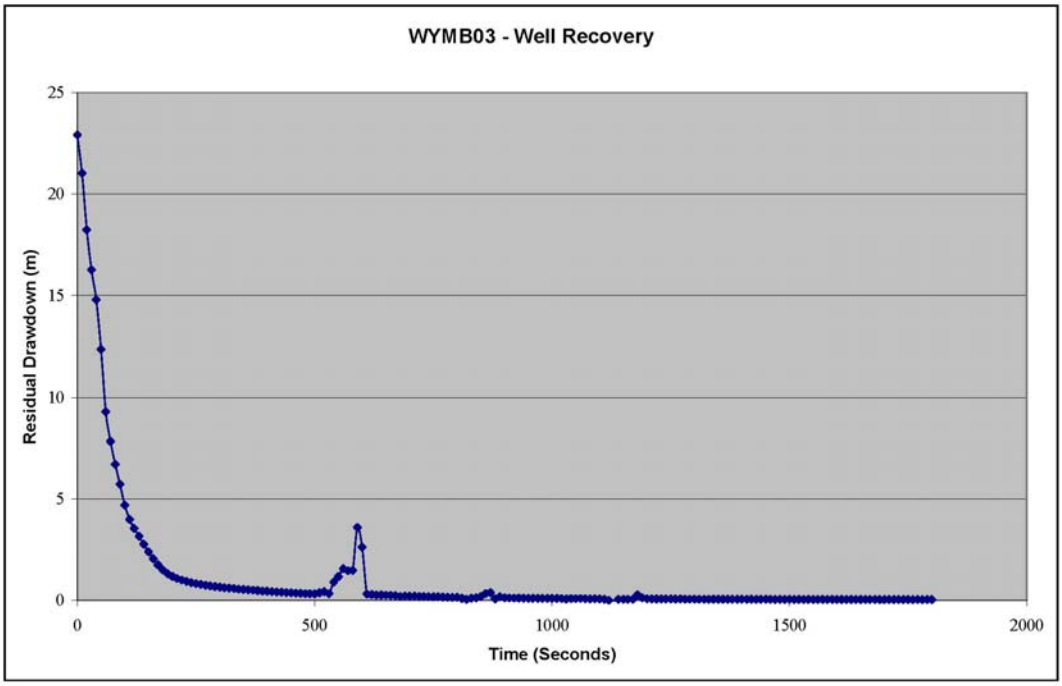
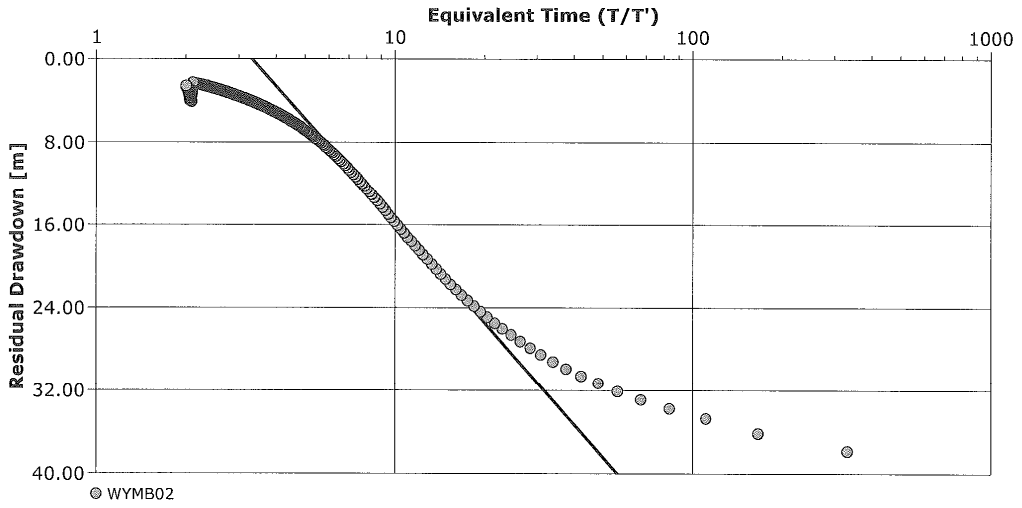

WYMB01 - Well Recovery
Residual Drawdown (m)
60
50
40
30
20
10
0
0
500
1000
1500
2000
Time (Seconds)


WYMB02 - Well Recovery
Residual Drawdown (m)
45
40
35
30
25
20
15
10
5
0
0
500
1000
1500
2000
2500
3000
3500
Time (Seconds)


WYMB03 - Well Recovery
Residual Drawdown (m)
25
20
15
10
5
0
0
500
1000
1500
2000
Time (Seconds)

IMPAX group	**Pumping Test Analysis Report**	5
	Project: Tomingley Gold Project	
	Number: 2009-0024	
	Client: Alkane Resources Limited	

Location: Tomingley, NSW	Pumping Test: WYMB02 - Recovery Test	Pumping Well: WYMB02
Test Conducted by: James Morrow		Test Date: 15/10/2009
Analysis Performed by: James Morrow	Theis Recovery	Analysis Date: 15/10/2009
Aquifer Thickness: 43.00 m	Discharge Rate: 0.212 [l/s]	



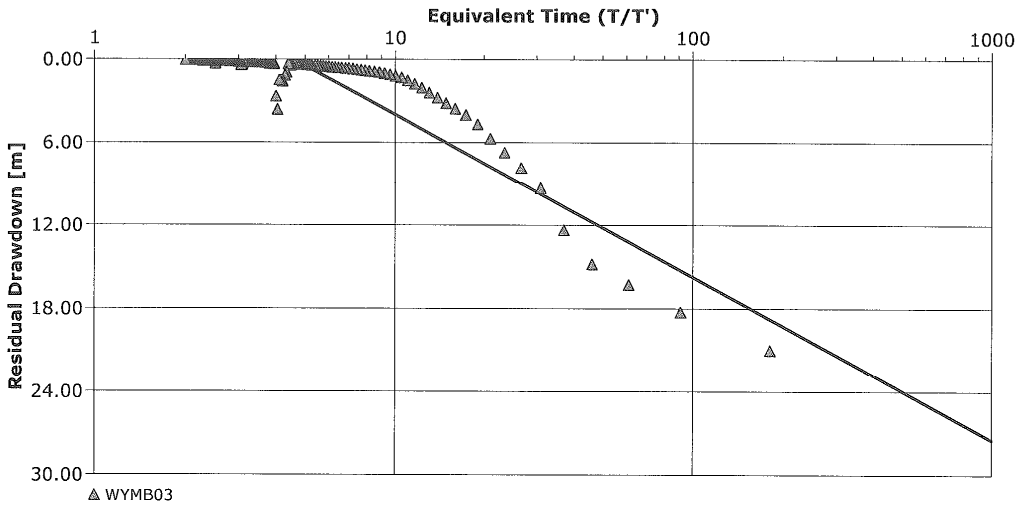
Calculation after Theis & Jacob

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Radial Distance to PW [m]	
WYMB02	1.03×10^{-1}	2.39×10^{-3}		

IMPAX group

Pumping Test Analysis Report	5
Project: Tomingley Gold Project	
Number: 2009-0024	
Client: Alkane Resources Limited	

Location: Tomingley, NSW	Pumping Test: WYMB03 - Recovery Test	Pumping Well: WYMB03
Test Conducted by: James Morrow		Test Date: 15/10/2009
Analysis Performed by: James Morrow	Theis Recovery	Analysis Date: 15/10/2009
Aquifer Thickness: 42.00 m	Discharge Rate: 0.036 [l/s]	



Calculation after Theis & Jacob

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Radial Distance to PW [m]	
WYMB03	4.85×10^{-2}	1.15×10^{-3}		

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Appendix 6

Australasian Groundwater & Environmental Consultants Groundwater Modelling Report dated 28 March 2011

(No. of pages including blank pages = 22)

Note: Appendix 6 is provided in colour on the Project CD

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Australasian Groundwater & Environmental Consultants Pty Ltd
ABN 64 080 238 642
36 Jeays Street, Bowen Hills, Qld. 4006 Australia
Phone (617) 3257 2055 Fax (617) 3257 2088
email: brisbane@ageconsultants.com.au
web: www.ageconsultants.com.au

DWl/ae (Project No. G1528)
28 March 2011

Senior Environmental Consultant
RW Corkery & Co. Pty Limited
PO Box 239
BROOKLYN NSW 2083

Attention: Mr. Alex Irwin

Dear Alex,

RE: REVIEW OF AQUIFER PERMEABILITY TESTING, GROUNDWATER INFLOWS AND IMPACT ON GROUNDWATER LEVELS FOR THE TOMINGLEY GOLD MINE

1.0 INTRODUCTION

The Environmental Assessment (EA) of the Tomingley Gold Project is currently being prepared by RW Corkery and Co Pty Limited (RWC) on behalf of Alkane Resources Ltd. RWC engaged the Impax Group (Impax) to prepare the general groundwater assessment for the EA and Australasian Groundwater and Environmental Consultants Pty Ltd (AGE) to undertake specific aspects of the assessment. Specifically AGE were requested to undertake an assessment of the predicted groundwater inflows and the radius of influence of the open pit and underground mine dewatering on the groundwater regime. AGE were also requested to undertake a review of the analysis of the permeability testing undertaken by Impax on monitoring bores previously installed by Coffey Geotechnics (Coffey).

