Boundary Creek and Big Swamp Remediation and Environmental Protection Plan

Barwon Water

Soil sampling and well completion report

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Contents

Executive Summary

In response to the reduction of baseflow to Boundary Creek associated with the operation of the Barwon Downs borefield, and the subsequent drying of acid sulfate soils in Yeodene (Big) Swamp, Barwon Water received a Section 78 Ministerial Notice pursuant to Section 78 of the Water Act (1989), directing the corporation to develop and implement a Remediation Plan for the Boundary Creek and Big Swamp environments.

This report presents the findings of a soil sampling and groundwater monitoring investigation, which is one of a number of assessments aimed at informing the remediation plan.

The program collected a total of 181 soil samples across 17 sites via a combination of push tube and rotary auger drilling. Lithological logs indicate the presence of silts, clays and discrete sands and in the upper 6 m of the soil profile throughout Yeodene Swamp. This is consistent with the occurrence of alluvial deposits. Logs also indicate a relatively high organic matter content within the soil profile.

A total of 16 wells were constructed and were fitted with Solinst groundwater level loggers along with one barometric pressure logger. Groundwater levels varied between 1.4 and -0.10 m bgl (above ground surface) throughout the swamp and tended to be closer to the surface (<0.5 m bgl) in the lower reaches of the swamp and deeper (~1 m bgl) in the upstream reaches of the swamp.

Slug tests were undertaken at each of the 17 newly installed wells. Hydraulic conductivities ranged from 0.02 to 1.8 m/day, with an average conductivity of 0.50 m/day and a standard deviation of 0.62 m/day. This is broadly consistent with the range in hydraulic conductivities expected for unconsolidated silts (Domenico and Schwartz, 1990).

Organic carbon content was analysed and classified according to Huang et al., (2009). Accordingly, 26% of soil samples collected were classified as mineral soils, 24% as mineral soils with organics, 43% as organic soils and 8% as peat. This indicates that while the majority of soil samples are classified as organic soils or soils with organics, only a small proportion are technically classified as peat.

Sulfate concentrations in soils ranged from 0.9 mg/L to 5,100 mg/L with an average concentration of 284 mg/L. The average concentration of sulfate in soil samples (taken at 0.5 m depth intervals) increased from 165 mg/L at 0.5 m to 686 mg/L at 1.0 m depth. Concentrations below this subsequently declined to an average of between 130 and 160 mg/L to 6.0 m depth.

Of the 181 samples analysed, 180 exceed the 0.03 %S net acidity concentration limit for characterisation as acid sulfate soils. Acid neutralising capacity was below detection in all samples. This indicates that within the soils sampled, there is no capacity to neutralise any of the existing acid present, or any potential acidity that may be released upon further oxidation.

Concentrations of existing acidity tend to decline with depth. The average concentration throughout all cores was >0.5 %S in the upper 2.0 meters of the soil profile, 0.25 %S at 4.0 meters depth and 0.13 %S below 4.5 m depth. This is consistent with oxidation of sulfides and subsequent acidification during drying in the upper soil profile.

Significant concentrations of potential acidity (sulfide) exist in soils collected from the subsurface of the swamp. The average potential acidity increased from 0.12 %S in the top 0.5 m of the soil profile to 3.6 %S at 1.5 m depth. Average concentrations variably declined from 3.6 %S at 1.5 m depth to 1.3 %S below 4.5 m depth. The results indicate that significant stores of potential acidity remain throughout the lower soil profile of the swamp, and that future drying and oxidation of these soils may result in acid generation.

1. Introduction

1.1 Background

The Yeodene (Big) Swamp is located on Boundary Creek and contains acid sulfate soils (ASS) that have dried out, resulting in the release of acidic water to the lower reaches of Boundary Creek and ultimately, the Barwon River.

A report commissioned by Barwon Water titled “Barwon Downs Hydrogeological Studies 2016-17: numerical model calibration and historical impacts” (Jacobs, 2018a), found that the operation of the Barwon Downs borefield over the past 30 years is responsible for two thirds of the reduction of groundwater base flow into boundary Creek.

A subsequent study, titled the “Yeodene Swamp Study” (Jacobs, 2018b) concluded that baseflow reduction, combined with the inability to deliver supplementary flows to the swamp has led to the drying of ASS in Yeodene Swamp.

In response to the above, Barwon Water received a Section 78 Ministerial Notice pursuant to Section 78 of the Water Act 1989, directing the corporation to develop and implement a Remediation Plan for the Boundary Creek and Big Swamp environments.

Furthermore, Barwon Water are required to undertake appropriate hydrogeological, hydrological and geochemical assessments necessary to inform and support the development of the Remediation Plan. To refine this, a series of data gaps were assessed and prioritised by Rivers and Wetlands (Baldwin, 2018) in consultation with the Boundary Creek Remediation Working Group, Barwon Water, Jacobs and other independent experts including Professor Richard Bush and Dr Vanessa Wong.

This report presents the findings of a soil sampling and groundwater monitoring investigation, which represents one of a number of assessments aimed at informing the remediation plan and aims to close out the below questions which have been raised. Potential data gaps that could be informed by this study include:

Question 4: Is there a hydraulic connection between Big Swamp and the Lower Tertiary Aquifer?

Question 5: Are there preferential surface or subsurface flow paths in Big Swamp?

Question 6: How much actual and potential acidity is currently stored in Big Swamp?

Question 7: How much sulfate remains in the sediment profile in the swamp?

Question 8: How much bioavailable carbon is currently stored in Big Swamp that can be used to promote biogeochemical processes?

Question 13: How extensive is fire damage to the peat in Big Swamp?

1.2 Scope of work

Jacobs were engaged by Barwon Water to design and undertake a field program.

The program includes:

- Technical advice during the borehole drilling and construction of up to 18 wells throughout Yeodene Swamp;
- Collection of soil samples for the purpose of hydrogeological and geochemical characterisation;
- Aquifer permeability testing (by slug testing) at the well locations for hydrogeological characterisation;
- Deployment of loggers for ongoing monitoring of groundwater levels; and
- Survey of new wells and existing features throughout the swamp.

This report summarises the outcomes of the field program. This report is intended to be essentially a factual report and does not provide extensive analysis and interpretation of the results. This is expected to be provided through later reports issued by Barwon Water, following further analysis.

2. Site investigation

2.1 Borehole drilling and soil sample collection

During the development of the soil sampling and well installation program, eighteen potential sites were proposed for investigation. Of these, 17 sites were safely accessible. BH13 could not be accessed safely due to the presence of dense vegetation and uneven surfaces. Investigations of the remaining sites took place between April and May 2019. Borehole drilling was undertaken by Go Dill Pty Ltd under supervision of a Jacobs hydrogeologist. Borehole logging, sample collection and handling was independently verified by a representative from Monash University. A brief summary of the drilling/sampling program is as follows:

2.1.1 Track mounted drilling

BH01, BH04, BH05, BH06, BH07, BH08, BH09, BH10, BH11, BH14, BH15, BH16 and BH17 were drilled using a Geoprobe track mounded drilling rig.

Collection of soil samples at these sites occurred via 60 mm diameter plastic lined push tubes to 4.5 m below ground level (m bgl) or until refusal. Holes were subsequently advanced to 6.0 m depth using 203 mm diameter hollow stem auger. The hollow stem augers increased the diameter of the borehole to 203 mm.

Using this method, undisturbed soil cores were returned to 4.5 m bgl and disturbed samples were returned between 4.5 and 6.0 m bgl.

2.1.2 Hand held sampling

BH02, BH03, BH12 and BH18 were sampled using a hand-held petrol driven 60 mm diameter push tube sampler due to access restrictions. These locations were sampled to 3.6 m bgl or refusal. The returned samples were undisturbed.

2.1.3 Sample handling

A total of 181 Soil samples were taken from a range of depths. Samples were described and handled according to Sullivan et. al (2018). These were sealed in ASS polyethylene zip lock bags provided by ALS laboratories and placed on ice in coolers in the field. Samples were transferred to a portable freezer upon return from the field on the day of collection. Samples were subsequently sent to Monash University for laboratory analysis and were received in a frozen condition.

A summary of the borehole drilling is shown below in Table 2-1, borehole locations are shown in Figure 2-1. Borehole lithology logs are shown in Appendix A.

Table 2-1 Summary of borehole drilling

Bore ID	Date Drilled	Drilling Method	Coordinates[1]		Surface elevation (m AHD)	Borehole diameter (mm)	Termination depth	
			Easting	Northing			m bgl[3]	m AHD[4]
BH01	17/04/2019	GeoProbe	735858.9	5743834.9	141.9	203	6	135.9
BH02	7/05/2019	Hand	735838.9	5743863.1	141.8	60	3.6	138.1
BH03	7/05/2019	Hand	735853.3	5743889.0	141.7	60	3.6	137.7
BH04	23/04/2019	GeoProbe	735682.3	5743890.3	143.4	203	6	137.4
BH05	18/04/2019	GeoProbe	735686.9	5743921.0	143.1	203	6	137.1
BH06	18/04/2019	GeoProbe	735712.2	5743922.107	142.9	203	6	136.9

Bore ID	Date Drilled	Drilling Method	Coordinates[1]		Surface elevation (m AHD)	Borehole diameter (mm)	Termination depth	
			Easting	Northing			m bgl[3]	m AHD[4]
BH07	17/04/2019	GeoProbe	735721.7	5743948.325	142.5	203	6	136.5
BH08	25/04/2019	GeoProbe	735607.0	5743908.6	144.6	203	6	138.6
BH09	24/04/2019	GeoProbe	735609.7	5743944.4	144.4	203	6	138.4
BH10	24/04/2019	GeoProbe	735622.3	5743966.9	144.3	203	6	138.3
BH11	8/05/2019	GeoProbe	735469.3	5743898.1	147.1	203	6	141.1
BH12	9/05/2019	Hand	735438.0	5743952.7	147.2	60	3.4	143.8
BH14	25/04/2019	GeoProbe	735360.8	5743853.1	147.7	203	6	141.7
BH15	26/04/2019	GeoProbe	735330.5	5743870.0	147.4	203	6	141.4
BH16	7/05/2019	GeoProbe	735300.1	5743903.5	148.0	203	6	142.0
BH17	6/05/2019	GeoProbe	735266.8	5743903.0	148.1	203	5.9	142.2
BH18[2] (YS05)	23/03/2019	Hand	735276	5743824	148.7	60	3.6	145.1

Note:

1. Datum MGA94 zone 54 - survey to an accuracy of ±0.030 m
2. BH18 coordinates were taken via handled GPS and to an accuracy of ±3.0 m
3. m bgl – metres below ground level
4. AHD – Australian Height Datum

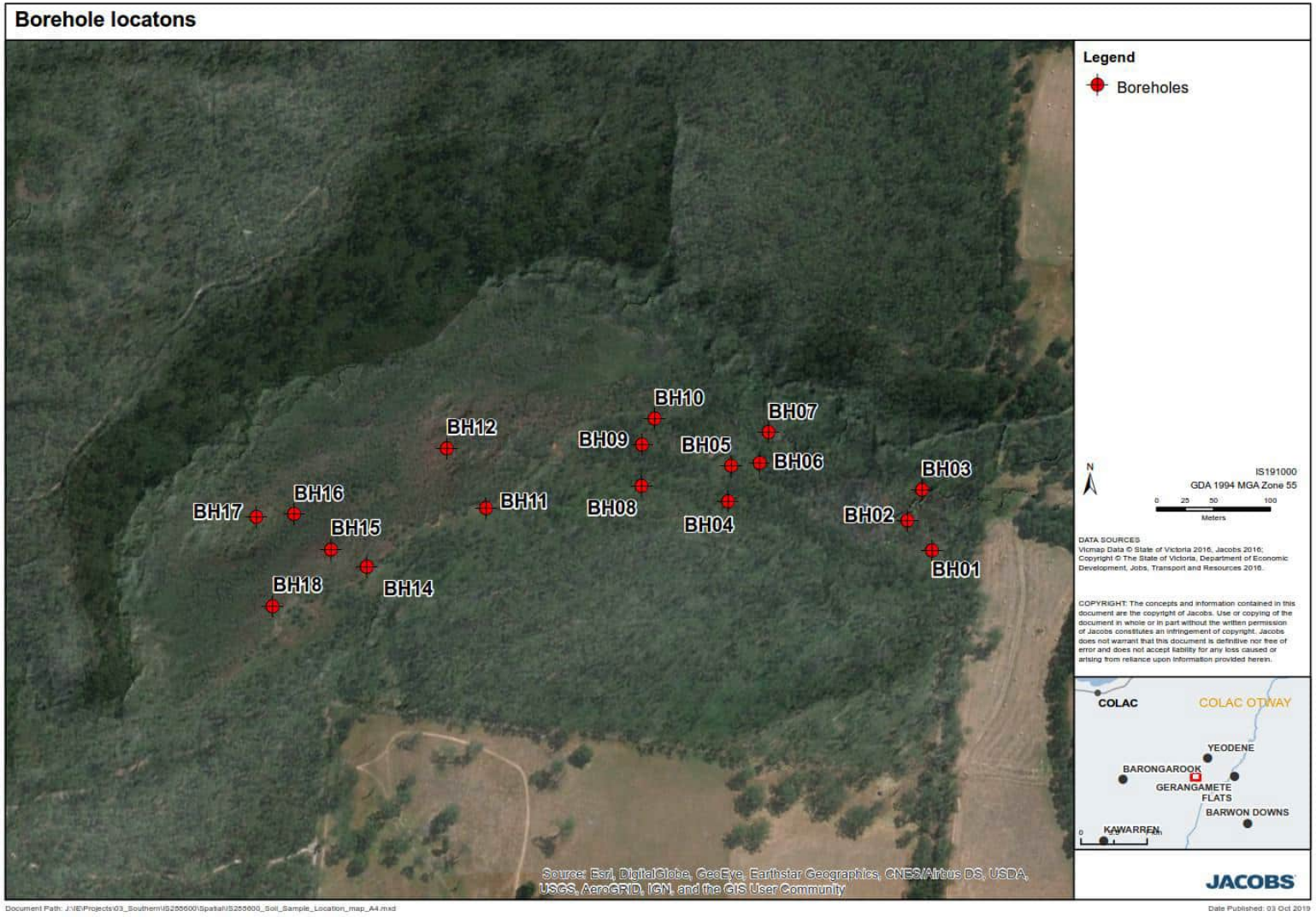

Figure 2-1 borehole location

2.2 Groundwater well construction

Table 2-2 below provides a summary of the construction details of the groundwater monitoring wells that were installed between April and May 2019 in the drilled boreholes. It is noted that a well was not installed at BH18 as a previously installed well (YS05) was already present at this location from earlier investigations (Jacobs, 2017).

Monitoring wells were constructed by sequentially joining threaded casing and screen lengths and lowering them down the drilled borehole to termination depth. Monitoring bores BH02, BH03 and BH12 were constructed with 26 mm class 18 uPVC casing with 1.5 m long screens slotted at a 0.3 mm aperture. A sump was not installed on these shallower wells to ensure the watertable was intersected.

The remaining wells were constructed using 50 mm diameter class 18 uPVC casing. Screens were 3.0 m long and slotted at a 0.4 mm aperture. All 50 mm diameter wells had 1.0 m sumps installed below the screen interval in case of sediment build up.

Gravel pack (8/16 Sibelco gravel) was free poured into the annulus between the well casing and drilled borehole to provide a filter pack around the screened section. Bentonite chips were subsequently free poured on top of the gravel pack to form a seal to the surface and to prevent grout or cement from seeping into the gravel pack.

During construction of BH02 and BH03, well screens were pushed past the bottom of the drilled borehole and into the underlaying sediments. Therefore, the bottom of the screened interval for both these wells does not have filter pack around it and is surrounded by natural formation. This represents the bottom 0.1 m of BH02 and the bottom 0.4 m of BH03. At BH06, BH08 and BH14, slight hole collapse occurred between drilling and construction. This occurred around the bottom of the sump and did not prevent any gravel pack from encasing the screen interval of these wells.

Constructed well casings were finished approximately 0.70 m above ground level and encased in yellow steel monument cover that were finished approximately 0.80 above ground level. BH02 and BH03 were installed with a 1.1 m high casing and 1.25 m high monument cover due to increased risk of surface water inundation at these locations. Due to the height of some well casings, the installed monument casing could not close entirely at some wells. All wells were named on the inside cap of the monument using a permanent marker.

A summary of well construction details are shown below in Table 2-2 and correspond to the borehole locations listed in Table 2-1. Further well construction details are summarised in the following appendices:

- Well construction and lithology logs are shown in Appendix A
- Push tube photographs are shown in Appendix B
- Well completion photographs are shown in Appendix C
- Well completion reports are detailed in Appendix D
- Well construction licenses are listed in Appendix E

Table 2-2 monitoring well installation details

Well ID	BCL	Stickup (m)	Constructed bore diameter (mm)	Total construction depth (m bgl)	Screen from (m bgl)	Screen to (m bgl)
BH01	WRK112869	0.60	50	6	2.0	5.0
BH02	WRK112870	1.16	26	3.7	2.2	3.7
BH03	WRK112871	1.20	26	4	2.5	4.0
BH04	WRK112872	0.82	50	6	2.0	5.0

Well ID	BCL	Stickup (m)	Constructed bore diameter (mm)	Total construction depth (m bgl)	Screen from (m bgl)	Screen to (m bgl)
BH05	WRK112873	0.79	50	6	2.0	5.0
BH06	WRK112874	0.68	50	6	1.9	4.9
BH07	WRK112875	0.55	50	6	2.0	5.0
BH08	WRK112876	0.67	50	6	1.9	4.9
BH09	WRK112877	0.68	50	6	2.0	5.0
BH10	WRK112878	0.69	50	6	2.0	5.0
BH11	WRK112879	0.63	50	6	2.0	5.0
BH12	WRK112880	0.71	26	3.4	1.9	3.4
BH14	WRK112882	0.64	50	6	2.0	5.0
BH15	WRK112883	0.66	50	6	2.0	5.0
BH16	WRK112884	0.81	50	6	2.0	5.0
BH17	WRK112885	0.66	50	5.9	1.9	4.9
YS05	N/A	0.82	50	3.00	1.50	3.00

2.3 Well development

Groundwater wells were developed between the 23rd and 24th May 2019 via surging and purging of the screened interval using both airlift and bail methods. Wells were developed in order to remove introduced products, improve near well permeability, reduce entry loss, reduce entry of suspended solids and increase well efficiency. Accordingly, all wells were developed according to the minimum construction reequipments for water bores in Australia (NUDLC, 2012).

All wells were developed by removing standing water from the casing via airlift purging and/or bailing. During airlifting, polyethylene tubing was gradually lowered down-hole with a continuous flow of air supplied by a compressor and standing water in the well was displaced by air and brought to the surface. Water was then allowed to flow through high pressure polyethylene piping secured to top of the well and was collected to monitor water quality. The tubing was continuously lowered down the well until the bottom was reached and the well was purged of water. If yields from the well were adequate, the tubing was left in the well to provide a continues flow of water from the aquifer to the surface for periods of time ranging from 30 minutes to 1 hour. If yields were low, wells were allowed to recover for a period before development continued. Go Dill Pty Ltd undertook the development, supervised on site by a Jacobs hydrogeologist.

Field water quality was recorded during development using a calibrated YSI water quality probe. Development was undertaken until a minimum of ten well volumes of water had been removed or until insufficient water was being produced. Wells with 50 mm casing diameter were developed via airlift on 23rd May. The remaining wells developed were developed by bailer due to wet conditions limiting access by vehicle and air compressor on 24th of May. All 26 mm diameter wells were bail purged. Table 2-3 summarises the development of the wells.

Table 2-3 Details of well development

Well ID	Date	Time	Cumulative volume (L)	Electrical conductivity (uS/cm	pH	Temperature (deg C)	Reduction Oxidation Potential (mV)	Dissolved Oxygen (mg/L)	Purge method
BH01	23/05/2019	10:00	25	574	6.18	19.8	72.4	1.65	Airlift
		10:02	40	602	5.95	13.7	65.8	3.99	
		10:06	60	594	5.88	13.2	75.9	1.63	
		10:07	80	607	5.84	12.7	78.9	6.42	
		10:15	90	600	5.75	12.3	89.7	10.3	
		10:20	100	821	5.53	11.7	99.4	9.16	
		10:25	125	930	4.9	11.4	135.1	9.34	
		10:30	150	979	4.51	11.7	154	9.61	
		10:35	175	1007	4.37	11.5	168	9.41	
BH02	24/05/2019	2:20	1	682	6.01	14	71	5.8	Bail
		2:30	2	658	6.18	14.1	40	2.07	
		2:40	3	627	6.27	14.3	47.8	1.55	
		2:50	4	580	6.26	14.6	68	2.59	
		3:00	5	602	6.32	14.2	71	4.09	
BH03	24/05/2019	1:30	1	636	5.18	12.7	164	3.56	Bail
		1:35	2	556	5.68	12.8	91	2.41	
		1:41	3	536	5.85	13.5	83	0.2	
		1:50	4	538	5.94	13.4	69	1.02	
		1:55	5	538	6.01	13.5	71	2.31	
		2:00	6	544	6.06	13.7	64	3	
		2:10	7	545	6.1	13.8	54	3.4	
BH04	23/05/2019	11:21	25	2960	4.02	14.7	198	9.44	Airlift
		11:25	50	2922	4.03	14.6	198	8.7	
		11:30	75	2965	4.02	14.2	200	8.74	
		11:35	100	3021	4.01	13.6	202	9.57	
		11:40	125	3013	4.01	13.6	203	8.33	
		11:50	150	3059	4.01	13.4	205	8.9	
BH05	23/05/2019	14:10	25	536	5.97	13.4	77.4	9.09	Airlift
		14:15	50	506	5.88	13.3	88.2	8.47	
		14:35	75	515	5.61	11.7	111	8.5	
BH06	23/05/2019	12:10	25	791	4.89	13.6	170	6.64	Airlift
		12:30	50	790	5.11	13.2	154	6.01	
		12:50	75	808	5.16	11.5	38	8.44	
BH07	23/05/2019	13:10	20	620	5.46	13.8	138	3.5	Airlift
		13:21	45	565	6.18	12.4	100	9.98	
		13:50	75	538	6.22	10.4	92	9.54	
BH08	23/05/2019	4:30	25	5500	3.73	15.4	207	7.73	Airlift
		4:45	27	6184	3.6	12.2	228	9.5	
BH08	24/05/2019	7:42	40	6782	3.57	15.3	219	5.42	Bail
		8:00	55	6711	3.54	15.1	247	3.19	
		8:10	60	6621	3.53	14.9	207	9.11	
BH09	23/05/2019	3:10	25	3581	4.14	14.7	187	8.56	Airlift
		3:50	50	3787	3.83	13.7	217	8.3	
BH10	23/05/2019	3:55	25	944	4.74	13.6	184	6.27	Airlift
		4:20	50	797	5.24	12.8	142.5	6.44	
BH11	24/05/2019	8:20	12	3332	2.6	14	410	3.92	Airlift
		8:30	25	3247	2.59	14.6	415	3.48	
		8:40	40	3300	2.71	14.6	396	0.03	
		8:45	50	3248	2.68	14.8	399	0	

		9:00	65	3372	2.67	14.6	398	3.71	
BH12	24/05/2019	9:10	1	1846	2.78	13.2	367	4.1	Airlift
		9:20	2	1833	2.83	13.1	357	5.02	
		9:30	4	1861	2.82	12.9	347	5.49	
		9:45	6	1887	2.77	13	359	6.06	
BH14	24/05/2019	12:35	25	5125	3.02	16.2	317	2.33	Bail
		12:40	30	4547	3.52	16.7	366	2.01	
		12:50	50	4356	3.6	16.6	259	1.51	
		13:00	60	4387	3.61	16.5	250	1.77	
		13:10	75	4437	3.6	16.5	247	1.95	
BH15	24/05/2019	12:00	25	1530	3.43	14.4	304	1.06	Bail
		12:10	40	1583	3.38	14.5	395	3.07	
		12:15	50	1560	3.31	14.4	293	1.44	
		12:30	75	1582	3.46	14.5	291	2.81	

2.4 Groundwater levels and logger installation

A total of 17 groundwater level loggers and one barometric logger was installed throughout the newly constructed wells and YS05.

Groundwater levels were recorded using an electronic water level tape before a Solinst level logger was deployed into the monitoring well on a stainless steel cable. All loggers were set to hang approximately 1 m above the bottom of the well, with 2 to 5 metres of water column above. One barometric logger was installed in BH01. All loggers were set to one hour recording intervals to measure short term fluctuations in water level. The loggers have a maximum of 40,000 memory points equating to 4.5 years of continues logging without downloading and or resetting. It is recommended that the logging frequency is revised following the first 12 months of monitoring to preserve logger batter and memory.

Table 2-4 below summarises the logger installation including measured water levels at time of deployment.

Table 2-4 level logger installation summary

Well ID	Date	Time	Logger serial number	Groundwater level at deployment	
				m bgl	m AHD
BH01	12/06/2019	7:53	0022105721	0.17	141.69
BH01 (Barro)	12/06/2019	8:00	0012104949	-	-
BH02	12/06/2019	7:55	0022105724	-0.08	141.83
BH03	12/06/2019	7:58	0022105709	-0.10	141.84
BH04	12/06/2019	9:13	0022105726	0.33	143.03
BH05	12/06/2019	9:15	0022105727	0.69	142.40
BH06	12/06/2019	9:18	0022105725	0.86	142.04
BH07	12/06/2019	9:20	0022105706	0.05	142.45
BH08	12/06/2019	10:08	0022105698	0.86	143.76
BH09	12/06/2019	10:10	0022105718	1.22	143.14
BH10	12/06/2019	10:13	0022105711	1.13	143.18
BH11	12/06/2019	10:15	0022105716	1.23	145.86

Well ID	Date	Time	Logger serial number	Groundwater level at deployment	
				m bgl	m AHD
BH12	12/06/2019	10:17	0022105699	1.22	145.98
BH14	12/06/2019	11:09	0022105689	1.40	146.26
BH15	12/06/2019	11:11	0022105722	0.31	147.11
BH16	12/06/2019	11:13	0022105732	0.63	147.36
BH17	12/06/2019	11:15	0022105691	1.17	146.94
YS05	06/08/2019	11:00	TBC	0.44	148.28

Note:

1. BH02 and BH03 groundwater level was measured to be above ground level and is denoted by a negative sign.

2.5 Survey

Elevation, and co-ordinates were recorded at the installed groundwater monitoring wells. In addition, to better characterise the location of key features within the swamp, elevation and co-ordinates were collected from 13 locations within the fire trench, and 10 locations along downstream drainage paths of the swamp. This was undertaken by a Jacobs surveyor on the 10th and 12th June 2019. All surveyed points were cross referenced to control Elliminyt PM78 and recorded to an accuracy of ±0.030m. Each survey point for the fire trench and tributary is shown in Table 2-5 and Table 2-6 respectively. Points are also shown spatially in Figure 2-2.

Table 2-5 Survey point locations along fire trench

Point ID	Easting	Northing	Elevation (m AHD)
999	735091.2	5743688.6	150.7
1000	735123.0	5743696.5	150.3
1001	735178.3	5743711.8	149.2
1002	735218.0	5743721.1	149.9
1003	735292.6	5743756.7	150.6
1004	735349.3	5743791.5	148.8
1012	735464.3	5743835.3	148.6
1020	735605.3	5743884.4	145.7
1021	735664.3	5743875.3	144.6
1022	735683.4	5743864.6	144.5
1029	735733.8	5743849.6	143.1
1030	735805.8	5743802.6	142.0
1032	735875.5	5743805.2	141.6

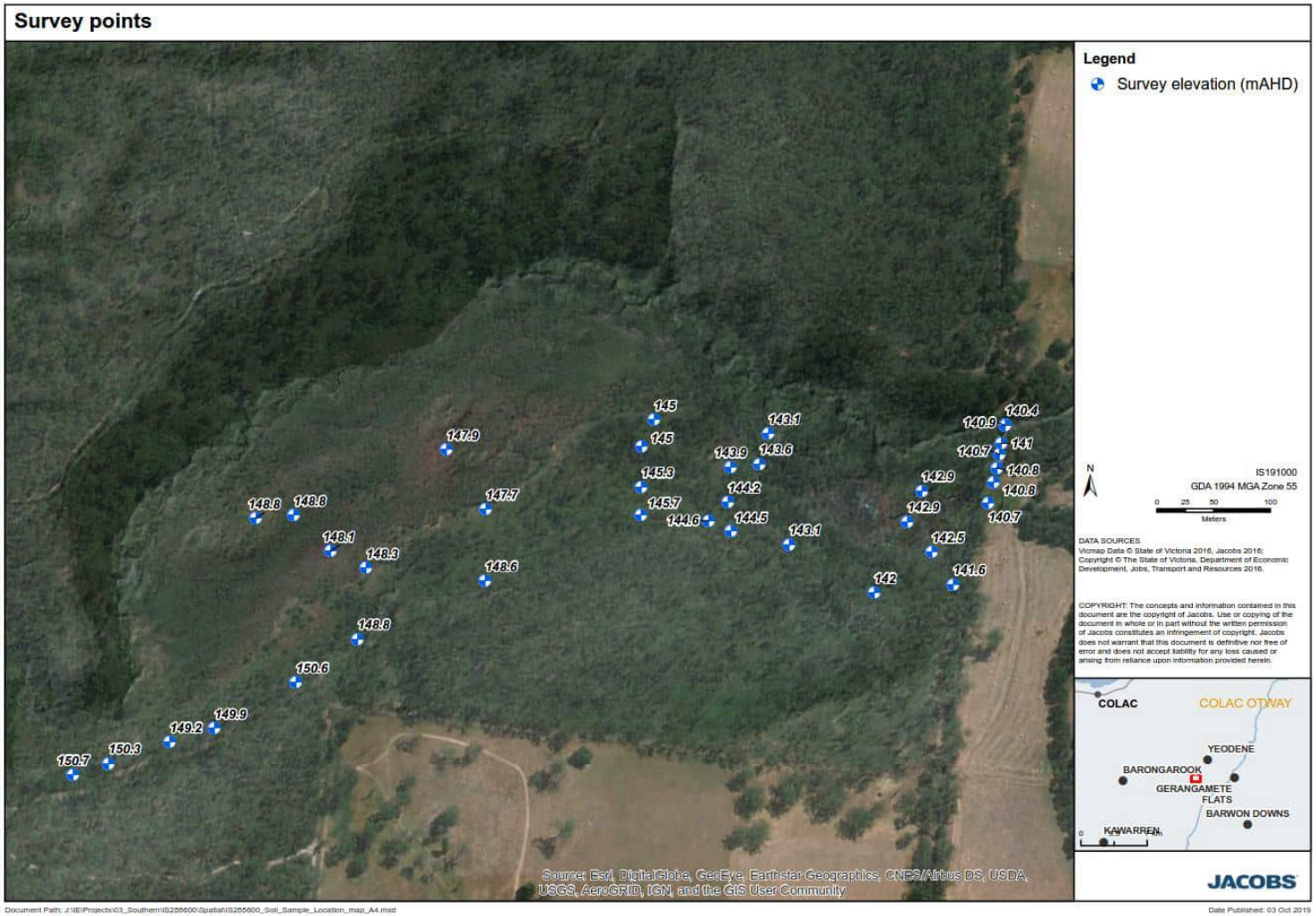

Figure 2-2 Location of survey points at wells installed, fire trench and drainage line

Table 2-6 Survey point locations along outflow tributary

Point ID	Easting	Northing	Elevation (m AHD)
2000	735930.6	5743942.4	140.4
2001	735930.3	5743941.7	140.9
2002	735926.0	5743926.3	141.0
2003	735923.521	5743916.736	140.7
2005	735920.6	5743904.8	140.8
2006	735917.0	5743893.0	140.8
2007	735911.0	5743874.9	140.7
2008	735913.1	5743875.7	141.4
2009	735922.6	5743908.0	141.2
2010	735930.3	5743941.4	141.0
2011	735930.7	5743942.5	140.8

2.6 Spoil management

During the investigation, excavated ASS waste material was exposed to the atmosphere, presumably resulting in some oxidation. As such, the exposed waste material was deposited in accordance with an environmental management plan to a depth of >0.5 m below the ground surface and buried under topsoil.

To limit oxidation, soil material excavated from depth was managed in the following way:

- The duration of waste material exposure at the surface prior to disposal to the subsurface was limited
- Clay dominated material was placed on top of coarser grained material as a natural oxygen barrier

While is it presumed that some oxidation did occur, there was no notable discoloration or iron hydroxide staining noticed on exposed material, suggesting this was limited. Figure 2-3 below illustrates the disposal.

Figure 2-3 Spoil management procedure

3. Results of investigation

3.1 Lithological logs

The location of boreholes is shown in Figure 2-1 and lithological logs in Appendix A.

Lithological logs indicate that clays and silts are the dominant lithology's throughout the swamp, although small discrete intervals of sands do occur. Small intervals of burnt peat were identified in the upper 0.5 m of some soil cores, most dominantly at BH17 and BH18 (see question 13 section 1.1).

Figure 3-1 below shows the lithology at boreholes both spatially and vertically using Leapfrog geological modelling software. A vertical exaggeration of 10x has been applied. This illustrates that boreholes located towards the upper reaches of the swamp (BH11, BH14, BH15 and BH16) tend to be clay dominated, while boreholes at the lower reaches of the swamp at (BH1, BH2, BH3 and BH7) tend to be silt dominated. Small lenses of coarse sand are evident at BH04, BH08, BH11, BH12, BH14, BH16 and BH17.

These results are consistent with the dominance of quaternary alluvial sediments in the upper 6 m of the stratigraphic profile in the swamp. The dominance of clay and limited presence of sand through the cores may limit connection between the LTA and the swamp (see question 4 in 1.1), however this is somewhat speculative and likely to be better resolved thorough water balance assessments that will be undertaken in subsequent studies.

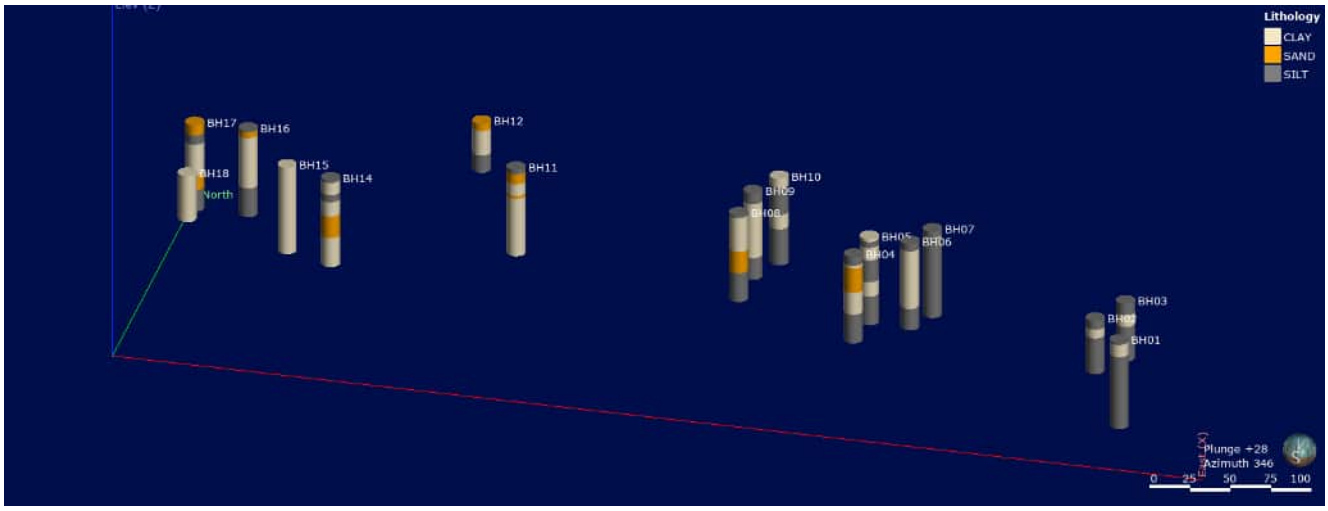

Figure 3-1 Leapfrog geological model showing the primary constituents of SILT (grey), CLAY (light yellow) and SAND (orange) throughout the bore logs

3.2 Aquifer Permeability testing

Slug testing of groundwater monitoring was completed between 11th and 13th June 2019. Testing was undertaken using a solid PVC slug to displace water in the well and a groundwater level logger was deployed in each well to record the change in groundwater head in real time and viewed on a laptop. Viewing the change in water column height in the well in real time allowed for visualisation that the test was complete before a subsequent test was undertaken. A minimum of one test was undertaken at each well with multiple tests occurring at wells which recovered faster.

Change in water level data recorded during the tests was processed using the Aqtesolv software package to estimate hydraulic conductivity (K) for the screened section of the aquifer at each well. The determination of a K value for each test was undertaken using a visual match on a log-log displacement/time curve using the Bouwer and Rice (1976) analytical solution for unconfined aquifers method. A hydraulic conductivity anisotropy ratio ($K_{vertical}/K_{horizontal}$) of 0.2 was assumed as is consistent for alluvium (Todd, 1980). While lower values may be appropriate for clay dominated sediments, analysis was not sensitive to this parameter with a K_v/K_h value of

0.01 yielding an average increase in the overall K value of only 9%. An aquifer thickness of 10 m was used in all analysis. Where multiple tests occurred, an average of the resulting estimates of K was used to give an overall estimate of hydraulic conductivity for the tested intervals. The curve fitting undertaken as part of this analysis is included in Appendix F and a summary of the results presented in Table 3-1.

Hydraulic conductivities ranged from 0.02 to 1.8 m/day, with an average conductivity of 0.50 m/day and a standard deviation of 0.62 m/day. This is broadly consistent with the range in hydraulic conductivities expected for unconsolidated silts (Domenico and Schwartz, 1990).

A broad range in hydraulic conductivities is observed through the swamp. Elevated hydraulic conductivities were observed at BH06, BH09, BH10, BH11, BH12 and BH16. These are predominantly located through the centre of the swamp. This may suggest greater groundwater flow rates at these locations. However, neither lithological logs nor slug tests suggest the occurrence of a pervasive unit of elevated permeability that promotes subsurface flow (see question 5 in section 1.1). Additionally, there does not appear to be a consistent trend between the dominant lithology at each given well and the hydraulic conductivity (Table 3-1), which makes the inference of such trends difficult to assert.

Further to the above, the dominance of clays and silts suggest that groundwater flow will be dominantly horizontal. As discussed above, an anisotropy ratio of 0.2 has been assumed for the below analysis, as is consistent with the range of 0.1 – 0.5 assumed for alluvium by Todd (1980), however this could be as low as 0.01 in clays, which reinforces that subsurface flow through the swamp will be dominantly horizontal.

Table 3-1 Results of slug testing of groundwater wells

Bore ID	Effective Screened Interval (m bgl)[1]	Dominant lithology in Sreen	Slug test type (Falling /Rising head)	Estimated hydraulic conductivity (k) (m/day)	
				Test Result	Final estimate for well
BH01	1.5 – 6.0	Silty CLAY	Falling head	0.27	0.22
			Rising head	0.22	
			Falling head	0.16	
			Rising head	0.22	
BH02	1.9 – 3.5	Silty CLAY	Falling head	0.03	0.11
			Falling head	0.18	
BH03	1.5 – 3.6	Silty CLAY	Falling head	0.03	0.03
			Falling head	0.03	
BH04	1.6 – 6.0	Silty CLAY	Falling head	0.09	0.09
			Rising head	0.09	
BH05	1.5 – 6.0	Silty CLAY	Falling head	0.05	0.06
			Rising head	0.06	
			Rising head	0.06	
BH06	1.5 – 5.9	Silty CLAY	Falling head	1.35	1.51
			Rising head	1.12	
			Falling head	1.18	
			Rising head	2.41	
BH07	1.5 – 6.0	Silty CLAY	Falling head	0.02	0.02
			Rising head	0.01	
BH08	1.5 – 5.9	Silty CLAY / Silty SAND	Rising head	0.10	0.10
BH09	1.5 – 6.0	Silty CLAY	Falling head	1.34	1.31
			Rising head	1.26	
			Falling head	1.34	
			Rising head	1.30	
BH10	1.6 – 6.0	Silty CLAY / Clayey SILT	Rising head	0.83	1.30
			Rising head	1.60	
			Falling head	1.14	
			Rising head	1.64	

Bore ID	Effective Screened Interval (m bgl)[1]	Dominant lithology in Sreen	Slug test type (Falling /Rising head)	Estimated hydraulic conductivity (k) (m/day)	
				Test Result	Final estimate for well
BH11	1.5 – 6.0	CLAY	Falling head	0.35	0.35
			Rising head	0.35	
BH12	0.7 – 3.5[1]	Sandy CLAY	Rising head	0.82	0.82
BH14	1.5 – 5.5	Clayey SILT, CLAY, SAND	Rising head	0.14	0.13
			Rising head	0.13	
BH15	1.5 – 6.0	Silty CLAY	Falling head	0.12	0.16
			Rising head	0.20	
BH16	1.3 – 6.0	Sandy CLAY	Rising head	1.72	1.79
			Rising head	1.85	
BH17	1.4 – 5.9	Sandy CLAY	Falling head	0.06	0.05
			Falling head	0.04	

Notes:

1. Effective screen is length of gravel pack of well.
2. Well screen was unsaturated

3.3 Groundwater levels

Depth to groundwater was measured in all 16 newly installed wells in June 2019. YS05 in was measured in July 2019.

The groundwater levels recorded as part of investigations have been summarised in Table 3-2 below. Groundwater levels varied between 1.4 and -0.10 m bgl. Groundwater levels labelled with a negative m bgl value indicate artesian conditions. These were recorded at BH02 and BH03 in the lower reaches of the swamp.

These data have been used in conjunction with a digital terrain model to generate a potentiometric groundwater surface and depth to groundwater map for the monitoring period (Figure 3-2). This illustrates a steep hydraulic gradient towards the swamp from the north and a gentler hydraulic gradient towards the swamp from the south. The hydraulic gradient through the swamp trends to the east in a broadly similar direction to the flow path of Boundary Creek.

Depth to watertable mapping indicates groundwater levels near to the surface (<0.5 m bgl) in the lower reaches of the swamp near (BH02) and through the north west portion of the swamp.