2.0 PROPOSED MINING SCENARIO

The proposed mining operation includes excavation of ore and waste rock from three open cuts, namely Wyoming One, Wyoming Three and Caloma open pits. Extension from the base of the Wyoming One Pit provides for an option for an underground mine. The open cuts would be excavated to between 95m (Wyoming Three Pit) and 175m (Caloma Pit) depth below ground level, and the Wyoming One underground mine would extend 200m below the base of the Wyoming One Pit.

3.0 PERMEABILITY TESTING

In October 2009, Impax conducted short duration pumping tests on three of the test bores (WYMB01, WYMB02 and WYMB03), installed by Coffey Geotechnics Pty Ltd in 2007.

Prior to the commencement of the test, a water level logger was placed in the bottom of each bore. Water was air-lifted from the bores and captured in a graduated container so that the volume of water removed could be assessed. The bores were air-lifted until they were dry, or the groundwater yield became steady. Air-lifting then ceased and the wells were allowed to recover and the recovery data was analysed using the Hvorslev Method (1951) for confined aquifers using *Aquifer Test Version 2.5* software, (Waterloo Hydrogeologic, 1996). The rising head data sheets and graphical analysis for each monitoring bore tested are presented in Attachment A.

The results of the analyses indicated a permeability range of 1.2×10^{-9}m/s to 7.1×10^{7}m/s (0.0001 to 0.06m/day in bores WYMB01 and WYMB03 respectively), indicating generally low permeability values for groundwater hosted in the fractured Ordovician aquifer. The results of the each permeability test are discussed below.

WYMB01

WYMB01 was air-lifted for a period of 30 minutes. Approximately 130 litres of water was removed during this period, giving an average pumping rate of 0.072L/s.

The standing water level at the commencement of the test was 37.60m below the top of the well casing and at the completion of air lifting was approximately 90m below the top of the well casing, which indicated the well had been pumped dry. The standing water level recovered to approximately 85.34m (5% recovery) after 30 minutes of the cessation of air-lifting and remained relatively stagnant for the following 4 hours. The test was discontinued at this stage.

Analysis of the data by AGE estimated the average hydraulic conductivity (K) value for the surrounding aquifer to be 1.2×10^{-9}m/sec (0.0001 m/day), which is two orders of magnitude lower than that the average K value of 0.02 m/day determined by Coffey when this monitoring bore was installed.

WYMB02

WYMB02 was airlifted for a period of 55 minutes. Approximately 700 litres of water was removed during this period, giving an average pumping rate of 0.21L/s.

The standing water level at the commencement of the test was 59.54m below the top of the well casing. The standing water level at the completion of air lifting was approximately 98.72m below the top of the well casing, which indicated the total drawdown was 39.18m. The standing water level recovered to 67.73m (80% recovery) within 700 seconds (11.6 minutes), and to 62.15m below top of casing (approximately 93%) within 55 minutes of the cessation of air lifting. The test was discontinued at this stage.

Analysis of the data by AGE after 80% recovery estimated the average K value for the surrounding aquifer to be 1.1×10^{-7}m/sec (0.01 m/day), which again is less than the than that the average K value of 0.07m/day determined by Coffey when this monitoring bore was installed.

WYMB03

WYMB03 was air-lifted for a period of 30 minutes. Approximately 65 litres of water was removed during this period, giving an average pumping rate of 0.036L/s.

The standing water level at the commencement of the test was 55.28m below the top of the well casing. The standing water level at the completion of air-lifting was approximately 78.19m below the top of the well casing, which indicated the total drawdown was 22.91m. The standing water level recovered to 56.47m (around 95% recovery), within 200 seconds (3.3 minutes) and 55.32m (close to 100% recovery), below top of casing within 55 minutes of the cessation of air-lifting. The test was discontinued at this stage.

Analysis of the data by AGE after 95% recovery estimated the average K value for the surrounding aquifer to be 7.1 x 10^{-7}m/sec (0.06 m/day), which is only slightly less than the than that the average K value of 0.08m/day determined by Coffey when this monitoring bore was installed.

4.0 PIT DEWATERING – GROUNDWATER INFLOW

4.1 Assessment Methodology - Parameters

The New South Wales Office of Water (NOW) have indicated that spreadsheet analysis using classical groundwater flow equations would be acceptable for the assessment of groundwater inflow to the mine and of the radius of influence of dewatering, rather than complex 3D numerical flow modelling.

The assessment of likely groundwater seepage rates into the proposed Wyoming One, Wyoming Three and Caloma open pits as well as the radius of influence on groundwater levels of pit dewatering was therefore undertaken using equations developed by Marinelli and Niccoli (2002)[1] and the following information and assumptions:

- anecdotal information from the exploration and resource drilling which indicates that the basement geology is "tight" with yields from exploration bores generally low to non existent;
- an aquifer permeability of the between 10^{-6} and 10^{-7}m/sec based on the results of the permeability testing undertaken at each location;
- a saturated aquifer thickness of 115m at Wyoming One and Caloma open pits, that is, the depth to groundwater around 60m and a pit depth of 170m and 175m respectively; and
- a saturated aquifer thickness of 40m at Wyoming Three open pit, that is, the depth to groundwater around 60m and a pit depth of 100m.

The analytical method of Marinelli and Niccoli requires a simplification of the hydrogeological environment and is used to provide a 'broad' range of potential drawdown and pit inflow. The equations calculate groundwater inflow from the Proterozoic aquifer from the pit walls and from the base of the pit separately, based on the conceptual model presented in Figure 1 below.

[1] Marinelli F and Niccoli W.L., (2000), *"Simple Analytical Equations for Estimating Groundwater Inflow to a Mine Pit"*, Groundwater Vol. 38 No. 2, pp311-314.

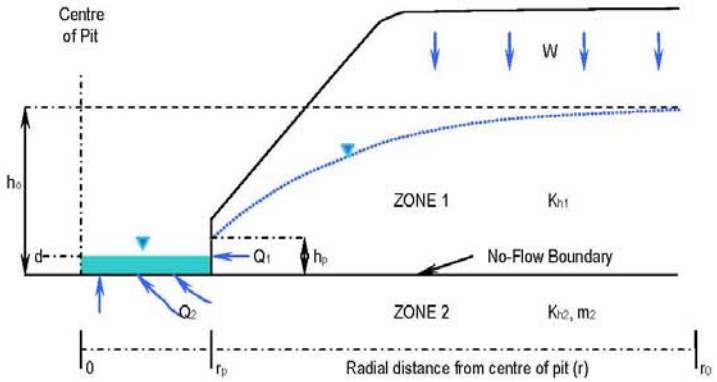


Figure 1: Pit Inflow Analytical Model (after Marinelli and Niccoli [2000])[1]

Groundwater inflows were calculated for Zone 1 and Zone 2 using the following equations:

Zone 1

$$Q_1 = W \pi (r_o^2 - r_p^2) \qquad m^3 / day$$

Zone 2

$$Q_2 = 4 r_p \left\langle \frac{K_{h2}}{m_2} \right\rangle (h_o - d)$$

$$m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

The extent of drawdown due to the nett groundwater inflow then allows for determination of the radius of influence of the inflow on the water table by iteration from the following equation:

$$h_0 = \sqrt{h_p^2 + \frac{W}{K_{h1}}\left[r_0^2 \ln\left(\frac{r_0}{r_p}\right) - \frac{(r_0^2 - r_p^2)}{2}\right]}$$

where:

- k_{h1} – *hydraulic conductivity value for the aquifer in Zone 1*
- h_o – *saturated thickness of aquifer*
- W – *rainfall recharge rate*
- h_p – *the height of the aquifer seepage face in the open excavation*
- r_p – *equivalent radius of pit as a cylinder*
- K_{h2} – *horizontal hydraulic conductivity value for the aquifer in Zone 2*
- k_{v2} – *vertical hydraulic conductivity values for the aquifer*
- D – *depth of water level in base of pit*

For Zone 1 the analytical solution considers steady-state, unconfined, horizontal, radial flow and assumes that:

- the pit walls are approximated as a circular cylinder;
- groundwater flow is horizontal; the Dupuit-Forchheimer approximation is used to account for changes in saturated thickness due to depression of the water table;
- the static (pre-mining) water table is approximately horizontal;
- uniform distributed recharge occurs across the site as a result of surface infiltration from rainfall; all recharge within the radius of influence (cone of depression), of the excavation is assumed to be captured by the excavation;
- groundwater flow toward the excavation is axially symmetric.