Table 3-2 Summary of groundwater levels (m bgl) and groundwater elevation (m AHD) recorded

Well ID	Date	Groundwater level	
		m bgl	m AHD
BH01	12/06/2019	0.17	141.69
BH02	12/06/2019	-0.08	141.83
BH03	12/06/2019	-0.10	141.84
BH04	12/06/2019	0.33	143.03
BH05	12/06/2019	0.69	142.40
BH06	12/06/2019	0.86	142.04
BH07	12/06/2019	0.05	142.45
BH08	12/06/2019	0.86	143.76

Well ID	Date	Groundwater level	
		m bgl	m AHD
BH09	12/06/2019	1.22	143.14
BH10	12/06/2019	1.13	143.18
BH11	12/06/2019	1.23	145.86
BH12	12/06/2019	1.22	145.98
BH14	12/06/2019	1.40	146.26
BH15	12/06/2019	0.31	147.11
BH16	12/06/2019	0.63	147.36
BH17	12/06/2019	1.17	146.94

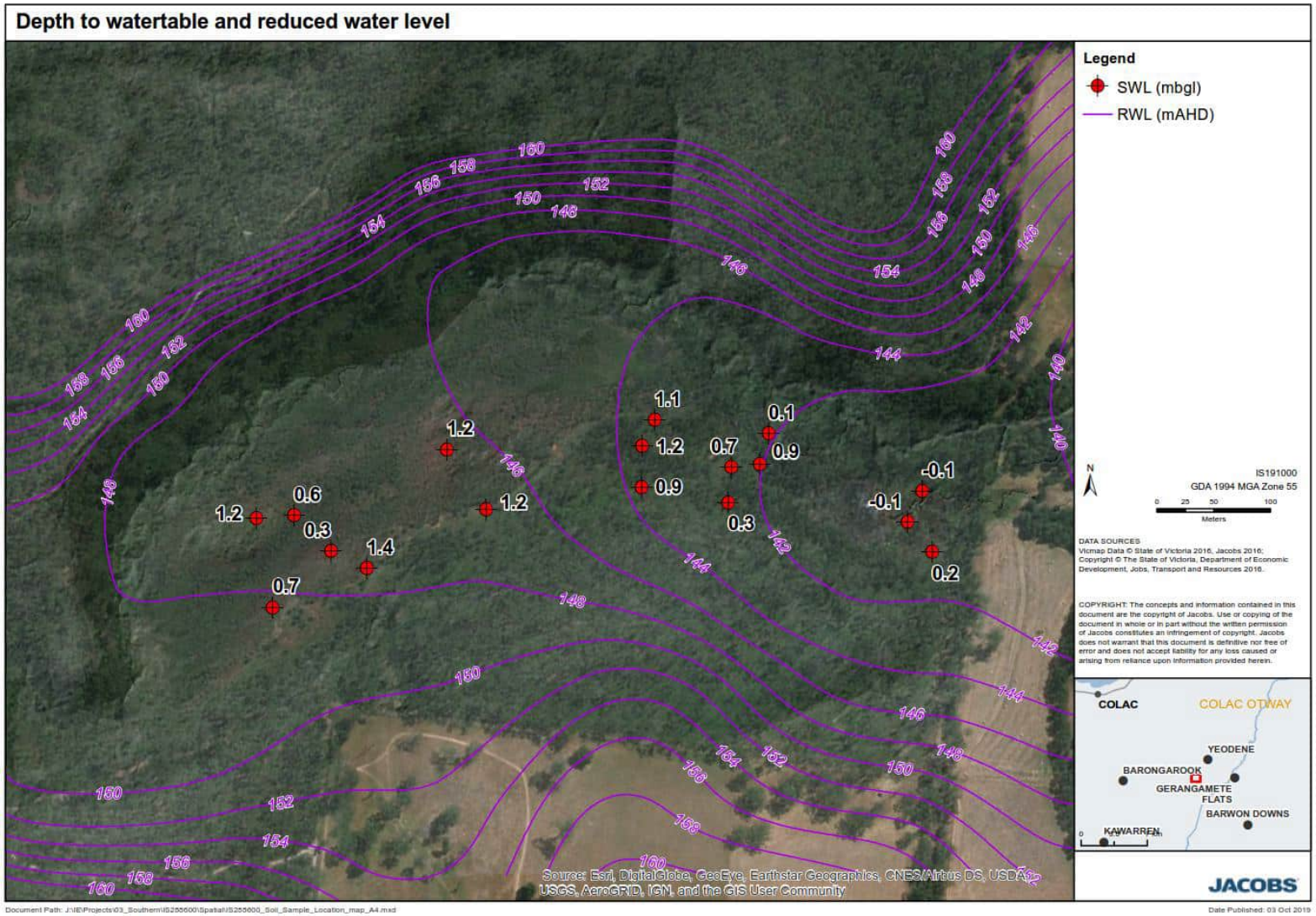

Figure 3-2 Depth to water table and groundwater elevation at wells and as interpreted throughout Big Swamp from the well data– June 2019

3.4 Static geochemical test work

Soil samples were collected at various depths at all boreholes across Big Swamp. The soils were analysed for a number of geochemical properties. This section provides a preliminary assessment of the general trends in geochemistry observed both spatially and with depth through the swamp. A detailed geochemical assessment is in preparation by Monash University. The general parameters discussed here include organic carbon, sulfate and acidity (in its various forms). These results have been detailed in Appendix G.

3.4.1 Organic carbon content

Analysis of the organic matter (OM) and organic carbon (OC) content of soils was undertaken by Monash University Laboratories via the loss on ignition (LOI) method. A total of 181 samples were analysed via this method with the results summarised in Table 3-3 below.

These results indicate that the soils throughout the swamp are predominated by those with a high organic carbon content. This is consistent with core logs (Appendix A) which indicate the presence of organic material, organic odour and peat layers throughout the soil profile.

While there are a number of guidelines available which classify organic soils according to their organic carbon content, mineral fraction, clay content and texture, we have adopted a limit of >30% OC for the classification of peat in accordance with Huang et al., (2009). This limit is based on a combination of experimental work, literature review and evaluation of currently existing classification systems (e.g. Inisheva, 2006; Isbell, 2002).

Accordingly, 26% of soil samples collected are classified as mineral soils, 24% as mineral soils with organics, 43% as organic soils and 8% as peat. To summarise, while the majority of soil samples are classified as organic soils or soils with organics, only a small proportion are technically consistent with peat.

These results provide a starting point to answering research question 8 (see section 1.1), in that the soils throughout the swamp contain significant concentrations of organic carbon. However, the bio-availability of this carbon and its capacity to promote processes such as sulfate reduction remain unquantified. This is likely to be further resolved in parallel studies being undertaken by Monash University.

Table 3-3 Summary of organic C content of soils via LOI analysis

Organic Carbon (%)	No. of samples	% of samples	Classification
<3	46	26%	Mineral soils
3 - 15	43	24%	Mineral soils with organics
15 - 30	77	43%	Organic soils
>30	15	8%	Peat

3.4.2 Sulfate

Sulfate was extracted from each of the 181 sediment samples using a 20 ml milli-Q water extraction at Monash University Laboratories. The concentration of sulfate in the resulting extracts ranged from 0.9 mg/L to 5,100 mg/L with an average concentration of 284 mg/L.

Trends in sulfate concentrations with depth are illustrated in Figure 3-3. The average concentration increases from 165 mg/L at 0.5 m to 686 mg/L at 1.0 m depth before gradually declining to an average of 160 mg/L at 3.0 m. Average concentrations below 3.0 m depth vary between 160 and 130 mg/L.

Given the nature of the site and the presence of acid sulfate soils, these results are consistent with oxidation of sulfides in the upper soil profile and the subsequent release of sulfuric acid. Similar trends in existing acidity would be expected throughout the soil profile if this is the case and are discussed in further detail below.

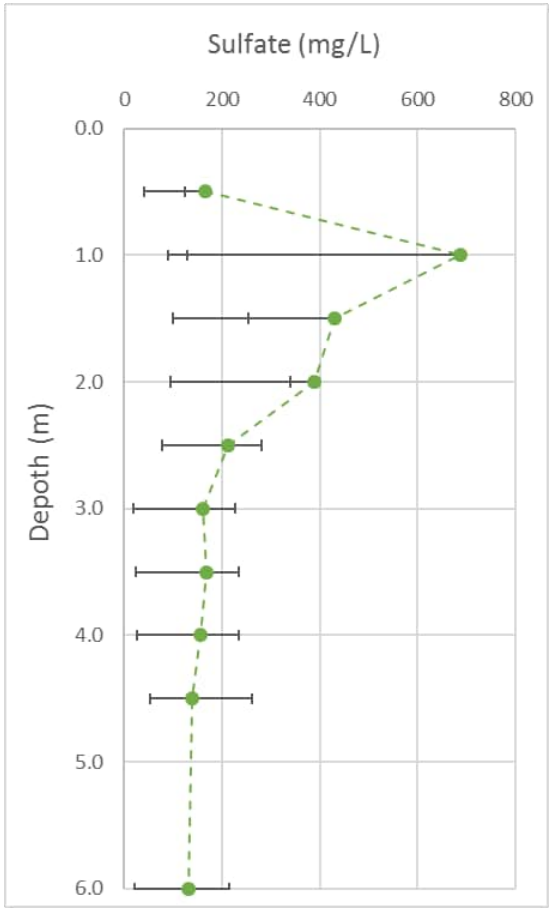

Figure 3-3 Average, 25th and 75th percentile (shown as error bars) of sulfate with depth (aggregate from 0.5 m intervals)

3.4.3 Acidity

A summary of the potential and existing acidity within each soil core has been prepared in Appendix G. General trends in potential and existing acidity with depth have been summarised in Figure 3-4. A full report and laboratory certificates regarding static chemistry results is in preparation by Monash University. For the purpose of this report, the results are briefly summarised below and the key findings are as follows:

- Acid neutralising capacity (ANC) was below detection in all samples analysed. This indicates that within the soils samples, there is no capacity to neutralise any of the existing acid present, or any potential acidity that may be released upon further oxidation.

- High concentrations of net acidity are present throughout the majority of samples collected from the swamp. Of the 181 samples collected, 180 exceed the criteria of 0.03 %S for classification as acid sulfate soils (EPA, 2009).

- Concentrations of existing acidity tends to decline with depth. Figure 3-4 shows a decline in the average concentration of acidity from >0.5 %S in the upper 2.0 meters of the soil profile, to 0.25 %S at 4.0 meters depth and 0.13 %S below 4.5 m depth. These trends are consistent sulfate concentrations and provide further support for the occurrence of sulfide oxidation in the upper portion of the soil profile.

- Significant concentrations of potential acidity (sulfide) exist in soils collected from the subsurface of the swamp. Figure 3-4 shows an increase in the average potential acidity from 0.12 %S in the top 0.5 m of the soil profile to 3.6 %S at 1.5 m depth. Average concentrations variably decline from 3.6 %S at 1.5 m depth to 1.3 %S below 4.5 m depth. The results indicate that significant stores of potential acidity remain throughout the soil profile of the swamp, and that future drying and oxidation of these soils may result in acid generation.

- Average sulfide concentrations peaked between 1.5-2.0 m below the ground surface. This could be related to the formation contemporary sulfides as a result of the infiltration of ferrous, sulfate rich leachate from the upper profile as it is subject to reducing conditions below the water table. However, there is significant variability in the concentration of sulfides at depth and as such, this could be an artefact of heterogeneity at the site.

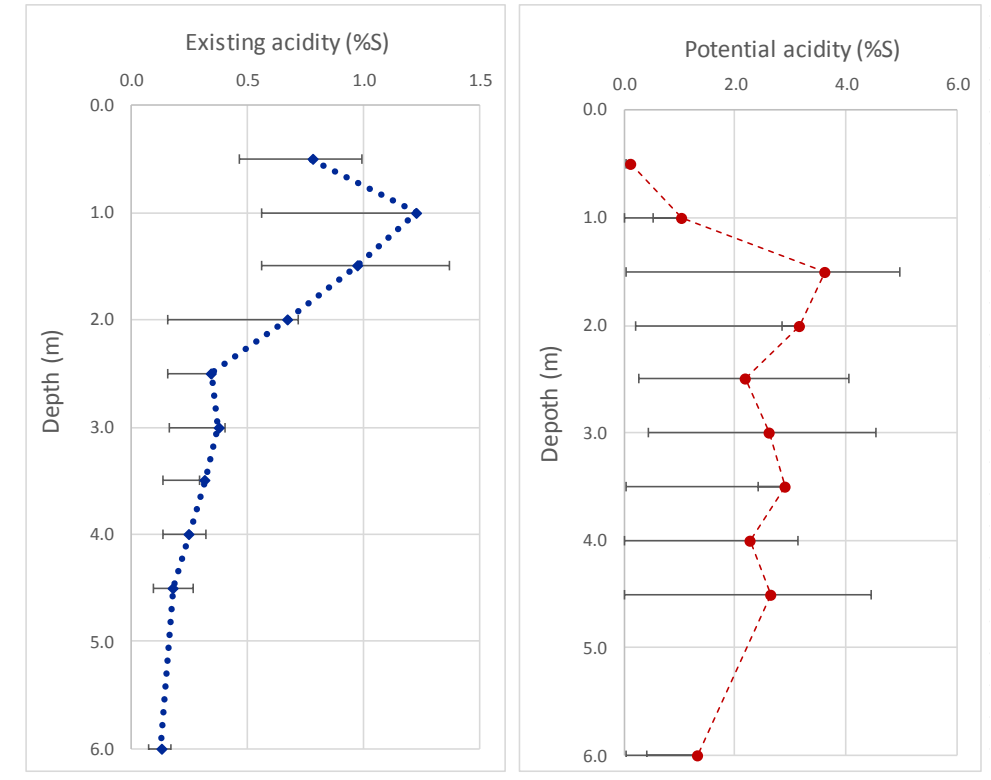

Figure 3-4 Average, 25th and 75th percentile (show as error bars) of existing and potential acidity with depth (aggregate from 0.5 m intervals)

In addition to trends throughout soil profiles discussed above, spatial trends were also assessed using subsurface 3D geological modelling software Leapfrog Works (Leapfrog). This has been used to show the 3D spatial distribution of the boreholes with respect to existing and potential acidity in Yeodene Swamp. A radial basis function linear interpolation was applied to the numerical borehole data to create two 3D numerical heat map models showing the 3D spatial distribution of potential and existing acidity within the swamp.

The models were bound by the topography and a horizontal elevation of 135.8 m AHD (the lowest elevation of coring at BH01). Ellipsoid ratios of 9, 9 and 1 were applied for the maximum, intermediate and minimum directions of the model (x, y and z) respectively. This yields a greater emphasis on the horizontal plane of the models rather than the vertical plain for both models. This was undertaken to allow for the numerical value at a specific borehole and depth to have a greater effect horizontally where no data was available. The purpose of these models is to allow discussion of spatial trends in acidity to be discussed and not the full quantification of acid stores.

Figure 3-5 and Figure 3-6 show a horizontal slice with a slight dip at approximate depths at 0 – 2 m bgl for existing acidity and 2 – 6 m bgl for potential acidity. Figure 3-5 illustrates that the highest concentrations of existing acidity tend to occur throughout the upstream areas of the swamp at BH18, BH14, BH12 and BH11. In these boreholes, concentrations of existing acidity exceed 2.0 %S in the upper 2.0 m of the soil profile (approximately double the average concentration for this interval through the swamp).

Similarly, concentrations of potential acidity tend to be higher in the same general area, with concentrations exceeding 10 %S at BH18, BH15 and BH14. However, similar concentrations were also observed through the through the downstream portion of the swamp at discrete intervals in BH4, BH5, BH6, BH8, BH9 and BH10.

Conversely, throughout the central area of the swamp (at BH11 and BH12), only one sample was collected with a concentration of potential acidity exceeding 1 %S. The average concentration across samples from BH11 and BH12 was 0.58 %S, compared to the average concentration of potential acidity of 6.2 %S at BH18. While this illustrates the reduction in potential acidity that are observed through the central portion of the swamp, it should be noted that such concentrations are still ~20 times greater than the net acidity limit for classification of ASS.

Given this, it can be concluded that regardless of specific location within the swamp, significant stores of potential acidity are likely to exist that should be taken into account when considering management strategies.

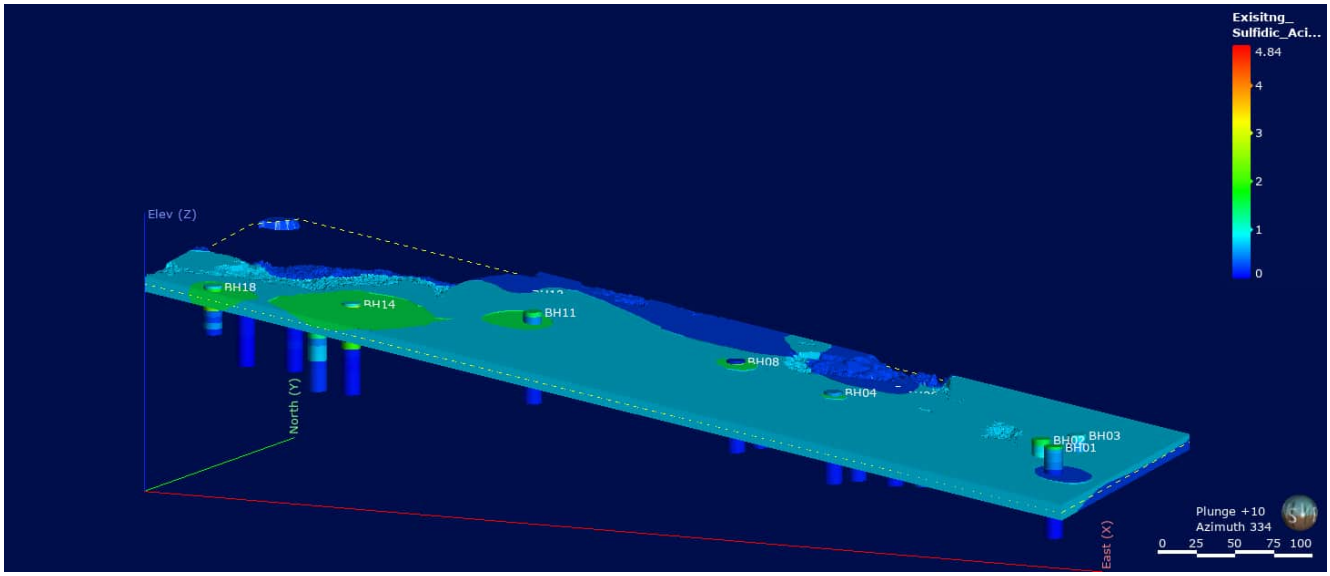

Figure 3-5 Existing acidity heat map sliced at 0 – 2 m depth

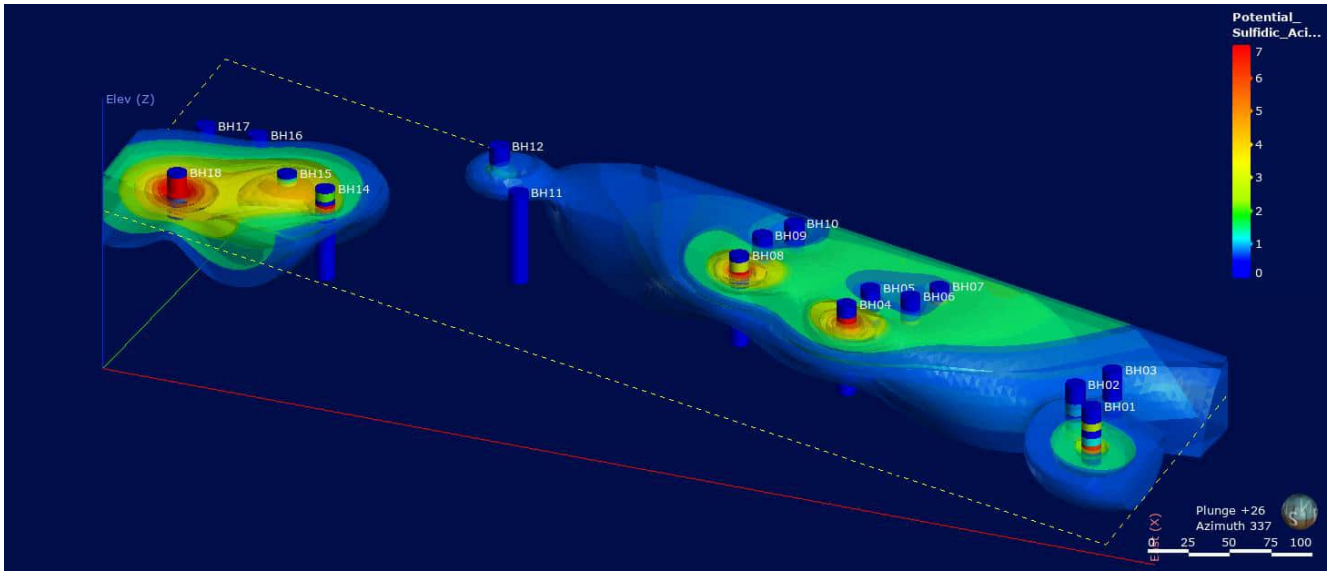

Figure 3-6 Potential acidity heat map sliced at 2 – 6 m depth

4. Summary and conclusions

4.1 Summary

This report details the outcomes of a field program involving soil sample collection at 17 sites for subsequent static geochemical analysis of acid suflate soils, the construction of 17 well at these sites, the deployment of groundwater level loggers in each well, aquifer permeability testing at each site and groundwater level monitoring. The outcomes of the field program can be summarised as follows.

4.1.1 Lithological logs and soil sample collection

A total of 181 soil samples were collected across 17 sites via a combination of push tube and rotary auger drilling. Each core was logged, photographed and samples were collected and handled in accordance with Sullivan et al. (2018) during transfer to Monash University for static geochemical analysis.

Lithological logs indicate the presence of silts, clays and discrete sands and in the upper 6 m of the soil profile throughout Yeodene Swamp. This is consistent with the occurrence of alluvial deposits. Logs also indicate a relatively high organic matter content within the soil profile.

4.1.2 Well construction and logger installation

A total of 16 wells were constructed. Of these, 13 were constructed to a depth of ~6 m bgl with 50 mm uPVC using a drilling rig. An additional 3 wells were constructed by hand to depths of 3 to 4 m bgl with 26 mm uPVC. Wells were finished with a stick up of ~0.70 m and a steel lockable standpipe.

Solinst groundwater level loggers were deployed in each well to a depth approximately 1 m above the well's total depth. Loggers were set to record levels at a 1 hr frequency. A total of 17 groundwater loggers were deployed including 16 at the newly installed wells and one in a previously installed well (BH18 previously termed YS05 in the Yeodene Swamp Study – Jacobs, 2018b). One Barometric level logger was also installed at BH01.

4.1.3 Aquifer permeability testing

Slug tests were undertaken at each of the 17 newly installed wells. Hydraulic conductivities ranged from 0.02 to 1.8 m/day, with an average conductivity of 0.50 m/day and a standard deviation of 0.62 m/day. This is broadly consistent with the range in hydraulic conductivities expected for unconsolidated silts (Domenico and Schwartz, 1990).

4.1.4 Groundwater levels

Groundwater levels varied between 1.4 and -0.10 m bgl (negative sign denotes groundwater levels above ground surface – artesian conditions). Depth to watertable mapping indicates groundwater levels near to the surface (<0.5 m bgl) in the lower reaches of the swamp (near BH02) and through the north west portion of the swamp.

4.1.5 Static geochemical test work

181 samples were analysed for organic carbon content and classified according to Huang et al., (2009). Accordingly, 26% of soil samples collected were classified as mineral soils, 24% as mineral soils with organics, 43% as organic soils and 8% as peat. In summary, while most soil samples are classified as organic soils or soils with organics, only a small proportion are technically classified as peat.

Sulfate concentrations ranged from 0.9 mg/L to 5,100 mg/L with an average concentration of 284 mg/L. The average concentration of sulfate in soil samples at 0.5 m intervals increased from 165 mg/L at 0.5 m to 686 mg/L at 1.0 m depth. Concentrations below this subsequently declined to an average of between 130 and 160 mg/L to 6.0 m depth.

Of the 181 samples analysed, 180 exceed the 0.03 %S net acidity concentration limit for characterisation as acid sulfate soils. Acid neutralising capacity was below detection in all samples. This indicates that within the soils sampled, there is no capacity to neutralise any of the existing acid present, or any potential acidity that may be released upon further oxidation.

Concentrations of existing acidity tend to decline with depth. The average concentration of throughout all cores was >0.5 %S in the upper 2.0 meters of the soil profile, 0.25 %S at 4.0 meters depth and 0.13 %S below 4.5 m depth.

Significant concentrations of potential acidity (sulfide) exist in soils collected from the subsurface of the swamp. The average potential acidity increased from 0.12 %S in the top 0.5 m of the soil profile to 3.6 %S at 1.5 m depth. Average concentrations variably declined from 3.6 %S at 1.5 m depth to 1.3 %S below 4.5 m depth. The results indicate that significant stores of potential acidity remain throughout the soil profile of the swamp, and that future drying and oxidation of these soils may result in acid generation.

4.2 Conclusions

Within the context of the Boundary Creek and Big Swamp Remediation and Environmental Protection Plan, a number of conclusions can be drawdown from the above investigations which have the capacity to answer or inform research questions that have remained unresolved to date. The conclusions and relevant research questions have been listed below:

4.2.1 Question 4: Is there a hydraulic connection between Big Swamp and the Lower Tertiary Aquifer?

The dominance of clays and silts and limited occurrence of sand through the cores suggests that connection between the LTA and the swamp may be limited. Further, the shallow groundwater levels are not indicative of significant drawdown at the swamp. However, the results presented here are not conclusive and are likely to be better resolved through water balance assessments that will be undertaken in other studies.

4.2.2 Question 5: Are there preferential surface or subsurface flow paths in Big Swamp?

Elevated hydraulic conductivities were observed at BH06, BH09, BH10, BH11, BH12 and BH16. These are predominantly located through the centre of the swamp and may suggest higher groundwater flow rates through these areas. However, neither lithological logs nor slug tests suggest the occurrence of a pervasive unit of elevated permeability that promotes subsurface flow. Given the alluvial nature of sediments through the swamp and the dominance of clay and silt, it is likely that groundwater flow will be dominantly horizontal.

4.2.3 Question 6: How much actual and potential acidity is currently stored in Big Swamp?

The static geochemical test work presented within this report provides sufficient data to quantify the amount of existing and potential acidity within the swamp. While full quantification is beyond the scope of this report, further interrogation of the data and refinement of the models in section 3.4.2 could be used for this purpose.

4.2.4 Question 7: How much sulfate remains in the sediment profile in the swamp?

Results indicate average sulfate concentrations of >400 mg/L in the upper 2 m of the soil profile throughout the swamp. Trends in sulfate concentrations with depth are similar to those given by existing acidity vs depth. This suggests that the products of sulfide oxidation (including sulfate) have been retained in the soil profile to some degree. The capacity for these to react and generate alkalinity under different conditions is being assessed separately by Monash University.

4.2.5 Question 8: How much bioavailable carbon is currently stored in Big Swamp that can be used to promote biogeochemical processes?

The static geochemical results presented within this report provide an indication of the organic carbon content, which was found to be >15% in greater than half of all samples collected. The bioavailability of this carbon has not been assessed as part of this study.

4.2.6 Question 13: How extensive is fire damage to the peat in Big Swamp?

Charring and the occurrence of burnt material within soil profiles was limited to the upper 0.5 m of the soil profiles in cores taken towards the western portion of the swamp. However as discussed in section 3.4, peat layers did not dominate the soil profile.

5. References

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Appendix A. Borehole logs and groundwater monitoring well construction details

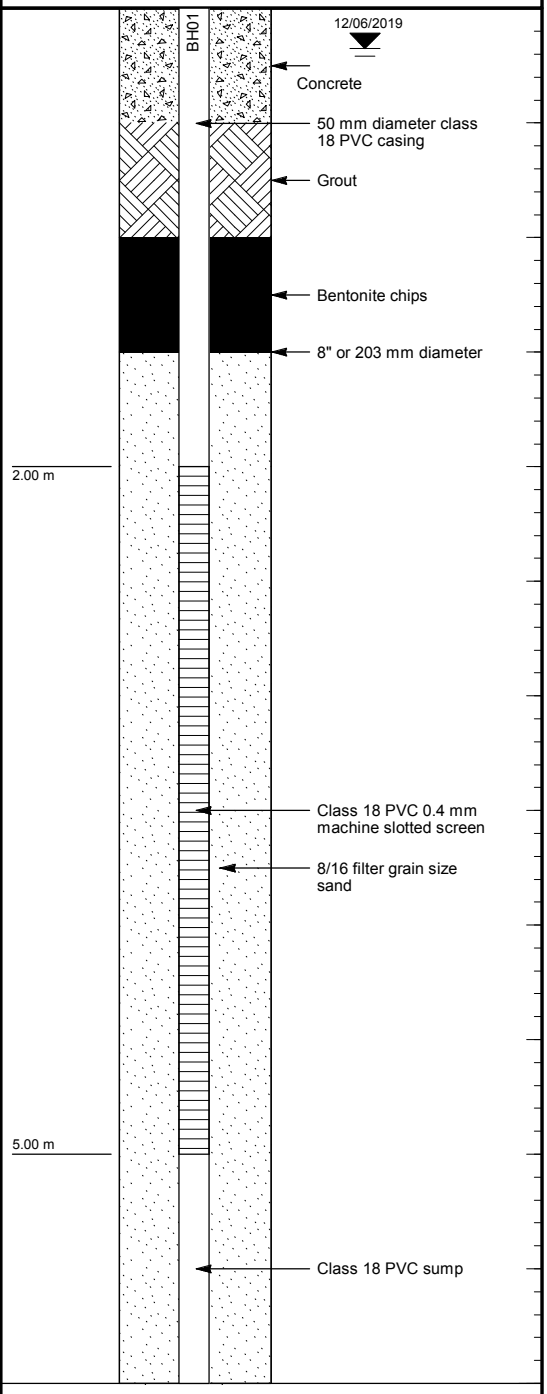
Piezometer Installation Details

BH01

Project: Yeodene Swamp ASS field investigation **Page:** 1 of 1
Client: Barwon Water **Location:** Yedodene Swamp **Project No:** IS288600

Contractor:	GoDrill	**Easting:**	735858.9	**Elevation:**	141.86	**Started:**	17/05/0219
Plant:	Geoprobe	**Northing:**	5743834.9	**Datum:**		**Finished:**	17/05/0219
Logged by:	NU **Checked by:** GH	**Grid:**	MGA94 Zone 54	**Inclination:**	-90°	**Orientation:**	

DRILLING				MATERIAL SUBSTANCE		INSTALLATION DETAILS			
Method & Support	Water	RL (m)	Depth (m)	Graphic Log	Description of Strata	ID	Type	Stick Up & RL	Tip Depth & RL
						BH01	Standpipe	0.60 m 142.5 m	6.00 m 135.86 m
PT	12/06/2019	141	1		Clayey SILT with some sand: brown black with orange and red staining, dry to moist, loose poor cohesion, many roots and rootlets				
					Clayey SILT: low plasticity, dark brown-dark grey, moist, loose with some cohesion				
					Silty CLAY: low to moderate plasticity, medium to dark brown with bright orange mottles, moist, soft, cohesive, some hard fibres 5mm incisions (peat)				
					Silty CLAY with trace gravels: low plasticity, dark brown to black, wet, soft, angular gravels, high organic content (rootlets and decaying material)				
		140	2			2.00 m			
		139	3						
		138	4						
AD/T		137	5		Clayey SILT with some sand: low plasticity, dark grey to medium grey, wet, soft poor cohesion, fine sand, limited organic materials	5.00 m			
		136	6						
					Hole Terminated at 6.00 m				



DRILLING

PT - Push Tube
AD/T - Auguer drilling with tc-but

GROUNDWATER SYMBOLS

= Water level (static) = Water level (during drilling)

Piezometer Installation Details

BH02

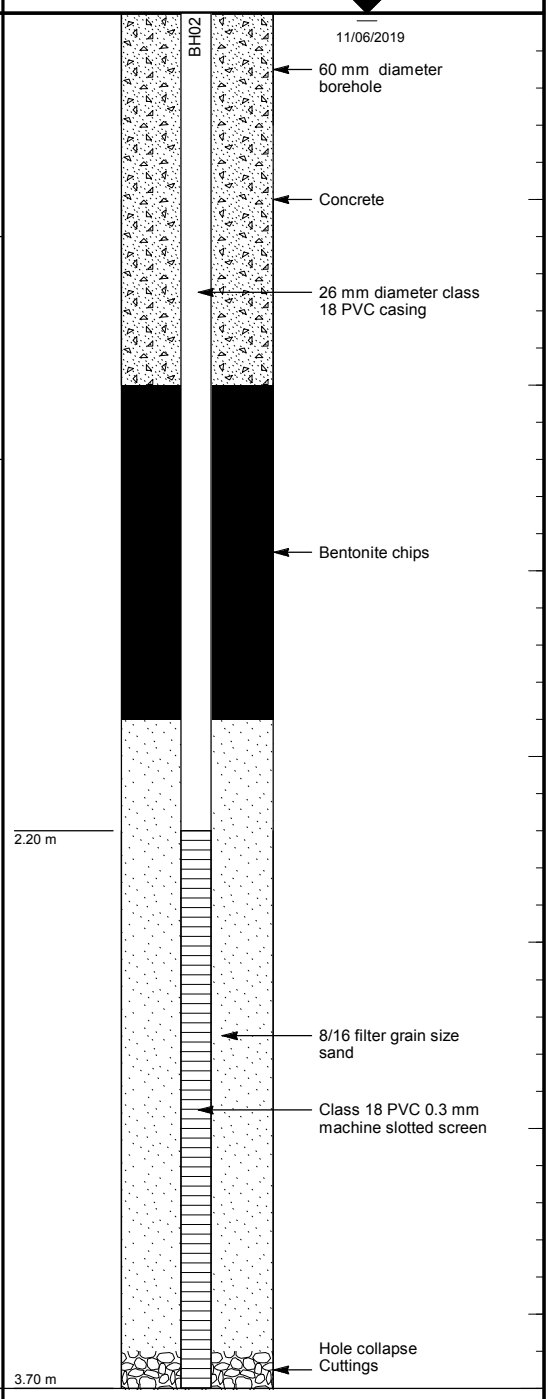
Project: Yeodene Swamp ASS field investigation
Page: 1 of 1
Client: Barwon Water
Location: Yedodene Swamp
Project No: IS288600

Contractor:	GoDrill	**Easting:**	735838.9	**Elevation:**	141.75	**Started:**	07/05/2019
Plant:	Petrol driven and sampler	**Northing:**	5743863.1	**Datum:**		**Finished:**	07/05/2019
Logged by:	NU **Checked by:** GH	**Grid:**	MGA94 Zone 54	**Inclination:**	-90°	**Orientation:**	

DRILLING | MATERIAL SUBSTANCE | INSTALLATION DETAILS

Method & Support	Water	RL (m)	Depth (m)	Graphic Log	Description of Strata
PT	11/06/2019	141	0.5		Clayey SILT: orange-brown, wet, soft loose granular texture and dispersible grains
			1.0		Clayey SILT: dark brown to black brown with orange mottles, wet, soft loose, dispersible angular texture, poor cohesion
		140	1.5		Silty CLAY: low to moderate plasticity, dark grey, wet, soft, cohesive, decaying organic material
			2.0		
		139	2.5		
			3.0		
			3.5		
					Hole Terminated at 3.70 m

ID	Type	Stick Up & RL	Tip Depth & RL
BH02	Standpipe	1.16 m 142.9 m	3.70 m 138.05 m



DRILLING

PT - Push Tube
AD/T - Auguer drilling with tc-but

GROUNDWATER SYMBOLS

▼ = Water level (static) ▽ = Water level (during drilling)

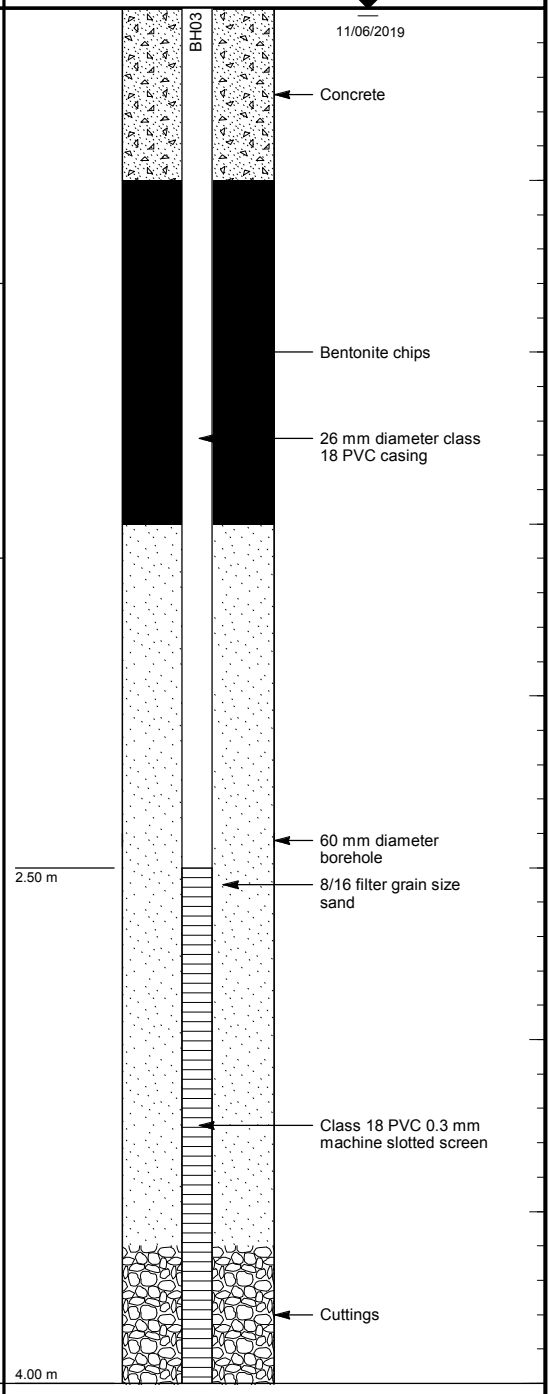
Piezometer Installation Details

BH03

Project: Yeodene Swamp ASS field investigation
Page: 1 of 1
Client: Barwon Water
Location: Yedodene Swamp
Project No: IS288600

Contractor:	GoDrill	**Easting:**	735853.3	**Elevation:**	141.74	**Started:**	07/05/2019
Plant:	Petrol driven and sampler	**Northing:**	5743889.0	**Datum:**		**Finished:**	07/05/2019
Logged by:	NU **Checked by:** GH	**Grid:**	MGA94 Zone 54	**Inclination:**	-90°	**Orientation:**	

DRILLING				MATERIAL SUBSTANCE		INSTALLATION DETAILS			
Method & Support	Water	RL (m)	Depth (m)	Graphic Log	Description of Strata	ID	Type	Stick Up & RL	Tip Depth & RL
						BH03	Standpipe	1.20 m 142.94 m	4.00 m 137.74 m
PT	11/06/2019	141.5	0.5		Clayey SILT: orange-red with dark brown mottles, wet, loose granular texture that disaggregates, some rootles and organic matter				
		141.0	1.0		Clayey SILT: dark brown with orange and red mottles, wet, loose poor cohesion, angular texture, few rootlets present				
		140.5	1.5						
		140.0	2.0		Silty CLAY: low plasticity, brown to grey, wet, soft cohesive buttery texture with some rootlets and decaying organic material				
		139.5	2.5						
		139.0	3.0						
		138.5	3.5						
		138.0	4.0		Hole Terminated at 4.00 m				



DRILLING

PT - Push Tube
AD/T - Auguer drilling with tc-but

GROUNDWATER SYMBOLS

▼ = Water level (static) ▽ = Water level (during drilling)

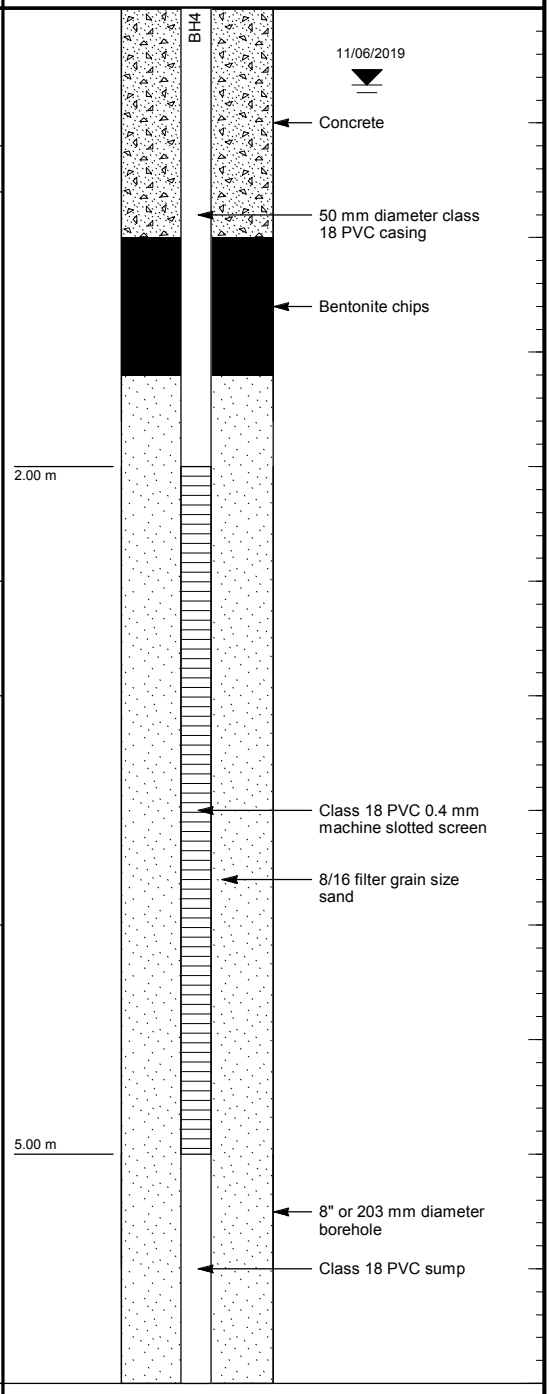
Piezometer Installation Details

BH04

Project: Yeodene Swamp ASS field investigation
Page: 1 of 1
Client: Barwon Water
Location: Yedodene Swamp
Project No: IS288600

Contractor:	GoDrill	**Easting:**	735682.3	**Elevation:**	143.37	**Started:**	24/04/2019
Plant:	Geoprobe	**Northing:**	5743890.3	**Datum:**		**Finished:**	24/04/2019
Logged by:	NU **Checked by:** GH	**Grid:**	MGA94 Zone 54	**Inclination:**	-90°	**Orientation:**	

DRILLING				MATERIAL SUBSTANCE		INSTALLATION DETAILS			
Method & Support	Water	RL (m)	Depth (m)	Graphic Log	Description of Strata	ID	Type	Stick Up & RL	Tip Depth & RL
						BH4	Standpipe	0.82 m 144.19 m	6.00 m 137.37 m
PT	11/06/2019	143	0		Clayey SILT: red with white mottles, dry, firm to hard grains, no cohesion, dark abundant roots/rootlets and decaying organic matter				
					Clayey SILT: dark brown to black with some yellow brown mottles, moist, loose poor cohesion, crumbly, some roots				
		142	1		Silty CLAY: moderate to low plasticity, dark brown to black, moist, soft, cohesive, abundant decaying organic material				
		141	2		Clayey SAND with some silt: low plasticity, wet, soft, cohesive, medium size sand, no organic matter				
		140	3		Silty CLAY with trace sand: moderate to low plasticity, medium grey, wet, soft, no organic matter				
AD/T		139	4		CLAY with a trace sand: moderate to high plasticity, dark grey, most, stiff to very stiff, fine to medium grained sand				
		138	5						
			6		Hole Terminated at 6.00 m				