Groundwater inflow to the pits and drawdown in water level was undertaken for the range of hydraulic conductivity values determined from the in-situ permeability testing at the sites. The hydraulic permeability values adopted are assumed to reflect the upper limit for the fractured crystalline rock mass. Thus they could be considered conservative by representing a worse case scenario. The inputs used in the estimates were as follows.

k_{h1}	–	hydraulic conductivity for zone 1	=	4.1 x 10^{-7}m/sec
k_{h2}	–	hydraulic conductivity for zone 2	=	0.1 x zone 1 value
k_{v2}	–	vertical hydraulic conductivity zone 2	=	equivalent to k_{h2}
h_o	–	saturated thickness of aquifer	=	115m (Caloma Pit), 110m (Wyoming One Pit), 40m (Wyoming Three Pit), and 200m (Wyoming One underground mine)
W	–	rainfall recharge to aquifer	=	1% of annual rainfall or 4.7mm/yr
h_p	–	the height of seepage face in the excavation	=	2m
r_p	–	equivalent radius of mine pit as a cylinder	=	94m (Caloma Pit), 97m (Wyoming One Pit), 43m (Wyoming Three Pit), and 22m (Wyoming One underground mine)
D	–	assumed depth of water level in base of pit	=	1m

4.2 Assessed Inflow and Drawdown

3.1.1 Caloma Pit

This pit will be the largest and deepest of the three pits and hence is predicted to have the greater potential inflows and drawdown impact on groundwater. The range of potential inflows and drawdown presented in Figure 2 is based on the final void geometry at the end of the proposed mine life for the Caloma Pit. Groundwater inflow and drawdown will gradually increase as the pit deepens and reaches a predicted maximum within the range presented in Figure 2. The analytical method indicates that steady state groundwater inflow to the Caloma Pit at full depth could range between 2L/sec and 12L/sec for an assumed effective hydraulic conductivity range for the rock mass of between 1 x 10^{-7}m/sec and 7 x 10^{-7}m/sec respectively, as determined from the permeability testing. Not all water will collect in the pit bottom as the majority is likely to be lost to evaporation or removed with the ore. Higher inflows may be experienced periodically when water

bearing fractures are intersected, but these inflows are likely to be short term as the fracture is expected to drain relatively quickly.

The predicted radius of the cone of depression of the water table ranges from less than 1700m to around 3900m for the adopted permeability range.

Based on the general indication that the rock mass is tight, it is concluded that inflow will be at the lower end of the range given, that is to say 2 - 7L/sec with much of this lost to evaporation.

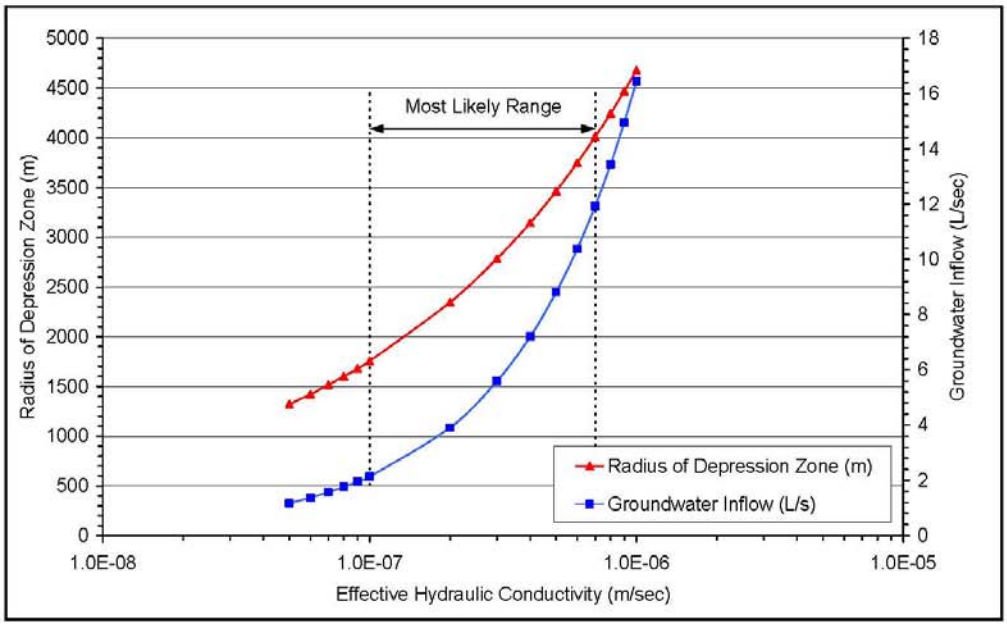


Figure 2: Estimated Groundwater Inflows and Drawdown – Caloma Pit

3.1.2 Wyoming One Pit

The extents of the Wyoming One Pit are slightly smaller than those for the Caloma Pit from which the analytical assessment indicates a slight reduction in groundwater inflow but a generally similar extent of drawdown. Assuming the effective rock mass hydraulic conductivity values range between 1 x 10^{-7}m/sec and 7 x 10^{-7}m/sec (as determined from the permeability testing), the analytical method predicts:

- groundwater inflows between 2L/sec and 11L/sec; and
- extent of drawdown between 1,700m and 3,900m.

As for the Caloma Pit and a general indication that the rock mass is tight, it is considered inflow to this pit will be at the lower end of the range given, that is around 2 - 7L/sec with much of this lost to evaporation.

3.1.3 Wyoming One Pit Underground Extension

The proposed continuation of mining by developing an underground mine from the base of the Wyoming One Pit will result in additional and greater impact on the surrounding groundwater regime. The range of potential inflows and drawdown presented in Figure 3 is based on the final volume of the underground mine at the end of the proposed mine life for the Wyoming One Pit Underground Extension. The analytical assessment of the underground mine indicates generally higher groundwater inflows could be expected into the underground workings along with a corresponding increase in the drawdown extent within the range presented in Figure 3. Assuming effective rock mass hydraulic conductivity values ranging between 1 x 10^{-7}m/sec and 7 x 10^{-7}m/sec, the analytical method predicts:

- groundwater inflows between 3L/sec and 20L/sec; and
- extent of drawdown between 2300m and 5600m.

However, based on the general indication that the rock mass is tight, it is considered this inflow will be at the lower end of the range given, that is around 3 - 11L/sec. Some of this water can be expected to be lost as water vapour removed by extraction through the ventilation system.

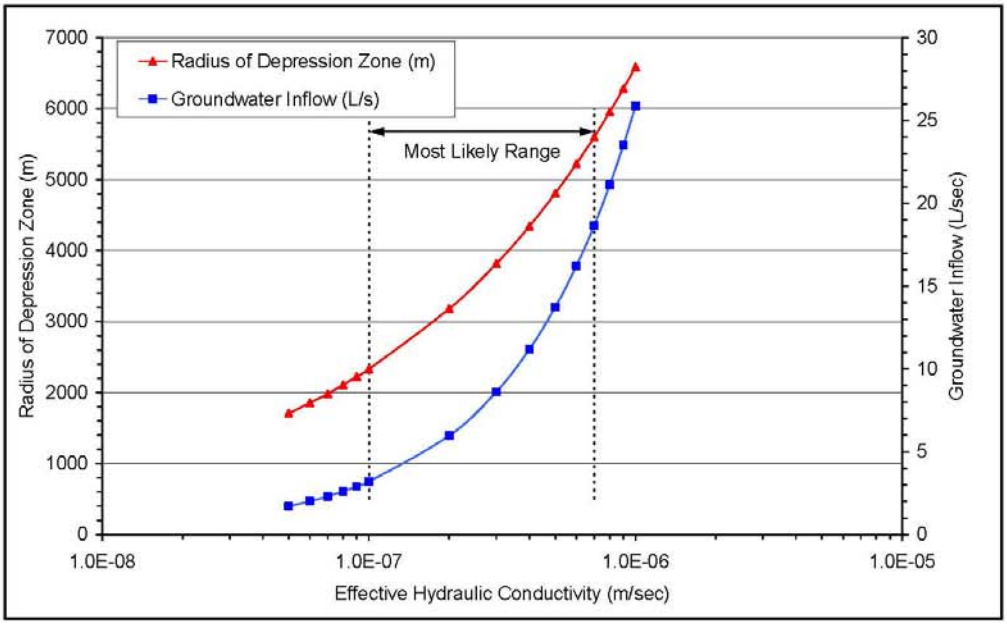


Figure 3: Estimated Groundwater Inflows and Drawdown – Wyoming One Pit Underground Extension

3.1.4 Wyoming Three Pit

The Wyoming Three Pit, which will be 100m deep, is much shallower than the other two pits and therefore estimates of inflow rates and extent of drawdown based on the assuming bulk rock mass

hydraulic conductivity values determined from the permeability testing of between 1 x 10^{-7}m/sec and 7 x 10^{-7}m/sec are significantly reduced, viz:

- groundwater inflows between 0.3L/sec and 1.5L/sec; and
- extent of drawdown between 650m and 1450m.

As for other two pits and the general indication that the rock mass is tight, it is considered inflow to this pit will be at the lower end of the range and hence will be minimal given much of this will be lost to evaporation.

3.1.5 Limitations

The methodology by Marinelli and Niccoli only considers the individual pit being assessed and not the cumulative effects of all three pits being mined, either concurrently or consecutively. Hence it is likely the predicted inflows are most probably an over estimate and are therefore conservative. That is, where two or more pits are mined concurrently, it is probable the inflows to each pit will be less than that predicted to each individual pit. Similarly, if mined consecutively, inflows to the second and third pits will be less than those to the first mined pit.

Comparison of the predicted extent of drawdown for an average aquifer permeability value of 4.1 x 10^{-7}m/sec for each pit relative to that for the Wyoming One Pit Underground Extension is presented graphically in Figure 4. This shows the cumulative extent of drawdown will be largely governed by the depth of the underground operation, and hence would not be expected to alter significantly from that predicted for the underground mine (i.e. the predicted drawdown from each of the open pits is generally within this larger drawdown extent).

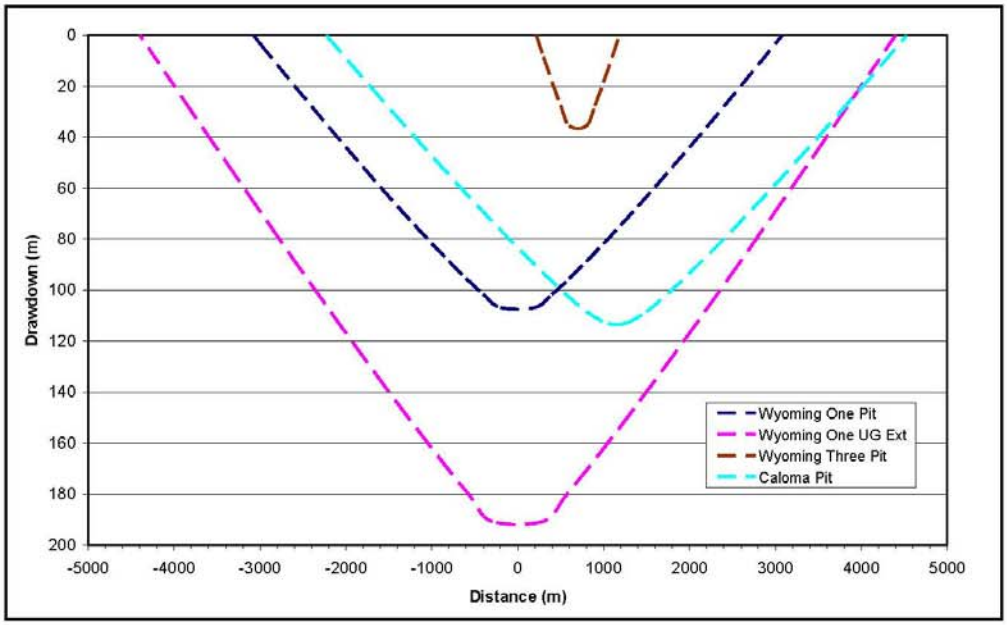


Figure 4: Comparison of Predicted Drawdown Extent for each Pit in Relation to the Wyoming One Pit Underground Extension

5.0 FINAL VOID WATER LEVELS

The pits created by open cut mining will remain as voids when mining at the Tomingley Gold Project ceases. Post mining, abstraction of groundwater from the aquifer will cease and the final voids will gradually fill with water until an equilibrium condition establishes. The potential sources of water that may contribute to filling the final void are:

- discharge from the fractured Ordovician aquifer; and
- direct rainfall.

The equilibrium elevation of the water level of the final void will therefore be governed by the following components:

- the size and shape of the void;
- direct rainfall into the void;
- groundwater inflow from the fractured Ordovician aquifer; and
- the rate of evaporation from the surface of the void lake.

The rates of recovery of the water levels and the equilibrium water levels for the final Wyoming One, Wyoming Three and Caloma Pits were determined using a spreadsheet water balance model developed for each site. For the Wyoming One Mine, recovery of water levels within the proposed underground extension at the base of the pit was also considered. The equilibrium water level is obtained when evaporation loss is equivalent to inflow and allows for assessment of whether the pit will act as a sink to groundwater or a source in the long term. The water balance of the final void was based on the following equation:

Water Balance of Final Void = direct rainfall + groundwater inflow – evaporation

The water balance of the final underground mine was based on the following equation:

Water Balance of Final Underground Workings = direct rainfall (to pit) +groundwater inflow

This assumes that post mining the open pit and the underground workings will be in hydraulic connection and water reporting to the open pit as rainfall runoff will ultimately contribute to recovery of water levels within the underground workings.

Direct Rainfall

The rainfall input is based on the daily rainfall for the Peak Hill Post Office weather station (No. 050031) multiplied by the plan surface area of the void catchment (which is equivalent to the overall pit footprint). The assessed volume of water added to each pit from rainfall is:

- 87,172 m^3/year reporting to the Wyoming One void;
- 46,117 m^3/year reporting to the Wyoming Three void; and
- 100,670 m^3/year reporting to the Caloma void.

Open Water Body Evaporation

The rate of evaporation from a surface water body in the Tomingley Mine Project area was estimated assuming a pan-evaporation factor of 0.7 to account for the fact the final void is a deep, semi-shaded pit and protected from winds, all of which reduce evaporation.

Daily evaporation data was determined using 120-year period SILO climate data provided by the Queensland Department of Environment and Resource Management (DERM) for the Tomingley Mine Project area.

Groundwater Inflow into the Final Void

Groundwater inflows into the final void were estimated using the following form of the Darcy Equation:

$$Q = KiA \ m^3/day.$$

In estimating the indicative groundwater inflow rates to the pits, each spreadsheet model assumed an average 'K' value of 4.1 x 10^{-7}m/sec or 0.035m/day as determined from the permeability test results for the Tomingley Gold Project.

The rate of water level recovery within each pit and the underground mine was determined using the surface area/volume relationship for each mine. The configuration of each pit and underground mine was provided by RWC and is presented in Attachment B.

The hydraulic gradient *(i)* and the saturated aquifer surface area (*A*) are both variable and were determined iteratively from the changed pit water level for each time step. The regional groundwater level was assumed to be RL210m for the duration of the simulation which is equivalent to the general pre-mining groundwater level measured at the site.