DRILLING

PT - Push Tube
AD/T - Auguer drilling with tc-but

GROUNDWATER SYMBOLS

▼ = Water level (static) ▽ = Water level (during drilling)

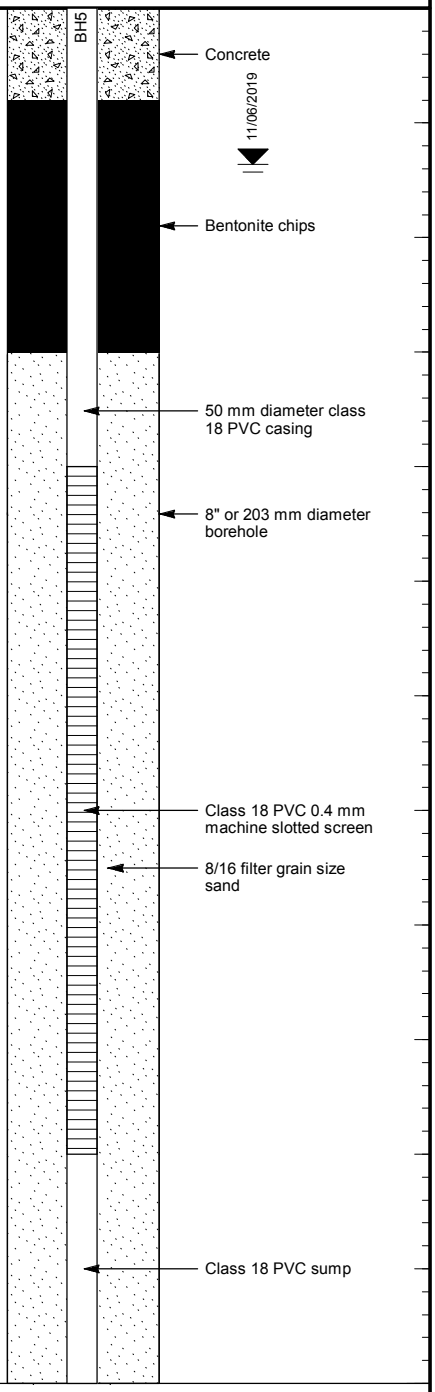
Piezometer Installation Details

BH05

Project: Yeodene Swamp ASS field investigation
Page: 1 of 1
Client: Barwon Water
Location: Yedodene Swamp
Project No: IS288600

Contractor:	GoDrill	**Easting:**	735686.9	**Elevation:**	143.08	**Started:**	18/04/2019
Plant:	Geoprobe	**Northing:**	5743921.0	**Datum:**		**Finished:**	18/04/2019
Logged by:	NU **Checked by:** GH	**Grid:**	MGA94 Zone 54	**Inclination:**	-90°	**Orientation:**	

DRILLING				MATERIAL SUBSTANCE		INSTALLATION DETAILS			
Method & Support	Water	RL (m)	Depth (m)	Graphic Log	Description of Strata	ID	Type	Stick Up & RL	Tip Depth & RL
						BH5	Standpipe	0.80 m 143.88 m	6.00 m 137.08 m
PT	11/06/2019	143			Sandy SILT with some clay: orange red to yellow brown, dry, loose hard granular sand texture, rootlets abundant				
					Silty CLAY: low to moderate plasticity, dark brown with red mottles, moist, soft to firm, some organic matter				
					Clayey SILT: low plasticity, dark brown, wet, soft, cohesive, some fibrous inclusions (peat)				
		142	1						
					Silty CLAY with trance of sand: low to moderate plasticity, dark brown, moist, soft to firm, some organic material, find sand				
		141	2			2.00 m			
			3		Clayey SILT with trace of sand: low plasticity, dark brown, wet, soft, cohesive, find sand				
		140							
		139	4		Silty CLAY: low plasticity, dark grey with some yellow brown mottles, wet, soft, cohesive				
AD/T		138	5			5.00 m			
			6		Hole Terminated at 6.00 m				



DRILLING

PT - Push Tube
AD/T - Auguer drilling with tc-but

GROUNDWATER SYMBOLS

▼ = Water level (static) ▽ = Water level (during drilling)

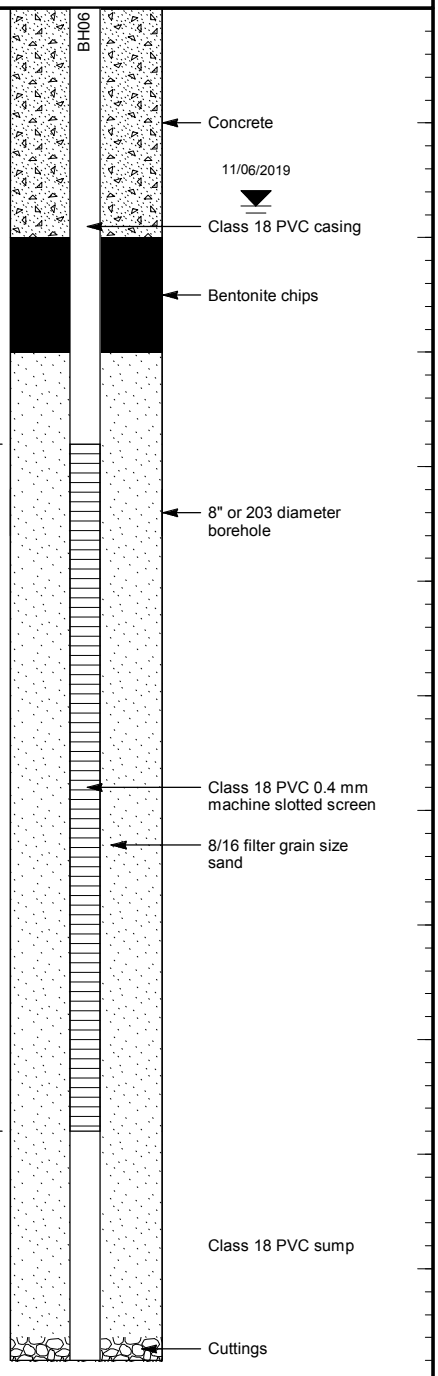
Piezometer Installation Details

BH06

Project: Yeodene Swamp ASS field investigation
Page: 1 of 1
Client: Barwon Water
Location: Yedodene Swamp
Project No: IS288600

Contractor:	GoDrill	**Easting:**	735712.2	**Elevation:**	142.90	**Started:**	18/04/2019
Plant:	Geoprobe	**Northing:**	5743922.1	**Datum:**		**Finished:**	18/04/2019
Logged by:	NU **Checked by:** GH	**Grid:**	MGA94 Zone 54	**Inclination:**	-90°	**Orientation:**	

DRILLING				MATERIAL SUBSTANCE		INSTALLATION DETAILS			
Method & Support	Water	RL (m)	Depth (m)	Graphic Log	Description of Strata ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, major defect type)	ID	Type	Stick Up & RL	Tip Depth & RL
						BH06	Standpipe	0.68 m 143.58 m	5.90 m 137.00 m
PT	11/06/2019	142	1		Clayey SILT with some sand: dark brown to red brown, dry, very loose, poor cohesion, granular texture, rootlets abundant, fine sands				
					Clayey SILT: dark brown/black with dark red rootles, moist, firm fibrous texture (peat), some rootles				
					SILT with some sand: yellow brown, dry, loose, poor cohesion, fine sand				
					Clayey SILT with trace sand: low plasticity, dark brown, moist, soft, fibrous texture (peat), find sand, organic material abundant				
		141	2		Silty CLAY: low to moderate plasticity, dark brown, wet, soft, abundant organics	1.90 m			
		140	3		Silty CLAY: low to moderate plasticity, dark brown, wet, soft, abundant organics				
AD/T		139	4						
		138	5		Silty CLAY: low to moderate plasticity, dark brown, wet, very soft, abundant organics	4.90 m			
		137	6		Hole Terminated at 6.00 m				



DRILLING

PT - Push Tube
AD/T - Auguer drilling with tc-but

GROUNDWATER SYMBOLS

▼ = Water level (static) ▽ = Water level (during drilling)

Piezometer Installation Details

BH07

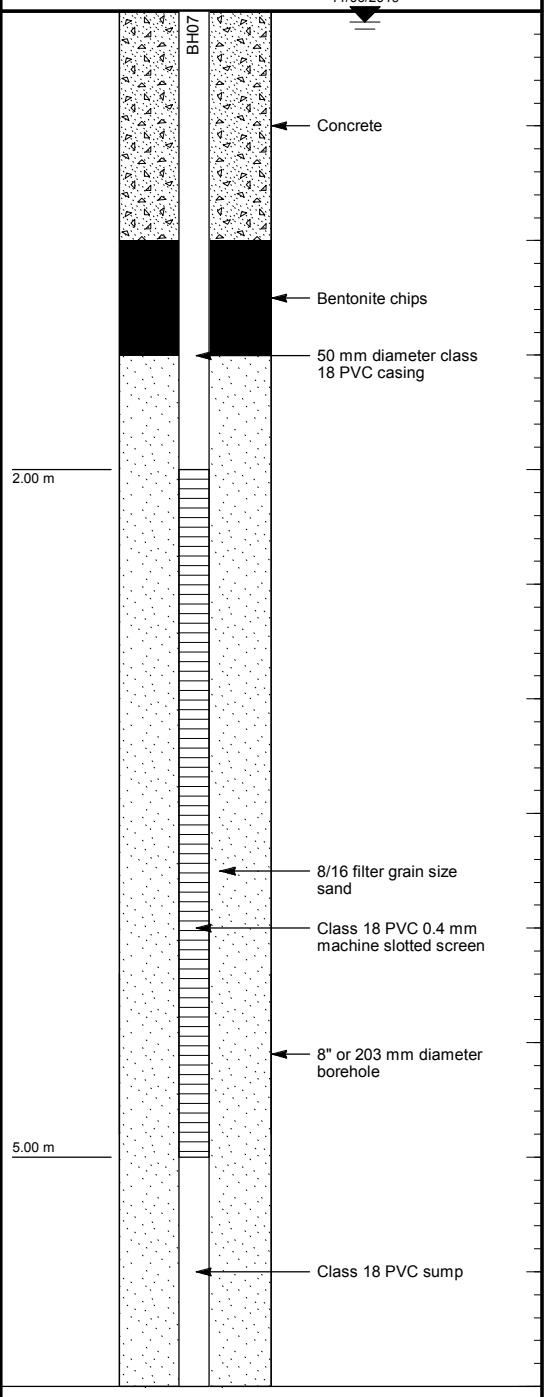
Project: Yeodene Swamp ASS field investigation
Page: 1 of 1
Client: Barwon Water
Location: Yedodene Swamp
Project No: IS288600

Contractor:	GoDrill	**Easting:**	735721.7	**Elevation:**	142.50	**Started:**	17/04/2019
Plant:	Geoprobe	**Northing:**	5743948.3	**Datum:**		**Finished:**	17/04/2019
Logged by:	NU **Checked by:** GH	**Grid:**	MGA94 Zone 54	**Inclination:**	-90°	**Orientation:**	

DRILLING | MATERIAL SUBSTANCE | INSTALLATION DETAILS

Method & Support	Water	RL (m)	Depth (m)	Graphic Log	Description of Strata ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, major defect type)
PT	11/06/2019	142	0		Clayey SILT: dark brown to black with orange/red grains, moist, loose, granular texture, rootlets abundant
					Clayey SILT with trace gravel: low plasticity, dark brown to back, moist, soft, cohesive, trace rootles, decaying organic material
					Silty CLAY: low plasticity, dark grey to dark brown, wet, soft, cohesive, high concentration of decaying organic material.
		141	1		
			2		
		140	3		
		139	4		
AD/T		138	5		
		137	6		Hole Terminated at 6.00 m

ID	Type	Stick Up & RL	Tip Depth & RL
BH07	Standpipe	0.56 m 143.05 m	6.00 m 136.50 m



DRILLING

PT - Push Tube
AD/T - Auguer drilling with tc-but

GROUNDWATER SYMBOLS

▼ = Water level (static) ▽ = Water level (during drilling)

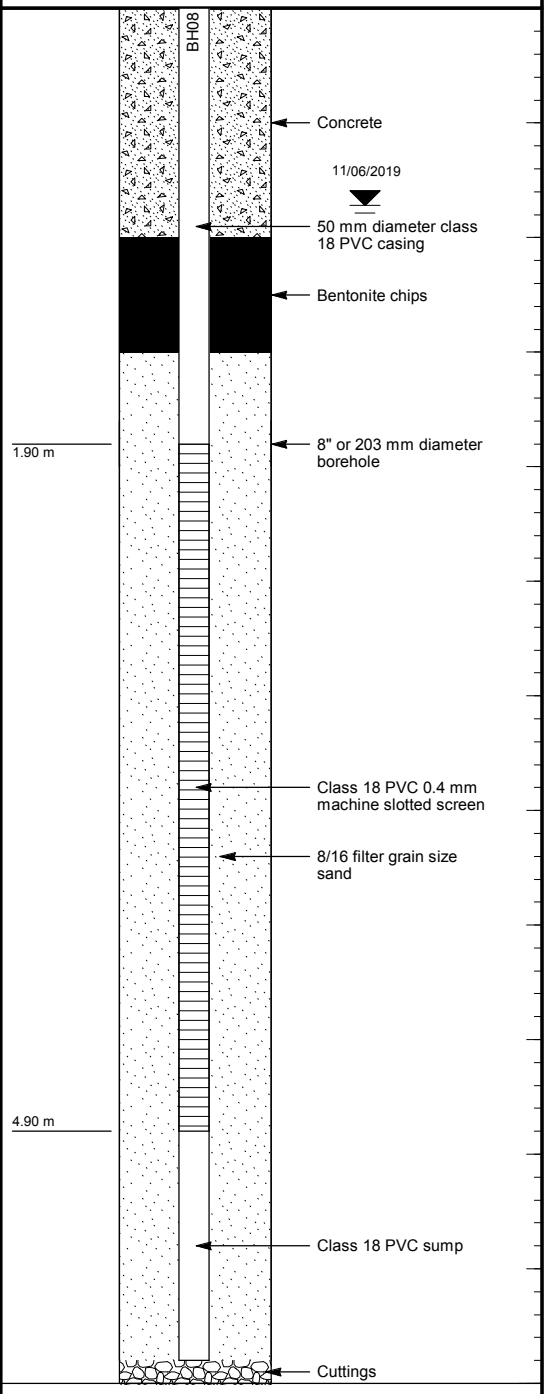
Piezometer Installation Details

BH08

Project: Yeodene Swamp ASS field investigation
Page: 1 of 1
Client: Barwon Water
Location: Yedodene Swamp
Project No: IS288600

Contractor:	GoDrill	**Easting:**	735607.0	**Elevation:**	144.62	**Started:**	25/04/2019
Plant:	Geoprobe	**Northing:**	5743908.6	**Datum:**		**Finished:**	25/04/2019
Logged by:	NU **Checked by:** GH	**Grid:**	MGA94 Zone 54	**Inclination:**	-90°	**Orientation:**	

DRILLING				MATERIAL SUBSTANCE		INSTALLATION DETAILS			
Method & Support	Water	RL (m)	Depth (m)	Graphic Log	Description of Strata ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, major defect type)	ID	Type	Stick Up & RL	Tip Depth & RL
						BH08	Standpipe	0.67 m 145.29 m	5.90 m 138.72 m
PT	11/06/2019	144	1		Sandy SILT: red with white mottles, dry, poor cohesion, hard grains in loose material, few rootlets				
					Clayey SILT: low plasticity, dark brown, moist, soft, cohesive, some rootlets				
					Silty CLAY with trace sand: moderate plasticity, dark grey to brown grey, moist, firm, fine sand, many rootlets				
		143	2		Sandy CLAY: low plasticity, grey with light grey mottles, moist, soft, cohesive, fine to medium sand, no rootlets	1.90 m			
		142	3		Silty CLAY with some sand: moderate to high plasticity, grey, moist, firm to stiff, fine to medium sand, trace organics				
		141	4		Silty SAND: light grey with some black mottles, wet, loose, medium grained sand				
AD/V		140	5			4.90 m			
		139	6		Hole Terminated at 6.00 m				



DRILLING

PT - Push Tube
AD/T - Auguer drilling with tc-but

GROUNDWATER SYMBOLS

▼ = Water level (static) ▽ = Water level (during drilling)

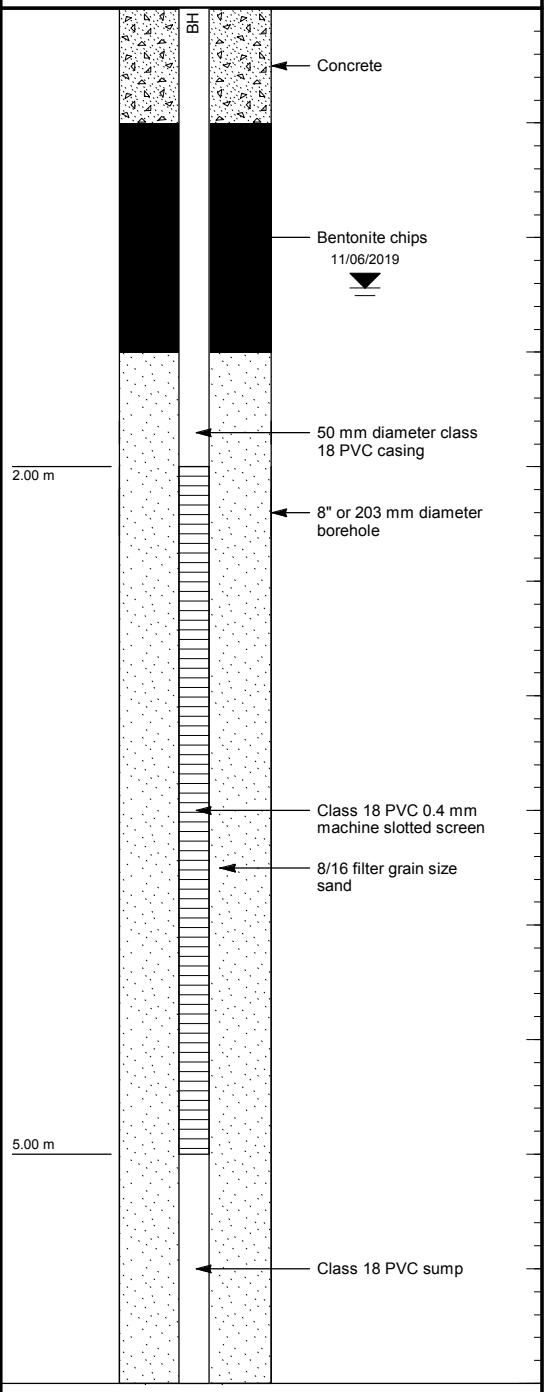
Piezometer Installation Details

BH09

Project: Yeodene Swamp ASS field investigation
Page: 1 of 1
Client: Barwon Water
Location: Yedodene Swamp
Project No: IS288600

Contractor:	GoDrill	**Easting:**	735609.7	**Elevation:**	144.36	**Started:**	24/04/2019
Plant:	Geoprobe	**Northing:**	5743944.4	**Datum:**		**Finished:**	24/04/2019
Logged by:	NU **Checked by:** GH	**Grid:**	MGA94 Zone 54	**Inclination:**	-90°	**Orientation:**	

DRILLING				MATERIAL SUBSTANCE		INSTALLATION DETAILS			
Method & Support	Water	RL (m)	Depth (m)	Graphic Log	**Description of Strata** ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, major defect type)	ID	Type	Stick Up & RL	Tip Depth & RL
						BH	Standpipe	0.68 m 145.04 m	6.00 m 138.36 m
PT	11/06/2019	144	1		SILT with trace sand: red to red brown, dry, loose, poor cohesion, find sand, decaying organic material				
		143			Clayey SILT with trace sand: dark brown, moist, loose, poor cohesion, friable				
		142	2		Silty CLAY: moderate to low plasticity, medium brown to grey, moist, firm, abundant organics				
			3		Silty CLAY: moderate to low plasticity, medium brown to grey, moist, firm to stiff, abundant organics				
		141			Silty CLAY: low to moderate plasticity, medium brown to grey, wet, soft to firm, increasing concentration of organics but variable				
			4		CLAY with some sand: high plasticity, medium grey with yellow brown mottles, moist, very stiff				
		140							
AD/T		139	5		Sandy CLAY: moderate plasticity, medium grey to yellow mottles, wet, firm				
			6		Hole Terminated at 6.00 m				



DRILLING

PT - Push Tube
AD/T - Auguer drilling with tc-but

GROUNDWATER SYMBOLS

▼ = Water level (static) ▽ = Water level (during drilling)

Piezometer Installation Details

BH10

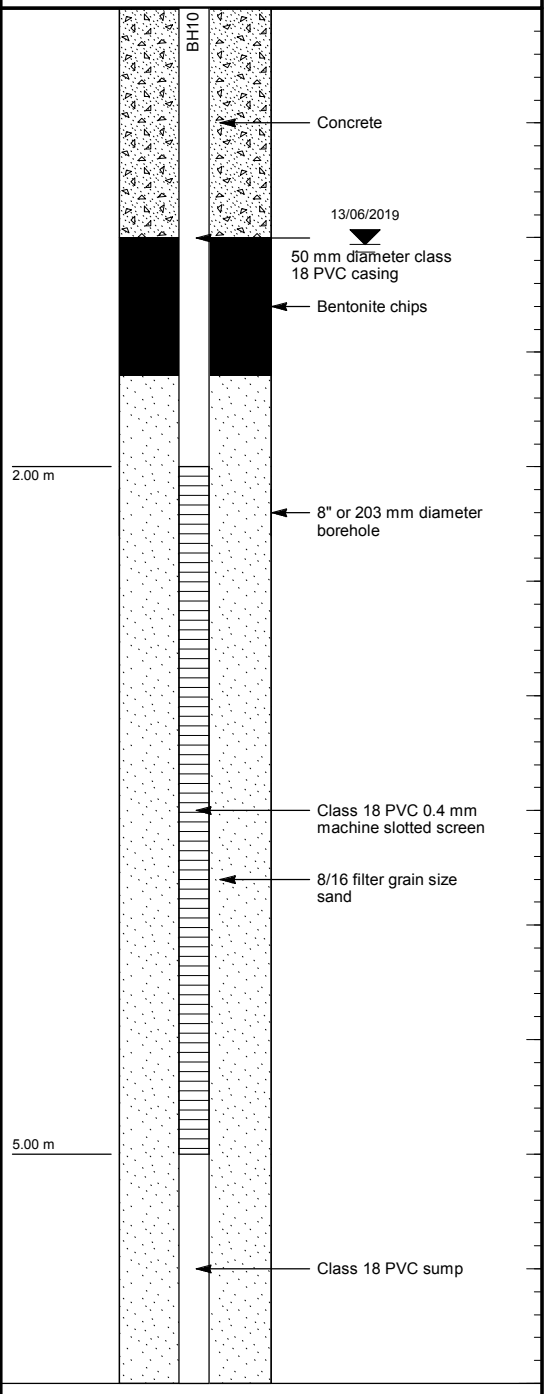
Project: Yeodene Swamp ASS field investigation
Page: 1 of 1
Client: Barwon Water
Location: Yedodene Swamp
Project No: IS288600

Contractor:	GoDrill	**Easting:**	735622.3	**Elevation:**	144.31	**Started:**	24/04/2019
Plant:	Geoprobe	**Northing:**	5743966.9	**Datum:**		**Finished:**	24/04/2019
Logged by:	NU **Checked by:** GH	**Grid:**	MGA94 Zone 54	**Inclination:**	-90°	**Orientation:**	

DRILLING | MATERIAL SUBSTANCE | INSTALLATION DETAILS

Method & Support	Water	RL (m)	Depth (m)	Graphic Log	Description of Strata ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, major defect type)
PT	13/06/2019	144	0		Clayey SILT: low plasticity, red to dark brown/black, cohesive, abundant leaf material at the surface, some rootlets
			1		Silty CLAY: moderate to low plasticity, dark brown-black, wet, soft to firm, cohesive, some rootlets, some granular incisions (peat)
		143			
			2		
		142			Clayey SILT: low plasticity, medium to dark brown, wet, very soft, abundant decaying organic material
			3		
		141			Silty CLAY: moderate to low plasticity, dark brown-dark grey with some orange mottles, wet, firm, varying concentrations of organics in lenses
			4		
		140			
AD/T			5		
		139			
			6		Hole Terminated at 6.00 m

ID	Type	Stick Up & RL	Tip Depth & RL
BH10	Standpipe	0.68 m 145.0 m	6.00 m 138.31 m



DRILLING

PT - Push Tube
AD/T - Auguer drilling with tc-but

GROUNDWATER SYMBOLS

▼ = Water level (static) ▽ = Water level (during drilling)

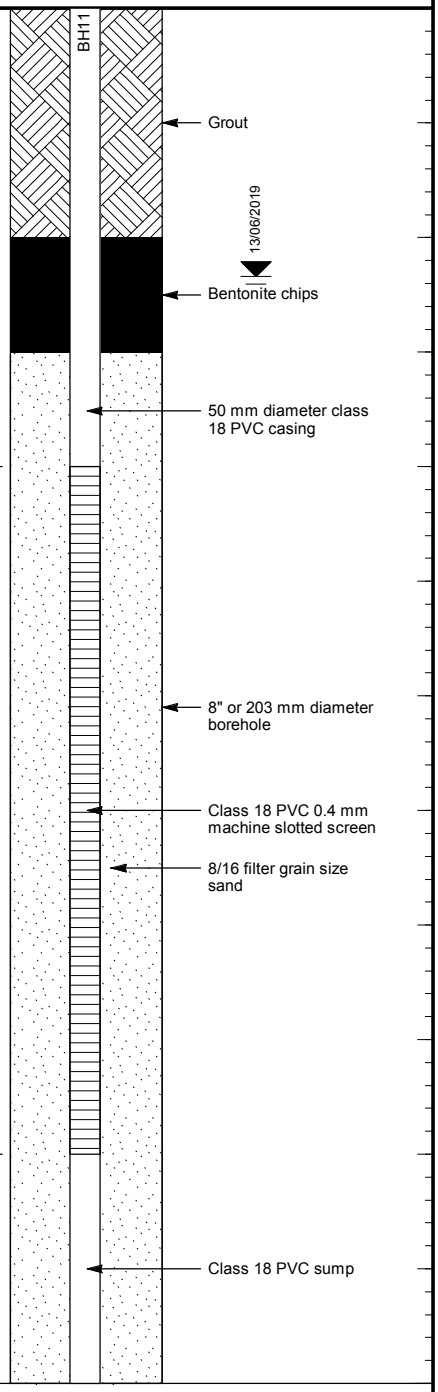
Piezometer Installation Details

BH11

Project: Yeodene Swamp ASS field investigation
Page: 1 of 1
Client: Barwon Water
Location: Yedodene Swamp
Project No: IS288600

Contractor:	GoDrill	**Easting:**	735469.3	**Elevation:**	147.09	**Started:**	08/05/2019
Plant:	Geoprobe	**Northing:**	5743898.0	**Datum:**		**Finished:**	08/05/2019
Logged by:	NU **Checked by:** GH	**Grid:**	MGA94 Zone 54	**Inclination:**	-90°	**Orientation:**	

DRILLING				MATERIAL SUBSTANCE		INSTALLATION DETAILS			
Method & Support	Water	RL (m)	Depth (m)	Graphic Log	Description of Strata ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, major defect type)	ID	Type	Stick Up & RL	Tip Depth & RL
						BH11	Standpipe	0.63 m 147.72 m	6.00 m 141.09 m
PT	13/06/2019	147	0		Clayey SILT with some sand: black brown with orange red mottles, dry, loose, fine sand, abundant rootlets				
					SAND with some silt: orange with white mottles, medium grained, dry, loose, some roots/rootlets				
		146	1		Silty CLAY: moderate plasticity, black brown, moist, firm, cohesive, abundant rootlets and organic material				
					Clayey SAND: grey, medium grain size				
		145	2		CLAY with some sand: high plasticity, medium grey, moist, stiff, find sand, some organic rootlets	2.00 m			
		144	3						
		143	4						
AD/T		142	5			5.00 m			
			6		Hole Terminated at 6.00 m				



DRILLING

PT - Push Tube
AD/T - Auguer drilling with tc-but

GROUNDWATER SYMBOLS

▼ = Water level (static) ▽ = Water level (during drilling)

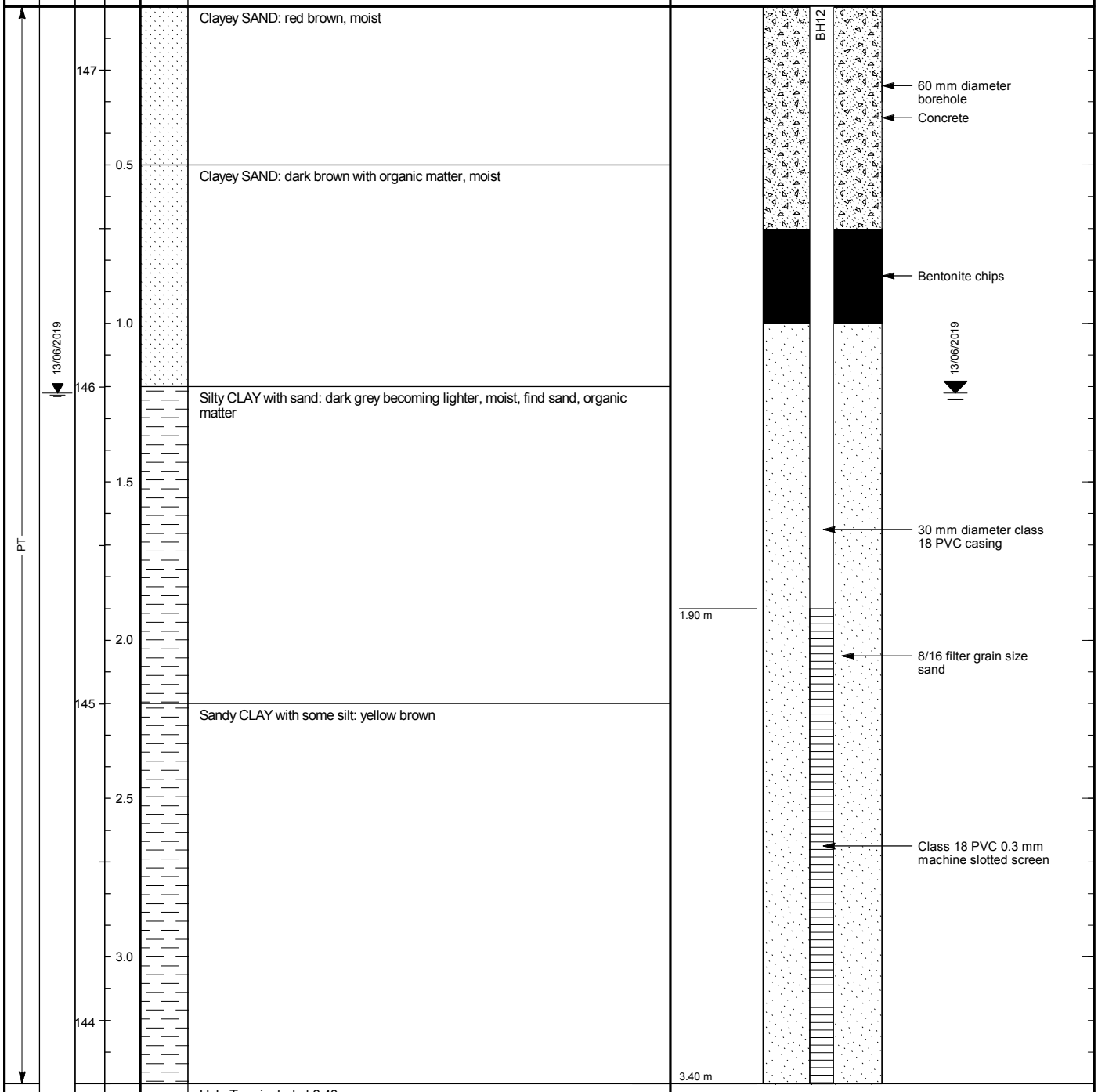
Piezometer Installation Details

BH12

Project: Yeodene Swamp ASS field investigation **Page:** 1 of 1
Client: Barwon Water **Location:** Yedodene Swamp **Project No:** IS288600

Contractor:	GoDrill	**Easting:**	735438.0	**Elevation:**	147.20	**Started:**	09/05/2019
Plant:	Hand auger	**Northing:**	5743952.7	**Datum:**		**Finished:**	09/05/2019
Logged by:	NU **Checked by:** GH	**Grid:**	MGA94 Zone 54	**Inclination:**	-90°	**Orientation:**	

DRILLING				MATERIAL SUBSTANCE		INSTALLATION DETAILS			
Method & Support	Water	RL (m)	Depth (m)	Graphic Log	Description of Strata ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, major defect type)	ID	Type	Stick Up & RL	Tip Depth & RL
						BH12	Standpipe	0.71 m 147.91 m	3.40 m 143.80 m



DRILLING

PT - Push Tube
AD/T - Auguer drilling with tc-but

GROUNDWATER SYMBOLS

▼ = Water level (static) ▽ = Water level (during drilling)

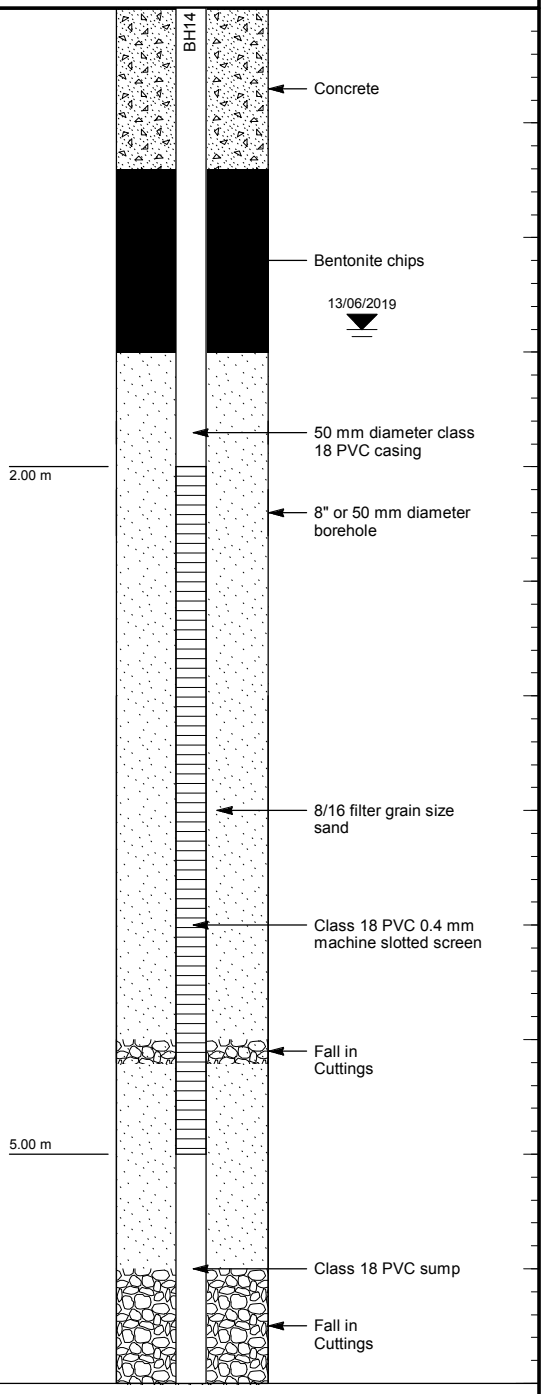
Piezometer Installation Details

BH14

Project: Yeodene Swamp ASS field investigation
Page: 1 of 1
Client: Barwon Water
Location: Yedodene Swamp
Project No: IS288600

Contractor:	GoDrill	**Easting:**	735360.8	**Elevation:**	147.67	**Started:**	25/04/2019
Plant:	Geoprobe	**Northing:**	5743853.1	**Datum:**		**Finished:**	25/04/2019
Logged by:	NU **Checked by:** GH	**Grid:**	MGA94 Zone 54	**Inclination:**	-90°	**Orientation:**	

DRILLING				MATERIAL SUBSTANCE		INSTALLATION DETAILS			
Method & Support	Water	RL (m)	Depth (m)	Graphic Log	Description of Strata ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, major defect type)	ID	Type	Stick Up & RL	Tip Depth & RL
						BH14	Standpipe	0.64 m 148.3 m	6.00 m 141.67 m
PT	13/06/2019	147	1		Clayey SILT: low plasticity, dark brown with red mottles, moist, soft, cohesive				
					Clayey SILT: low plasticity, dark brown to grey brown, moist, soft to firm, lenses of wet decaying wood				
					Silty CLAY: low to moderate plasticity, dark grey/brown, moist, soft to firm, cohesive, some fibrous grains (peat), some decaying organic matter				
		146	2		Clayey SILT with trace sand: light grey, wet, soft, find sand				
		145	3		CLAY with some sand: light grey, moist, firm to stiff, fine grained sand				
		144	4		Silty SAND with some clay: medium to fine grained, wet, loose, poor cohesion				
AD/T		143	5		SAND with trace gravel: light grey, wet, coarse, loose, poor cohesion, subrounded up to 10mm silicate gravels				
		142	6		Hole Terminated at 6.00 m				



DRILLING

PT - Push Tube
AD/T - Auguer drilling with tc-but

GROUNDWATER SYMBOLS

▼ = Water level (static) ▽ = Water level (during drilling)

Piezometer Installation Details

BH15

Project: Yeodene Swamp ASS field investigation
Page: 1 of 1
Client: Barwon Water
Location: Yedodene Swamp
Project No: IS288600

Contractor:	GoDrill	**Easting:**	735330.5	**Elevation:**	147.42	**Started:**	26/04/2019
Plant:	Geoprobe	**Northing:**	5743870.0	**Datum:**		**Finished:**	26/04/2019
Logged by:	NU **Checked by:** GH	**Grid:**	MGA94 Zone 54	**Inclination:**	-90°	**Orientation:**	

DRILLING				MATERIAL SUBSTANCE		INSTALLATION DETAILS			
Method & Support	Water	RL (m)	Depth (m)	Graphic Log	Description of Strata ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, major defect type)	ID	Type	Stick Up & RL	Tip Depth & RL
						BH15	Standpipe	0.66 m 148.1 m	6.00 m 141.42 m

PT

AD/T

13/06/2019

147

146

145

144

143

142

1

2

3

4

5

6

Silty CLAY with trace sand: low plasticity, red brown and black brown, moist, soft, cohesive, fine sand with some hard-cohesive grains

Silty CLAY: low plasticity, grey brown with red mottles, moist, soft, lenses of decaying organics

Silty CLAY: moderate plasticity, grey brown, moist, soft, some organics and rootlets

Silty CLAY: moderate plasticity, dark brown with orange red mottles, wet, soft to stiff, abundant organics

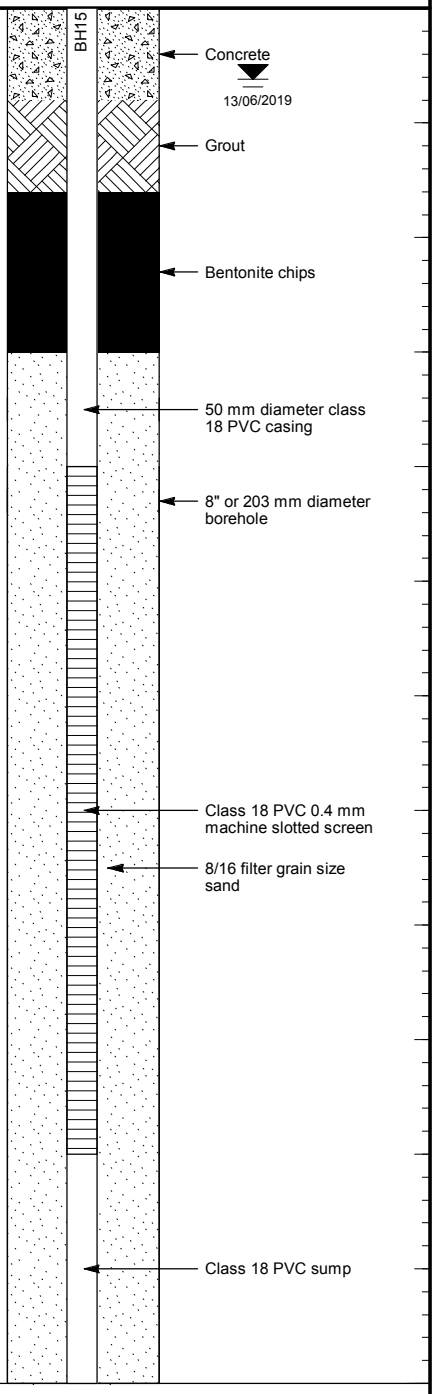
2.00 m

Silty CLAY with trace sand: low plasticity, brown grey, wet, soft to firm, fine sand, lenses of organics

Sandy CLAY with some silt: high plasticity, medium grey, wet, stiff, increased sand with depth

5.00 m

Hole Terminated at 6.00 m



DRILLING

PT - Push Tube
AD/T - Auguer drilling with tc-but

GROUNDWATER SYMBOLS

= Water level (static) = Water level (during drilling)

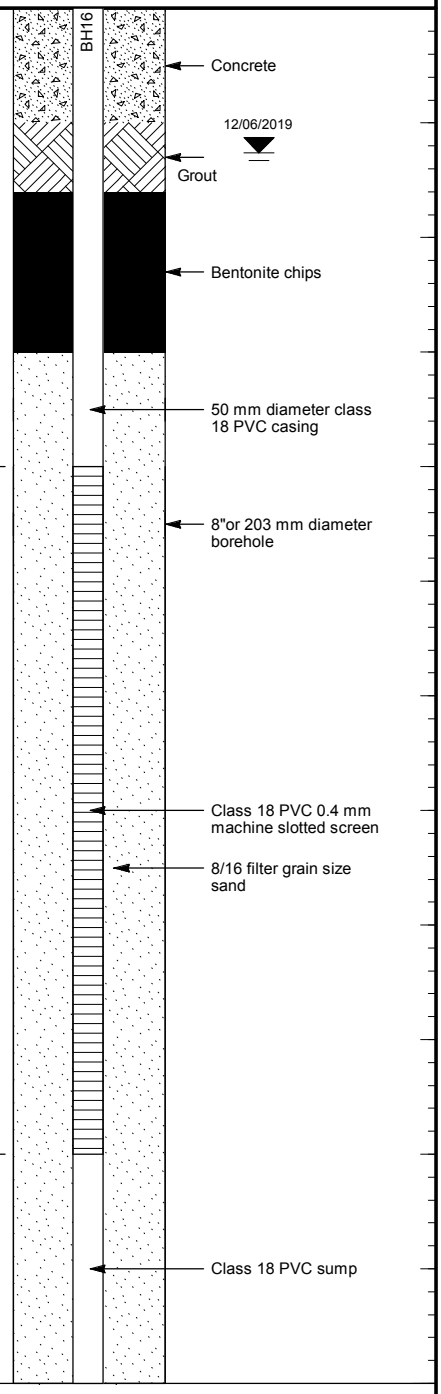
Piezometer Installation Details

BH16

Project: Yeodene Swamp ASS field investigation
Page: 1 of 1
Client: Barwon Water
Location: Yedodene Swamp
Project No: IS288600

Contractor:	GoDrill	**Easting:**	735300.1	**Elevation:**	147.99	**Started:**	07/05/2019
Plant:	Geoprobe	**Northing:**	5743903.5	**Datum:**		**Finished:**	07/05/2019
Logged by:	NU **Checked by:** GH	**Grid:**	MGA94 Zone 54	**Inclination:**	-90°	**Orientation:**	

DRILLING				MATERIAL SUBSTANCE		INSTALLATION DETAILS			
Method & Support	Water	RL (m)	Depth (m)	Graphic Log	Description of Strata ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, major defect type)	ID	Type	Stick Up & RL	Tip Depth & RL
						BH16	Standpipe	0.82 m 148.08 m	6.00 m 141.99 m
PT	12/06/2019	147	1		Silty CLAY with char: low plasticity, orange to red, moist, stiff, cohesive, dark brown pieces of char Sandy SILT: black brown, dry, loose, poor cohesion, some rootlets				
					Silty SAND: low plasticity, orange brown with some medium grey mottling, wet, loose, slightly cohesive, medium to fine grained sand becoming coarser with depth				
		146	2		Sandy CLAY: low plasticity, medium grey with orange mottles, wet, soft	2.00 m			
					CLAY with some sand: high plasticity, grey, wet, soft, fine sand				
		145	3		Sandy CLAY: moderate to low plasticity, grey, wet, soft				
		144	4		Sandy CLAY: orange with grey mottles, moist, soft to firm				
AD/T		143	5			5.00 m			
		142	6		Hole Terminated at 6.00 m				



DRILLING

PT - Push Tube
AD/T - Auguer drilling with tc-but

GROUNDWATER SYMBOLS

▼ = Water level (static) ▽ = Water level (during drilling)

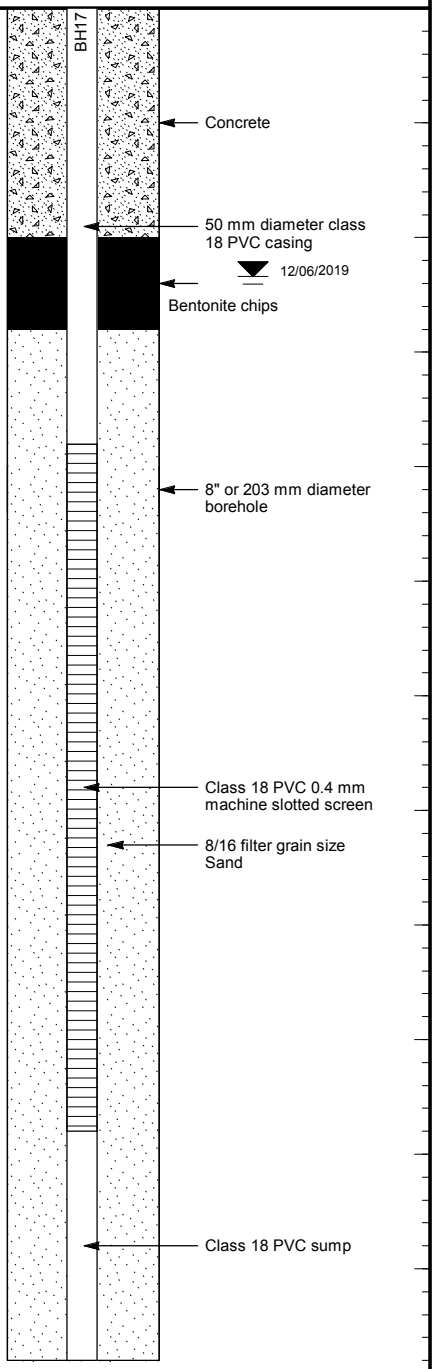
Piezometer Installation Details

BH17

Project: Yeodene Swamp ASS field investigation
Page: 1 of 1
Client: Barwon Water
Location: Yedodene Swamp
Project No: IS288600

Contractor:	GoDrill	**Easting:**	735266.8	**Elevation:**	148.10	**Started:**	06/05/2019
Plant:	Geoprobe	**Northing:**	5743903.0	**Datum:**		**Finished:**	06/05/2019
Logged by:	NU **Checked by:** GH	**Grid:**	MGA94 Zone 54	**Inclination:**	-90°	**Orientation:**	

DRILLING				MATERIAL SUBSTANCE		INSTALLATION DETAILS			
Method & Support	Water	RL (m)	Depth (m)	Graphic Log	Description of Strata ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, major defect type)	ID	Type	Stick Up & RL	Tip Depth & RL
						BH17	Standpipe	0.66 m 148.77 m	5.90 m 142.20 m
PT	12/06/2019	148	0		Sandy SILT with some clay: low plasticity, orange to red, dry to moist, loose, poor cohesion, abundant rootlets				
					Silty SAND: grey, fine to medium grained, dry, loose, poor cohesion, residual burnt peat				
		147	1		SAND: yellow brown, medium grained, dry, loose, poor cohesion				
					Sandy SILT: grey with yellow and brown mottles, moist, loose, poor cohesion				
			2			1.90 m			
		146			Sandy CLAY: low to moderate plasticity, light grey, moist, firm, sand fine grained sand				
		145	3						
					Sandy CLAY: low plasticity, light brown with dark grey mottles, wet, stiff				
		144	4		Silty SAND: light grey with yellow brown mottles, wet, loose, poor cohesion, silicates present				
					Clayey SAND: orange/brown, wet, loose, poor cohesion	4.90 m			
		143	5						
		142	6		Hole Terminated at 6.00 m				



DRILLING

NMLC NMLC Coring
NQ NQ Coring
HQ HQ Coring
PQ PQ Coring
TCR % core run recovered
RQD % core run > 100mm long (rock fraction only measured)

GROUNDWATER SYMBOLS

▼ = Water level (static)
▽ = Water level (during drilling)

JACOBS Engineering Log - Borehole

BH18

Project: Yeodene Swamp ASS field investigation
Page: 1 of 1
Client: Barwon Water
Location: Yedodene Swamp
Project No: IS288600

Contractor:	GoDrill	**Easting:**	735276.0	**Elevation:**	148.72	**Started:**	08/05/2019
Plant:	Geoprobe	**Northing:**	5743824.0	**Datum:**		**Finished:**	08/05/2019
Logged by:	NU **Checked by:** GH	**Grid:**	MGA94 Zone 54	**Inclination:**	-90°	**Orientation:**	

DRILLING INFORMATION | MATERIAL SUBSTANCE

Method & Support	Penetration	Groundwater Levels	Samples & SPT Data	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Moisture	Consistency Relative Density	Field Test Data & Other Observations
PT		▶		148	1		SW-SC	Sandy SILT: orange-red with black brown mottles, dry, loose, some char, dominated by FeOH	D	L	ALLUVIUM 0.00: Within burnt area
							CH	Silty CLAY: low to moderate plasticity, black brown with some mottles, moist, soft, cohesive	M		0.20: Organic odour
							CH	Silty CLAY: low to moderate plasticity, black brown with some orange red mottles, wet, soft, some pieces of char			
				147	2		CH	Silty CLAY with trace sand: moderate to low plasticity dark grey, wet, soft, find sand	W	S	1.60: Organic odour
				146	3		CH	Sandy CLAY: moderate to high plasticity, grey, wet, soft, medium size sand			
								Hole Terminated at 3.20 m			
				145	4						
				144	5						
				143	6						
				142	7						
				141	8						
				140	9						
				139							

METHOD & SUPPORT
HA Hand Auger
AS Auger
AD/V Auger - V-bit
AD/T Auger - TC-bit
WB Washbore
RR Rock Roller
AH Air Hammer
C Casing

PENETRATION
No resistance ranging to refusal

GROUNDWATER
▼ = Water level (static)
▽ = Water level (during drilling)
▶ = Water inflow
◀ = Water outflow

SAMPLES & FIELD TESTS

D	Disturbed Sample	N	SPT blows per 300mm
B	Bulk Sample	HW	SPT penetration by hammer weight
SPT	SPT Sample	RW	SPT penetration by rod weight
U	Undisturbed Sample	HP	Hand Penetrometer
E	Enviro Sample	HV	Hand Vane Shear
W	Water Sample	(P: Peak Su R: Residual Su)	

MOISTURE
D = Dry
M = Moist
W = Wet
Wp = Plastic Limit
Wl = Liquid Limit

DENSITY (N-value)

VL	Very Loose	0 - 4
L	Loose	4 - 10
MD	Medium Dense	10 - 30
D	Dense	30 - 50
VD	Very Dense	50 - 100

CONSISTENCY (Su) {N-value}

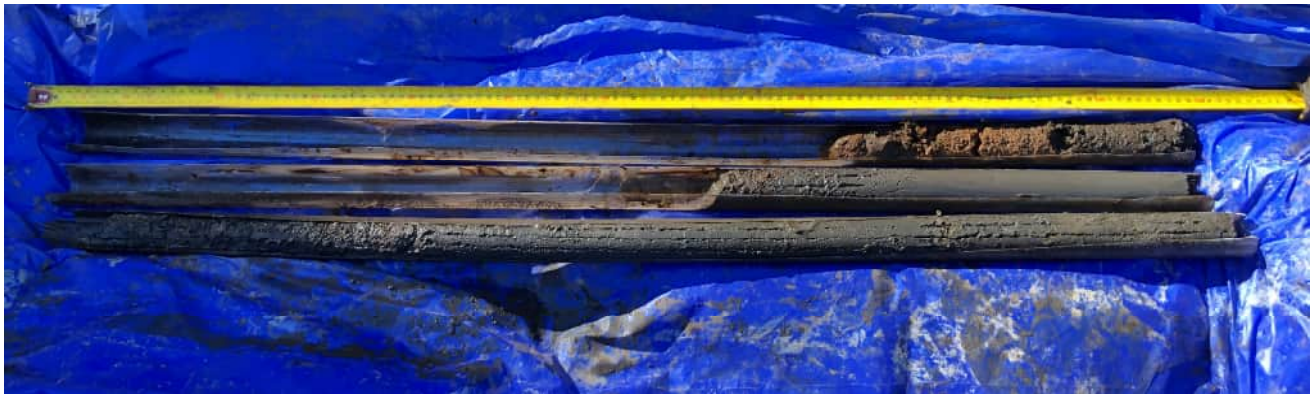
VS	Very Soft	< 12 kPa {0-2}
S	Soft	12 - 25 {2-4}
F	Firm	25 - 50 {4-8}
St	Stiff	50 - 100 {8-15}
VSt	Very Stiff	100 - 200 {15-30}
H	Hard	> 200 kPa {>30}

Appendix B. Push tube photographs

Appendix B. Push tube photographs

BH01, 0 to 4.5 m

BH02, 0 to 3.6 m



BH03, 0 to 3.7 m

BH04, 0 to 4.5 m

BH05, 0 to 4.5 m

BH06, 0 to 4.5 m

BH07, 0 to 4.5 m

BH08, 0 to 4.5 m

BH09, 0 to 4.5 m

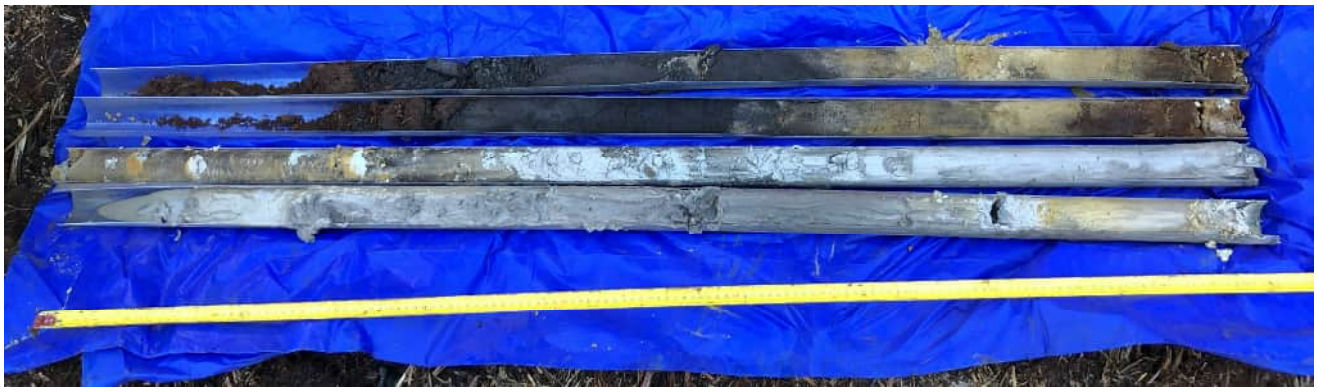
BH10, 0 to 4.5 m

BH11, 0 to 4.5 m

BH14, 0 to 4.5 m

BH15, 0 to 4.5 m

BH16, 0 to 4.5 m



BH17, 0 to 4.5 m

BH18, 0 to 3.4 m

Appendix C. Well completion photographs

Appendix C. Well completion photographs

BH01

BH02

BH03

BH04

BH05

BH06

BH07

BH08

BH09

BH10

BH11

BH12

BH14

BH15

BH16

BH17

Appendix D. Well completion reports

BH1

WATER ACT 1989
BORE COMPLETION REPORT

Southern Rural Water
Managing Water. Serving Communities.

SRW COPY –
To be sent to Southern Rural Water within 28 days of completion of bore.

LICENCE TO CONSTRUCT WORKS No. WLE 074097

Report on site 1 ☑ 2 ☐ 3 ☐ 4 ☐ 5 ☐

GPS CO-ORDS: E 735299 N 5743902

Drilled Bore ☑ Sprearpoint ☐ Well or Shaft ☐ Dragline ☐

ZONE: 54 / ~~55~~ (delete as applicable)

GDA 94/AD~~6~~6 (delete as applicable)

OFFICE USE ONLY
BORE NUMBER
BORE USES
GMA ..... ZONE .....

Bore Owner Barwon Water

Site Address 25 POSSUM RIDGE ROAD, YEODENE, VIC 3249 (Boundary Creek - Big Swamp)

Date Commenced 07 / 05 / 2019

Date Completed 07 / 05 / 2019

Total Depth 6 (m)

Was Bore Decommissioned? Y / N N

If Yes, State Method .....

1. DRILLING AND WATER INTERSECTION DETAILS

DRILLING TECHNIQUE				WATER INTERSECTIONS (while drilling, measurements taken from natural surface)									OFFICE USE
Method	From (m)	To (m)	Bit diam (mm)	From (m)	To (m)	Test Method	Static Level (m)	Est. yield l/sec	Draw down (m)	Casing at test (m)	Depth at test (m)	Ec at 25 C (µS/cm)	Lithology
Hollow Stem Auger	0	6	200										

2. CASINGS (CA) SCREENS (SC) SLOTS (SL) OPEN HOLE (OH)

GENERAL						CASING			SCREENS / SLOTS						OFFICE USE
Type CA	SC	SL	OH	From (m)	To (m)	Inner diam (mm)	Outer diam (mm)	Material	Inner diam (mm)	Outer diam (mm)	Material	Aperture (mm)	Filter Y / N	Trade Name	Lithology
☑	☐	☐	☐	6	5	50	60	C18 uPVC	26	32	C18 uPVC	0.3	N		
☐	☐	☑	☐	5	2	26	32	C18 uPVC	50	60	C18 uPVC	0.4	N		
☑	☐	☐	☐	2	+0.7	50	60	C18 uPVC							
☐	☐	☐	☐												
☐	☐	☐	☐												

100 x 100 steel monument cover

WELL HEAD FITTINGS

Casing Shoe Y / N

Bullnose / Sidcap Y / N Y

3. CEMENT (C) BENTONITE (B) SEALS (S) PACKERS (P) GRAVEL (G)

Material C	B	S	P	G	From (m)	To (m)	Cement (bags)	Water (litres)	Seal / Packer type	Outer diam of seal (mm)	Artificial Gravel Packing Method of placement	Gravel size mesh passing (mm)
☐	☐	☐	☐	☑	6	1.5					Gravity	1.2 - 2.4
☐	☑	☐	☐	☐	1.5	0.8			Medium Chips			
☑	☐	☐	☐	☐	0.8	0	4	40				
☐	☐	☐	☐	☐								

4. FINAL BORE DEVELOPMENT

Method	Yield l/sec	Draw down (m)	Pumping Time (min)	Recovery Time (min)	Final Static Level	Ec at 25 C (µS/cm)
Hand bailing	3 l/min		45		0.75	926

5. DRILLER'S PUMPING TEST

pH 4.3

Method	Static Level (m)	Yield l/sec	Pumping Level (m)	Draw down (m)	Pumping Time (min)	Recovery Time (min)	Ec at 25 C (µS/cm)

6. IF NOT A DRILLED BORE

Type	Length (m)	Width (m)	Diam (m)	Lining Material	From (m)	To (m)

7. SAMPLES

Have material samples been taken? Yes ☑ No ☐ If Yes From 0 (m)

Have water samples been taken? Yes ☑ No ☐ To 6 (m)

Samples taken by: Bore Owner ☐ Driller ☐ Project Geologist ☑

8. DISINFECTION

Was the Bore Disinfected? Yes ☐ No ☑

If yes, state method of disinfection: Chlorine Washed ☐ Steam Cleaned ☐

Other, please specify: .....

9. DRILLER'S LOG

Material	From (m)	To (m)
Clay, silty, red/orange	0	0.1
Silt, sandy, black/brown	0.1	0.5
Sand, clayey with silt, orange/brown grey	0.5	2
Clay, sandy, grey	2	6
Clay, sand, Drk grey	4	6

Driller's Name Ben Oughton

Driller's Licence No. 1049

Driller's Signature .....

Date 05 / 06 / 2019

Name of Plant Operator .....

Print and Sign

BH2

WATER ACT 1989
BORE COMPLETION REPORT

Southern Rural Water
Managing Water. Serving Communities.

SRW COPY –
To be sent to Southern Rural Water within 28 days of completion of bore.

LICENCE TO CONSTRUCT WORKS No. WLE 074097

Report on site 1 ☑ 2 ☐ 3 ☐ 4 ☐ 5 ☐

GPS CO-ORDS: E 735299 N 5743902

Drilled Bore ☑ Sprearpoint ☐ Well or Shaft ☐ Dragline ☐

ZONE: 54 / ~~55~~ (delete as applicable)

GDA 94/~~ADG66~~ (delete as applicable)

OFFICE USE ONLY
BORE NUMBER
BORE USES
GMA ..... ZONE .....

Bore Owner: Barwon Water

Site Address: 25 POSSUM RIDGE ROAD, YEODENE, VIC 3249 (Boundary Creek - Big Swamp)

Date Commenced: 07 / 05 / 2019

Date Completed: 07 / 05 / 2019

Total Depth: 6 (m)

Was Bore Decommissioned? Y / N: N

If Yes, State Method:

1. DRILLING AND WATER INTERSECTION DETAILS

DRILLING TECHNIQUE				WATER INTERSECTIONS (while drilling, measurements taken from natural surface)									OFFICE USE
Method	From (m)	To (m)	Bit diam (mm)	From (m)	To (m)	Test Method	Static Level (m)	Est. yield l/sec	Draw down (m)	Casing at test (m)	Depth at test (m)	Ec at 25 C (µS/cm)	Lithology
Hollow Stem Auger	0	6	200										

2. CASINGS (CA) SCREENS (SC) SLOTS (SL) OPEN HOLE (OH)

GENERAL						CASING			SCREENS / SLOTS						OFFICE USE
Type CA	SC	SL	OH	From (m)	To (m)	Inner diam (mm)	Outer diam (mm)	Material	Inner diam (mm)	Outer diam (mm)	Material	Aperture (mm)	Filter Y / N	Trade Name	Lithology
☐	☐	☑	☐	6	5	50	60	C18 uPVC	26	32	C18 uPVC	0.3	N		
☑	☐	☐	☐	5	2	26	32	C18 uPVC	50	60	C18 uPVC	0.4	N		
☐	☐	☐	☐	2	+0.7	50	60	C18 uPVC							
☐	☐	☐	☐												
☐	☐	☐	☐												

100 x 100 steel monument cover

WELL HEAD FITTINGS — Casing Shoe Y / N: ☐ — Bullnose / Sidcap Y / N: Y

3. CEMENT (C) BENTONITE (B) SEALS (S) PACKERS (P) GRAVEL (G)

Material C	B	S	P	G	From (m)	To (m)	Cement (bags)	Water (litres)	Seal / Packer type	Outer diam of seal (mm)	Artificial Gravel Packing Method of placement	Gravel size mesh passing (mm)
☐	☐	☐	☐	☑	6	1.5					Gravity	1.2 - 2.4
☐	☑	☐	☐	☐	1.5	0.8			Medium Chips			
☑	☐	☐	☐	☐	0.8	0	4	40				
☐	☐	☐	☐	☐								

4. FINAL BORE DEVELOPMENT

Method	Yield l/sec	Draw down (m)	Pumping Time (min)	Recovery Time (min)	Final Static Level	Ec at 25 C (µS/cm)
Hand bailing	3 l/min		45		0.75	926

5. DRILLER'S PUMPING TEST

pH 6.3

Method	Static Level (m)	Yield l/sec	Pumping Level (m)	Draw down (m)	Pumping Time (min)	Recovery Time (min)	Ec at 25 C (µS/cm)

6. IF NOT A DRILLED BORE

Type	Length (m)	Width (m)	Diam (m)	Lining Material	From (m)	To (m)

7. SAMPLES

Have material samples been taken? Yes ☑ No ☐ If Yes From 0 (m)

Have water samples been taken? Yes ☑ No ☐ To 6 (m)

Samples taken by: Bore Owner ☐ Driller ☐ Project Geologist ☑

8. DISINFECTION

Was the Bore Disinfected? Yes ☐ No ☑

If yes, state method of disinfection: Chlorine Washed ☐ Steam Cleaned ☐

Other, please specify:

9. DRILLER'S LOG

Material	From (m)	To (m)
Clay, silty, red/orange	0	0.1
Silt, sandy, black/brown	0.1	0.5
Sand, clayey with silt, orange/brown grey	0.5	2
Clay, sandy, grey	2	6
Clay, sand, Drk grey	4	6

Driller's Name: Ben Oughton

Driller's Licence No.: 1049

Driller's Signature:

Date: 05 / 06 / 2019

Name of Plant Operator:

Print and Sign

BH3

WATER ACT 1989
BORE COMPLETION REPORT

Southern Rural Water
Managing Water. Serving Communities.

SRW COPY –
To be sent to Southern Rural Water within 28 days of completion of bore.

LICENCE TO CONSTRUCT WORKS No. WLE 074097

Report on site 1 ☑ 2 ☐ 3 ☐ 4 ☐ 5 ☐

GPS CO-ORDS: E 735299 N 5743902

Drilled Bore ☑ Sprearpoint ☐ Well or Shaft ☐ Dragline ☐

ZONE: 54 / ~~55~~ delete as applicable

GDA 94/AD~~6~~6 delete as applicable

OFFICE USE ONLY
BORE NUMBER
BORE USES
GMA ..... ZONE .....

Bore Owner Barwon Water

Site Address 25 POSSUM RIDGE ROAD, YEODENE, VIC 3249 (Boundary Creek - Big Swamp)

Date Commenced 07 / 05 / 2019 Date Completed 07 / 05 / 2019 Total Depth 6 (m)

Was Bore Decommissioned? Y / N N If Yes, State Method .....

1. DRILLING AND WATER INTERSECTION DETAILS

DRILLING TECHNIQUE				WATER INTERSECTIONS (while drilling, measurements taken from natural surface)									OFFICE USE
Method	From (m)	To (m)	Bit diam (mm)	From (m)	To (m)	Test Method	Static Level (m)	Est. yield l/sec	Draw down (m)	Casing at test (m)	Depth at test (m)	Ec at 25 C (µS/cm)	Lithology
Hollow Stem Auger	0	6	200										

2. CASINGS (CA) SCREENS (SC) SLOTS (SL) OPEN HOLE (OH)

GENERAL						CASING			SCREENS / SLOTS						OFFICE USE
Type CA	SC	SL	OH	From (m)	To (m)	Inner diam (mm)	Outer diam (mm)	Material	Inner diam (mm)	Outer diam (mm)	Material	Aperture (mm)	Filter Y / N	Trade Name	Lithology
☐	☐	☑	☐	6	5	50	60	C18 uPVC	26	32	C18 uPVC	0.3	N		
☑	☐	☐	☐	5	2	26	32	C18 uPVC	50	60	C18 uPVC	0.4	N		
☐	☐	☐	☐	2	+0.7	50	60	C18 uPVC							
☐	☐	☐	☐												
☐	☐	☐	☐												

100 x 100 steel monument cover

WELL HEAD FITTINGS Casing Shoe Y / N ☐ Bullnose / Sidcap Y / N Y

3. CEMENT (C) BENTONITE (B) SEALS (S) PACKERS (P) GRAVEL (G)

Material C	B	S	P	G	From (m)	To (m)	Cement (bags)	Water (litres)	Seal / Packer type	Outer diam of seal (mm)	Artificial Gravel Packing Method of placement	Gravel size mesh passing (mm)
☐	☐	☐	☐	☑	6	1.5					Gravity	1.2 - 2.4
☐	☑	☐	☐	☐	1.5	0.8			Medium Chips			
☑	☐	☐	☐	☐	0.8	0	4	40				
☐	☐	☐	☐	☐								

4. FINAL BORE DEVELOPMENT

Method	Yield l/sec	Draw down (m)	Pumping Time (min)	Recovery Time (min)	Final Static Level	Ec at 25 C (µS/cm)
Hand bailing	3 l/min		45		0.75	926

5. DRILLER'S PUMPING TEST

pH 6.1

Method	Static Level (m)	Yield l/sec	Pumping Level (m)	Draw down (m)	Pumping Time (min)	Recovery Time (min)	Ec at 25 C (µS/cm)

6. IF NOT A DRILLED BORE

Type	Length (m)	Width (m)	Diam (m)	Lining Material	From (m)	To (m)

7. SAMPLES

Have material samples been taken? Yes ☑ No ☐ If Yes From 0 (m)
Have water samples been taken? Yes ☑ No ☐ To 6 (m)
Samples taken by: Bore Owner ☐ Driller ☐ Project Geologist ☑

8. DISINFECTION

Was the Bore Disinfected? Yes ☐ No ☑
If yes, state method of disinfection: Chlorine Washed ☐ Steam Cleaned ☐
Other, please specify: .....

9. DRILLER'S LOG

Material	From (m)	To (m)
Clay, silty, red/orange	0	0.1
Silt, sandy, black/brown	0.1	0.5
Sand, clayey with silt, orange/brown grey	0.5	2
Clay, sandy, grey	2	6
Clay, sand, Drk grey	4	6

Driller's Name Ben Oughton Driller's Licence No. 1049

Driller's Signature ..... Date 05 / 06 / 2019

Name of Plant Operator .....

Print and Sign

BH4

WATER ACT 1989
BORE COMPLETION REPORT

Southern Rural Water
Managing Water. Serving Communities.

SRW COPY –
To be sent to Southern Rural Water within 28 days of completion of bore.

LICENCE TO CONSTRUCT WORKS No. WLE 074097

Report on site 1 ☑ 2 ☐ 3 ☐ 4 ☐ 5 ☐

GPS CO-ORDS: E 735299 N 5743902

Drilled Bore ☑ Sprearpoint ☐ Well or Shaft ☐ Dragline ☐

ZONE: 54 / ~~55~~ (delete as applicable)

GDA 94/AD~~6~~6 (delete as applicable)

OFFICE USE ONLY
BORE NUMBER
BORE USES
GMA ..... ZONE .....

Bore Owner Barwon Water

Site Address 25 POSSUM RIDGE ROAD, YEODENE, VIC 3249 (Boundary Creek - Big Swamp)

Date Commenced 07 / 05 / 2019 Date Completed 07 / 05 / 2019 Total Depth 6 (m)

Was Bore Decommissioned? Y / N N If Yes, State Method .....

1. DRILLING AND WATER INTERSECTION DETAILS

DRILLING TECHNIQUE				WATER INTERSECTIONS (while drilling, measurements taken from natural surface)									OFFICE USE
Method	From (m)	To (m)	Bit diam (mm)	From (m)	To (m)	Test Method	Static Level (m)	Est. yield l/sec	Draw down (m)	Casing at test (m)	Depth at test (m)	Ec at 25 C (µS/cm)	Lithology
Hollow Stem Auger	0	6	200										

2. CASINGS (CA) SCREENS (SC) SLOTS (SL) OPEN HOLE (OH)

GENERAL						CASING			SCREENS / SLOTS						OFFICE USE
Type CA	SC	SL	OH	From (m)	To (m)	Inner diam (mm)	Outer diam (mm)	Material	Inner diam (mm)	Outer diam (mm)	Material	Aperture (mm)	Filter Y / N	Trade Name	Lithology
☑	☐	☐	☐	6	5	50	60	C18 uPVC	26	32	C18 uPVC	0.3	N		
☐	☐	☑	☐	5	2	26	32	C18 uPVC	50	60	C18 uPVC	0.4	N		
☑	☐	☐	☐	2	+0.7	50	60	C18 uPVC							
☐	☐	☐	☐												
☐	☐	☐	☐												

100 x 100 steel monument cover

WELL HEAD FITTINGS Casing Shoe Y / N ☐ Bullnose / Sidcap Y / N Y

3. CEMENT (C) BENTONITE (B) SEALS (S) PACKERS (P) GRAVEL (G)

Material C	B	S	P	G	From (m)	To (m)	Cement (bags)	Water (litres)	Seal / Packer type	Outer diam of seal (mm)	Artificial Gravel Packing Method of placement	Gravel size mesh passing (mm)
☐	☐	☐	☐	☑	6	1.5					Gravity	1.2 - 2.4
☐	☑	☐	☐	☐	1.5	0.8			Medium Chips			
☑	☐	☐	☐	☐	0.8	0	4	40				
☐	☐	☐	☐	☐								

4. FINAL BORE DEVELOPMENT

Method	Yield l/sec	Draw down (m)	Pumping Time (min)	Recovery Time (min)	Final Static Level	Ec at 25 C (µS/cm)
Hand bailing	3 l/min		45		0.75	926

5. DRILLER'S PUMPING TEST

pH 4.01

Method	Static Level (m)	Yield l/sec	Pumping Level (m)	Draw down (m)	Pumping Time (min)	Recovery Time (min)	Ec at 25 C (µS/cm)

6. IF NOT A DRILLED BORE

Type	Length (m)	Width (m)	Diam (m)	Lining Material	From (m)	To (m)

7. SAMPLES

Have material samples been taken? Yes ☑ No ☐ If Yes From 0 (m)
Have water samples been taken? Yes ☑ No ☐ To 6 (m)
Samples taken by: Bore Owner ☐ Driller ☐ Project Geologist ☑

8. DISINFECTION

Was the Bore Disinfected? Yes ☐ No ☑
If yes, state method of disinfection: Chlorine Washed ☐ Steam Cleaned ☐
Other, please specify: .....

9. DRILLER'S LOG

Material	From (m)	To (m)
Clay, silty, red/orange	0	0.1
Silt, sandy, black/brown	0.1	0.5
Sand, clayey with silt, orange/brown grey	0.5	2
Clay, sandy, grey	2	6
Clay, sand, Drk grey	4	6

Driller's Name Ben Oughton Driller's Licence No. 1049

Driller's Signature ..... Date 05 / 06 / 2019

Name of Plant Operator .....

Print and Sign

BH5

WATER ACT 1989
BORE COMPLETION REPORT

Southern Rural Water
Managing Water. Serving Communities.

SRW COPY –
To be sent to Southern Rural Water within 28 days of completion of bore.

LICENCE TO CONSTRUCT WORKS No. WLE074097

Report on site 1 ☑ 2 ☐ 3 ☐ 4 ☐ 5 ☐

GPS CO-ORDS: E 735299 N 5743902

Drilled Bore ☑ Sprearpoint ☐ Well or Shaft ☐ Dragline ☐

ZONE: 54 / ~~56~~ delete as applicable

GDA 94/AD~~66~~ delete as applicable

OFFICE USE ONLY
BORE NUMBER
BORE USES
GMA ..... ZONE .....

Bore Owner: Barwon Water

Site Address: 25 POSSUM RIDGE ROAD, YEODENE, VIC 3249(Boundary Creek - Big Swamp)

Date Commenced: 07 / 05 / 2019 Date Completed: 07 / 05 / 2019 Total Depth: 6 (m)

Was Bore Decommissioned? Y / N: N If Yes, State Method:

1. DRILLING AND WATER INTERSECTION DETAILS

DRILLING TECHNIQUE				WATER INTERSECTIONS (while drilling, measurements taken from natural surface)									OFFICE USE
Method	From (m)	To (m)	Bit diam (mm)	From (m)	To (m)	Test Method	Static Level (m)	Est. yield l/sec	Draw down (m)	Casing at test (m)	Depth at test (m)	Ec at 25 C (µS/cm)	Lithology
Hollow Stem Auger	0	6	200										

2. CASINGS (CA) SCREENS (SC) SLOTS (SL) OPEN HOLE (OH)

GENERAL						CASING			SCREENS / SLOTS						OFFICE USE
Type CA	SC	SL	OH	From (m)	To (m)	Inner diam (mm)	Outer diam (mm)	Material	Inner diam (mm)	Outer diam (mm)	Material	Aperture (mm)	Filter Y / N	Trade Name	Lithology
☑	☐	☐	☐	6	5	50	60	C18 uPVC	26	32	C18 uPVC	0.3	N		
☐	☐	☑	☐	5	2	26	32	C18 uPVC	50	60	C18 uPVC	0.4	N		
☑	☐	☐	☐	2	+0.7	50	60	C18 uPVC							
☐	☐	☐	☐												
☐	☐	☐	☐												

100 x 100 steel monument cover

WELL HEAD FITTINGS: Casing Shoe Y / N ☐ Bullnose / Sidcap Y / N Y

3. CEMENT (C) BENTONITE (B) SEALS (S) PACKERS (P) GRAVEL (G)

Material C	B	S	P	G	From (m)	To (m)	Cement (bags)	Water (litres)	Seal / Packer type	Outer diam of seal (mm)	Artificial Gravel Packing Method of placement	Gravel size mesh passing (mm)
☐	☐	☐	☐	☑	6	1.5					Gravity	1.2 - 2.4
☐	☑	☐	☐	☐	1.5	0.8			Medium Chips			
☑	☐	☐	☐	☐	0.8	0	4	40				
☐	☐	☐	☐	☐								

4. FINAL BORE DEVELOPMENT

Method	Yield l/sec	Draw down (m)	Pumping Time (min)	Recovery Time (min)	Final Static Level	Ec at 25 C (µS/cm)
Hand bailing	3 l/min		45		0.75	926

5. DRILLER'S PUMPING TEST

pH 5.61

Method	Static Level (m)	Yield l/sec	Pumping Level (m)	Draw down (m)	Pumping Time (min)	Recovery Time (min)	Ec at 25 C (µS/cm)

6. IF NOT A DRILLED BORE

Type	Length (m)	Width (m)	Diam (m)	Lining Material	From (m)	To (m)

7. SAMPLES

Have material samples been taken? Yes ☑ No ☐ If Yes From 0 (m)
Have water samples been taken? Yes ☑ No ☐ To 6 (m)
Samples taken by: Bore Owner ☐ Driller ☐ Project Geologist ☑

8. DISINFECTION

Was the Bore Disinfected? Yes ☐ No ☑
If yes, state method of disinfection: Chlorine Washed ☐ Steam Cleaned ☐
Other, please specify:

9. DRILLER'S LOG

Material	From (m)	To (m)
Clay, silty, red/orange	0	0.1
Silt, sandy, black/brown	0.1	0.5
Sand, clayey with silt, orange/brown grey	0.5	2
Clay, sandy, grey	2	6
Clay, sand, Drk grey	4	6

Driller's Name: Ben Oughton Driller's Licence No.: 1049

Driller's Signature: Date: 05 / 06 / 2019

Name of Plant Operator:

Print and Sign

BH6

WATER ACT 1989
BORE COMPLETION REPORT

Southern Rural Water
Managing Water. Serving Communities.

SRW COPY –
To be sent to Southern Rural Water within 28 days of completion of bore.

LICENCE TO CONSTRUCT WORKS No. WLE074097

Report on site 1 ☑ 2 ☐ 3 ☐ 4 ☐ 5 ☐

GPS CO-ORDS: E 735299 N 5743902

Drilled Bore ☑ Sprearpoint ☐ Well or Shaft ☐ Dragline ☐

ZONE: 54 / ~~56~~ delete as applicable

GDA 94/AD~~66~~ delete as applicable

OFFICE USE ONLY
BORE NUMBER
BORE USES
GMA ..... ZONE .....

Bore Owner Barwon Water

Site Address 25 POSSUM RIDGE ROAD, YEODENE, VIC 3249(Boundary Creek - Big Swamp)

Date Commenced 07 / 05 / 2019 Date Completed 07 / 05 / 2019 Total Depth 6 (m)

Was Bore Decommissioned? Y / N N If Yes, State Method .....

1. DRILLING AND WATER INTERSECTION DETAILS

DRILLING TECHNIQUE				WATER INTERSECTIONS (while drilling, measurements taken from natural surface)									OFFICE USE
Method	From (m)	To (m)	Bit diam (mm)	From (m)	To (m)	Test Method	Static Level (m)	Est. yield l/sec	Draw down (m)	Casing at test (m)	Depth at test (m)	Ec at 25 C (µS/cm)	Lithology
Hollow Stem Auger	0	6	200										

2. CASINGS (CA) SCREENS (SC) SLOTS (SL) OPEN HOLE (OH)

GENERAL						CASING			SCREENS / SLOTS						OFFICE USE
Type CA	SC	SL	OH	From (m)	To (m)	Inner diam (mm)	Outer diam (mm)	Material	Inner diam (mm)	Outer diam (mm)	Material	Aperture (mm)	Filter Y / N	Trade Name	Lithology
☑	☐	☐	☐	6	5	50	60	C18 uPVC	26	32	C18 uPVC	0.3	N		
☐	☐	☑	☐	5	2	26	32	C18 uPVC	50	60	C18 uPVC	0.4	N		
☑	☐	☐	☐	2	+0.7	50	60	C18 uPVC							
☐	☐	☐	☐												
☐	☐	☐	☐												

100 x 100 steel monument cover

WELL HEAD FITTINGS Casing Shoe Y / N ☐ Bullnose / Cap Y / N Y

3. CEMENT (C) BENTONITE (B) SEALS (S) PACKERS (P) GRAVEL (G)

Material C	B	S	P	G	From (m)	To (m)	Cement (bags)	Water (litres)	Seal / Packer type	Outer diam of seal (mm)	Artificial Gravel Packing Method of placement	Gravel size mesh passing (mm)
☐	☐	☐	☐	☑	6	1.5					Gravity	1.2 - 2.4
☐	☑	☐	☐	☐	1.5	0.8			Medium Chips			
☑	☐	☐	☐	☐	0.8	0	4	40				
☐	☐	☐	☐	☐								

4. FINAL BORE DEVELOPMENT

Method	Yield l/sec	Draw down (m)	Pumping Time (min)	Recovery Time (min)	Final Static Level	Ec at 25 C (µS/cm)
Hand bailing	3 l/min		45		0.75	926

5. DRILLER'S PUMPING TEST

pH 5.1

Method	Static Level (m)	Yield l/sec	Pumping Level (m)	Draw down (m)	Pumping Time (min)	Recovery Time (min)	Ec at 25 C (µS/cm)

6. IF NOT A DRILLED BORE

Type	Length (m)	Width (m)	Diam (m)	Lining Material	From (m)	To (m)

7. SAMPLES

Have material samples been taken? Yes ☑ No ☐ If Yes From 0 (m)
Have water samples been taken? Yes ☑ No ☐ To 6 (m)
Samples taken by: Bore Owner ☐ Driller ☐ Project Geologist ☑

8. DISINFECTION

Was the Bore Disinfected? Yes ☐ No ☑
If yes, state method of disinfection: Chlorine Washed ☐ Steam Cleaned ☐
Other, please specify: .....

9. DRILLER'S LOG

Material	From (m)	To (m)
Clay, silty, red/orange	0	0.1
Silt, sandy, black/brown	0.1	0.5
Sand, clayey with silt, orange/brown grey	0.5	2
Clay, sandy, grey	2	6
Clay, sand, Drk grey	4	6

Driller's Name Ben Oughton Driller's Licence No. 1049

Driller's Signature ..... Date 05 / 06 / 2019

Name of Plant Operator .....

Print and Sign

BH7

WATER ACT 1989
BORE COMPLETION REPORT

Southern Rural Water
Managing Water. Serving Communities.

SRW COPY –
To be sent to Southern Rural Water within 28 days of completion of bore.

LICENCE TO CONSTRUCT WORKS No. WLE 074097

Report on site 1 ☑ 2 ☐ 3 ☐ 4 ☐ 5 ☐

GPS CO-ORDS: E 735299 N 5743902

Drilled Bore ☑ Sprearpoint ☐ Well or Shaft ☐ Dragline ☐

ZONE: 54 / ~~55~~ delete as applicable

GDA 94/AD~~6~~6 delete as applicable

OFFICE USE ONLY
BORE NUMBER
BORE USES
GMA ..... ZONE .....

Bore Owner Barwon Water

Site Address 25 POSSUM RIDGE ROAD, YEODENE, VIC 3249 (Boundary Creek - Big Swamp)

Date Commenced 07 / 05 / 2019 Date Completed 07 / 05 / 2019 Total Depth 6 (m)

Was Bore Decommissioned? Y / N N If Yes, State Method .....

1. DRILLING AND WATER INTERSECTION DETAILS

DRILLING TECHNIQUE				WATER INTERSECTIONS (while drilling, measurements taken from natural surface)									OFFICE USE
Method	From (m)	To (m)	Bit diam (mm)	From (m)	To (m)	Test Method	Static Level (m)	Est. yield l/sec	Draw down (m)	Casing at test (m)	Depth at test (m)	Ec at 25 C (µS/cm)	Lithology
Hollow Stem Auger	0	6	200										

2. CASINGS (CA) SCREENS (SC) SLOTS (SL) OPEN HOLE (OH)

GENERAL						CASING			SCREENS / SLOTS						OFFICE USE
Type CA	SC	SL	OH	From (m)	To (m)	Inner diam (mm)	Outer diam (mm)	Material	Inner diam (mm)	Outer diam (mm)	Material	Aperture (mm)	Filter Y / N	Trade Name	Lithology
☑	☐	☐	☐	6	5	50	60	C18 uPVC	26	32	C18 uPVC	0.3	N		
☐	☐	☑	☐	5	2	26	32	C18 uPVC	50	60	C18 uPVC	0.4	N		
☑	☐	☐	☐	2	+0.7	50	60	C18 uPVC							
☐	☐	☐	☐												
☐	☐	☐	☐												

100 x 100 steel monument cover

WELL HEAD FITTINGS Casing Shoe Y / N ☐ Bullnose / Sidcap Y / N Y

3. CEMENT (C) BENTONITE (B) SEALS (S) PACKERS (P) GRAVEL (G)

Material C	B	S	P	G	From (m)	To (m)	Cement (bags)	Water (litres)	Seal / Packer type	Outer diam of seal (mm)	Artificial Gravel Packing Method of placement	Gravel size mesh passing (mm)
☐	☐	☐	☐	☑	6	1.5					Gravity	1.2 - 2.4
☐	☑	☐	☐	☐	1.5	0.8			Medium Chips			
☑	☐	☐	☐	☐	0.8	0	4	40				
☐	☐	☐	☐	☐								

4. FINAL BORE DEVELOPMENT

Method	Yield l/sec	Draw down (m)	Pumping Time (min)	Recovery Time (min)	Final Static Level	Ec at 25 C (µS/cm)
Hand bailing	3 l/min		45		0.75	926

5. DRILLER'S PUMPING TEST

pH 6.2

Method	Static Level (m)	Yield l/sec	Pumping Level (m)	Draw down (m)	Pumping Time (min)	Recovery Time (min)	Ec at 25 C (µS/cm)

6. IF NOT A DRILLED BORE

Type	Length (m)	Width (m)	Diam (m)	Lining Material	From (m)	To (m)

7. SAMPLES

Have material samples been taken? Yes ☑ No ☐ If Yes From 0 (m)
Have water samples been taken? Yes ☑ No ☐ To 6 (m)
Samples taken by: Bore Owner ☐ Driller ☐ Project Geologist ☑

8. DISINFECTION

Was the Bore Disinfected? Yes ☐ No ☑
If yes, state method of disinfection: Chlorine Washed ☐ Steam Cleaned ☐
Other, please specify: .....