The model simulation was undertaken as daily time steps for a period of 120 years using the daily rainfall and evaporation data. Output from each model predicts that the water level for:

- the Caloma Pit initially rises relatively quickly within the first five to ten years after the mining operation ceased due to the relatively small void volume at the base of the pit, and reaches quasi-equilibrium at approximately 50 years post mining at around RL200m. Thereafter, there is a slight rise in pit water level corresponding to increased rainfall events during Years 60 and 66 post mining, with pit water levels finally stabilising after approximately 85 years at around RL207m, as depicted in Figure 5.
- the Wyoming One Pit initially rises very quickly within the underground working rising to the base of the open pit in the first year. Thereafter, recovery resembles that of the Caloma Pit with further recovery being relative quick to Year 10 post mining due to the relatively small void volume at the base of the pit, and stabilising initially after approximately 50 years post mining at around RL180m. A continued slight rise in pit water level again occurs corresponding to increased rainfall events during Years 60 and 66 post mining, with the pit water level stabilising at around RL193m after approximately 85 years, as depicted in Figure 6.
- the Wyoming Three Pit also initially rises relatively quickly within the first five to ten years after the mining operation ceased, again due to the relatively small void volume at the base of the pit, and stabilises after approximately 50 years post mining at around RL202m as depicted in Figure 7. No further rise in pit water levels is observed after this time, which is probably a function of this pit being shallower with a slightly greater surface area to volume configuration, compared to that for the other two pits.

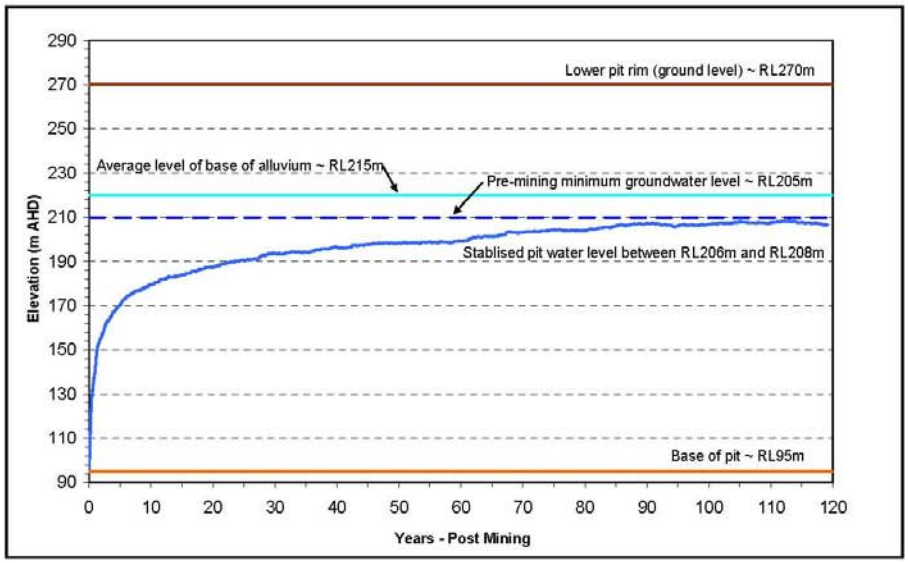


Figure 5: Caloma Pit - Simulated Rate of Recovery and Equilibrium Water Level

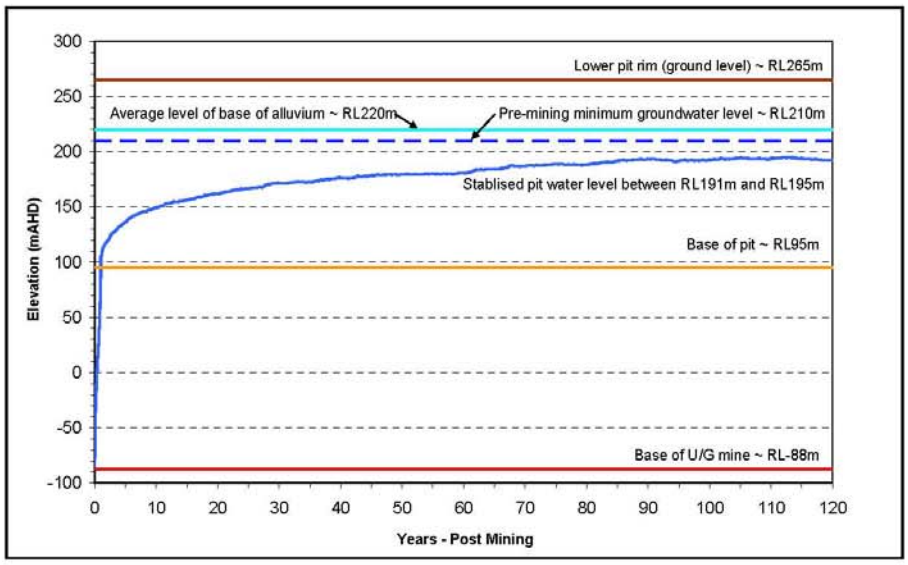


Figure 6: Wyoming One Pit - Simulated Rate of Recovery and Equilibrium Water Level

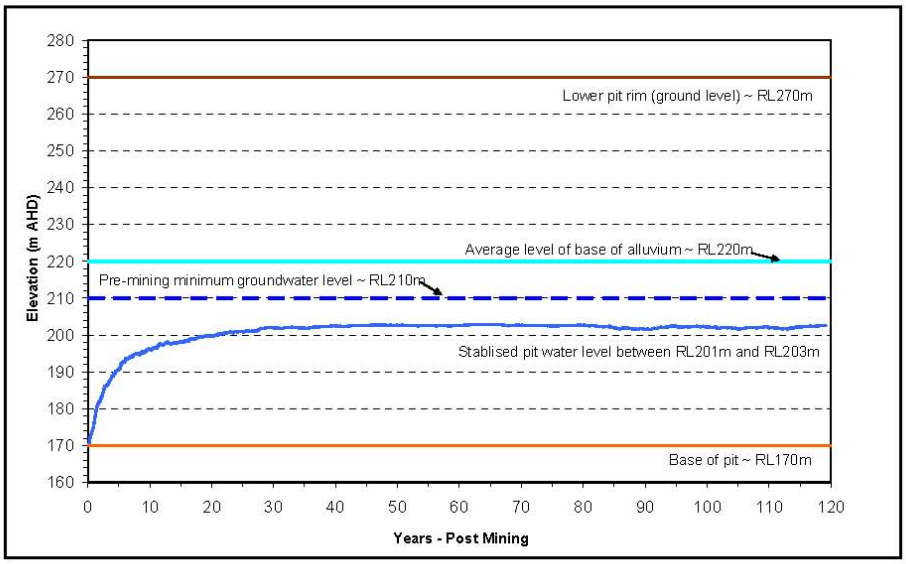


Figure 7: Wyoming Three Pit - Simulated Rate of Recovery and Equilibrium Water Level

In summary it is assessed that the pit water levels will stabilise somewhere between RL193m and RL207m, which is below the pre-mining fractured aquifer level of RL210m and well below the lower pit crest levels of between RL265m and RL270m. Based on the above, the final voids at the Tomingley Gold Project will remain as sinks to groundwater flow and should not over top or discharge water from the pit to the regional aquifer.

We trust the above review and assessment provides sufficient details for input into the Groundwater Assessment of the Tomingley Gold Project. Should you have any queries, please contact either of the undersigned.

Yours faithfully

DUNCAN W IRVINE
Senior Hydrogeologist

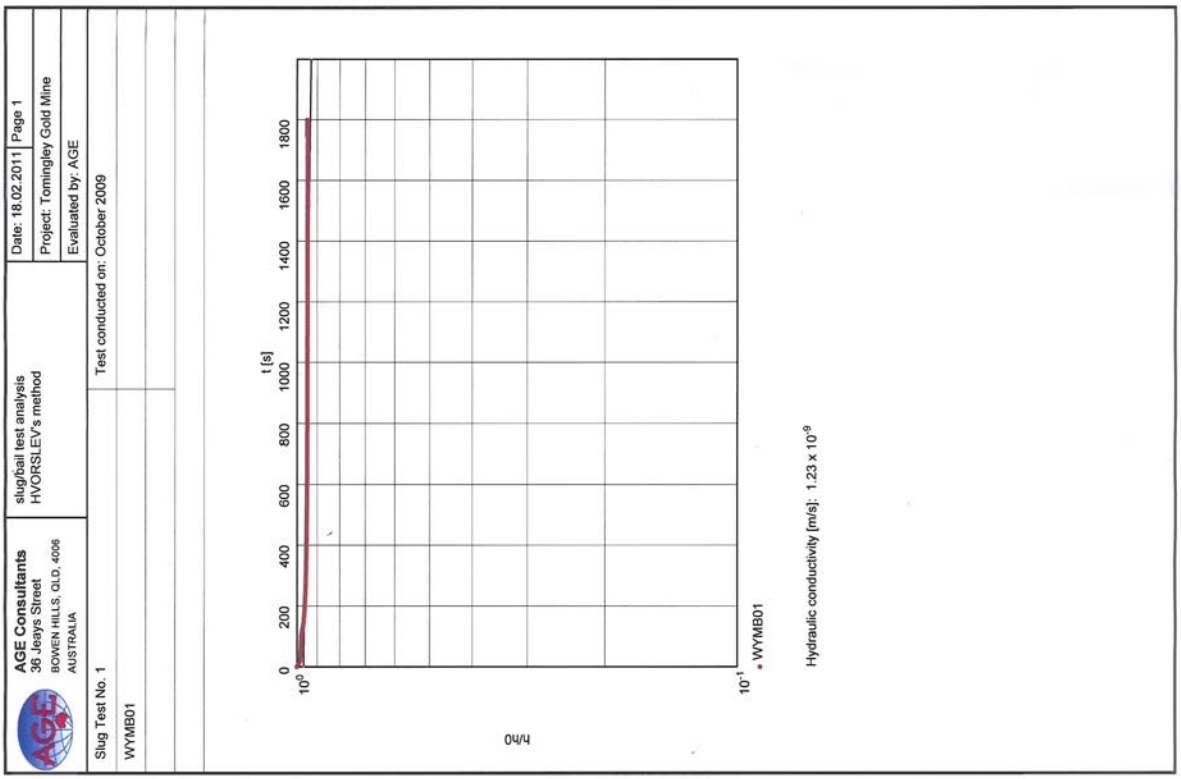
ERROL H. BRIESE
Principal Hydrogeologist

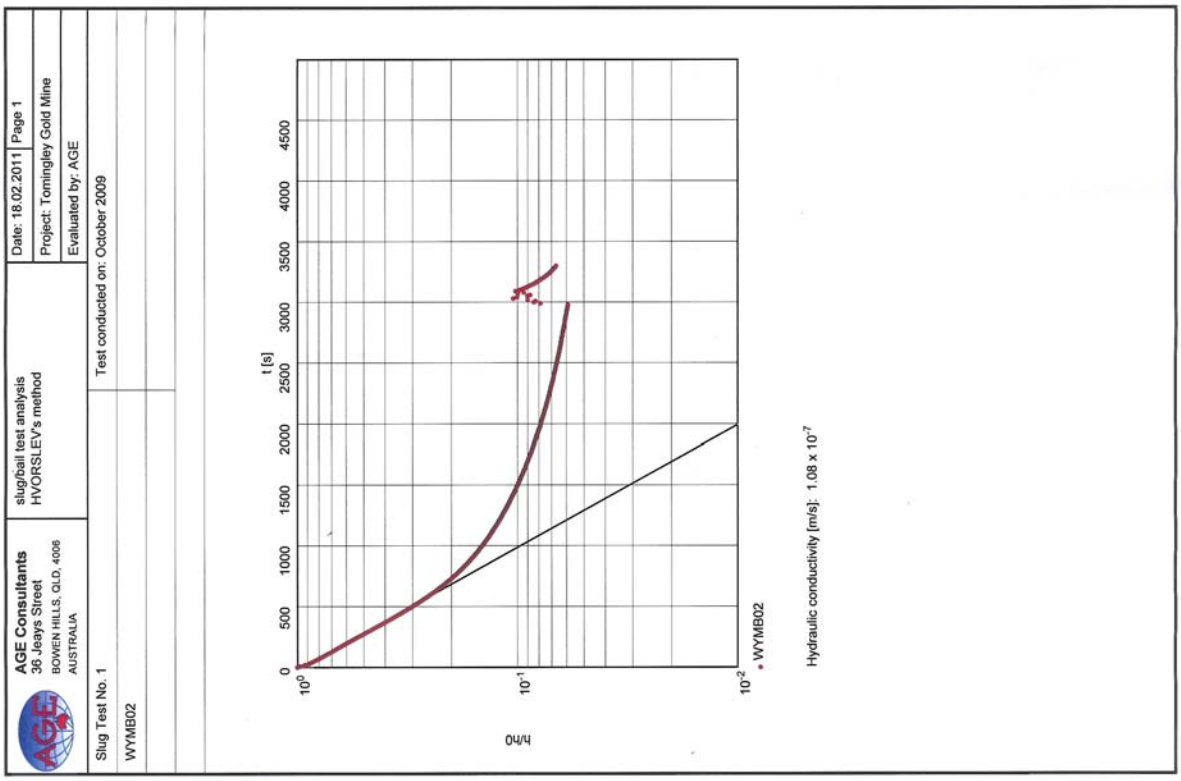
Australasian Groundwater and Environmental Consultants Pty Ltd

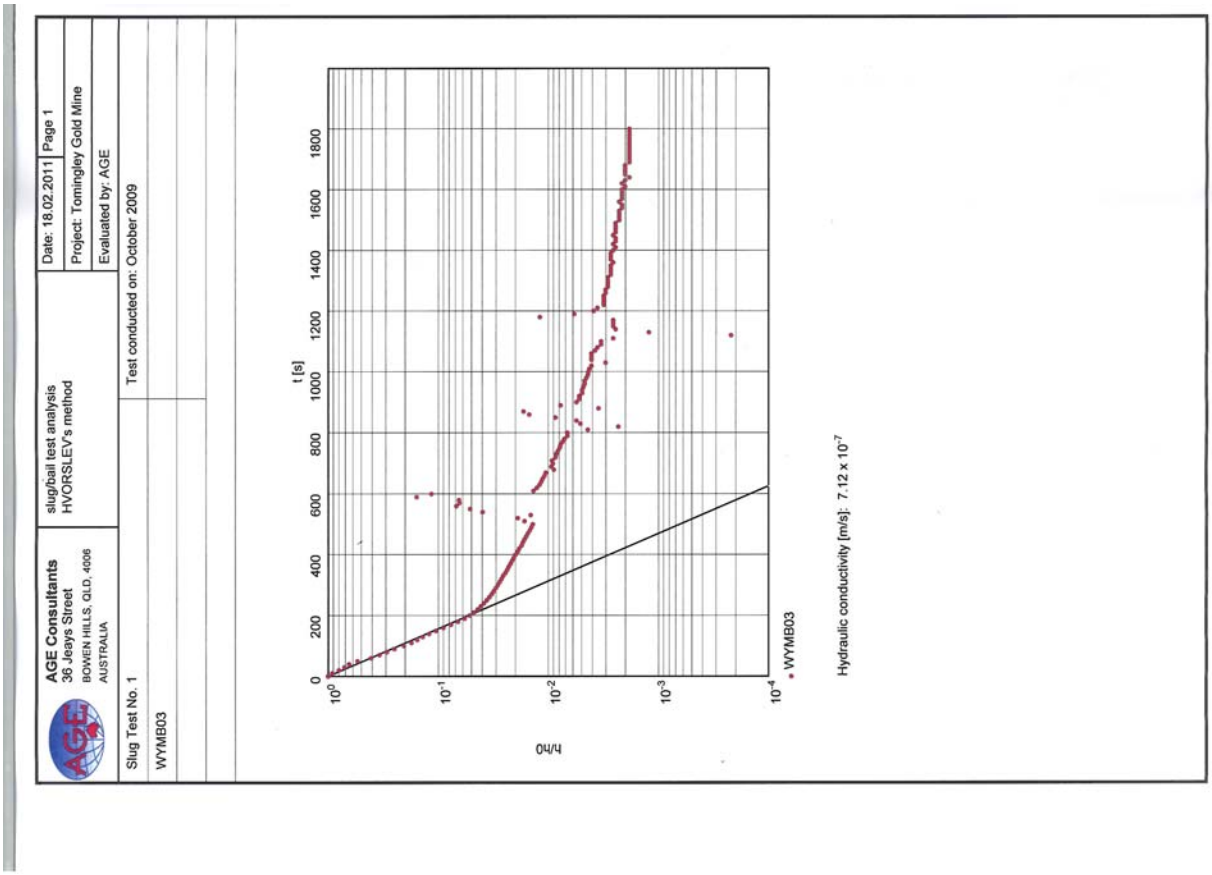
Attachment A: Permeability Test Data
Attachment B: Mine Elevation and Surface Area to Cumulative Volume Plots