9. DRILLER'S LOG

Material	From (m)	To (m)
Clay, silty, red/orange	0	0.1
Silt, sandy, black/brown	0.1	0.5
Sand, clayey with silt, orange/brown grey	0.5	2
Clay, sandy, grey	2	6
Clay, sand, Drk grey	4	6

Driller's Name Ben Oughton Driller's Licence No. 1049

Driller's Signature ..... Date 05 / 06 / 2019

Name of Plant Operator .....

Print and Sign

BH8

WATER ACT 1989
BORE COMPLETION REPORT

Southern Rural Water
Managing Water. Serving Communities.

SRW COPY –
To be sent to Southern Rural Water within 28 days of completion of bore.

LICENCE TO CONSTRUCT WORKS No. WLE 074097

Report on site 1 ☑ 2 ☐ 3 ☐ 4 ☐ 5 ☐

GPS CO-ORDS: E 735299 N 5743902

Drilled Bore ☑ Sprearpoint ☐ Well or Shaft ☐ Dragline ☐

ZONE: 54 / ~~55~~ (delete as applicable) GDA 94/AD~~6~~6 (delete as applicable)

OFFICE USE ONLY
BORE NUMBER
BORE USES
GMA ..... ZONE .....

Bore Owner Barwon Water

Site Address 25 POSSUM RIDGE ROAD, YEODENE, VIC 3249 (Boundary Creek - Big Swamp)

Date Commenced 07 / 05 / 2019 Date Completed 07 / 05 / 2019 Total Depth 6 (m)

Was Bore Decommissioned? Y / N N If Yes, State Method .....

1. DRILLING AND WATER INTERSECTION DETAILS

DRILLING TECHNIQUE				WATER INTERSECTIONS (while drilling, measurements taken from natural surface)									OFFICE USE
Method	From (m)	To (m)	Bit diam (mm)	From (m)	To (m)	Test Method	Static Level (m)	Est. yield l/sec	Draw down (m)	Casing at test (m)	Depth at test (m)	Ec at 25 C (µS/cm)	Lithology
Hollow Stem Auger	0	6	200										

2. CASINGS (CA) SCREENS (SC) SLOTS (SL) OPEN HOLE (OH)

GENERAL						CASING			SCREENS / SLOTS						OFFICE USE
Type CA	SC	SL	OH	From (m)	To (m)	Inner diam (mm)	Outer diam (mm)	Material	Inner diam (mm)	Outer diam (mm)	Material	Aperture (mm)	Filter Y / N	Trade Name	Lithology
☑	☐	☐	☐	6	5	50	60	C18 uPVC	26	32	C18 uPVC	0.3	N		
☐	☐	☑	☐	5	2	26	32	C18 uPVC	50	60	C18 uPVC	0.4	N		
☑	☐	☐	☐	2	+0.7	50	60	C18 uPVC							
☐	☐	☐	☐												
☐	☐	☐	☐												

100 x 100 steel monument cover

WELL HEAD FITTINGS Casing Shoe Y / N ☐ Bullnose / Sidcap Y / N Y

3. CEMENT (C) BENTONITE (B) SEALS (S) PACKERS (P) GRAVEL (G)

Material C	B	S	P	G	From (m)	To (m)	Cement (bags)	Water (litres)	Seal / Packer type	Outer diam of seal (mm)	Artificial Gravel Packing Method of placement	Gravel size mesh passing (mm)
☐	☐	☐	☐	☑	6	1.5					Gravity	1.2 - 2.4
☐	☑	☐	☐	☐	1.5	0.8			Medium Chips			
☑	☐	☐	☐	☐	0.8	0	4	40				
☐	☐	☐	☐	☐								

4. FINAL BORE DEVELOPMENT

Method	Yield l/sec	Draw down (m)	Pumping Time (min)	Recovery Time (min)	Final Static Level	Ec at 25 C (µS/cm)
Hand bailing	3 l/min		45		0.75	926

5. DRILLER'S PUMPING TEST

pH 3.53

Method	Static Level (m)	Yield l/sec	Pumping Level (m)	Draw down (m)	Pumping Time (min)	Recovery Time (min)	Ec at 25 C (µS/cm)

6. IF NOT A DRILLED BORE

Type	Length (m)	Width (m)	Diam (m)	Lining Material	From (m)	To (m)

7. SAMPLES

Have material samples been taken? Yes ☑ No ☐ If Yes From 0 (m)
Have water samples been taken? Yes ☑ No ☐ To 6 (m)
Samples taken by: Bore Owner ☐ Driller ☐ Project Geologist ☑

8. DISINFECTION

Was the Bore Disinfected? Yes ☐ No ☑
If yes, state method of disinfection: Chlorine Washed ☐ Steam Cleaned ☐
Other, please specify: .....

9. DRILLER'S LOG

Material	From (m)	To (m)
Clay, silty, red/orange	0	0.1
Silt, sandy, black/brown	0.1	0.5
Sand, clayey with silt, orange/brown grey	0.5	2
Clay, sandy, grey	2	6
Clay, sand, Drk grey	4	6

Driller's Name Ben Oughton Driller's Licence No. 1049
Driller's Signature ..... Date 05 / 06 / 2019
Name of Plant Operator .....

Print and Sign

BH9

WATER ACT 1989
BORE COMPLETION REPORT

Southern Rural Water
Managing Water. Serving Communities.

SRW COPY –
To be sent to Southern Rural Water within 28 days of completion of bore.

LICENCE TO CONSTRUCT WORKS No. WLE074097

Report on site 1 ☑ 2 ☐ 3 ☐ 4 ☐ 5 ☐

GPS CO-ORDS: E 735299 N 5743902

Drilled Bore ☑ Sprearpoint ☐ Well or Shaft ☐ Dragline ☐

ZONE: 54 / ~~56~~ delete as applicable

GDA 94/AD~~66~~ delete as applicable

OFFICE USE ONLY
BORE NUMBER
BORE USES
GMA ..... ZONE .....

Bore Owner: Barwon Water

Site Address: 25 POSSUM RIDGE ROAD, YEODENE, VIC 3249(Boundary Creek - Big Swamp)

Date Commenced: 07 / 05 / 2019 Date Completed: 07 / 05 / 2019 Total Depth: 6 (m)

Was Bore Decommissioned? Y / N: N If Yes, State Method:

1. DRILLING AND WATER INTERSECTION DETAILS

DRILLING TECHNIQUE				WATER INTERSECTIONS (while drilling, measurements taken from natural surface)									OFFICE USE
Method	From (m)	To (m)	Bit diam (mm)	From (m)	To (m)	Test Method	Static Level (m)	Est. yield l/sec	Draw down (m)	Casing at test (m)	Depth at test (m)	Ec at 25 C (µS/cm)	Lithology
Hollow Stem Auger	0	6	200										

2. CASINGS (CA) SCREENS (SC) SLOTS (SL) OPEN HOLE (OH)

GENERAL						CASING			SCREENS / SLOTS						OFFICE USE
Type CA	SC	SL	OH	From (m)	To (m)	Inner diam (mm)	Outer diam (mm)	Material	Inner diam (mm)	Outer diam (mm)	Material	Aperture (mm)	Filter Y / N	Trade Name	Lithology
☑	☐	☐	☐	6	5	50	60	C18 uPVC	26	32	C18 uPVC	0.3	N		
☐	☐	☑	☐	5	2	26	32	C18 uPVC	50	60	C18 uPVC	0.4	N		
☑	☐	☐	☐	2	+0.7	50	60	C18 uPVC							
☐	☐	☐	☐												
☐	☐	☐	☐												

100 x 100 steel monument cover

WELL HEAD FITTINGS: Casing Shoe Y / N ☐ Bullnose / Cap Y / N Y

3. CEMENT (C) BENTONITE (B) SEALS (S) PACKERS (P) GRAVEL (G)

Material C	B	S	P	G	From (m)	To (m)	Cement (bags)	Water (litres)	Seal / Packer type	Outer diam of seal (mm)	Artificial Gravel Packing Method of placement	Gravel size mesh passing (mm)
☐	☐	☐	☐	☑	6	1.5					Gravity	1.2 - 2.4
☐	☑	☐	☐	☐	1.5	0.8			Medium Chips			
☑	☐	☐	☐	☐	0.8	0	4	40				
☐	☐	☐	☐	☐								

4. FINAL BORE DEVELOPMENT

Method	Yield l/sec	Draw down (m)	Pumping Time (min)	Recovery Time (min)	Final Static Level	Ec at 25 C (µS/cm)
Hand bailing	3 l/min		45		0.75	926

5. DRILLER'S PUMPING TEST

pH 3.8

Method	Static Level (m)	Yield l/sec	Pumping Level (m)	Draw down (m)	Pumping Time (min)	Recovery Time (min)	Ec at 25 C (µS/cm)

6. IF NOT A DRILLED BORE

Type	Length (m)	Width (m)	Diam (m)	Lining Material	From (m)	To (m)

7. SAMPLES

Have material samples been taken? Yes ☑ No ☐ If Yes From 0 (m)
Have water samples been taken? Yes ☑ No ☐ To 6 (m)
Samples taken by: Bore Owner ☐ Driller ☐ Project Geologist ☑

8. DISINFECTION

Was the Bore Disinfected? Yes ☐ No ☑
If yes, state method of disinfection: Chlorine Washed ☐ Steam Cleaned ☐
Other, please specify:

9. DRILLER'S LOG

Material	From (m)	To (m)
Clay, silty, red/orange	0	0.1
Silt, sandy, black/brown	0.1	0.5
Sand, clayey with silt, orange/brown grey	0.5	2
Clay, sandy, grey	2	6
Clay, sand, Drk grey	4	6

Driller's Name: Ben Oughton Driller's Licence No.: 1049

Driller's Signature: Date: 05 / 06 / 2019

Name of Plant Operator:

Print and Sign

BH10

WATER ACT 1989
BORE COMPLETION REPORT

Southern Rural Water
Managing Water. Serving Communities.

SRW COPY –
To be sent to Southern Rural Water within 28 days of completion of bore.

LICENCE TO CONSTRUCT WORKS No. WLE074097

Report on site 1 ☑ 2 ☐ 3 ☐ 4 ☐ 5 ☐

GPS CO-ORDS: E 735299 N 5743902

Drilled Bore ☑ Sprearpoint ☐ Well or Shaft ☐ Dragline ☐

ZONE: 54 / ~~56~~ delete as applicable

GDA 94/AD~~66~~ delete as applicable

OFFICE USE ONLY
BORE NUMBER
BORE USES
GMA ..... ZONE .....

Bore Owner: Barwon Water

Site Address: 25 POSSUM RIDGE ROAD, YEODENE, VIC 3249(Boundary Creek - Big Swamp)

Date Commenced: 07 / 05 / 2019 Date Completed: 07 / 05 / 2019 Total Depth: 6 (m)

Was Bore Decommissioned? Y / N: N If Yes, State Method:

1. DRILLING AND WATER INTERSECTION DETAILS

DRILLING TECHNIQUE				WATER INTERSECTIONS (while drilling, measurements taken from natural surface)									OFFICE USE
Method	From (m)	To (m)	Bit diam (mm)	From (m)	To (m)	Test Method	Static Level (m)	Est. yield l/sec	Draw down (m)	Casing at test (m)	Depth at test (m)	Ec at 25 C (µS/cm)	Lithology
Hollow Stem Auger	0	6	200										

2. CASINGS (CA) SCREENS (SC) SLOTS (SL) OPEN HOLE (OH)

GENERAL						CASING			SCREENS / SLOTS						OFFICE USE
Type CA	SC	SL	OH	From (m)	To (m)	Inner diam (mm)	Outer diam (mm)	Material	Inner diam (mm)	Outer diam (mm)	Material	Aperture (mm)	Filter Y / N	Trade Name	Lithology
☑	☐	☐	☐	6	5	50	60	C18 uPVC	26	32	C18 uPVC	0.3	N		
☐	☐	☑	☐	5	2	26	32	C18 uPVC	50	60	C18 uPVC	0.4	N		
☑	☐	☐	☐	2	+0.7	50	60	C18 uPVC							
☐	☐	☐	☐												
☐	☐	☐	☐												

100 x 100 steel monument cover

WELL HEAD FITTINGS: Casing Shoe Y / N ☐ Bullnose / Sidcap Y / N Y

3. CEMENT (C) BENTONITE (B) SEALS (S) PACKERS (P) GRAVEL (G)

Material C	B	S	P	G	From (m)	To (m)	Cement (bags)	Water (litres)	Seal / Packer type	Outer diam of seal (mm)	Artificial Gravel Packing Method of placement	Gravel size mesh passing (mm)
☐	☐	☐	☐	☑	6	1.5					Gravity	1.2 - 2.4
☐	☑	☐	☐	☐	1.5	0.8			Medium Chips			
☑	☐	☐	☐	☐	0.8	0	4	40				
☐	☐	☐	☐	☐								

4. FINAL BORE DEVELOPMENT

Method	Yield l/sec	Draw down (m)	Pumping Time (min)	Recovery Time (min)	Final Static Level	Ec at 25 C (µS/cm)
Hand bailing	3 l/min		45		0.75	926

5. DRILLER'S PUMPING TEST

pH 5.2

Method	Static Level (m)	Yield l/sec	Pumping Level (m)	Draw down (m)	Pumping Time (min)	Recovery Time (min)	Ec at 25 C (µS/cm)

6. IF NOT A DRILLED BORE

Type	Length (m)	Width (m)	Diam (m)	Lining Material	From (m)	To (m)

7. SAMPLES

Have material samples been taken? Yes ☑ No ☐ If Yes From 0 (m)
Have water samples been taken? Yes ☑ No ☐ To 6 (m)
Samples taken by: Bore Owner ☐ Driller ☐ Project Geologist ☑

8. DISINFECTION

Was the Bore Disinfected? Yes ☐ No ☑
If yes, state method of disinfection: Chlorine Washed ☐ Steam Cleaned ☐
Other, please specify:

9. DRILLER'S LOG

Material	From (m)	To (m)
Clay, silty, red/orange	0	0.1
Silt, sandy, black/brown	0.1	0.5
Sand, clayey with silt, orange/brown grey	0.5	2
Clay, sandy, grey	2	6
Clay, sand, Drk grey	4	6

Driller's Name: Ben Oughton Driller's Licence No.: 1049

Driller's Signature: Date: 05 / 06 / 2019

Name of Plant Operator:

Print and Sign

BH11

WATER ACT 1989
BORE COMPLETION REPORT

Southern Rural Water
Managing Water. Serving Communities.

SRW COPY –
To be sent to Southern Rural Water within 28 days of completion of bore.

LICENCE TO CONSTRUCT WORKS No. WLE074097

Report on site 1 ☑ 2 ☐ 3 ☐ 4 ☐ 5 ☐

GPS CO-ORDS: E 735299 N 5743902

Drilled Bore ☑ Sprearpoint ☐ Well or Shaft ☐ Dragline ☐

ZONE: 54 / ~~56~~ delete as applicable

GDA 94/AD~~66~~ delete as applicable

OFFICE USE ONLY
BORE NUMBER
BORE USES
GMA ..... ZONE .....

Bore Owner Barwon Water

Site Address 25 POSSUM RIDGE ROAD, YEODENE, VIC 3249(Boundary Creek - Big Swamp)

Date Commenced 07 / 05 / 2019 Date Completed 07 / 05 / 2019 Total Depth 6 (m)

Was Bore Decommissioned? Y / N N If Yes, State Method .....

1. DRILLING AND WATER INTERSECTION DETAILS

DRILLING TECHNIQUE				WATER INTERSECTIONS (while drilling, measurements taken from natural surface)									OFFICE USE
Method	From (m)	To (m)	Bit diam (mm)	From (m)	To (m)	Test Method	Static Level (m)	Est. yield l/sec	Draw down (m)	Casing at test (m)	Depth at test (m)	Ec at 25 C (µS/cm)	Lithology
Hollow Stem Auger	0	6	200										

2. CASINGS (CA) SCREENS (SC) SLOTS (SL) OPEN HOLE (OH)

GENERAL						CASING			SCREENS / SLOTS						OFFICE USE
Type CA	SC	SL	OH	From (m)	To (m)	Inner diam (mm)	Outer diam (mm)	Material	Inner diam (mm)	Outer diam (mm)	Material	Aperture (mm)	Filter Y / N	Trade Name	Lithology
☑	☐	☐	☐	6	5	50	60	C18 uPVC	26	32	C18 uPVC	0.3	N		
☐	☐	☑	☐	5	2	26	32	C18 uPVC	50	60	C18 uPVC	0.4	N		
☑	☐	☐	☐	2	+0.7	50	60	C18 uPVC							
☐	☐	☐	☐												
☐	☐	☐	☐												

100 x 100 steel monument cover

WELL HEAD FITTINGS Casing Shoe Y / N ☐ Bullnose / Sidcap Y / N Y

3. CEMENT (C) BENTONITE (B) SEALS (S) PACKERS (P) GRAVEL (G)

Material C	B	S	P	G	From (m)	To (m)	Cement (bags)	Water (litres)	Seal / Packer type	Outer diam of seal (mm)	Artificial Gravel Packing Method of placement	Gravel size mesh passing (mm)
☐	☐	☐	☐	☑	6	1.5					Gravity	1.2 - 2.4
☐	☑	☐	☐	☐	1.5	0.8			Medium Chips			
☑	☐	☐	☐	☐	0.8	0	4	40				
☐	☐	☐	☐	☐								

4. FINAL BORE DEVELOPMENT

Method	Yield l/sec	Draw down (m)	Pumping Time (min)	Recovery Time (min)	Final Static Level	Ec at 25 C (µS/cm)
Hand bailing	3 l/min		45		0.75	926

5. DRILLER'S PUMPING TEST

pH 2.6

Method	Static Level (m)	Yield l/sec	Pumping Level (m)	Draw down (m)	Pumping Time (min)	Recovery Time (min)	Ec at 25 C (µS/cm)

6. IF NOT A DRILLED BORE

Type	Length (m)	Width (m)	Diam (m)	Lining Material	From (m)	To (m)

7. SAMPLES

Have material samples been taken? Yes ☑ No ☐ If Yes From 0 (m)
Have water samples been taken? Yes ☑ No ☐ To 6 (m)
Samples taken by: Bore Owner ☐ Driller ☐ Project Geologist ☑

8. DISINFECTION

Was the Bore Disinfected? Yes ☐ No ☑
If yes, state method of disinfection: Chlorine Washed ☐ Steam Cleaned ☐
Other, please specify: .....

9. DRILLER'S LOG

Material	From (m)	To (m)
Clay, silty, red/orange	0	0.1
Silt, sandy, black/brown	0.1	0.5
Sand, clayey with silt, orange/brown grey	0.5	2
Clay, sandy, grey	2	6
Clay, sand, Drk grey	4	6

Driller's Name Ben Oughton Driller's Licence No. 1049

Driller's Signature ..... Date 05 / 06 / 2019

Name of Plant Operator .....

Print and Sign

BH12

WATER ACT 1989
BORE COMPLETION REPORT

Southern Rural Water
Managing Water. Serving Communities.

SRW COPY –
To be sent to Southern Rural Water within 28 days of completion of bore.

LICENCE TO CONSTRUCT WORKS No. WLE 074097

Report on site 1 ☑ 2 ☐ 3 ☐ 4 ☐ 5 ☐

GPS CO-ORDS: E 735299 N 5743902

Drilled Bore ☑ Sprearpoint ☐ Well or Shaft ☐ Dragline ☐

ZONE: 54 / ~~55~~ (delete as applicable)

GDA 94/AD~~6~~6 (delete as applicable)

OFFICE USE ONLY
BORE NUMBER
BORE USES
GMA ..... ZONE .....

Bore Owner: Barwon Water

Site Address: 25 POSSUM RIDGE ROAD, YEODENE, VIC 3249 (Boundary Creek - Big Swamp)

Date Commenced: 07 / 05 / 2019

Date Completed: 07 / 05 / 2019

Total Depth: 6 (m)

Was Bore Decommissioned? Y / N: N

If Yes, State Method:

1. DRILLING AND WATER INTERSECTION DETAILS

DRILLING TECHNIQUE				WATER INTERSECTIONS (while drilling, measurements taken from natural surface)									OFFICE USE
Method	From (m)	To (m)	Bit diam (mm)	From (m)	To (m)	Test Method	Static Level (m)	Est. yield l/sec	Draw down (m)	Casing at test (m)	Depth at test (m)	Ec at 25 C (µS/cm)	Lithology
Hollow Stem Auger	0	6	200										

2. CASINGS (CA) SCREENS (SC) SLOTS (SL) OPEN HOLE (OH)

GENERAL						CASING			SCREENS / SLOTS						OFFICE USE
Type CA	SC	SL	OH	From (m)	To (m)	Inner diam (mm)	Outer diam (mm)	Material	Inner diam (mm)	Outer diam (mm)	Material	Aperture (mm)	Filter Y / N	Trade Name	Lithology
☐	☐	☑	☐	6	5	50	60	C18 uPVC	26	32	C18 uPVC	0.3	N		
☑	☐	☐	☐	5	2	26	32	C18 uPVC	50	60	C18 uPVC	0.4	N		
☐	☐	☐	☐	2	+0.7	50	60	C18 uPVC							
☐	☐	☐	☐												
☐	☐	☐	☐												

100 x 100 steel monument cover

WELL HEAD FITTINGS: Casing Shoe Y / N ☐ Bullnose / Sidcap Y / N Y

3. CEMENT (C) BENTONITE (B) SEALS (S) PACKERS (P) GRAVEL (G)

Material C	B	S	P	G	From (m)	To (m)	Cement (bags)	Water (litres)	Seal / Packer type	Outer diam of seal (mm)	Artificial Gravel Packing Method of placement	Gravel size mesh passing (mm)
☐	☐	☐	☐	☑	6	1.5					Gravity	1.2 - 2.4
☐	☑	☐	☐	☐	1.5	0.8			Medium Chips			
☑	☐	☐	☐	☐	0.8	0	4	40				
☐	☐	☐	☐	☐								

4. FINAL BORE DEVELOPMENT

Method	Yield l/sec	Draw down (m)	Pumping Time (min)	Recovery Time (min)	Final Static Level	Ec at 25 C (µS/cm)
Hand bailing	3 l/min		45		0.75	926

5. DRILLER'S PUMPING TEST

pH 2.7

Method	Static Level (m)	Yield l/sec	Pumping Level (m)	Draw down (m)	Pumping Time (min)	Recovery Time (min)	Ec at 25 C (µS/cm)

6. IF NOT A DRILLED BORE

Type	Length (m)	Width (m)	Diam (m)	Lining Material	From (m)	To (m)

7. SAMPLES

Have material samples been taken? Yes ☑ No ☐ If Yes From 0 (m)

Have water samples been taken? Yes ☑ No ☐ To 6 (m)

Samples taken by: Bore Owner ☐ Driller ☐ Project Geologist ☑

8. DISINFECTION

Was the Bore Disinfected? Yes ☐ No ☑

If yes, state method of disinfection: Chlorine Washed ☐ Steam Cleaned ☐

Other, please specify:

9. DRILLER'S LOG

Material	From (m)	To (m)
Clay, silty, red/orange	0	0.1
Silt, sandy, black/brown	0.1	0.5
Sand, clayey with silt, orange/brown grey	0.5	2
Clay, sandy, grey	2	6
Clay, sand, Drk grey	4	6

Driller's Name: Ben Oughton

Driller's Licence No.: 1049

Driller's Signature:

Date: 05 / 06 / 2019

Name of Plant Operator:

Print and Sign

BH14

WATER ACT 1989
BORE COMPLETION REPORT

Southern Rural Water
Managing Water. Serving Communities.

SRW COPY –
To be sent to Southern Rural Water within 28 days of completion of bore.

LICENCE TO CONSTRUCT WORKS No. WLE 074097

Report on site 1 ☑ 2 ☐ 3 ☐ 4 ☐ 5 ☐

GPS CO-ORDS: E 735299 N 5743902

Drilled Bore ☑ Sprearpoint ☐ Well or Shaft ☐ Dragline ☐

ZONE: 54 / ~~55~~ delete as applicable

GDA 94/AD~~6~~6 delete as applicable

OFFICE USE ONLY
BORE NUMBER
BORE USES
GMA ..... ZONE .....

Bore Owner Barwon Water

Site Address 25 POSSUM RIDGE ROAD, YEODENE, VIC 3249 (Boundary Creek - Big Swamp)

Date Commenced 07 / 05 / 2019 Date Completed 07 / 05 / 2019 Total Depth 6 (m)

Was Bore Decommissioned? Y / N N If Yes, State Method .....

1. DRILLING AND WATER INTERSECTION DETAILS

DRILLING TECHNIQUE				WATER INTERSECTIONS (while drilling, measurements taken from natural surface)									OFFICE USE
Method	From (m)	To (m)	Bit diam (mm)	From (m)	To (m)	Test Method	Static Level (m)	Est. yield l/sec	Draw down (m)	Casing at test (m)	Depth at test (m)	Ec at 25 C (µS/cm)	Lithology
Hollow Stem Auger	0	6	200										

2. CASINGS (CA) SCREENS (SC) SLOTS (SL) OPEN HOLE (OH)

GENERAL						CASING			SCREENS / SLOTS						OFFICE USE
Type CA	SC	SL	OH	From (m)	To (m)	Inner diam (mm)	Outer diam (mm)	Material	Inner diam (mm)	Outer diam (mm)	Material	Aperture (mm)	Filter Y / N	Trade Name	Lithology
☑	☐	☐	☐	6	5	50	60	C18 uPVC	26	32	C18 uPVC	0.3	N		
☐	☐	☑	☐	5	2	26	32	C18 uPVC	50	60	C18 uPVC	0.4	N		
☑	☐	☐	☐	2	+0.7	50	60	C18 uPVC							
☐	☐	☐	☐												
☐	☐	☐	☐												

100 x 100 steel monument cover

WELL HEAD FITTINGS Casing Shoe Y / N ☐ Bullnose / Sidcap Y / N Y

3. CEMENT (C) BENTONITE (B) SEALS (S) PACKERS (P) GRAVEL (G)

Material C	B	S	P	G	From (m)	To (m)	Cement (bags)	Water (litres)	Seal / Packer type	Outer diam of seal (mm)	Artificial Gravel Packing Method of placement	Gravel size mesh passing (mm)
☐	☐	☐	☐	☑	6	1.5					Gravity	1.2 - 2.4
☐	☑	☐	☐	☐	1.5	0.8			Medium Chips			
☑	☐	☐	☐	☐	0.8	0	4	40				
☐	☐	☐	☐	☐								

4. FINAL BORE DEVELOPMENT

Method	Yield l/sec	Draw down (m)	Pumping Time (min)	Recovery Time (min)	Final Static Level	Ec at 25 C (µS/cm)
Hand bailing	3 l/min		45		0.75	926

5. DRILLER'S PUMPING TEST

pH 3.6

Method	Static Level (m)	Yield l/sec	Pumping Level (m)	Draw down (m)	Pumping Time (min)	Recovery Time (min)	Ec at 25 C (µS/cm)

6. IF NOT A DRILLED BORE

Type	Length (m)	Width (m)	Diam (m)	Lining Material	From (m)	To (m)

7. SAMPLES

Have material samples been taken? Yes ☑ No ☐ If Yes From 0 (m)
Have water samples been taken? Yes ☑ No ☐ To 6 (m)
Samples taken by: Bore Owner ☐ Driller ☐ Project Geologist ☑

8. DISINFECTION

Was the Bore Disinfected? Yes ☐ No ☑
If yes, state method of disinfection: Chlorine Washed ☐ Steam Cleaned ☐
Other, please specify: .....

9. DRILLER'S LOG

Material	From (m)	To (m)
Clay, silty, red/orange	0	0.1
Silt, sandy, black/brown	0.1	0.5
Sand, clayey with silt, orange/brown grey	0.5	2
Clay, sandy, grey	2	6
Clay, sand, Drk grey	4	6

Driller's Name Ben Oughton Driller's Licence No. 1049

Driller's Signature ..... Date 05 / 06 / 2019

Name of Plant Operator .....

Print and Sign

BH15

WATER ACT 1989
BORE COMPLETION REPORT

Southern Rural Water
Managing Water. Serving Communities.

SRW COPY –
To be sent to Southern Rural Water within 28 days of completion of bore.

LICENCE TO CONSTRUCT WORKS No. WLE 074097

Report on site 1 ☑ 2 ☐ 3 ☐ 4 ☐ 5 ☐

GPS CO-ORDS: E 735299 N 5743902

Drilled Bore ☑ Sprearpoint ☐ Well or Shaft ☐ Dragline ☐

ZONE: 54 / ~~55~~ delete as applicable

GDA 94/AD~~6~~6 delete as applicable

OFFICE USE ONLY
BORE NUMBER
BORE USES
GMA ..... ZONE .....

Bore Owner Barwon Water

Site Address 25 POSSUM RIDGE ROAD, YEODENE, VIC 3249 (Boundary Creek - Big Swamp)

Date Commenced 07 / 05 / 2019 Date Completed 07 / 05 / 2019 Total Depth 6 (m)

Was Bore Decommissioned? Y / N N If Yes, State Method .....

1. DRILLING AND WATER INTERSECTION DETAILS

DRILLING TECHNIQUE				WATER INTERSECTIONS (while drilling, measurements taken from natural surface)									OFFICE USE
Method	From (m)	To (m)	Bit diam (mm)	From (m)	To (m)	Test Method	Static Level (m)	Est. yield l/sec	Draw down (m)	Casing at test (m)	Depth at test (m)	Ec at 25 C (µS/cm)	Lithology
Hollow Stem Auger	0	6	200										

2. CASINGS (CA) SCREENS (SC) SLOTS (SL) OPEN HOLE (OH)

GENERAL						CASING			SCREENS / SLOTS						OFFICE USE
Type CA	SC	SL	OH	From (m)	To (m)	Inner diam (mm)	Outer diam (mm)	Material	Inner diam (mm)	Outer diam (mm)	Material	Aperture (mm)	Filter Y / N	Trade Name	Lithology
☑	☐	☐	☐	6	5	50	60	C18 uPVC	26	32	C18 uPVC	0.3	N		
☐	☐	☑	☐	5	2	26	32	C18 uPVC	50	60	C18 uPVC	0.4	N		
☑	☐	☐	☐	2	+0.7	50	60	C18 uPVC							
☐	☐	☐	☐												
☐	☐	☐	☐												

100 x 100 steel monument cover

WELL HEAD FITTINGS Casing Shoe Y / N ☐ Bullnose / Sidcap Y / N Y

3. CEMENT (C) BENTONITE (B) SEALS (S) PACKERS (P) GRAVEL (G)

Material C	B	S	P	G	From (m)	To (m)	Cement (bags)	Water (litres)	Seal / Packer type	Outer diam of seal (mm)	Artificial Gravel Packing Method of placement	Gravel size mesh passing (mm)
☐	☐	☐	☐	☑	6	1.5					Gravity	1.2 - 2.4
☐	☑	☐	☐	☐	1.5	0.8			Medium Chips			
☑	☐	☐	☐	☐	0.8	0	4	40				
☐	☐	☐	☐	☐								

4. FINAL BORE DEVELOPMENT

Method	Yield l/sec	Draw down (m)	Pumping Time (min)	Recovery Time (min)	Final Static Level	Ec at 25 C (µS/cm)
Hand bailing	3 l/min		45		0.75	926

5. DRILLER'S PUMPING TEST

pH 3.46

Method	Static Level (m)	Yield l/sec	Pumping Level (m)	Draw down (m)	Pumping Time (min)	Recovery Time (min)	Ec at 25 C (µS/cm)

6. IF NOT A DRILLED BORE

Type	Length (m)	Width (m)	Diam (m)	Lining Material	From (m)	To (m)

7. SAMPLES

Have material samples been taken? Yes ☑ No ☐ If Yes From 0 (m)
Have water samples been taken? Yes ☑ No ☐ To 6 (m)
Samples taken by: Bore Owner ☐ Driller ☐ Project Geologist ☑

8. DISINFECTION

Was the Bore Disinfected? Yes ☐ No ☑
If yes, state method of disinfection: Chlorine Washed ☐ Steam Cleaned ☐
Other, please specify: .....

9. DRILLER'S LOG

Material	From (m)	To (m)
Clay, silty, red/orange	0	0.1
Silt, sandy, black/brown	0.1	0.5
Sand, clayey with silt, orange/brown grey	0.5	2
Clay, sandy, grey	2	6
Clay, sand, Drk grey	4	6

Driller's Name Ben Oughton Driller's Licence No. 1049

Driller's Signature ..... Date 05 / 06 / 2019

Name of Plant Operator .....

Print and Sign

BH16

WATER ACT 1989
BORE COMPLETION REPORT

Southern Rural Water
Managing Water. Serving Communities.

SRW COPY –
To be sent to Southern Rural Water within 28 days of completion of bore.

LICENCE TO CONSTRUCT WORKS No. WLE 074097

Report on site 1 ☑ 2 ☐ 3 ☐ 4 ☐ 5 ☐

GPS CO-ORDS: E 735299 N 5743902

Drilled Bore ☑ Sprearpoint ☐ Well or Shaft ☐ Dragline ☐

ZONE: 54 / ~~55~~ delete as applicable

GDA 94/AD~~6~~6 delete as applicable

OFFICE USE ONLY
BORE NUMBER
BORE USES
GMA ..... ZONE .....

Bore Owner Barwon Water

Site Address 25 POSSUM RIDGE ROAD, YEODENE, VIC 3249 (Boundary Creek - Big Swamp)

Date Commenced 07 / 05 / 2019 Date Completed 07 / 05 / 2019 Total Depth 6 (m)

Was Bore Decommissioned? Y / N N If Yes, State Method .....

1. DRILLING AND WATER INTERSECTION DETAILS

DRILLING TECHNIQUE				WATER INTERSECTIONS (while drilling, measurements taken from natural surface)									OFFICE USE
Method	From (m)	To (m)	Bit diam (mm)	From (m)	To (m)	Test Method	Static Level (m)	Est. yield l/sec	Draw down (m)	Casing at test (m)	Depth at test (m)	Ec at 25 C (µS/cm)	Lithology
Hollow Stem Auger	0	6	200										

2. CASINGS (CA) SCREENS (SC) SLOTS (SL) OPEN HOLE (OH)

GENERAL						CASING			SCREENS / SLOTS						OFFICE USE
Type CA	SC	SL	OH	From (m)	To (m)	Inner diam (mm)	Outer diam (mm)	Material	Inner diam (mm)	Outer diam (mm)	Material	Aperture (mm)	Filter Y / N	Trade Name	Lithology
☑	☐	☐	☐	6	5	50	60	C18 uPVC	26	32	C18 uPVC	0.3	N		
☐	☐	☑	☐	5	2	26	32	C18 uPVC	50	60	C18 uPVC	0.4	N		
☑	☐	☐	☐	2	+0.7	50	60	C18 uPVC							
☐	☐	☐	☐												
☐	☐	☐	☐												

100 x 100 steel monument cover

WELL HEAD FITTINGS Casing Shoe Y / N ☐ Bullnose / Sidcap Y / N Y

3. CEMENT (C) BENTONITE (B) SEALS (S) PACKERS (P) GRAVEL (G)

Material C	B	S	P	G	From (m)	To (m)	Cement (bags)	Water (litres)	Seal / Packer type	Outer diam of seal (mm)	Artificial Gravel Packing Method of placement	Gravel size mesh passing (mm)
☐	☐	☐	☐	☑	6	1.5					Gravity	1.2 - 2.4
☐	☑	☐	☐	☐	1.5	0.8			Medium Chips			
☑	☐	☐	☐	☐	0.8	0	4	40				
☐	☐	☐	☐	☐								

4. FINAL BORE DEVELOPMENT

Method	Yield l/sec	Draw down (m)	Pumping Time (min)	Recovery Time (min)	Final Static Level	Ec at 25 C (µS/cm)
Hand bailing	3 l/min		45		0.75	926

5. DRILLER'S PUMPING TEST

pH 4.1

Method	Static Level (m)	Yield l/sec	Pumping Level (m)	Draw down (m)	Pumping Time (min)	Recovery Time (min)	Ec at 25 C (µS/cm)

6. IF NOT A DRILLED BORE

Type	Length (m)	Width (m)	Diam (m)	Lining Material	From (m)	To (m)

7. SAMPLES

Have material samples been taken? Yes ☑ No ☐ If Yes From 0 (m)
Have water samples been taken? Yes ☑ No ☐ To 6 (m)
Samples taken by: Bore Owner ☐ Driller ☐ Project Geologist ☑

8. DISINFECTION

Was the Bore Disinfected? Yes ☐ No ☑
If yes, state method of disinfection: Chlorine Washed ☐ Steam Cleaned ☐
Other, please specify: .....

9. DRILLER'S LOG

Material	From (m)	To (m)
Clay, silty, red/orange	0	0.1
Silt, sandy, black/brown	0.1	0.5
Sand, clayey with silt, orange/brown grey	0.5	2
Clay, sandy, grey	2	6
Clay, sand, Drk grey	4	6

Driller's Name Ben Oughton Driller's Licence No. 1049

Driller's Signature ..... Date 05 / 06 / 2019

Name of Plant Operator .....

Print and Sign

BH17

WATER ACT 1989
BORE COMPLETION REPORT

Southern Rural Water
Managing Water. Serving Communities.

SRW COPY –
To be sent to Southern Rural Water within 28 days of completion of bore.

LICENCE TO CONSTRUCT WORKS No. WLE 074097

Report on site 1 ☑ 2 ☐ 3 ☐ 4 ☐ 5 ☐

GPS CO-ORDS: E 735299 N 5743902

Drilled Bore ☑ Sprearpoint ☐ Well or Shaft ☐ Dragline ☐

ZONE: 54 / ~~55~~ (delete as applicable) GDA 94/AD~~6~~6 (delete as applicable)

OFFICE USE ONLY
BORE NUMBER
BORE USES
GMA ..... ZONE .....

Bore Owner Barwon Water

Site Address 25 POSSUM RIDGE ROAD, YEODENE, VIC 3249 (Boundary Creek - Big Swamp)

Date Commenced 07 / 05 / 2019 Date Completed 07 / 05 / 2019 Total Depth 6 (m)

Was Bore Decommissioned? Y / N N If Yes, State Method .....

1. DRILLING AND WATER INTERSECTION DETAILS

DRILLING TECHNIQUE				WATER INTERSECTIONS (while drilling, measurements taken from natural surface)									OFFICE USE
Method	From (m)	To (m)	Bit diam (mm)	From (m)	To (m)	Test Method	Static Level (m)	Est. yield l/sec	Draw down (m)	Casing at test (m)	Depth at test (m)	Ec at 25 C (µS/cm)	Lithology
Hollow Stem Auger	0	6	200										

2. CASINGS (CA) SCREENS (SC) SLOTS (SL) OPEN HOLE (OH)

GENERAL						CASING			SCREENS / SLOTS						OFFICE USE
Type CA	SC	SL	OH	From (m)	To (m)	Inner diam (mm)	Outer diam (mm)	Material	Inner diam (mm)	Outer diam (mm)	Material	Aperture (mm)	Filter Y / N	Trade Name	Lithology
☑	☐	☐	☐	6	5	50	60	C18 uPVC	26	32	C18 uPVC	0.3	N		
☐	☐	☑	☐	5	2	26	32	C18 uPVC	50	60	C18 uPVC	0.4	N		
☑	☐	☐	☐	2	+0.7	50	60	C18 uPVC							
☐	☐	☐	☐												
☐	☐	☐	☐												

100 x 100 steel monument cover

WELL HEAD FITTINGS Casing Shoe Y / N ☐ Bullnose / Sidcap Y / N Y

3. CEMENT (C) BENTONITE (B) SEALS (S) PACKERS (P) GRAVEL (G)

Material C	B	S	P	G	From (m)	To (m)	Cement (bags)	Water (litres)	Seal / Packer type	Outer diam of seal (mm)	Artificial Gravel Packing Method of placement	Gravel size mesh passing (mm)
☐	☐	☐	☐	☑	6	1.5					Gravity	1.2 - 2.4
☐	☑	☐	☐	☐	1.5	0.8			Medium Chips			
☑	☐	☐	☐	☐	0.8	0	4	40				
☐	☐	☐	☐	☐								

4. FINAL BORE DEVELOPMENT

Method	Yield l/sec	Draw down (m)	Pumping Time (min)	Recovery Time (min)	Final Static Level	Ec at 25 C (µS/cm)
Hand bailing	3 l/min		45		0.75	926

5. DRILLER'S PUMPING TEST

pH 3.7

Method	Static Level (m)	Yield l/sec	Pumping Level (m)	Draw down (m)	Pumping Time (min)	Recovery Time (min)	Ec at 25 C (µS/cm)

6. IF NOT A DRILLED BORE

Type	Length (m)	Width (m)	Diam (m)	Lining Material	From (m)	To (m)

7. SAMPLES

Have material samples been taken? Yes ☑ No ☐ If Yes From 0 (m)
Have water samples been taken? Yes ☑ No ☐ To 6 (m)
Samples taken by: Bore Owner ☐ Driller ☐ Project Geologist ☑

8. DISINFECTION

Was the Bore Disinfected? Yes ☐ No ☑
If yes, state method of disinfection: Chlorine Washed ☐ Steam Cleaned ☐
Other, please specify: .....

9. DRILLER'S LOG

Material	From (m)	To (m)
Clay, silty, red/orange	0	0.1
Silt, sandy, black/brown	0.1	0.5
Sand, clayey with silt, orange/brown grey	0.5	2
Clay, sandy, grey	2	6
Clay, sand, Drk grey	4	6

Driller's Name Ben Oughton Driller's Licence No. 1049

Driller's Signature ..... Date 05 / 06 / 2019

Name of Plant Operator .....

Print and Sign

Appendix E. Well construction Licence

Works Licence ID:

WLE074097

Printed on: 28 Mar 2019 1:14:01 pm

COPY OF RECORD IN THE VICTORIAN WATER REGISTER

LICENCE TO CONSTRUCT WORKS

under Section 67 of the Water Act 1989

The information in this copy of record is as recorded at the time of printing. Current information should be obtained by a search of the register. The State of Victoria does not warrant the accuracy or completeness of this information and accepts no responsibility for any subsequent release, publication or reproduction of this information.

This licence does not remove the need to apply for any authorisation or permission necessary under any other Act of Parliament with respect to anything authorised by the works licence.

Water used under this licence is not fit for any use that may involve human consumption, directly or indirectly, without first being properly treated.

This licence is not to be interpreted as an endorsement of the design and/or construction of any works (including dams). The Authority does not accept any responsibility or liability for any suits or actions arising from injury, loss, damage or death to person or property which may arise from the maintenance, existence or use of the works.

Each person named as a licence holder is responsible for ensuring all the conditions of this licence are complied with.

This licence authorises its holders to construct the described works, subject to the conditions.

Licence Holder(s)

BARWON WATER of 44 LONSDALE STREET
SOUTH GEELONG VIC 3220

Licence Contact Details

BARWON WATER	44 LONSDALE STREET
	SOUTH GEELONG VIC 3220

Licence Details

Expiry date	28 Mar 2020
Status	Active
Authority	Southern Rural Water
Name of waterway or aquifer	NA for construct/decommission
Water system	Unincorporated (GMU)

Summary of Licensed Works

The details in this section are a summary only. They are subject to the conditions specified in this licence.

Works ID	*Works type*	*Use of water*
WRK112869	Bore	Observation
WRK112870	Bore	Observation
WRK112871	Bore	Observation
WRK112872	Bore	Observation
WRK112873	Bore	Observation
WRK112874	Bore	Observation
WRK112875	Bore	Observation
WRK112876	Bore	Observation
WRK112877	Bore	Observation
WRK112878	Bore	Observation
WRK112879	Bore	Observation
WRK112880	Bore	Observation
WRK112881	Bore	Observation
WRK112882	Bore	Observation
WRK112883	Bore	Observation
WRK112884	Bore	Observation
WRK112885	Bore	Observation
WRK112886	Bore	Observation

Description of Licensed Works

WORKS ID WRK112869

Works type	Bore
Works subtype	Drilled bore
Proposed maximum depth	60.000 metres

Works location

Easting	*Northing*	*Zone MGA*
735802.078	5743839.275	Zone 54

Land description

Volume 4177 Folio 273
CA 115A Parish of Yeo

Property address

25 POSSUM RIDGE ROAD, YEODENE, VIC 3249

Description of Licensed Works

WORKS ID WRK112870

Works type	Bore
Works subtype	Drilled bore
Proposed maximum depth	60.000 metres

Works location

Easting	*Northing*	*Zone MGA*
735842.659	5743828.521	Zone 54

Land description
Volume 4177 Folio 273
CA 115A Parish of Yeo

Property address
25 POSSUM RIDGE ROAD, YEODENE, VIC 3249

Description of Licensed Works

WORKS ID WRK112871

Works type	Bore
Works subtype	Drilled bore
Proposed maximum depth	60.000 metres

Works location

Easting	*Northing*	*Zone MGA*
735740.577	5743898.978	Zone 54

Land description
Volume 4177 Folio 273
CA 115A Parish of Yeo

Property address
25 POSSUM RIDGE ROAD, YEODENE, VIC 3249

Description of Licensed Works

WORKS ID WRK112872

Works type	Bore
Works subtype	Drilled bore
Proposed maximum depth	60.000 metres

Works location

Easting	*Northing*	*Zone MGA*
735830.248	5743889.117	Zone 54

Land description
Volume 4177 Folio 273
CA 115A Parish of Yeo

Property address
25 POSSUM RIDGE ROAD, YEODENE, VIC 3249

Description of Licensed Works

WORKS ID WRK112873

Works type	Bore
Works subtype	Drilled bore
Proposed maximum depth	60.000 metres

Works location

Easting	*Northing*	*Zone MGA*
735725.600	5743876.597	Zone 54

Land description

Volume 4177 Folio 273
CA 115A Parish of Yeo

Property address

25 POSSUM RIDGE ROAD, YEODENE, VIC 3249

Description of Licensed Works

WORKS ID WRK112874

Works type	Bore
Works subtype	Drilled bore
Proposed maximum depth	60.000 metres

Works location

Easting	*Northing*	*Zone MGA*
735761.978	5743931.093	Zone 54

Land description

Volume 4177 Folio 273
CA 115A Parish of Yeo

Property address

25 POSSUM RIDGE ROAD, YEODENE, VIC 3249

Description of Licensed Works

WORKS ID WRK112875

Works type	Bore
Works subtype	Drilled bore
Proposed maximum depth	60.000 metres

Works location

Easting	*Northing*	*Zone MGA*
735618.190	5743916.251	Zone 54

Land description
Volume 4177 Folio 273
CA 115A Parish of Yeo

Property address
25 POSSUM RIDGE ROAD, YEODENE, VIC 3249

Description of Licensed Works

WORKS ID WRK112876

Works type	Bore
Works subtype	Drilled bore
Proposed maximum depth	60.000 metres

Works location

Easting	*Northing*	*Zone MGA*
735634.810	5743953.576	Zone 54

Land description
Volume 4177 Folio 273
CA 115A Parish of Yeo

Property address
25 POSSUM RIDGE ROAD, YEODENE, VIC 3249

Description of Licensed Works

WORKS ID WRK112877

Works type	Bore
Works subtype	Drilled bore
Proposed maximum depth	60.000 metres

Works location

Easting	*Northing*	*Zone MGA*
735432.908	5743914.204	Zone 54

Land description
Volume 4177 Folio 273
CA 115A Parish of Yeo

Property address
25 POSSUM RIDGE ROAD, YEODENE, VIC 3249

Description of Licensed Works

WORKS ID WRK112878

Works type	Bore
Works subtype	Drilled bore
Proposed maximum depth	60.000 metres

Works location

Easting	*Northing*	*Zone MGA*
735427.588	5743953.473	Zone 54

Land description

Volume 4177 Folio 273
CA 115A Parish of Yeo

Property address

25 POSSUM RIDGE ROAD, YEODENE, VIC 3249

Description of Licensed Works

WORKS ID WRK112879

Works type	Bore
Works subtype	Drilled bore
Proposed maximum depth	60.000 metres

Works location

Easting	*Northing*	*Zone MGA*
735426.652	5744001.564	Zone 54

Land description

Volume 4177 Folio 273
CA 115A Parish of Yeo

Property address

25 POSSUM RIDGE ROAD, YEODENE, VIC 3249

Description of Licensed Works

WORKS ID WRK112880

Works type	Bore
Works subtype	Drilled bore
Proposed maximum depth	60.000 metres

Works location

Easting	*Northing*	*Zone MGA*
735372.904	5743845.708	Zone 54

Land description
Volume 4177 Folio 273
CA 115A Parish of Yeo

Property address
25 POSSUM RIDGE ROAD, YEODENE, VIC 3249

Description of Licensed Works

WORKS ID WRK112881

Works type	Bore
Works subtype	Drilled bore
Proposed maximum depth	60.000 metres

Works location

Easting	*Northing*	*Zone MGA*
735333.053	5743873.448	Zone 54

Land description
Volume 4177 Folio 273
CA 115A Parish of Yeo

Property address
25 POSSUM RIDGE ROAD, YEODENE, VIC 3249

Description of Licensed Works

WORKS ID WRK112882

Works type	Bore
Works subtype	Drilled bore
Proposed maximum depth	60.000 metres

Works location

Easting	*Northing*	*Zone MGA*
735302.808	5743891.766	Zone 54

Land description
Volume 4177 Folio 273
CA 115A Parish of Yeo

Property address
25 POSSUM RIDGE ROAD, YEODENE, VIC 3249

Description of Licensed Works

WORKS ID WRK112883

Works type	Bore
Works subtype	Drilled bore
Proposed maximum depth	60.000 metres

Works location

Easting	*Northing*	*Zone MGA*
735253.750	5743914.896	Zone 54

Land description

Volume 4177 Folio 273
CA 115A Parish of Yeo

Property address

25 POSSUM RIDGE ROAD, YEODENE, VIC 3249

Description of Licensed Works

WORKS ID WRK112884

Works type	Bore
Works subtype	Drilled bore
Proposed maximum depth	60.000 metres

Works location

Easting	*Northing*	*Zone MGA*
735303.069	5743804.663	Zone 54

Land description

Volume 4177 Folio 273
CA 115A Parish of Yeo

Property address

25 POSSUM RIDGE ROAD, YEODENE, VIC 3249

Description of Licensed Works

WORKS ID WRK112885

Works type	Bore
Works subtype	Drilled bore
Proposed maximum depth	60.000 metres

Works location

Easting	*Northing*	*Zone MGA*
735752.298	5743915.492	Zone 54

Land description
Volume 4177 Folio 273
CA 115A Parish of Yeo

Property address
25 POSSUM RIDGE ROAD, YEODENE, VIC 3249

Description of Licensed Works

WORKS ID WRK112886

Works type	Bore
Works subtype	Drilled bore
Proposed maximum depth	60.000 metres

Works location

Easting	*Northing*	*Zone MGA*
735643.222	5743986.250	Zone 54

Land description
Volume 4177 Folio 273
CA 115A Parish of Yeo

Property address
25 POSSUM RIDGE ROAD, YEODENE, VIC 3249

Related Instruments

Related entitlements Nil

Related water-use entities Nil

Application History

Reference	*Type*	*Status*	*Lodged date*	*Approved date*	*Recorded date*
WLI610021	Issue	Approved	28 Mar 2019	28 Mar 2019	

Conditions

Licence WLE074097 is subject to the following conditions:

Siting and construction

1 The bore(s) must be drilled at the location specified in the application approved by the Authority.

2 If after drilling the bore is considered unsatisfactory a replacement bore may be drilled on the land specified in the licence.

Preventing pollution

3 All earthworks must be carried out, and all drilling fluids and waters produced during construction and development must be disposed of, in ways that avoid contaminating native vegetation, waterways, aquifers, the riparian environment, the riverine environment or other people's property.

4 Construction must stop immediately if the Authority reasonably believes that fuel, lubricant, drilling fluid, soil or water produced during construction and development is at risk of being spilled into native vegetation, waterways, aquifers, the riparian environment, the riverine environment or other people's property.

5 The licence holder must construct and maintain bund walls, in accordance with the timeframe, specifications, guidelines or standards prescribed by the Authority, to prevent fuel, lubricant, drilling fluid, soil or water produced during construction and development from being spilled into native vegetation, waterways, aquifers, the riparian environment, the riverine environment or other people's property.

Construction standards

6 The bore(s) must be constructed, and where relevant decommissioned, in accordance with the Minimum Construction Requirements for Water Bores in Australia, Edition 3 or its successor.

Drilling licence and supervision requirements

7 The bore(s) must be constructed by, or under the direct supervision of, a driller licensed under the Water Act 1989 and endorsed as a Class 1, 2, or 3 driller, with appropriate endorsements.

8 If artesian pressure is expected or encountered, then a driller licensed under the Water Act 1989, and endorsed as a class 3 driller, must install casing in the bore(s) to a suitable depth, and in a suitable manner, to prevent its outbreak. A suitable valve must also be fitted to the bore.

Bore completion report

9 A Bore Completion Report must be submitted to the Authority within 28 working days of the bore(s) being completed.

Protecting water resources

10 No more than 18 bore(s) may be brought to final development under this licence.

11 At the completion of drilling and before the drilling rig leaves the site, all but 18 bore(s) must be decommissioned so as to eliminate physical hazards, conserve aquifer yield, prevent groundwater contamination and prevent the intermingling of desirable and undesirable waters.

12 The bore(s) must be located at least 30 metres from any authority's channel, reserve or easement unless authorised by the Authority.

Protecting water quality

13 Drilling must not exceed the maximum depth.

14 The bore(s) must be constructed so as to prevent aquifer contamination caused by vertical flow outside the casing.

15 If two or more aquifers are encountered, the bore(s) must be constructed to ensure that an impervious seal is made and maintained between each aquifer to prevent aquifer connection through vertical flow outside the casing; under no circumstances are two or more aquifers to be screened within the one bore or in any other manner to allow connection between them.

16 Boreheads must be constructed, to ensure that no flood water, surface runoff or potential

subsurface contaminated soakage can enter the bore or bore annulus.

Protecting other water users

17 The diameter of the drill casing must not exceed 130 millimetres.

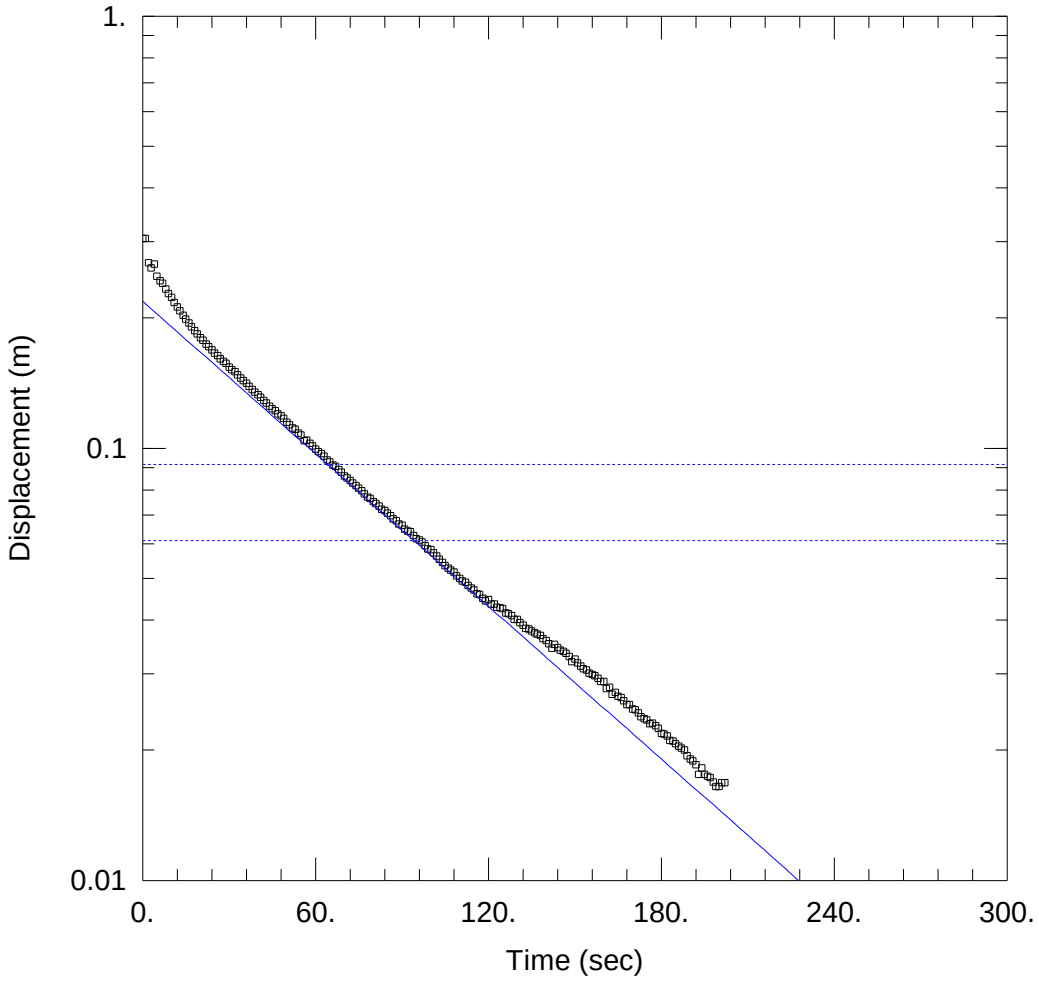
18 The bore(s) must be constructed so that water levels in the bore(s) can be measured by an airline, a piezometer or a method approved in writing by the Authority.

Fees and charges

19 The licence holder must, when requested by the Authority, pay all fees, costs and other charges under the Water Act 1989 in respect of this licence.

END OF COPY OF RECORD

Appendix F. Aquifer permeability test results



BH01 FH1

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH01.aqt
Date: 06/18/19 Time: 17:03:10

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH01
Test Date: 11/06/2019

AQUIFER DATA

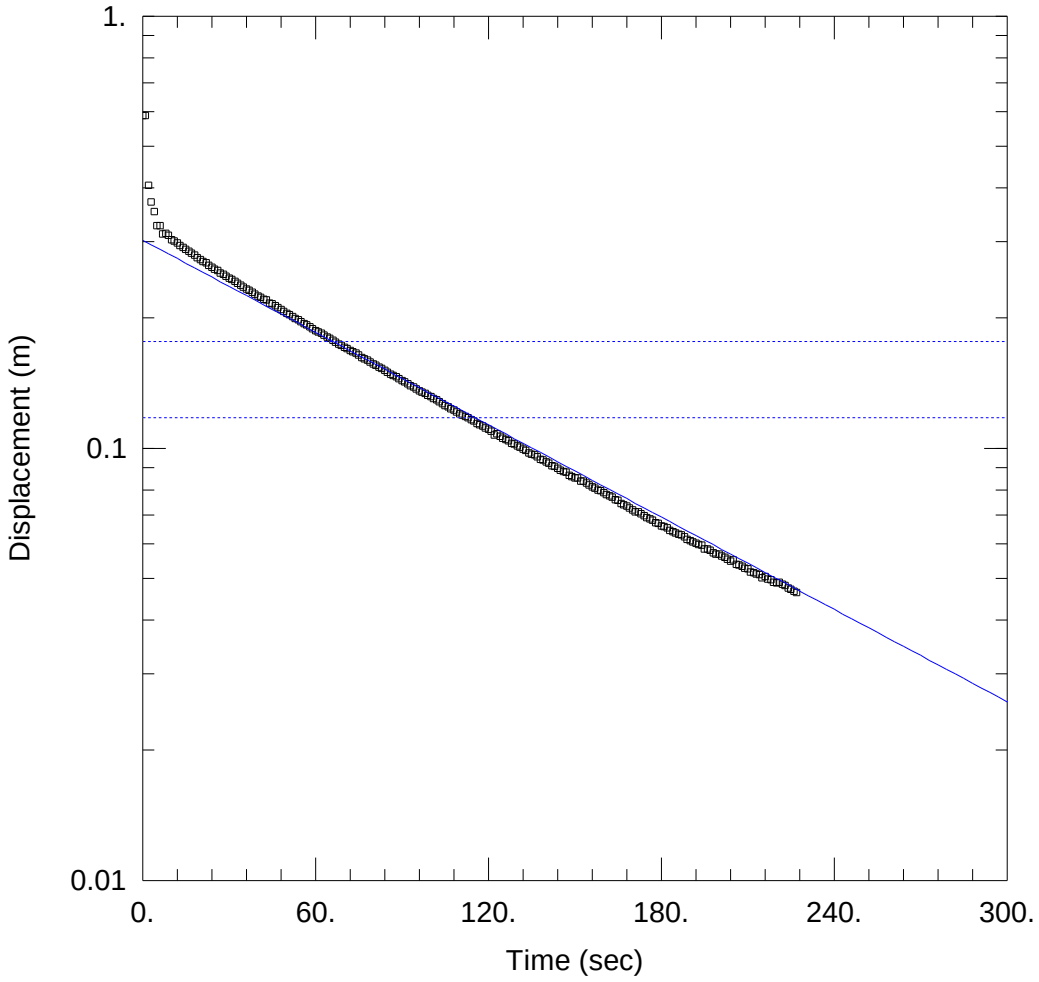
Saturated Thickness: 10. m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (BH01)

Initial Displacement: 0.3059 m
Static Water Column Height: 5.83 m
Total Well Penetration Depth: 5.83 m
Screen Length: 4.5 m
Casing Radius: 0.025 m
Well Radius: 0.1017 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.2676 m/day
y0 = 0.2187 m



BH01 FH2

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH01.aqt
Date: 06/18/19 Time: 17:07:11

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH01
Test Date: 11/06/2019

AQUIFER DATA

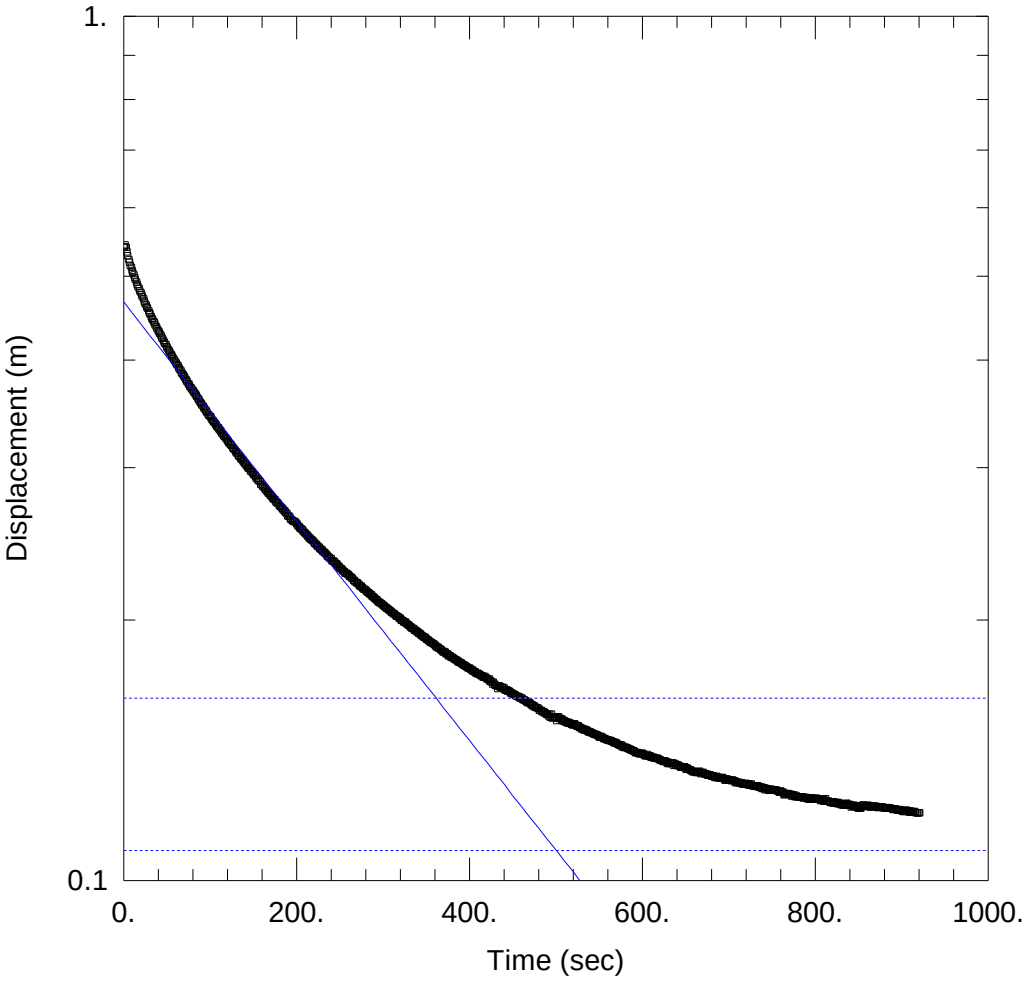
Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (BH01)

Initial Displacement: 0.5881 m Static Water Column Height: 5.83 m
Total Well Penetration Depth: 5.83 m Screen Length: 4.5 m
Casing Radius: 0.025 m Well Radius: 0.1017 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 0.1619 m/day y0 = 0.3029 m



BH05 RH1

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH05.aqt
Date: 06/18/19 Time: 17:29:25

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH05
Test Date: 11/06/2019

AQUIFER DATA

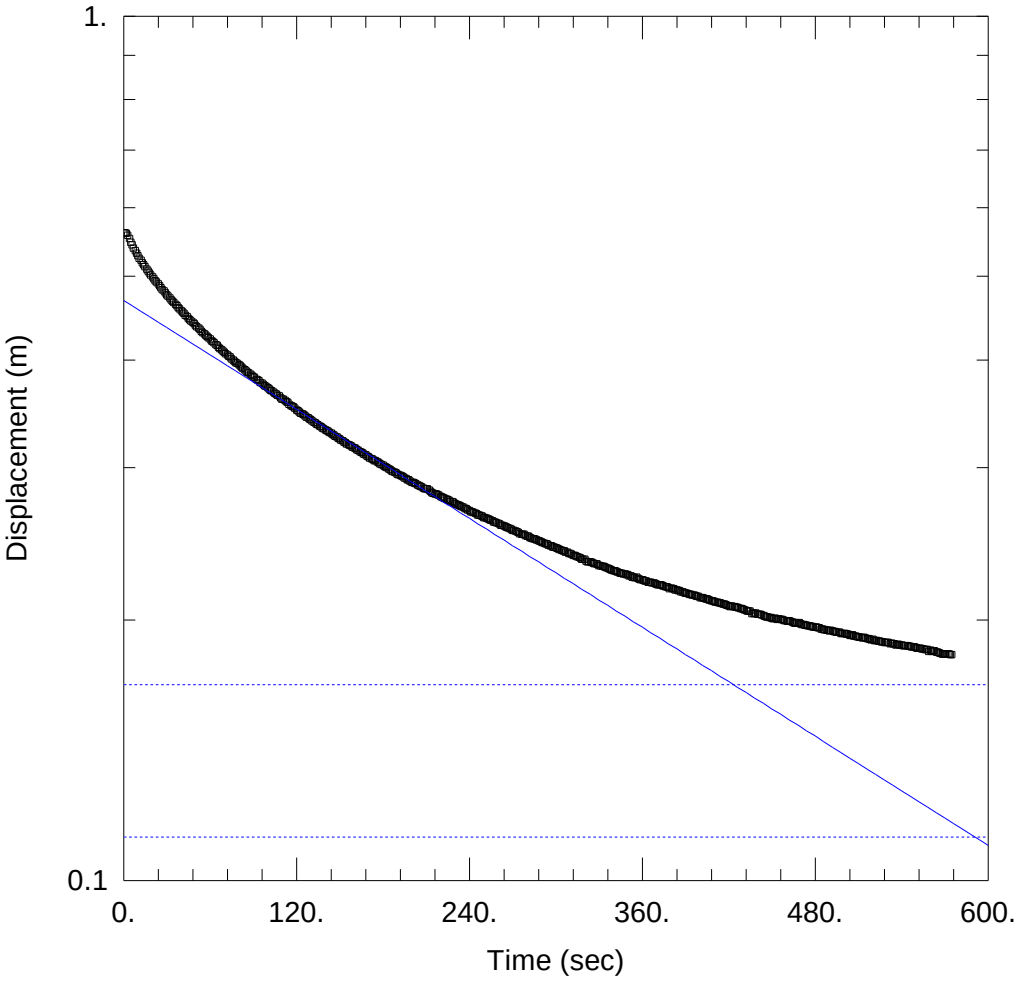
Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (New Well)

Initial Displacement: 0.5411 m
Total Well Penetration Depth: 5.31 m
Casing Radius: 0.025 m
Static Water Column Height: 5.314 m
Screen Length: 4.5 m
Well Radius: 0.1017 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.05668 m/day
y0 = 0.4667 m



BH05 RH2

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH05.aqt
Date: 06/18/19 Time: 17:31:13

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH05
Test Date: 11/06/2019

AQUIFER DATA

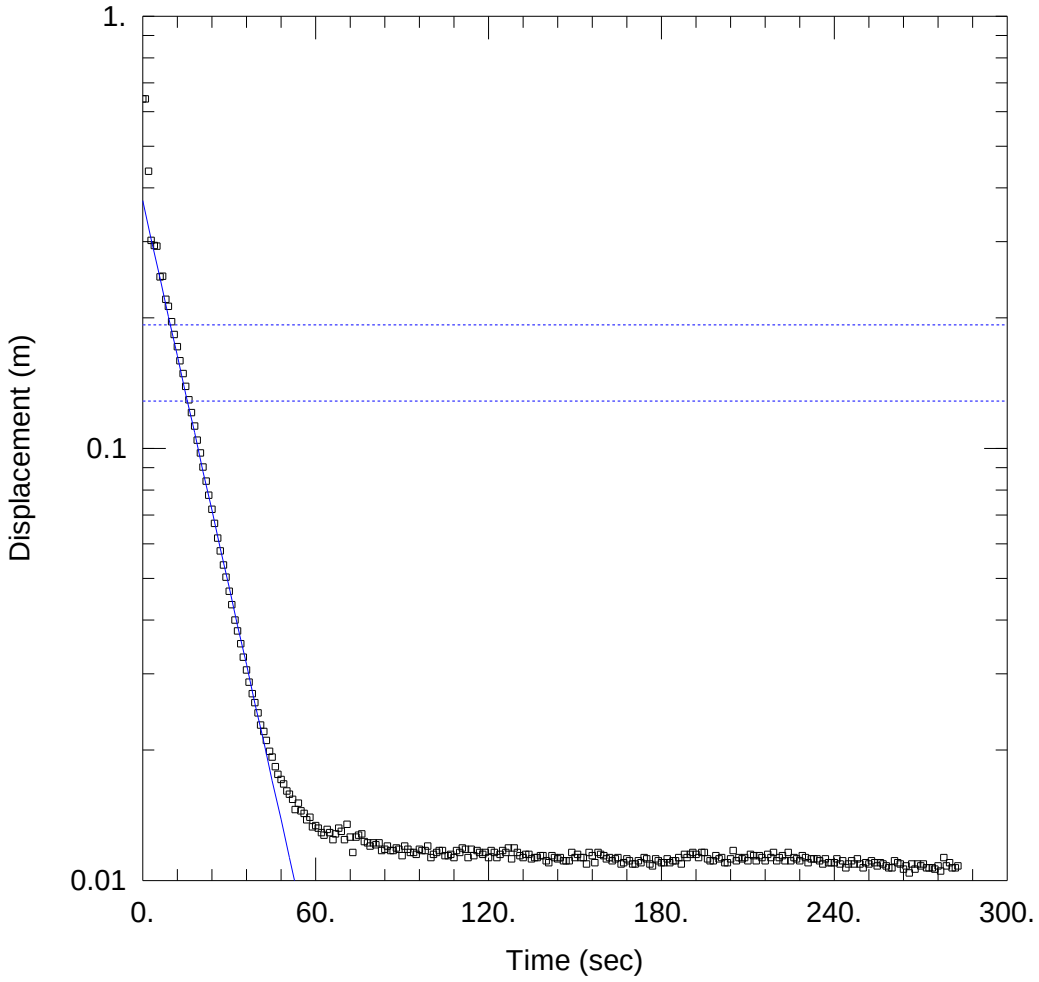
Saturated Thickness: 10. m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (New Well)

Initial Displacement: 0.5613 m
Total Well Penetration Depth: 5.31 m
Casing Radius: 0.025 m
Static Water Column Height: 5.314 m
Screen Length: 4.5 m
Well Radius: 0.1017 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.04697 m/day
y0 = 0.4688 m



BH06 FH1

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH06.aqt
Date: 06/19/19 Time: 06:56:53

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH06
Test Date: 11/06/2019

AQUIFER DATA

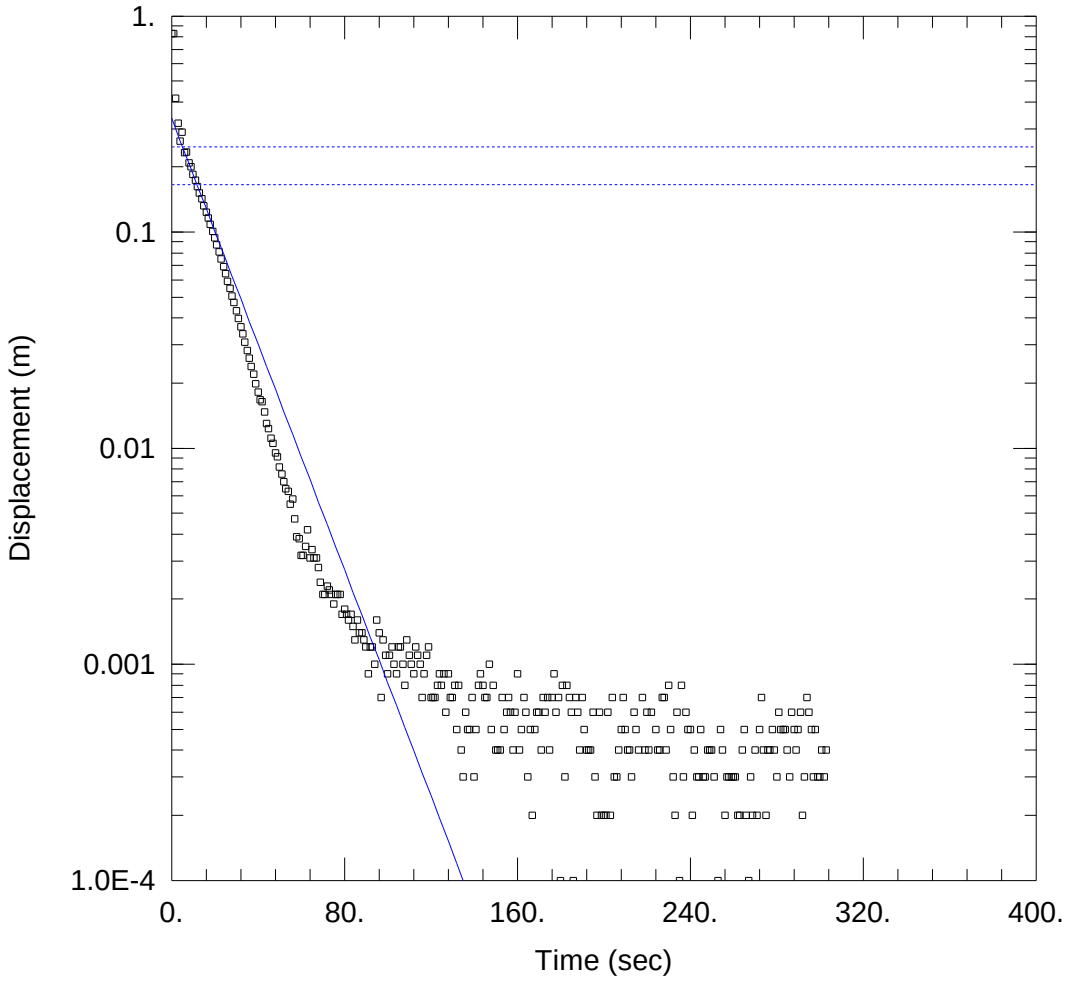
Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (New Well)

Initial Displacement: 0.6427 m
Total Well Penetration Depth: 5.04 m
Casing Radius: 0.025 m
Static Water Column Height: 5.039 m
Screen Length: 4.4 m
Well Radius: 0.1017 m

SOLUTION

Aquifer Model: Unconfined
K = 1.347 m/day
Solution Method: Bouwer-Rice
y0 = 0.3736 m



BH06 FH2

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH06.aqt
Date: 06/19/19 Time: 06:59:52

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH06
Test Date: 11/06/2019

AQUIFER DATA

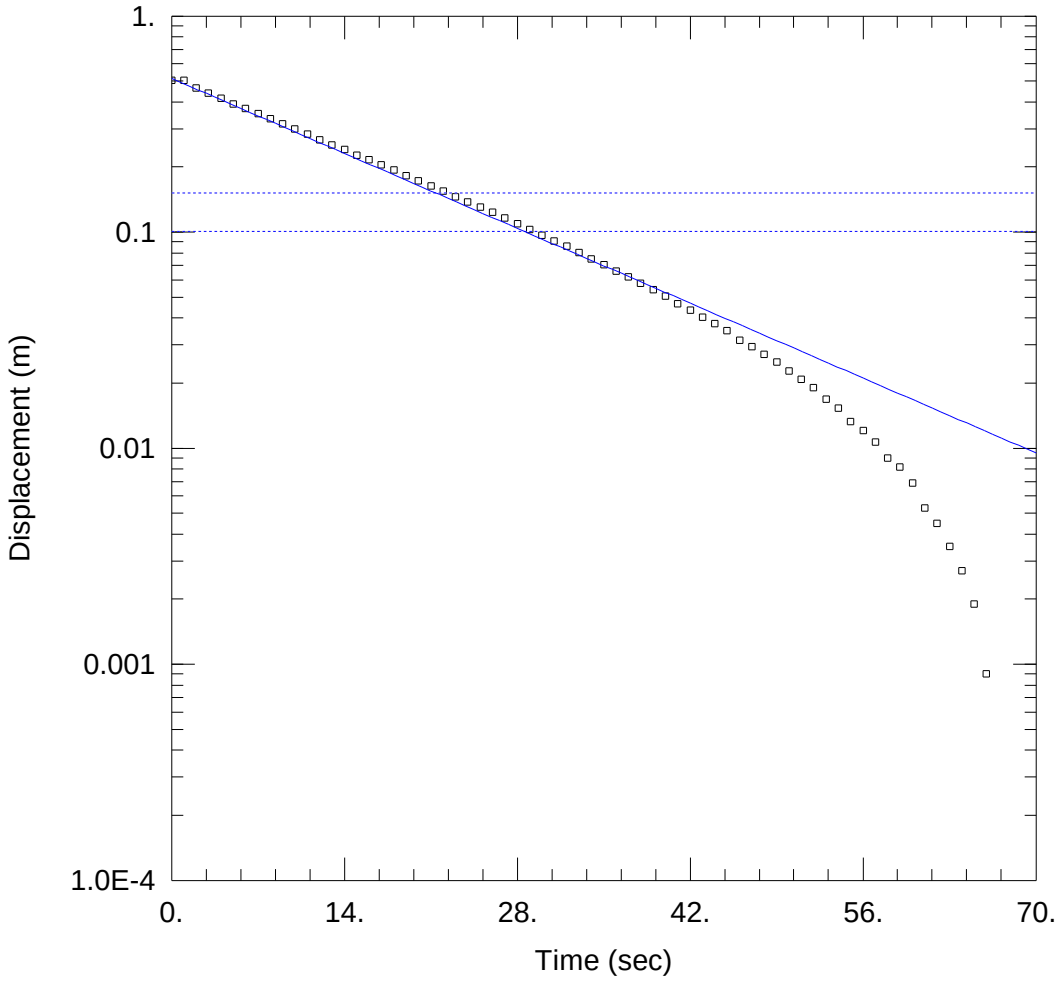
Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (New Well)

Initial Displacement: 0.8276 m Static Water Column Height: 5.039 m
Total Well Penetration Depth: 5.04 m Screen Length: 4.4 m
Casing Radius: 0.025 m Well Radius: 0.1017 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 1.18 m/day y0 = 0.3361 m



BH06 RH1

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH06.aqt
Date: 06/19/19 Time: 06:58:36

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH06
Test Date: 11/06/2019

AQUIFER DATA

Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.2

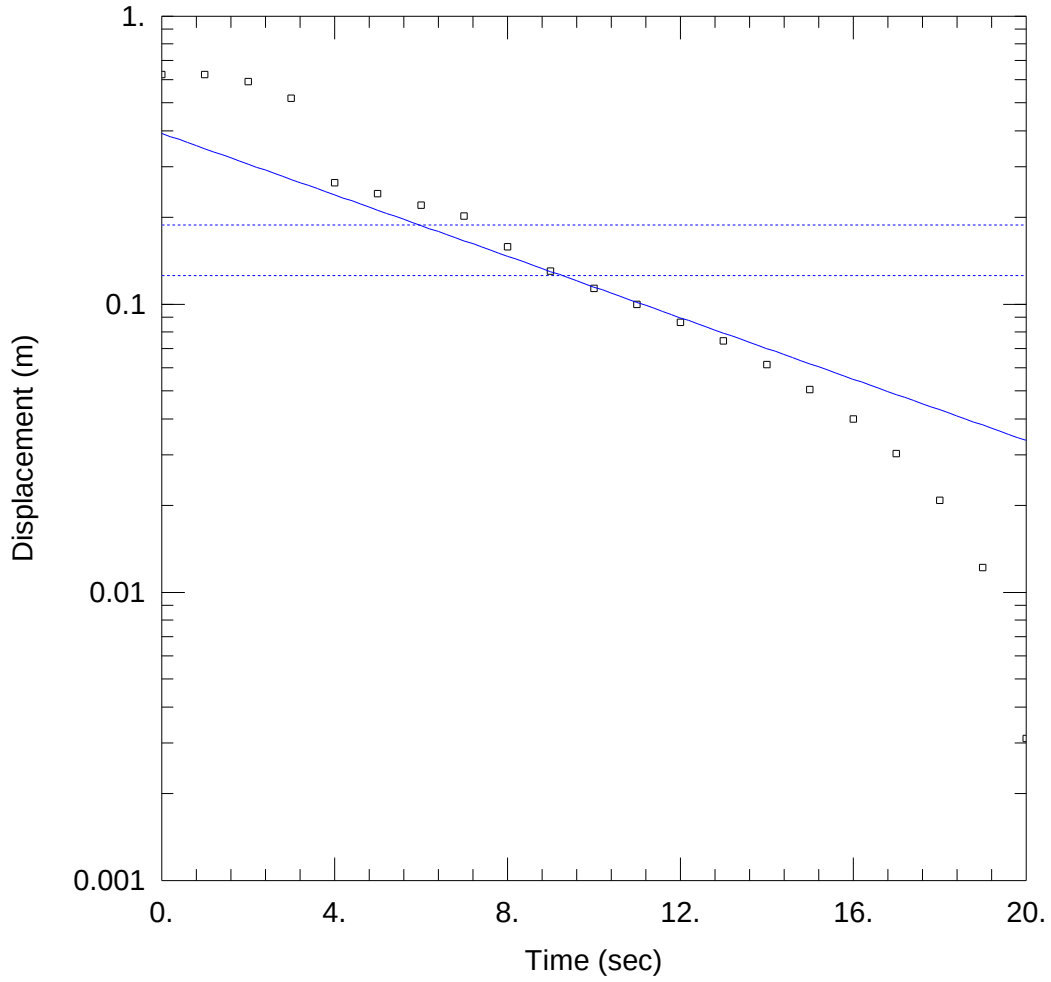
WELL DATA (New Well)

Initial Displacement: 0.5046 m
Total Well Penetration Depth: 5.04 m
Casing Radius: 0.025 m
Static Water Column Height: 5.039 m
Screen Length: 4.4 m
Well Radius: 0.1017 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 1.119 m/day
y0 = 0.5139 m



BH06 RH2

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH06.aqt
Date: 06/19/19 Time: 07:01:56