Attachment A

Permeability Test Data


AGE Consultants
36 Jeays Street
BOWEN HILLS, QLD, 4006
AUSTRALIA
slug/bail test analysis
HVORSLEV's method
Date: 18.02.2011 Page 1
Project: Tomingley Gold Mine
Evaluated by: AGE
Slug Test No. 1
Test conducted on: October 2009
WYMB01
h/h0
t [s]
0 200 400 600 800 1000 1200 1400 1600 1800
10^0
10^{-1}
WYMB01
Hydraulic conductivity [m/s]: 1.23 x 10^{-9}


AGE Consultants
36 Jeays Street
BOWEN HILLS, QLD, 4006
AUSTRALIA
slug/bail test analysis
HVORSLEV's method
Date: 18.02.2011 Page 1
Project: Tomingley Gold Mine
Evaluated by: AGE
Slug Test No. 1
Test conducted on: October 2009
WYMB02
h/h0
t [s]
0 500 1000 1500 2000 2500 3000 3500 4000 4500
10^0
10^{-1}
10^{-2}
WYMB02
Hydraulic conductivity [m/s]: 1.08 x 10^{-7}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AUSTRALIA
slug/bail test analysis
HVORSLEV's method
Date: 18.02.2011 Page 1
Project: Tomingley Gold Mine
Evaluated by: AGE
Test conducted on: October 2009
Slug Test No. 1
WYMB03
t [s]
0
200
400
600
800
1000
1200
1400
1600
1800
h/h0
10^0
10^-1
10^-2
10^-3
10^-4
WYMB03
Hydraulic conductivity [m/s]: 7.12 x 10^-7

Attachment B

Mine Elevation and Surface Area to Cumulative Volume Plots

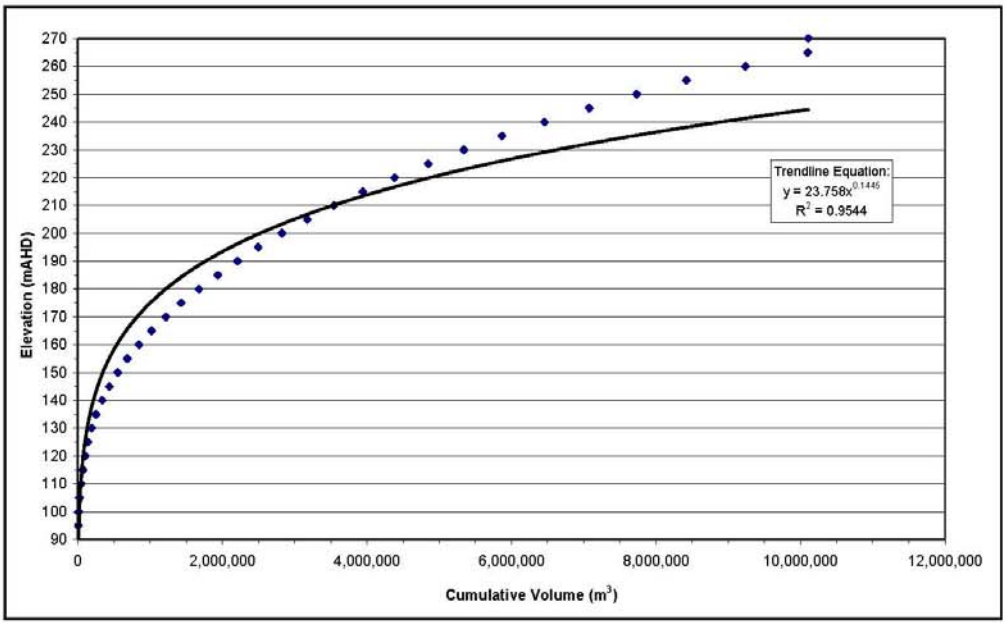

Figure B1: Caloma Pit – Cumulative Volume to Elevation Plot

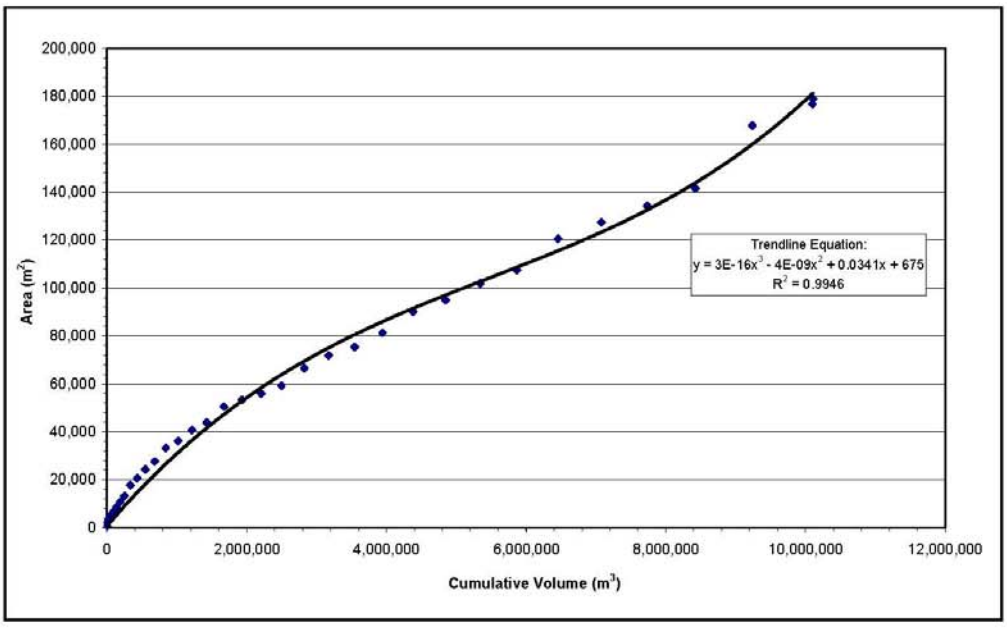

Figure B2: Caloma Pit – Cumulative Volume to Surface Area Plot

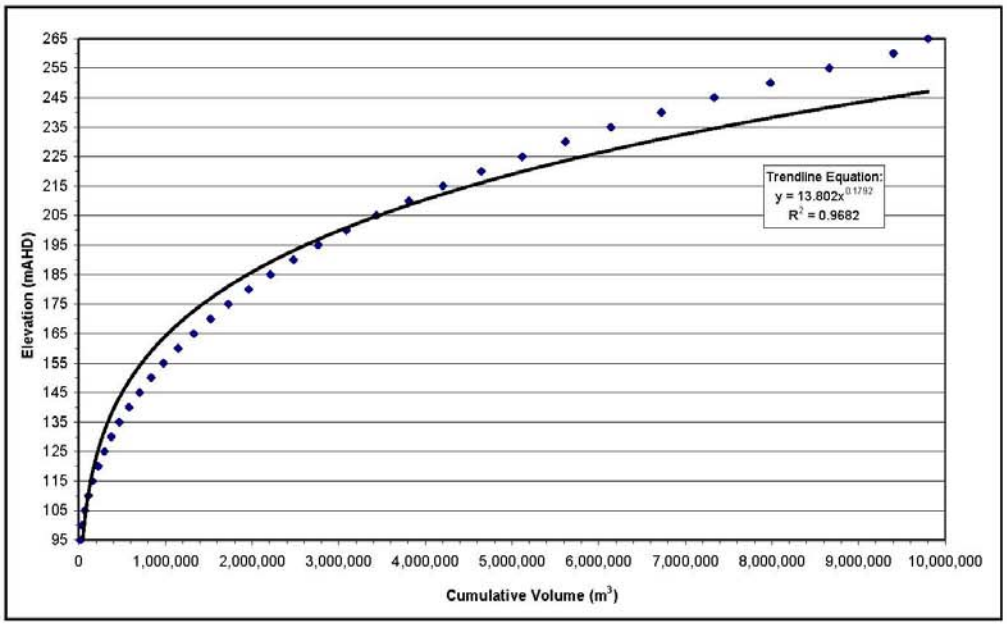

Figure B3: Wyoming One Pit – Cumulative Volume to Elevation Plot

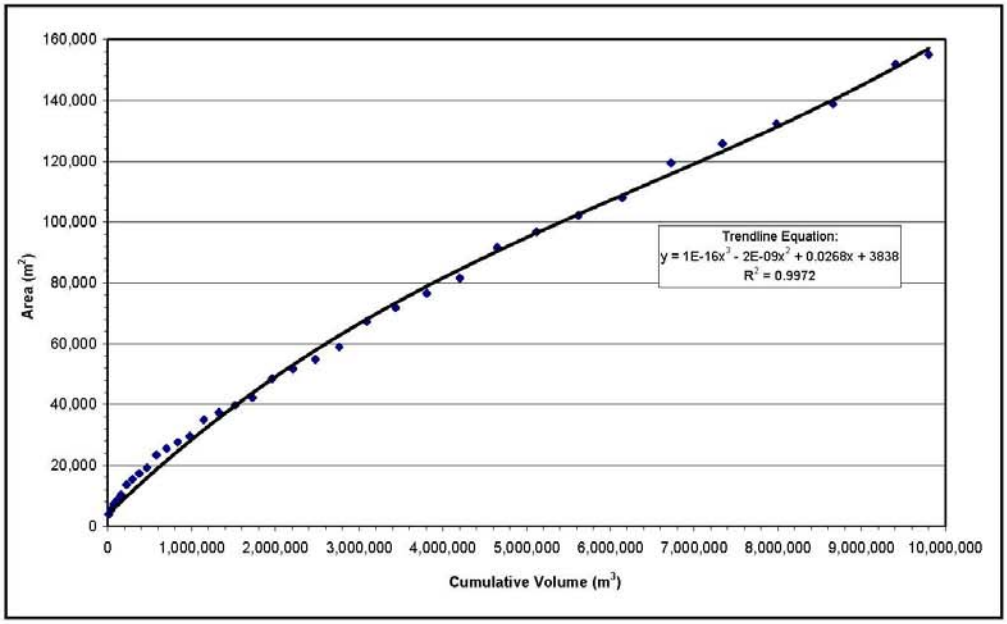

Figure B4: Wyoming One Pit – Cumulative Volume to Surface Area Plot

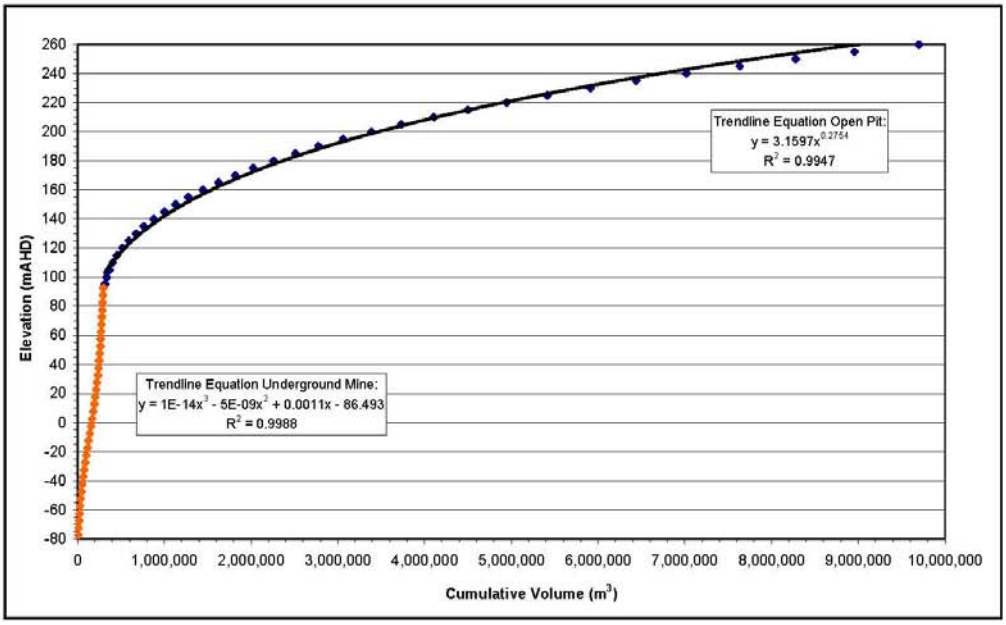

Figure B5: Wyoming One Pit and Underground Extension – Cumulative Volume to Elevation Plot

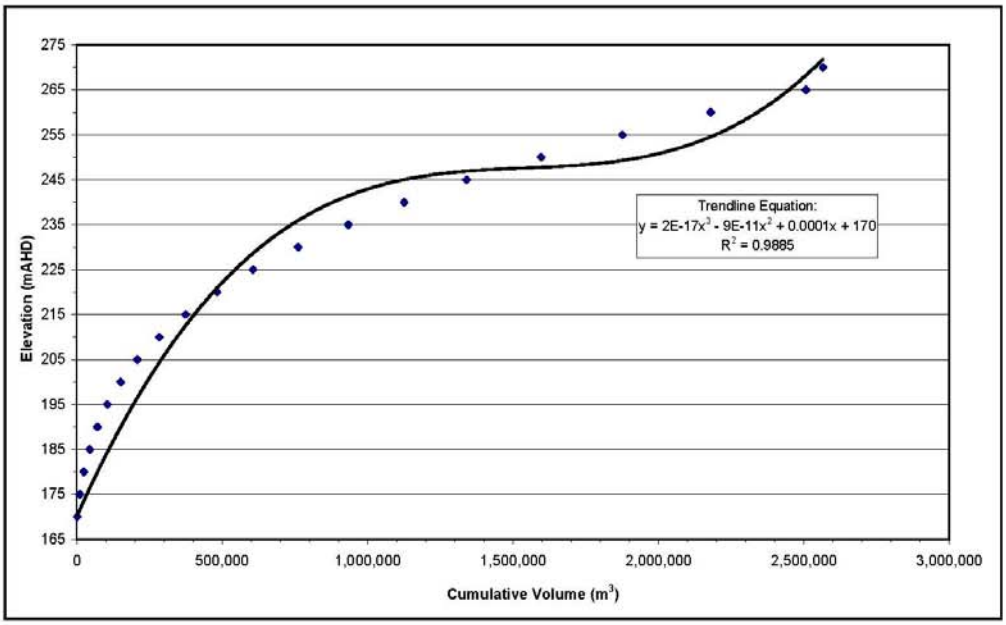

Figure B6: Wyoming Three Pit – Cumulative Volume to Elevation Plot

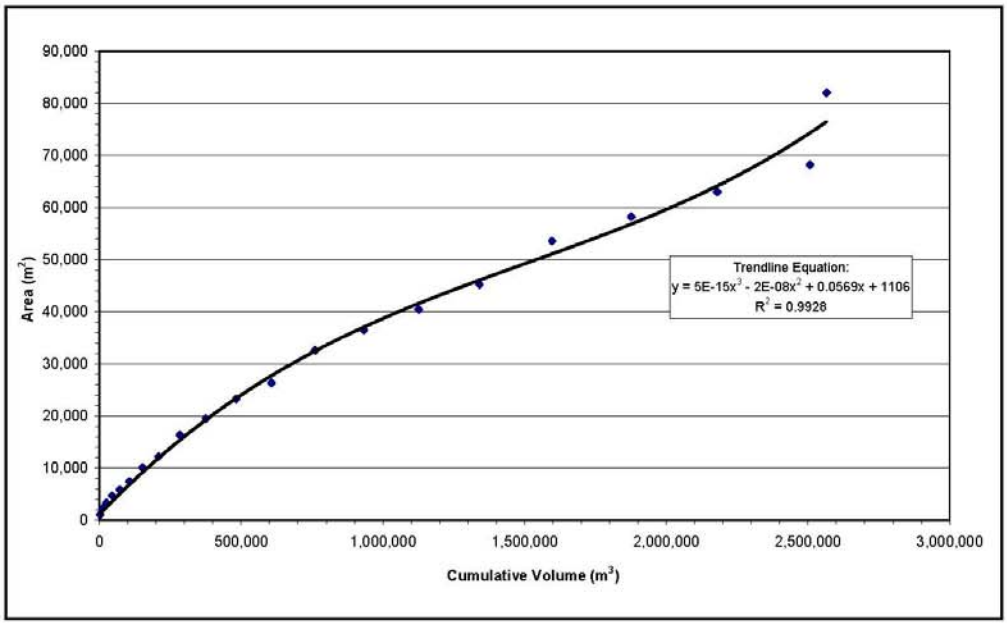

Figure B7: Wyoming Three Pit – Cumulative Volume to Surface Area Plot