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH06
Test Date: 11/06/2019

AQUIFER DATA

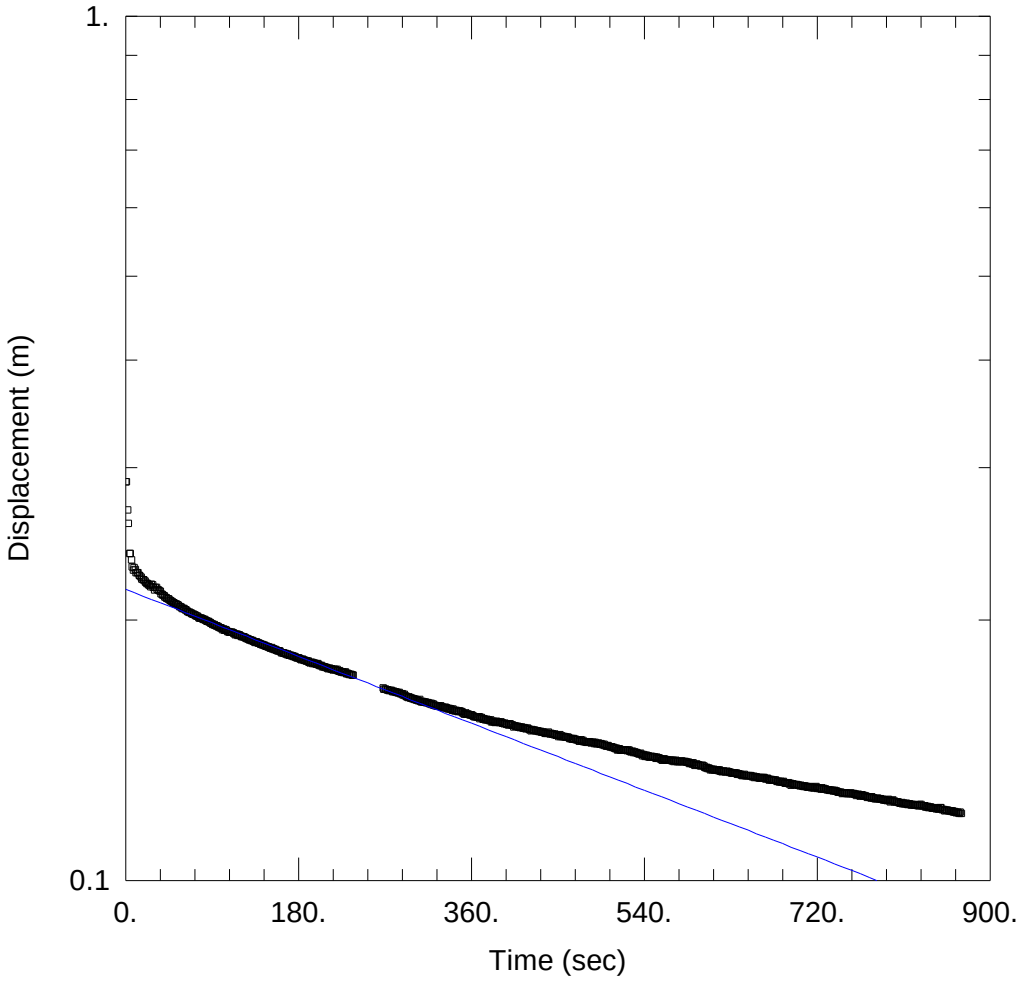
Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (New Well)

Initial Displacement: 0.6277 m
Total Well Penetration Depth: 5.04 m
Casing Radius: 0.025 m
Static Water Column Height: 5.039 m
Screen Length: 4.4 m
Well Radius: 0.1017 m

SOLUTION

Aquifer Model: Unconfined
K = 2.407 m/day
Solution Method: Bouwer-Rice
y0 = 0.3914 m



BH07 FH1

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH07.aqt
Date: 06/19/19 Time: 07:03:14

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH07
Test Date: 11/06/2019

AQUIFER DATA

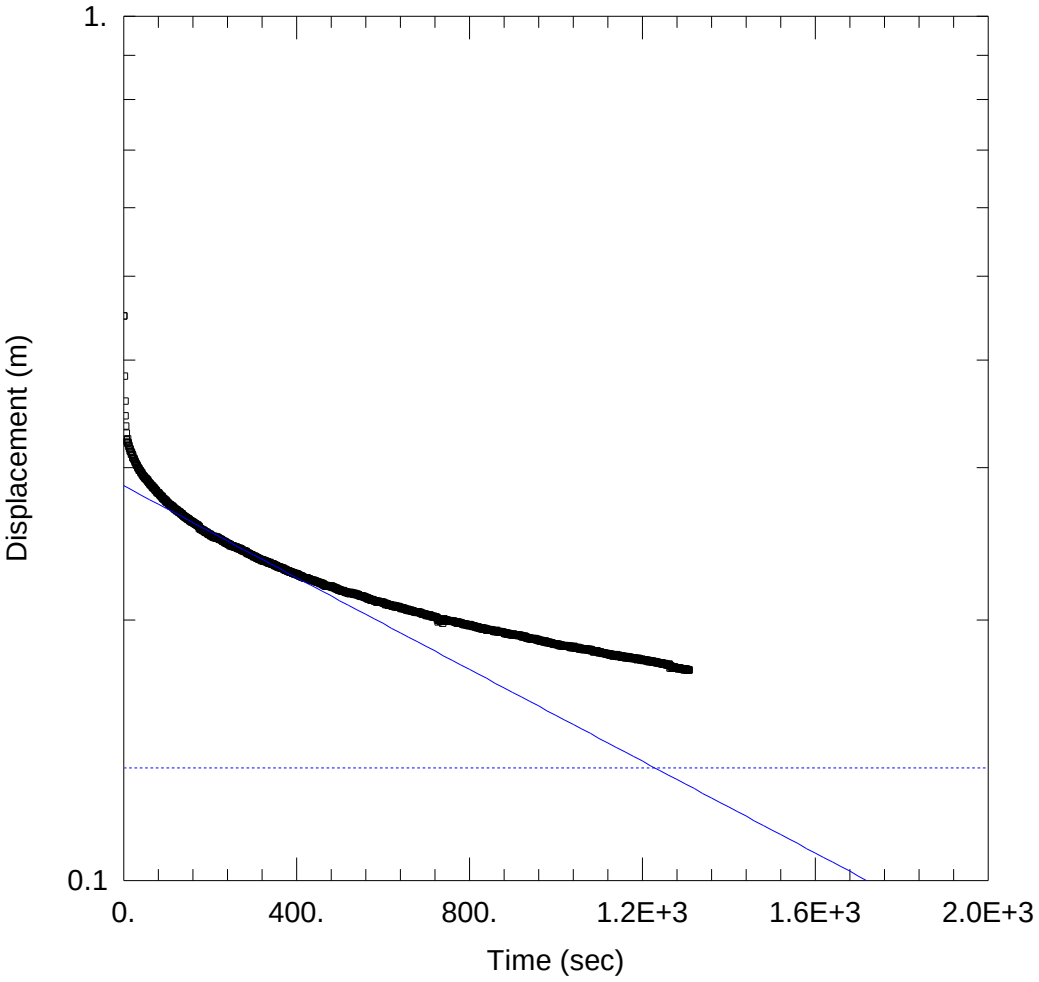
Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (New Well)

Initial Displacement: 0.2889 m Static Water Column Height: 5.955 m
Total Well Penetration Depth: 5.96 m Screen Length: 4.5 m
Casing Radius: 0.025 m Well Radius: 0.1017 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 0.01965 m/day y0 = 0.2171 m



BH07 RH1

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH07.aqt
Date: 06/19/19 Time: 07:04:44

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH07
Test Date: 11/06/2019

AQUIFER DATA

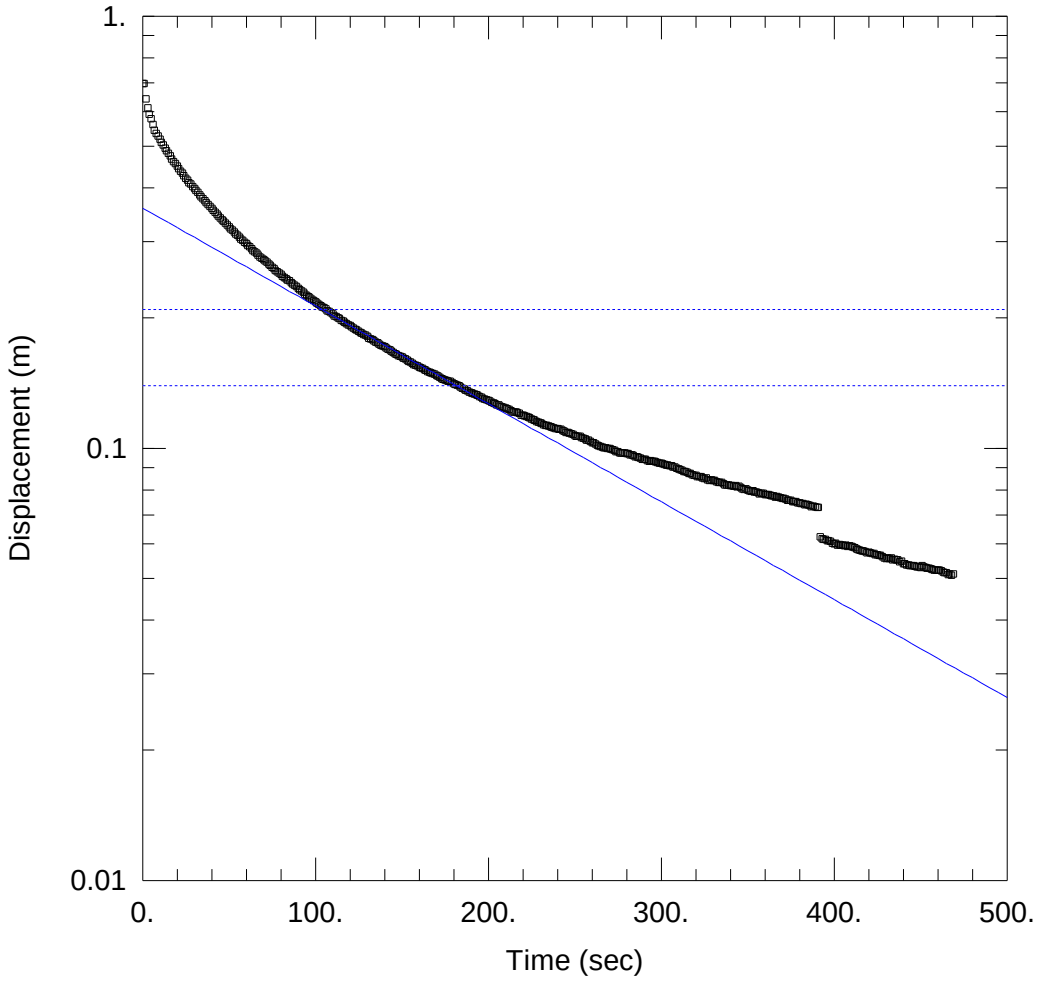
Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (New Well)

Initial Displacement: 0.4498 m Static Water Column Height: 5.955 m
Total Well Penetration Depth: 5.96 m Screen Length: 4.5 m
Casing Radius: 0.025 m Well Radius: 0.1017 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 0.01213 m/day y0 = 0.286 m



BH08 RH1

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH08.aqt
Date: 06/19/19 Time: 07:06:13

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH0
Test Date: 11/06/2019

AQUIFER DATA

Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.2

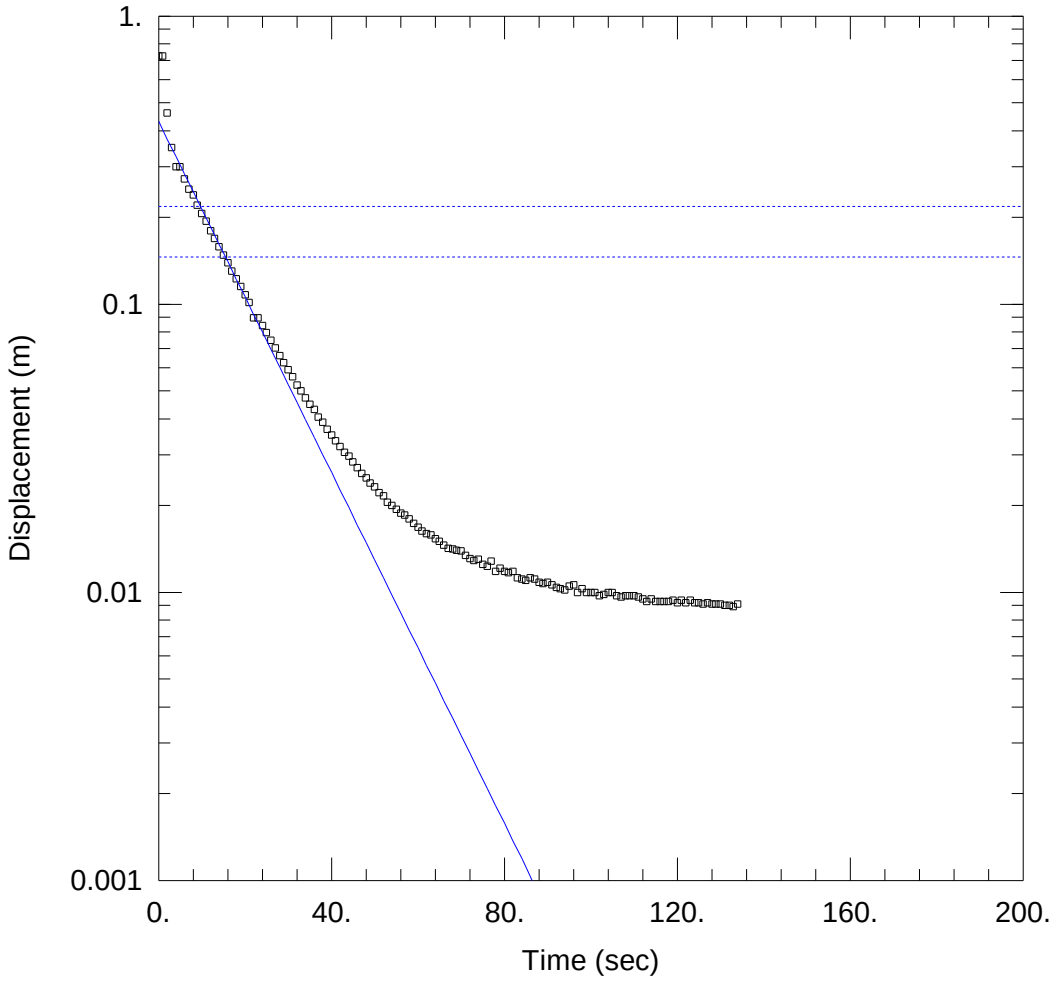
WELL DATA (New Well)

Initial Displacement: 0.6984 m Static Water Column Height: 5.04 m
Total Well Penetration Depth: 5.04 m Screen Length: 4.4 m
Casing Radius: 0.025 m Well Radius: 0.1017 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.1023 m/day y0 = 0.3593 m



BH09 FH1

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH09.aqt
Date: 06/19/19 Time: 07:07:53

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH09
Test Date: 13/06/2019

AQUIFER DATA

Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.2

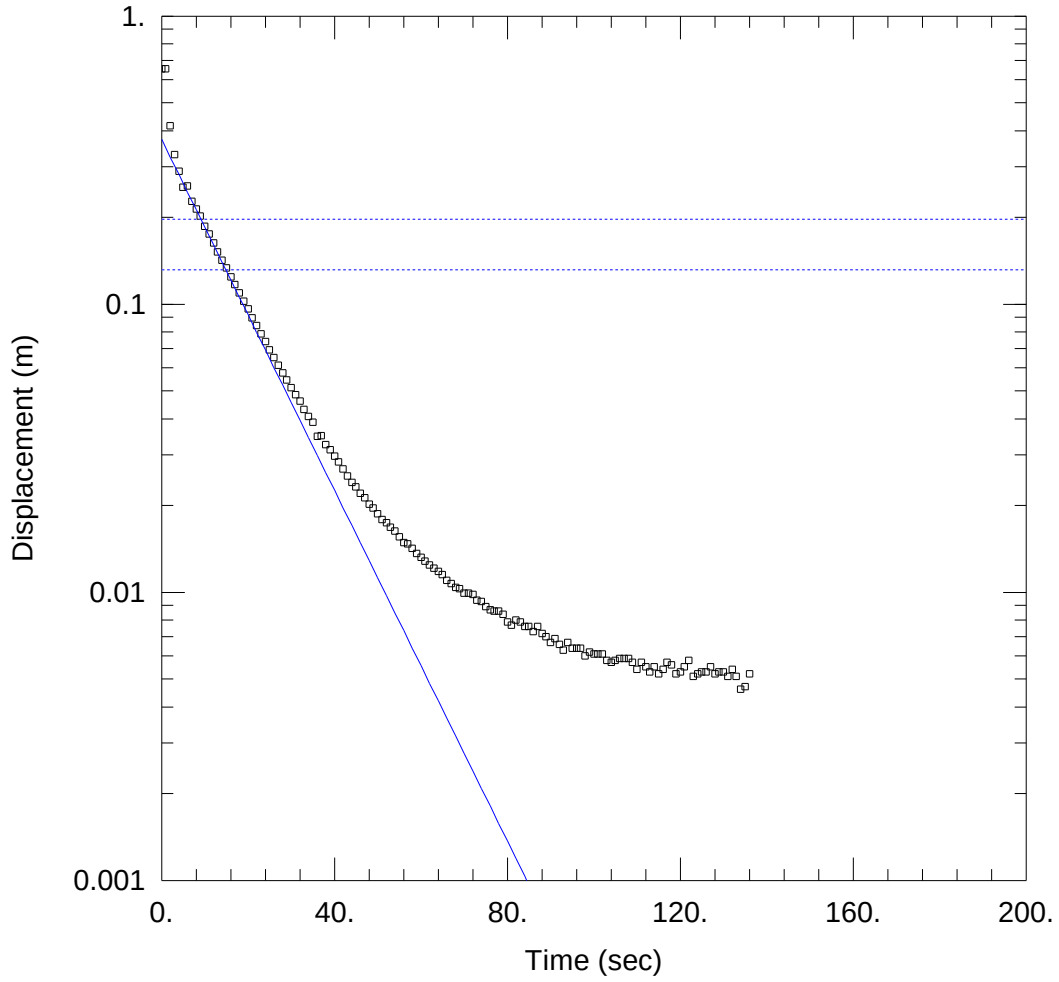
WELL DATA (New Well)

Initial Displacement: 0.7268 m Static Water Column Height: 4.78 m
Total Well Penetration Depth: 4.78 m Screen Length: 4.5 m
Casing Radius: 0.025 m Well Radius: 0.1017 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 1.335 m/day y0 = 0.4304 m



BH09 FH2

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH09.aqt
Date: 06/19/19 Time: 07:11:18

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH09
Test Date: 13/06/2019

AQUIFER DATA

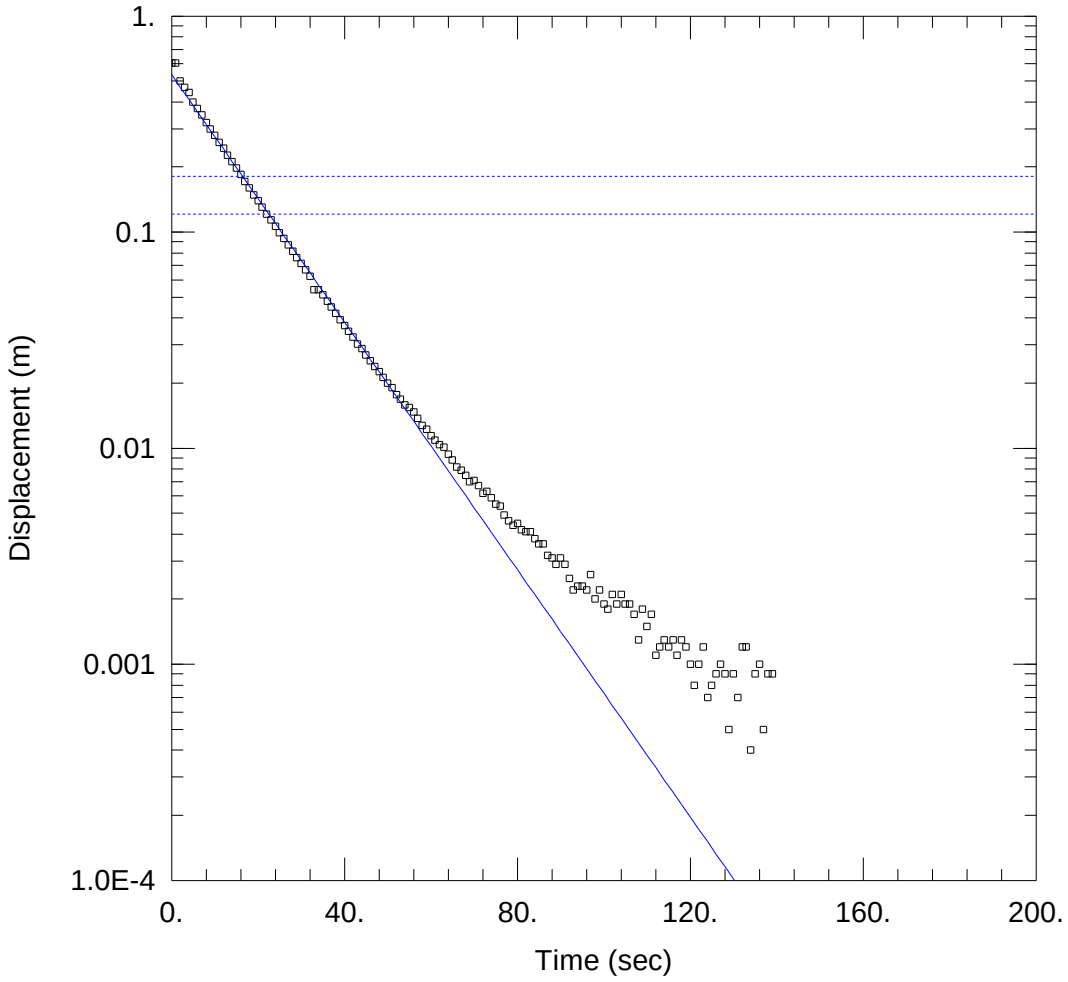
Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (New Well)

Initial Displacement: 0.6571 m
Total Well Penetration Depth: 4.78 m
Casing Radius: 0.025 m
Static Water Column Height: 4.78 m
Screen Length: 4.5 m
Well Radius: 0.1017 m

SOLUTION

Aquifer Model: Unconfined
K = 1.335 m/day
Solution Method: Bouwer-Rice
y0 = 0.3725 m



BH09 RH1

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH09.aqt
Date: 06/19/19 Time: 07:09:05

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH09
Test Date: 13/06/2019

AQUIFER DATA

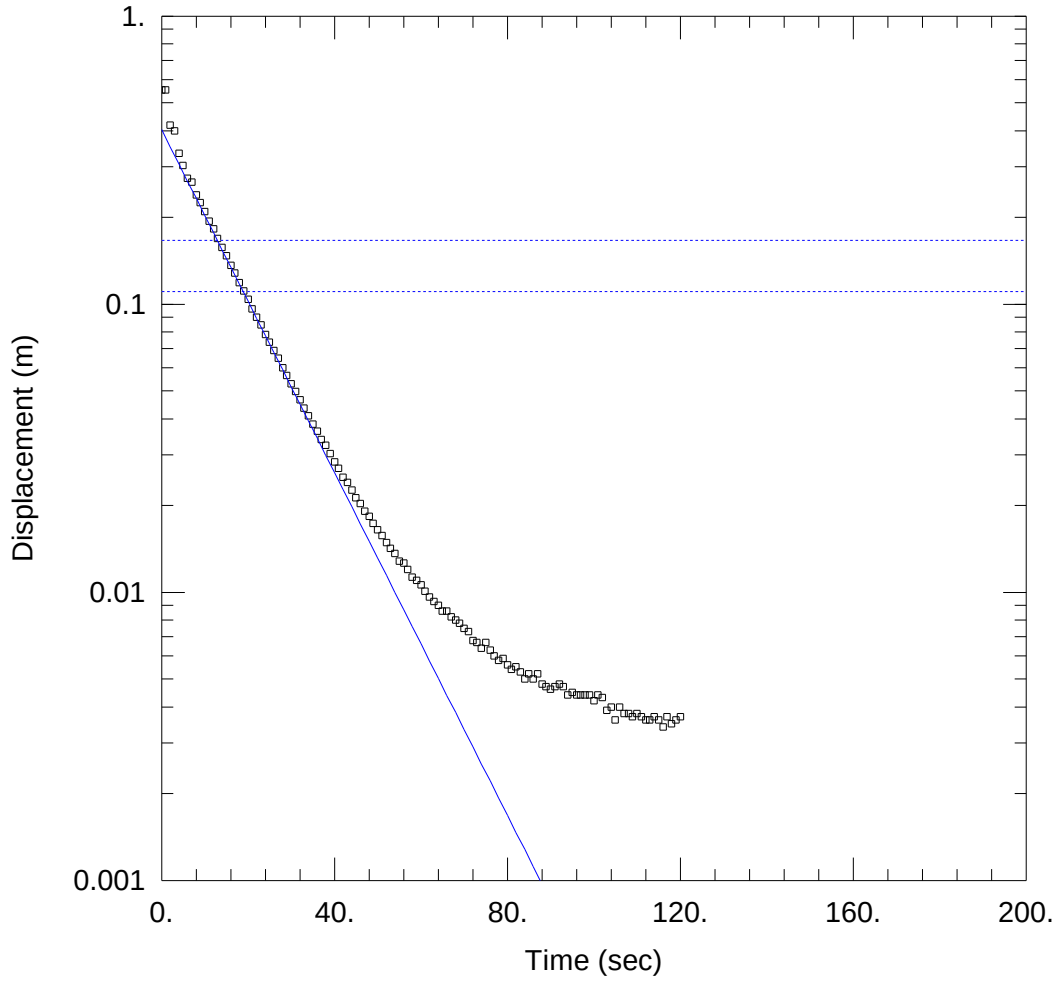
Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (New Well)

Initial Displacement: 0.6048 m
Total Well Penetration Depth: 4.78 m
Casing Radius: 0.025 m
Static Water Column Height: 4.78 m
Screen Length: 4.5 m
Well Radius: 0.1017 m

SOLUTION

Aquifer Model: Unconfined
K = 1.255 m/day
Solution Method: Bouwer-Rice
y0 = 0.5345 m



BH09 RH2

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH09.aqt
Date: 06/19/19 Time: 07:13:14

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH09
Test Date: 13/06/2019

AQUIFER DATA

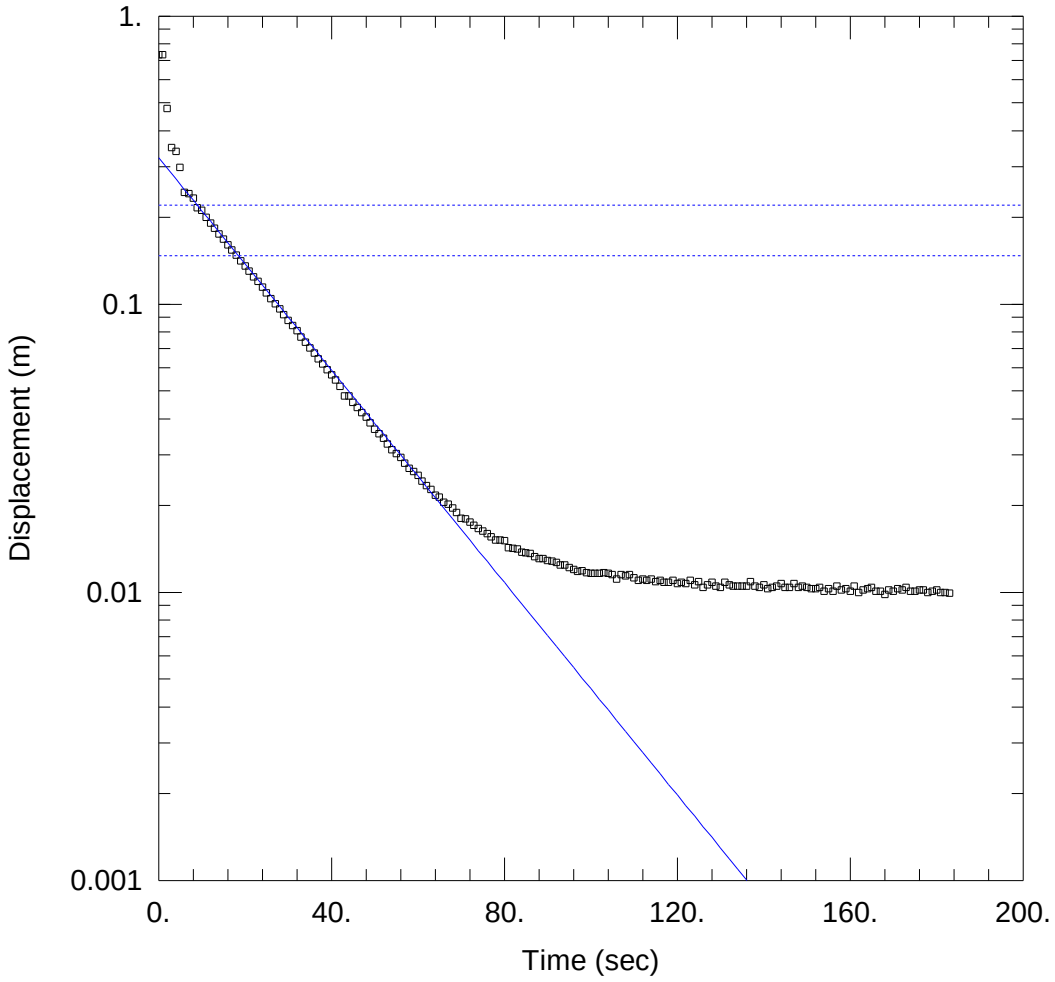
Saturated Thickness: 10. m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (New Well)

Initial Displacement: 0.5537 m
Total Well Penetration Depth: 4.78 m
Casing Radius: 0.025 m
Static Water Column Height: 4.78 m
Screen Length: 4.5 m
Well Radius: 0.1017 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.304 m/day
y0 = 0.4023 m



BH10 FH1

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH10.aqt
Date: 06/19/19 Time: 07:16:08

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH10
Test Date: 13/06/2019

AQUIFER DATA

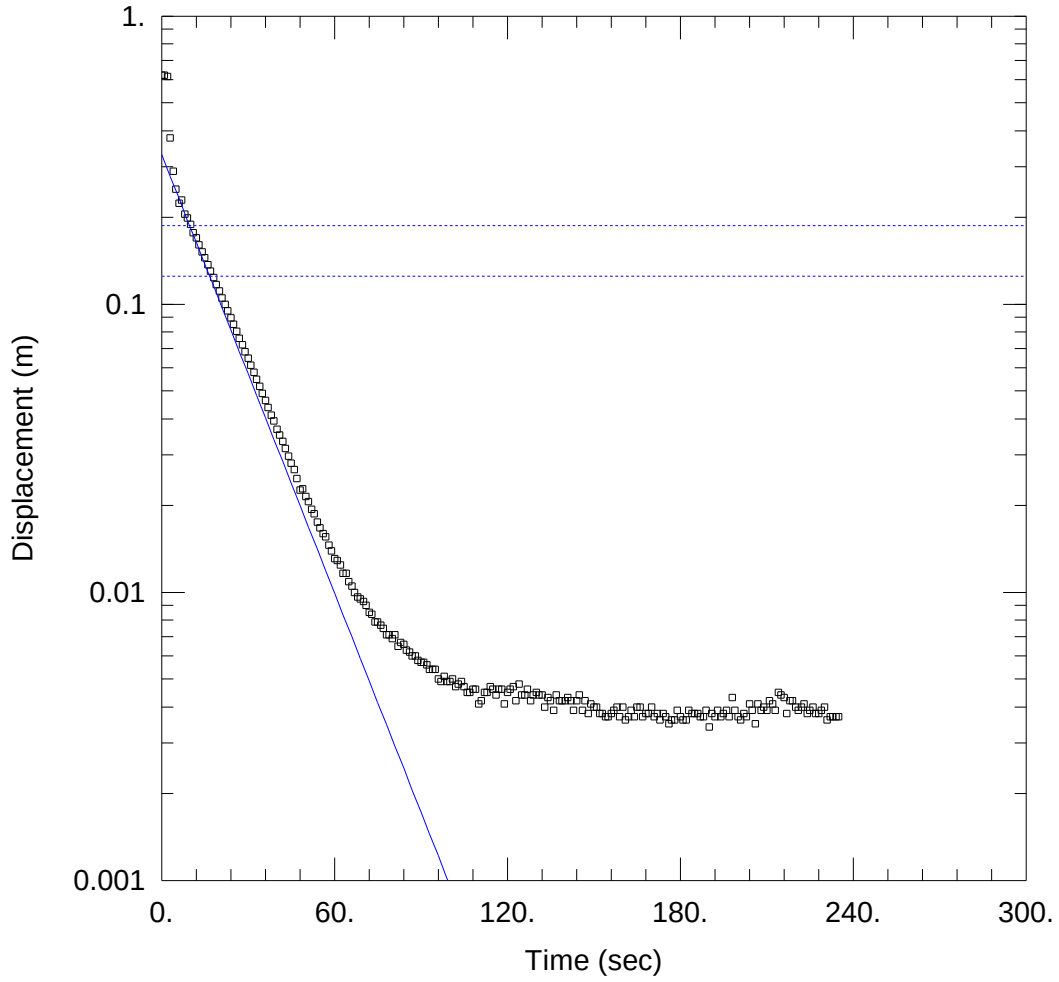
Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (New Well)

Initial Displacement: 0.7346 m
Total Well Penetration Depth: 4.97 m
Casing Radius: 0.025 m
Static Water Column Height: 4.97 m
Screen Length: 4.4 m
Well Radius: 0.1017 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.8306 m/day
y0 = 0.3223 m



BH10 FH2

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH10.aqt
Date: 06/19/19 Time: 07:19:09

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH10
Test Date: 13/06/2019

AQUIFER DATA

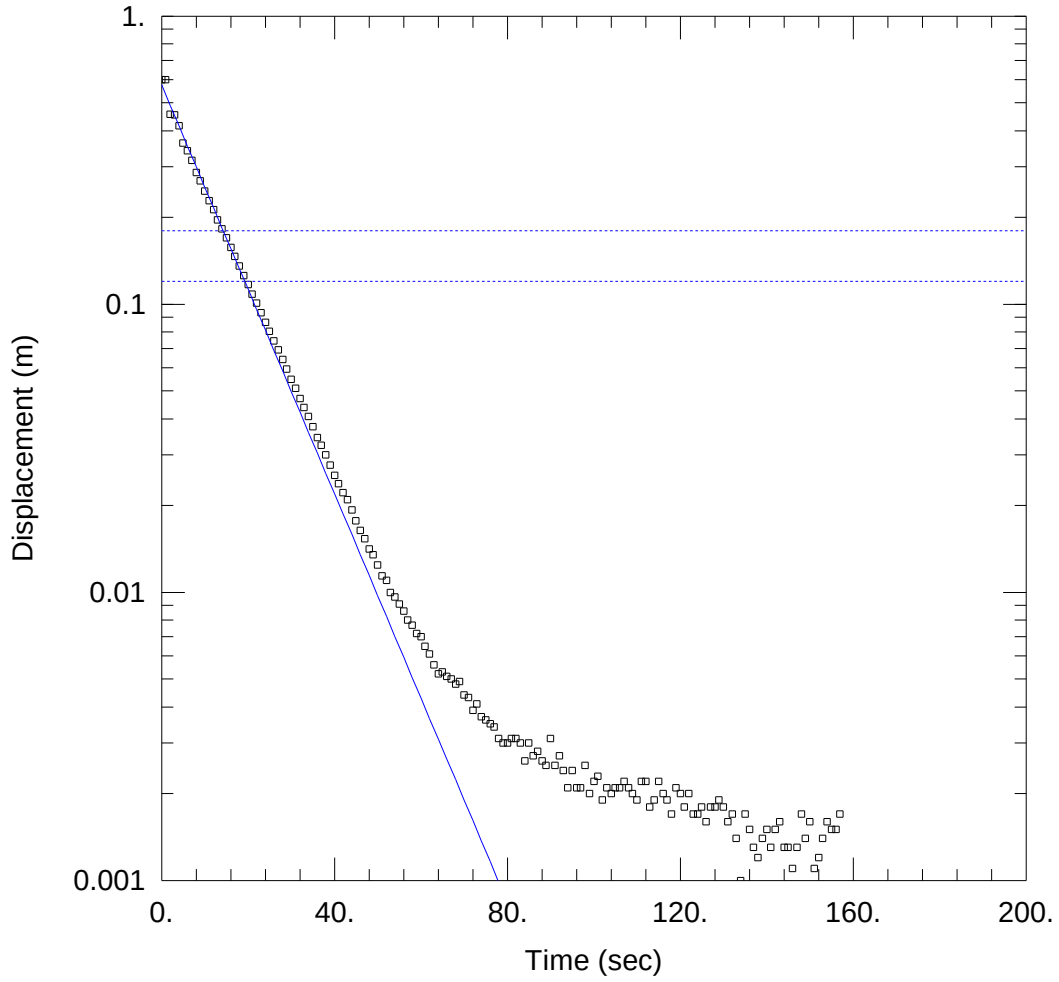
Saturated Thickness: 10. m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (New Well)

Initial Displacement: 0.6232 m
Total Well Penetration Depth: 4.97 m
Casing Radius: 0.025 m
Static Water Column Height: 4.97 m
Screen Length: 4.4 m
Well Radius: 0.1017 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.143 m/day
y0 = 0.3306 m



BH10 RH1

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH10.aqt
Date: 06/19/19 Time: 07:17:30

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH10
Test Date: 13/06/2019

AQUIFER DATA

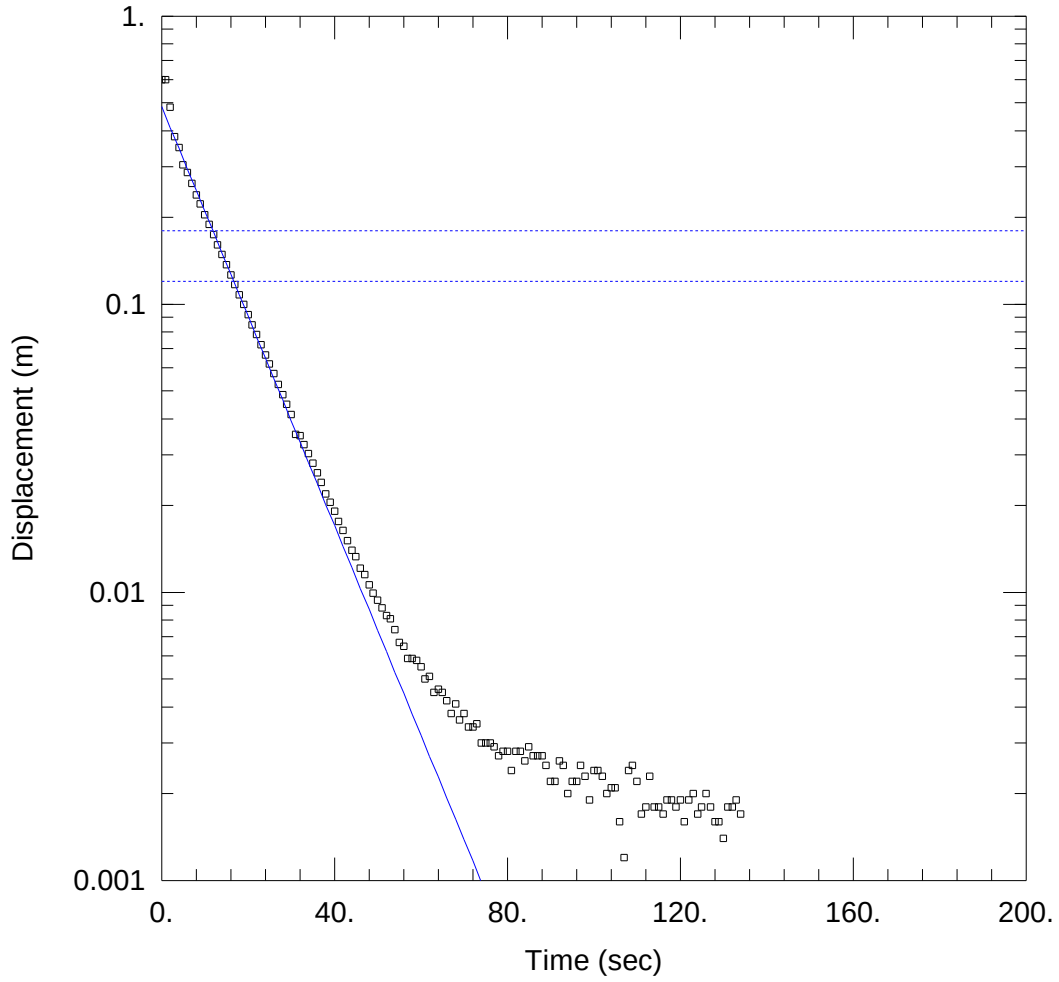
Saturated Thickness: 10. m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (New Well)

Initial Displacement: 0.5999 m
Total Well Penetration Depth: 4.97 m
Casing Radius: 0.025 m
Static Water Column Height: 4.97 m
Screen Length: 4.4 m
Well Radius: 0.1017 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.598 m/day
y0 = 0.5761 m



BH10 RH2

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH10.aqt
Date: 06/19/19 Time: 07:20:17

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH10
Test Date: 13/06/2019

AQUIFER DATA

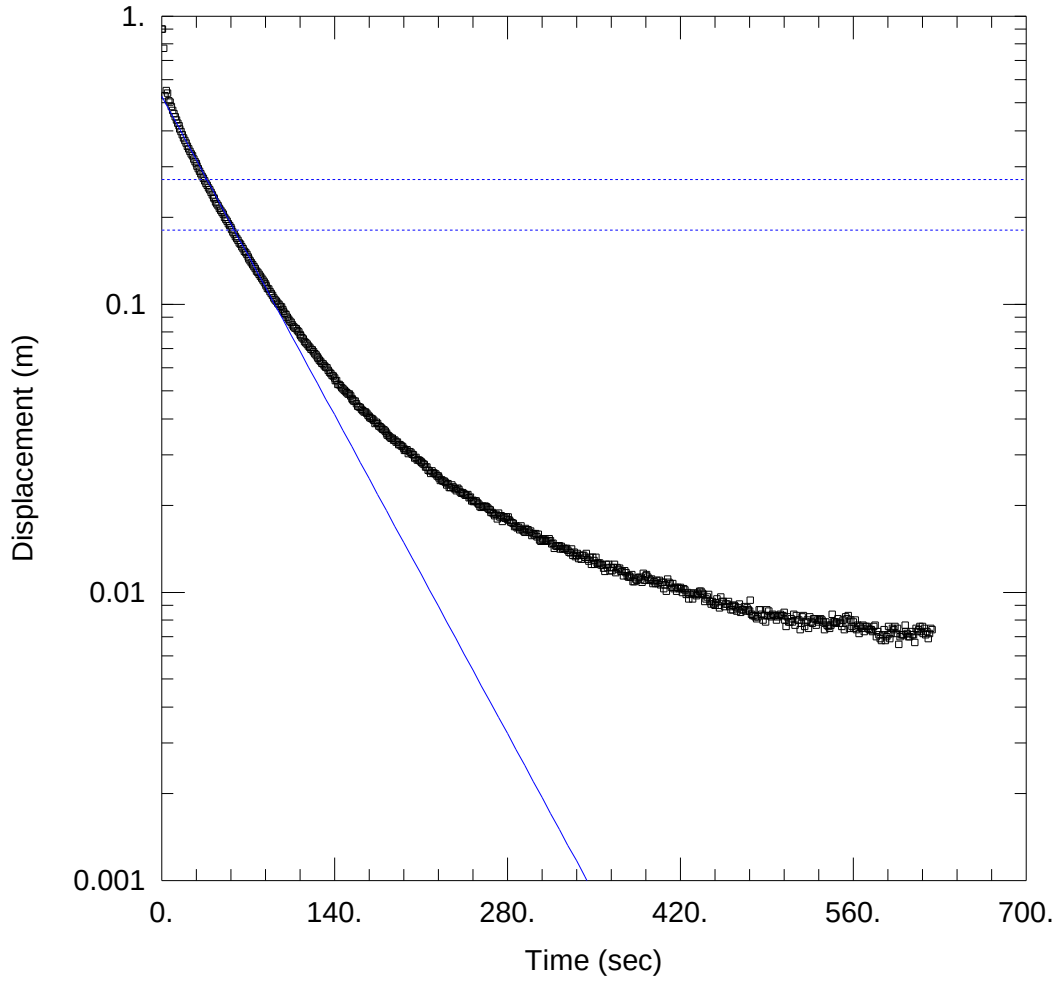
Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (New Well)

Initial Displacement: 0.6002 m
Total Well Penetration Depth: 4.97 m
Casing Radius: 0.025 m
Static Water Column Height: 4.97 m
Screen Length: 4.4 m
Well Radius: 0.1017 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.639 m/day
y0 = 0.4853 m



BH11 FH1

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH11.aqt
Date: 06/19/19 Time: 07:23:20

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH11
Test Date: 13/06/2019

AQUIFER DATA

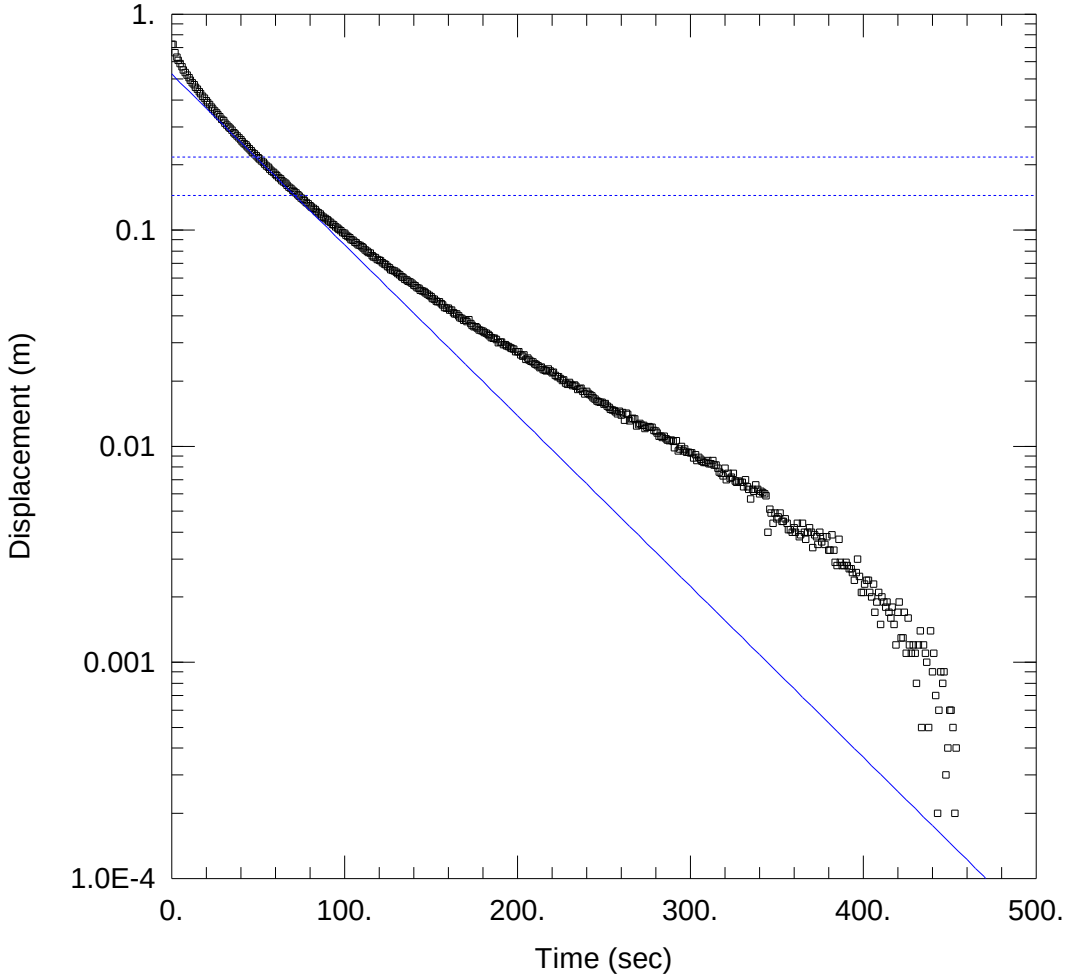
Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (New Well)

Initial Displacement: 0.9027 m
Total Well Penetration Depth: 4.83 m
Casing Radius: 0.025 m
Static Water Column Height: 4.83 m
Screen Length: 4.5 m
Well Radius: 0.1017 m

SOLUTION

Aquifer Model: Unconfined
K = 0.3473 m/day
Solution Method: Bouwer-Rice
y0 = 0.5275 m



BH11 RH1

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH11.aqt
Date: 06/19/19 Time: 07:24:50

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH11
Test Date: 13/06/2019

AQUIFER DATA

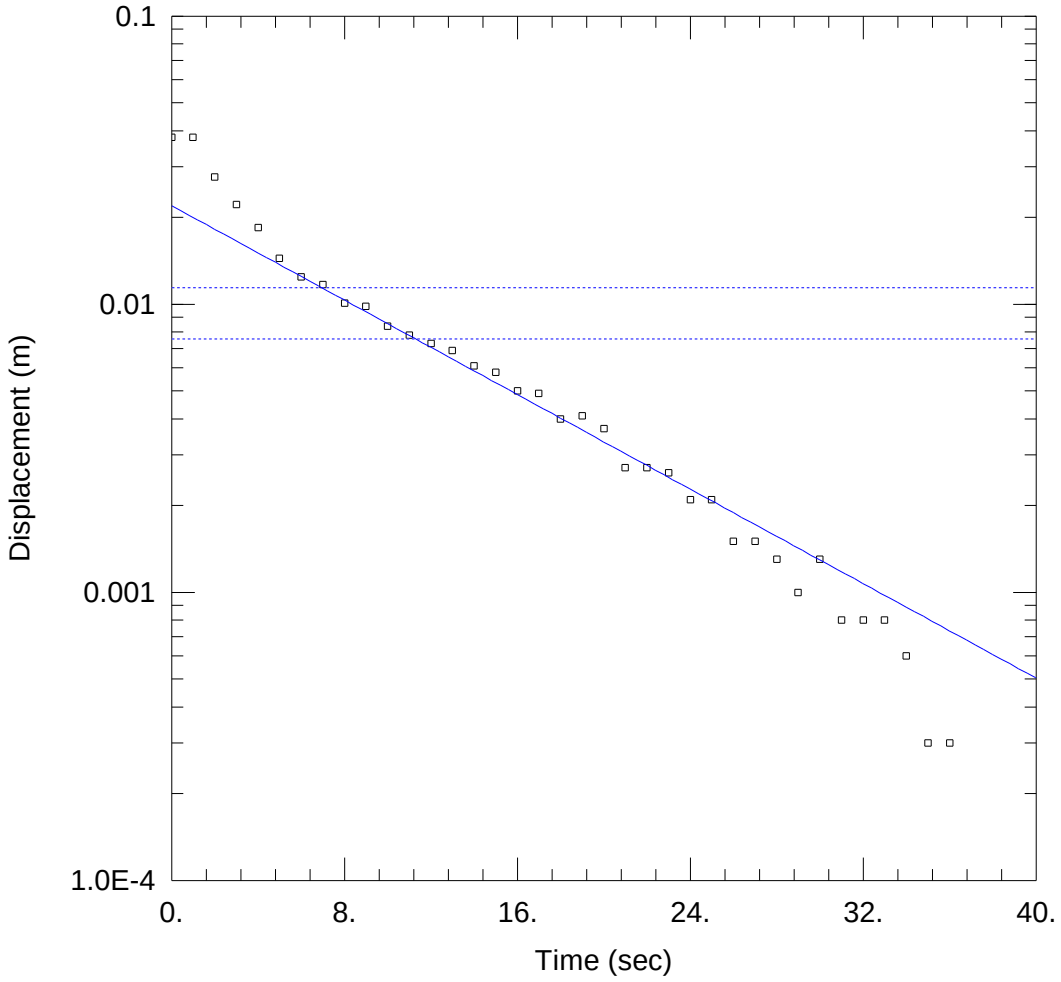
Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (New Well)

Initial Displacement: 0.7241 m
Total Well Penetration Depth: 4.83 m
Casing Radius: 0.025 m
Static Water Column Height: 4.83 m
Screen Length: 4.5 m
Well Radius: 0.1017 m

SOLUTION

Aquifer Model: Unconfined
K = 0.3473 m/day
Solution Method: Bouwer-Rice
y0 = 0.5275 m



BH12 RH1

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH12.aqt
Date: 06/19/19 Time: 07:29:39

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH12
Test Date: 13/06/2019

AQUIFER DATA

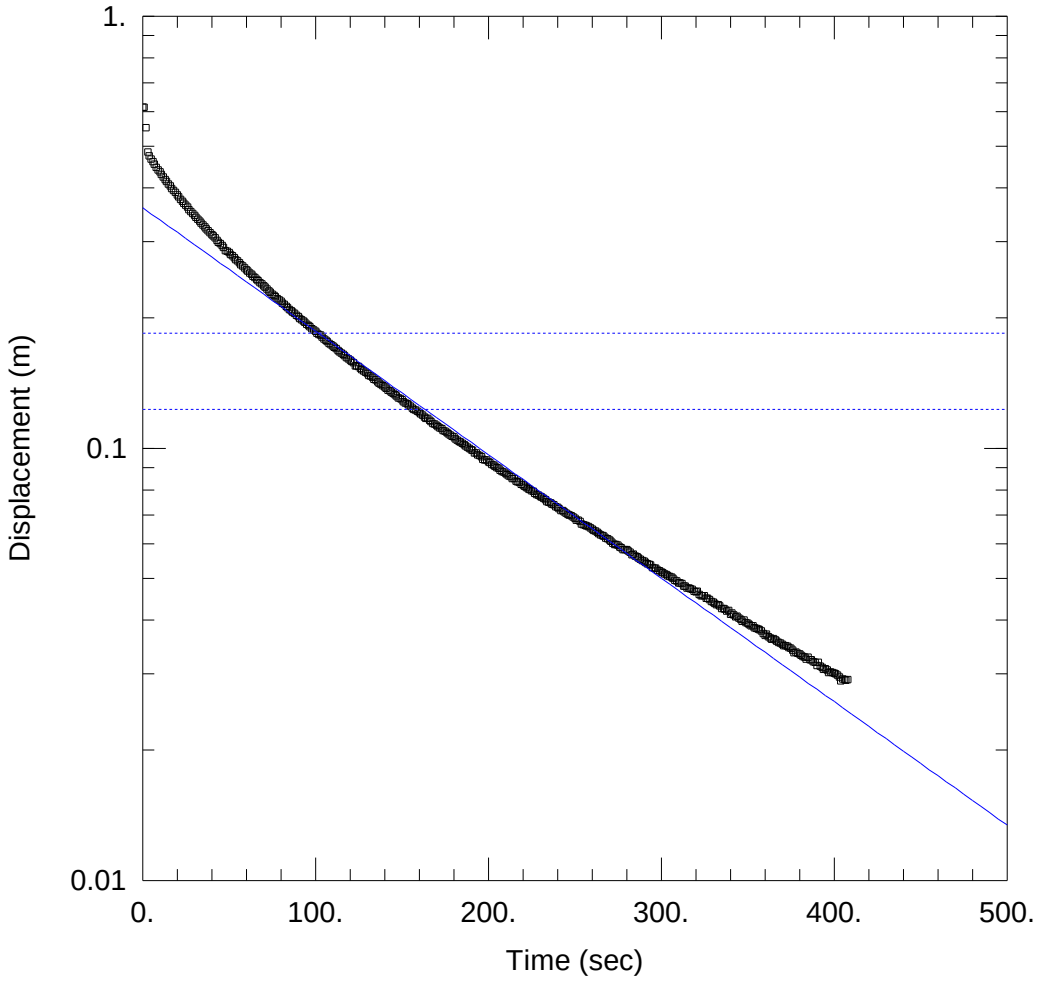
Saturated Thickness: 10. m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (New Well)

Initial Displacement: 0.0379 m
Total Well Penetration Depth: 3.22 m
Casing Radius: 0.013 m
Static Water Column Height: 2.183 m
Screen Length: 3.22 m
Well Radius: 0.03 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.8201 m/day
y0 = 0.02196 m



BH14 RH1

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH14.aqt
Date: 06/19/19 Time: 07:42:46

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH14
Test Date: 13/06/2019

AQUIFER DATA

Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.2

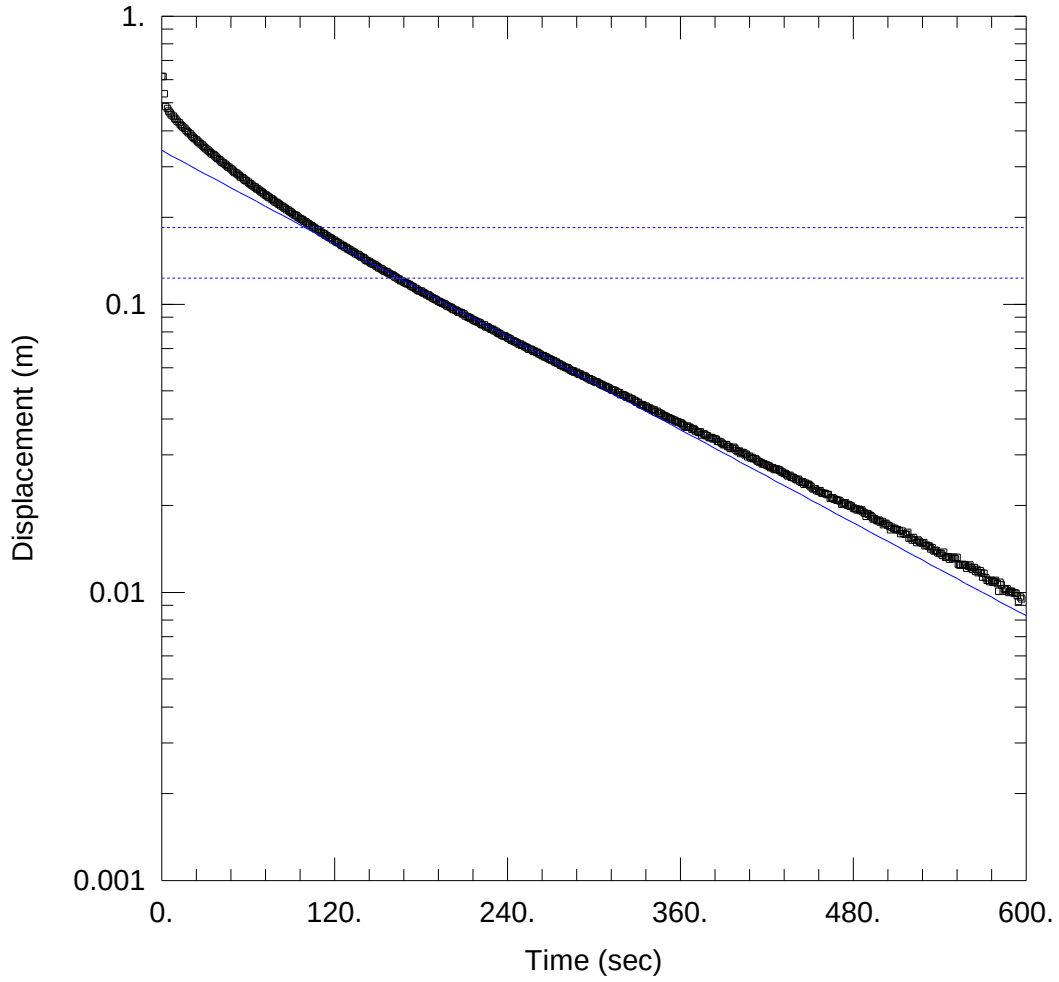
WELL DATA (New Well)

Initial Displacement: 0.6143 m
Total Well Penetration Depth: 4.1 m
Casing Radius: 0.025 m
Static Water Column Height: 4.1 m
Screen Length: 4. m
Well Radius: 0.1017 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.1353 m/day
y0 = 0.3601 m



BH14 RH2

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH14.aqt
Date: 06/19/19 Time: 07:34:25

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH14
Test Date: 13/06/2019

AQUIFER DATA

Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.2

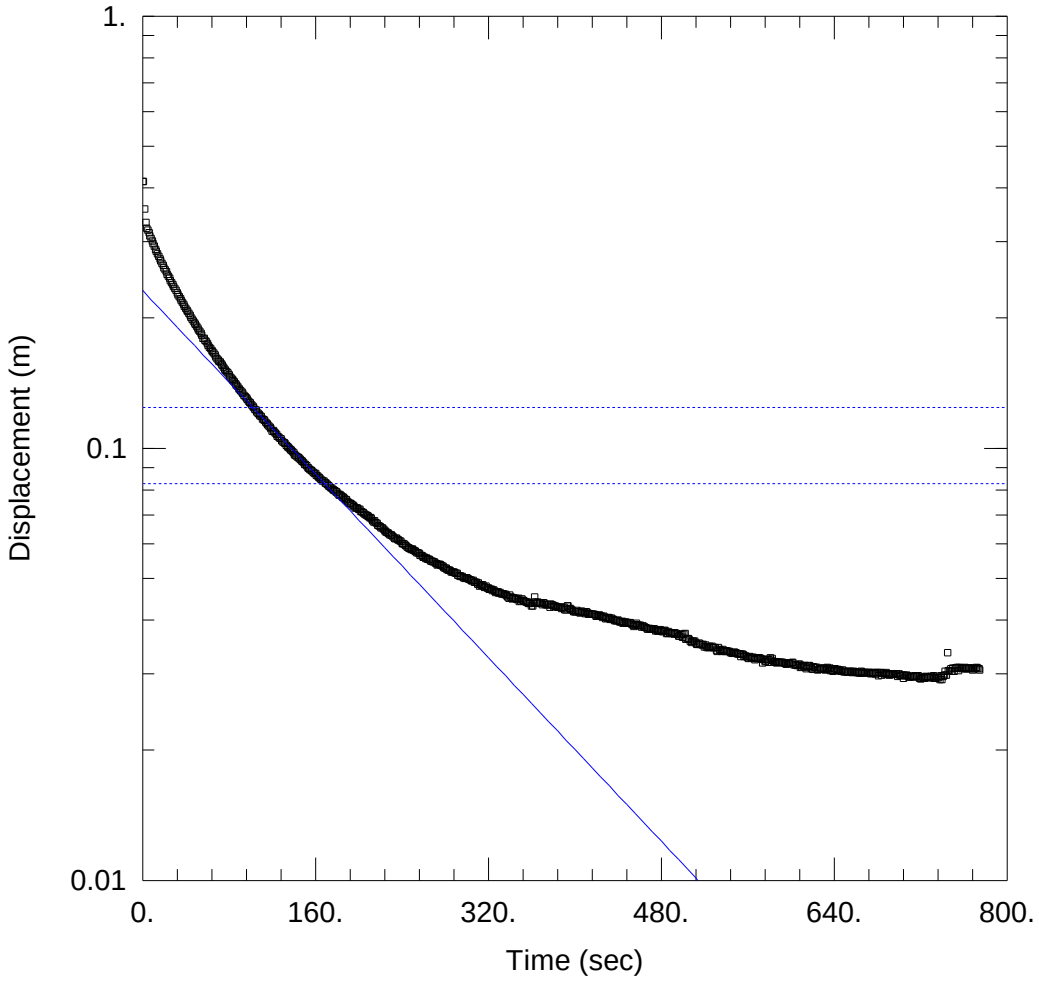
WELL DATA (New Well)

Initial Displacement: 0.6157 m Static Water Column Height: 4.1 m
Total Well Penetration Depth: 4.1 m Screen Length: 4. m
Casing Radius: 0.025 m Well Radius: 0.1017 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.1275 m/day y0 = 0.3416 m



BH15 FH1

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH15.aqt
Date: 06/19/19 Time: 07:44:59

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH15
Test Date: 13/06/2019

AQUIFER DATA

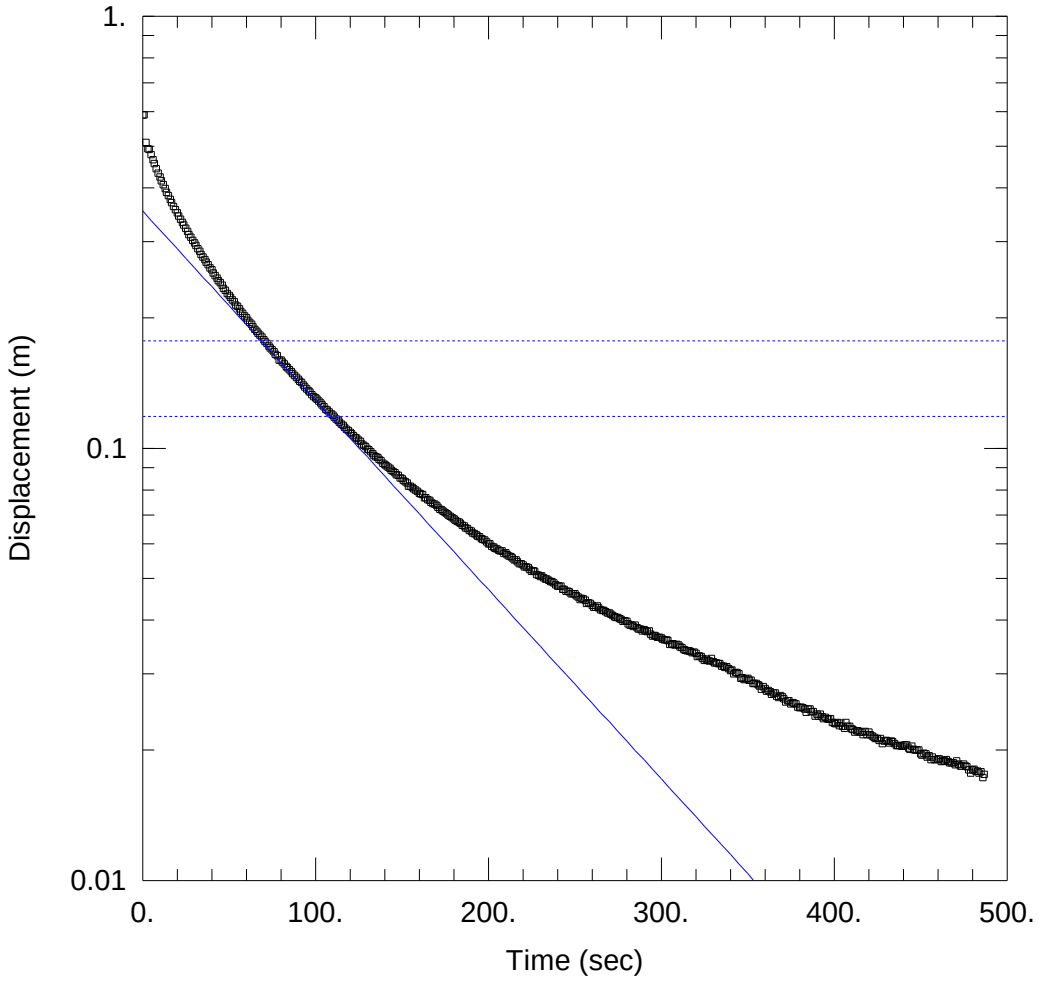
Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (New Well)

Initial Displacement: 0.4137 m
Total Well Penetration Depth: 5.69 m
Casing Radius: 0.025 m
Static Water Column Height: 5.69 m
Screen Length: 4.5 m
Well Radius: 0.1017 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.1202 m/day
y0 = 0.2316 m



BH15 RH1

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH15.aqt
Date: 06/19/19 Time: 07:49:43

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH15
Test Date: 13/06/2019

AQUIFER DATA

Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.2

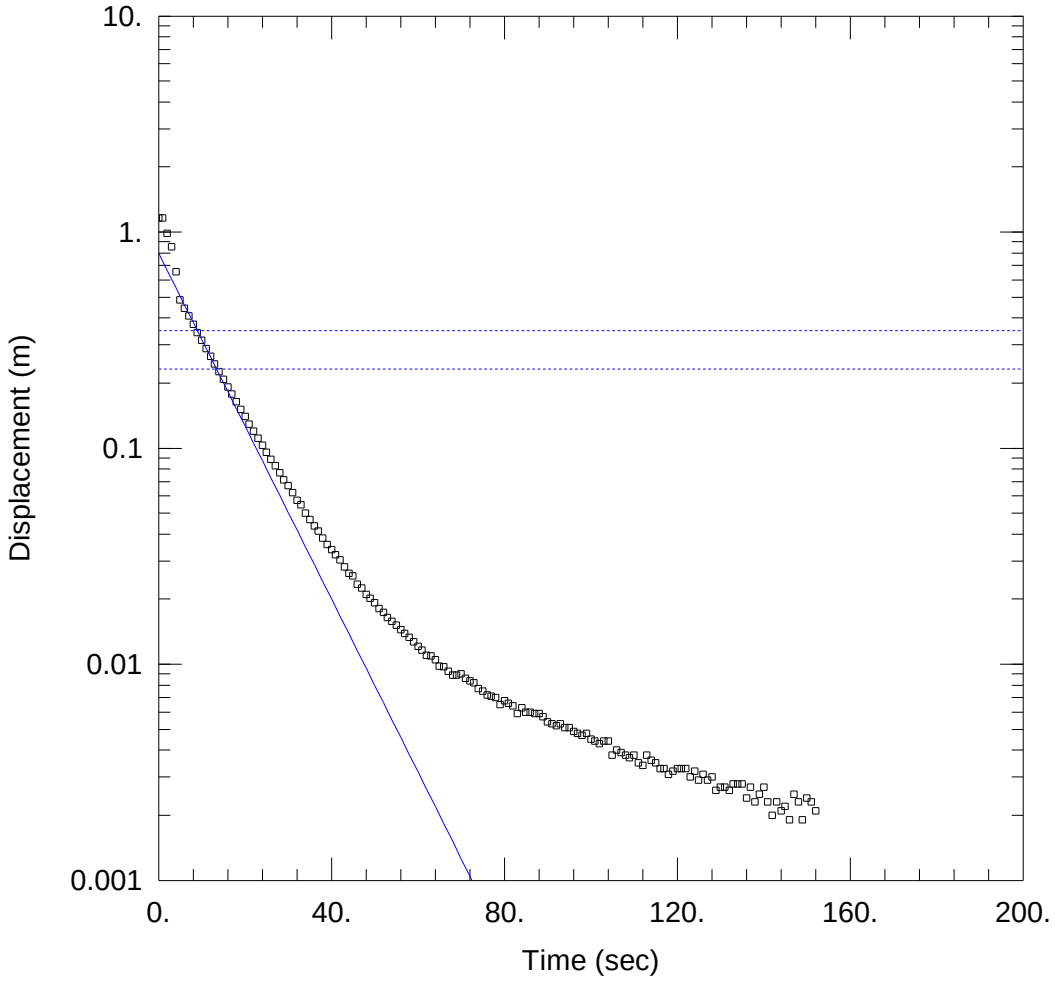
WELL DATA (New Well)

Initial Displacement: 0.591 m
Total Well Penetration Depth: 5.69 m
Casing Radius: 0.025 m
Static Water Column Height: 5.69 m
Screen Length: 4.5 m
Well Radius: 0.1017 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.1983 m/day
y0 = 0.3538 m



BH16 RH1

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH16.aqt
Date: 06/19/19 Time: 07:53:19

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH16
Test Date: 12/06/2019

AQUIFER DATA

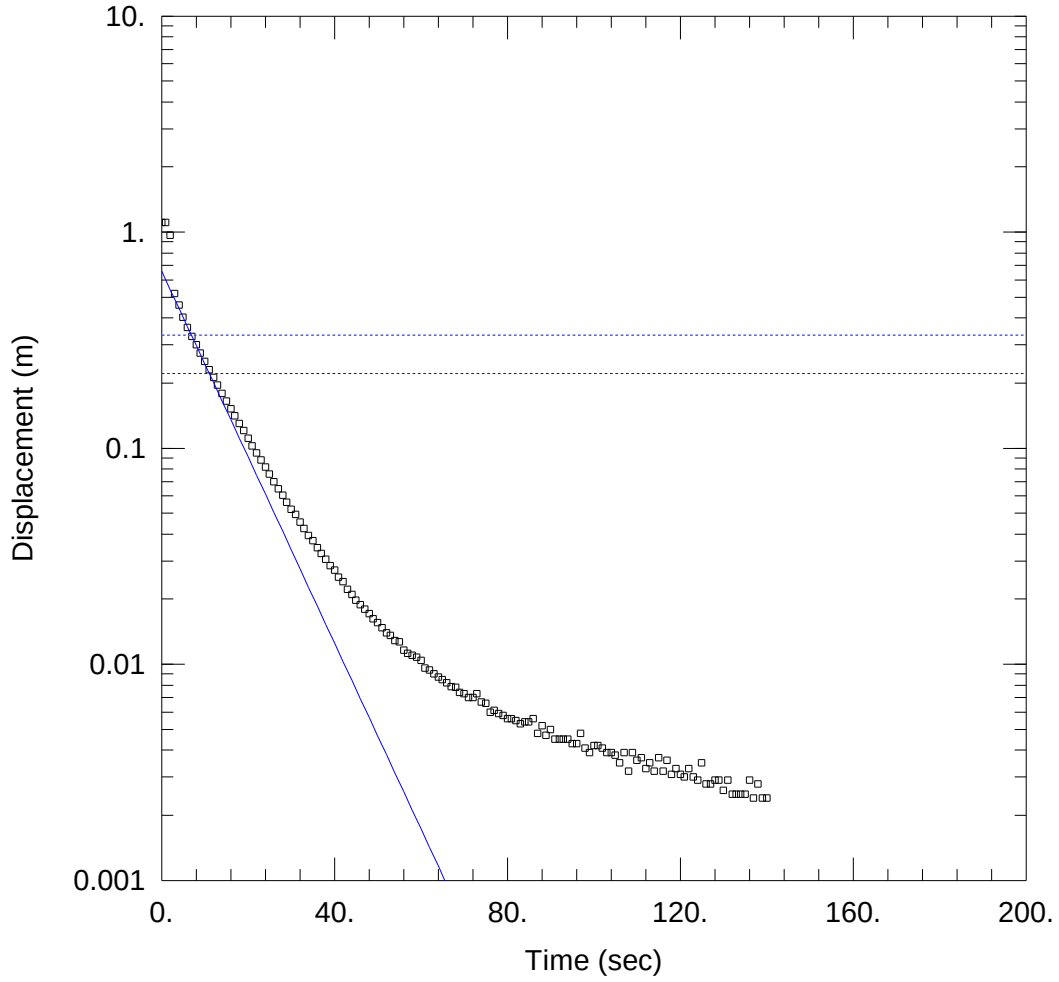
Saturated Thickness: 10. m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (New Well)

Initial Displacement: 1.165 m
Total Well Penetration Depth: 5.37 m
Casing Radius: 0.025 m
Static Water Column Height: 5.37 m
Screen Length: 4.7 m
Well Radius: 0.1017 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.724 m/day
y0 = 0.7966 m



BH16 RH2

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH16.aqt
Date: 06/19/19 Time: 07:56:42

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH16
Test Date: 12/06/2019

AQUIFER DATA

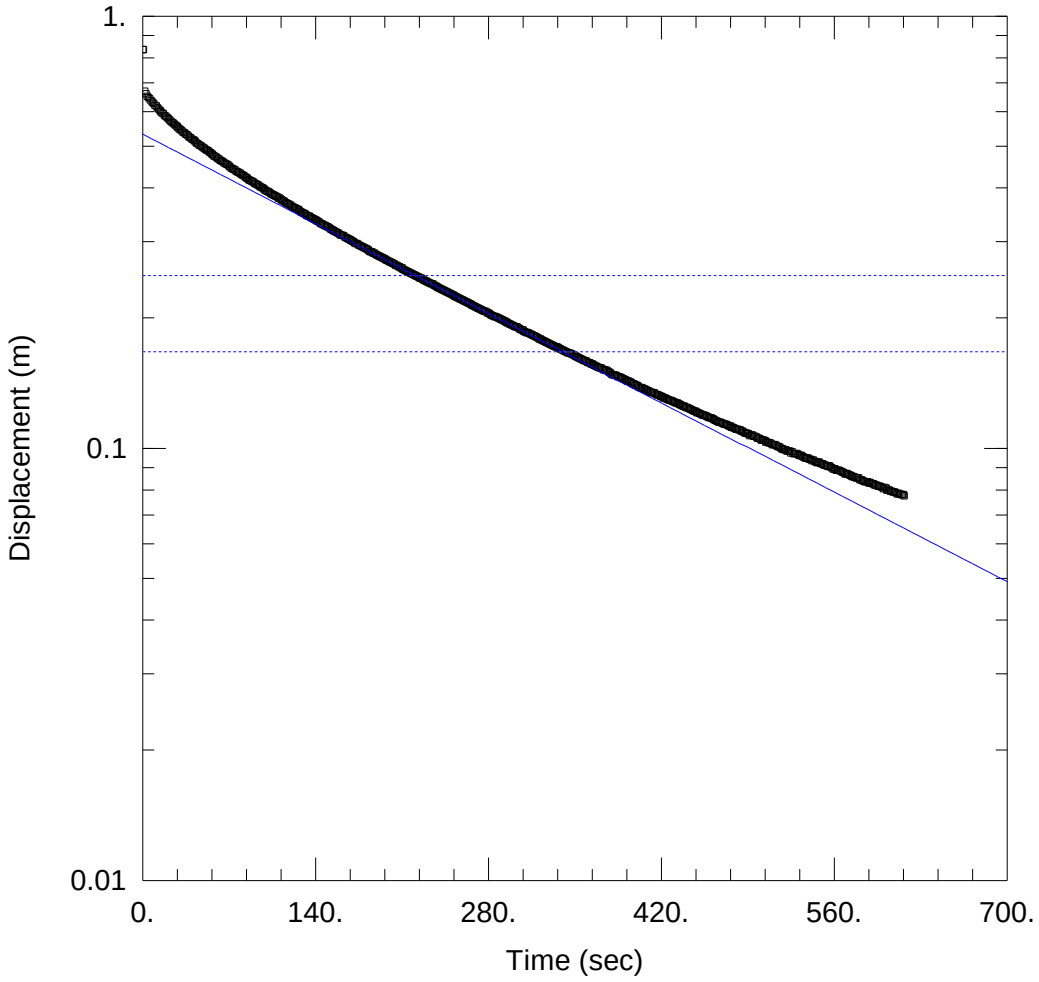
Saturated Thickness: 10. m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (New Well)

Initial Displacement: 1.108 m
Total Well Penetration Depth: 5.37 m
Casing Radius: 0.025 m
Static Water Column Height: 5.37 m
Screen Length: 4.7 m
Well Radius: 0.1017 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.852 m/day
y0 = 0.6577 m



BH17 FH1

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH17.aqt
Date: 06/19/19 Time: 08:01:21

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH17
Test Date: 12/06/2019

AQUIFER DATA

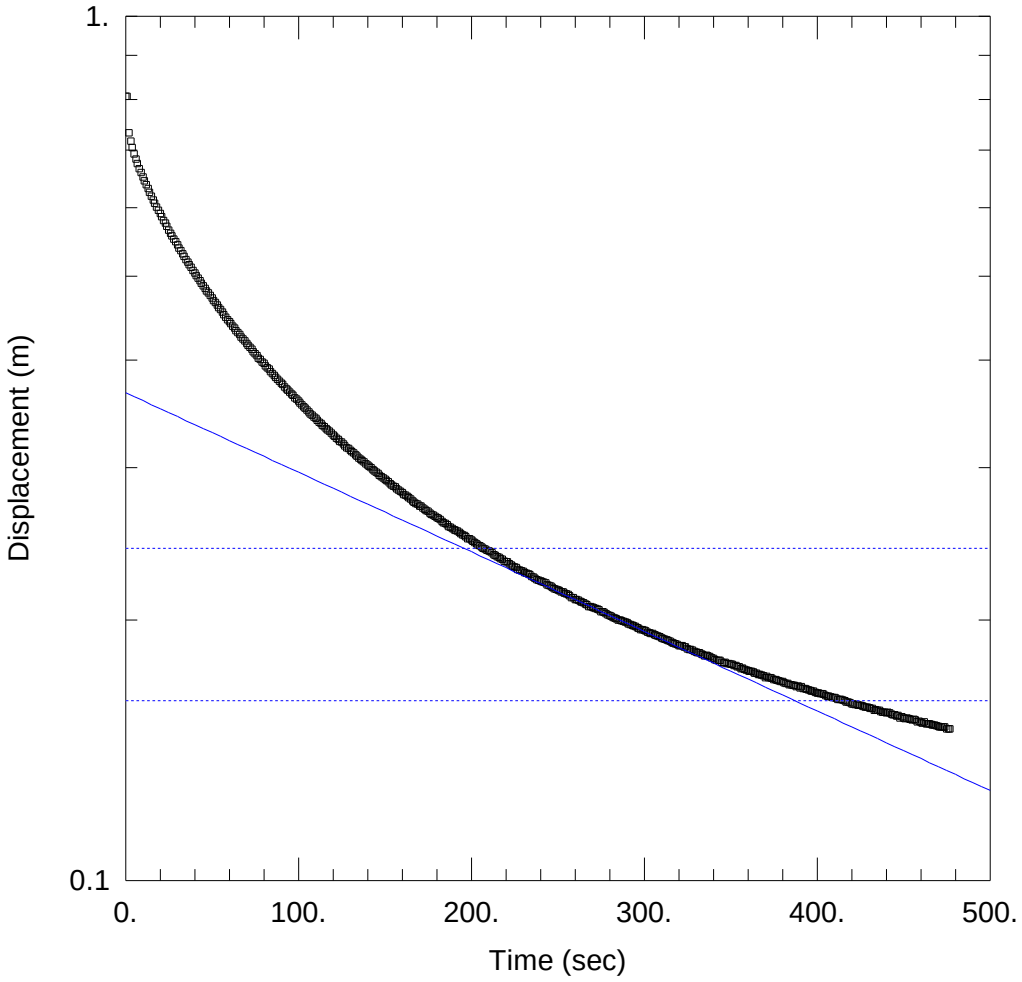
Saturated Thickness: 10. m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (New Well)

Initial Displacement: 0.8348 m
Total Well Penetration Depth: 4.73 m
Casing Radius: 0.025 m
Static Water Column Height: 4.73 m
Screen Length: 4.5 m
Well Radius: 0.1017 m

SOLUTION

Aquifer Model: Unconfined
K = 0.06476 m/day
Solution Method: Bouwer-Rice
y0 = 0.5327 m



BH17 FH2

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH17.aqt
Date: 06/19/19 Time: 08:00:08

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH17
Test Date: 12/06/2019

AQUIFER DATA

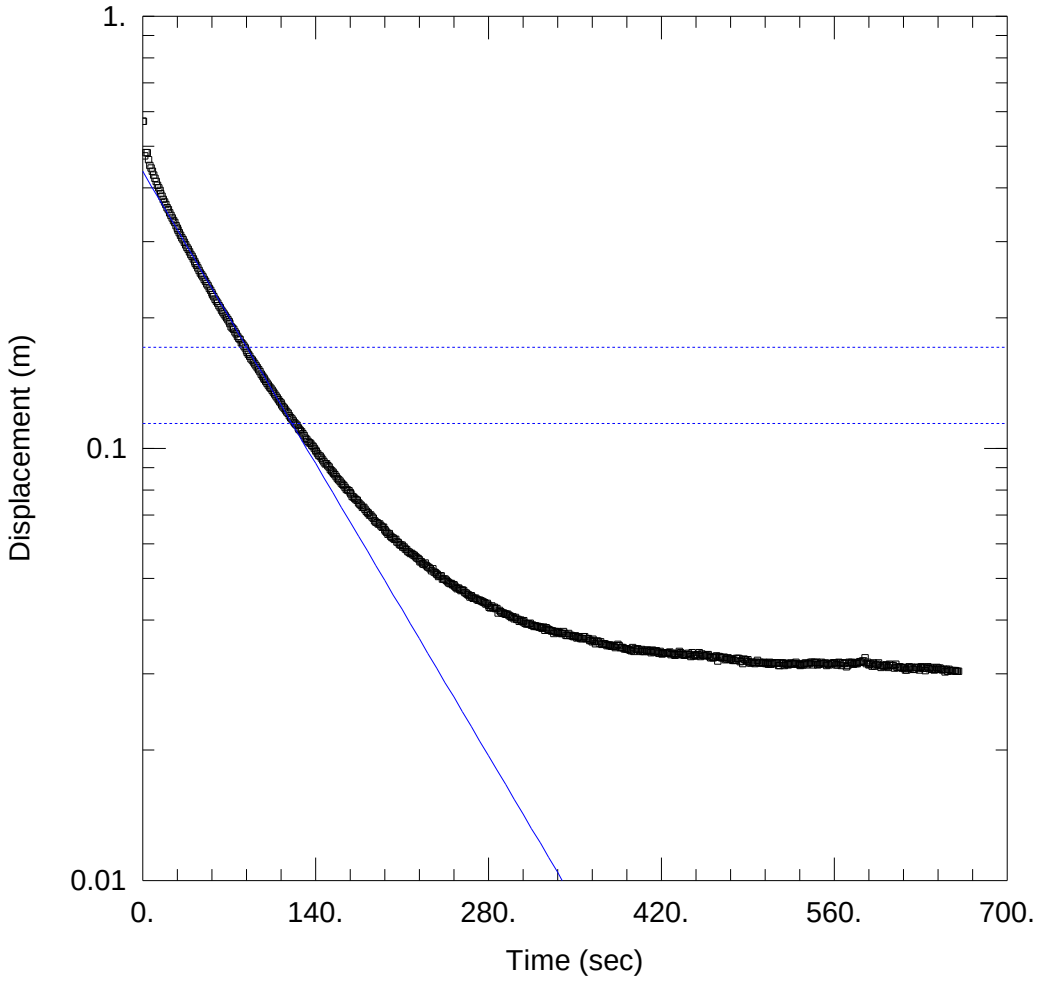
Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (New Well)

Initial Displacement: 0.8071 m
Total Well Penetration Depth: 4.73 m
Casing Radius: 0.025 m
Static Water Column Height: 4.73 m
Screen Length: 4.5 m
Well Radius: 0.1017 m

SOLUTION

Aquifer Model: Unconfined
K = 0.04028 m/day
Solution Method: Bouwer-Rice
y0 = 0.3665 m



BH01 RH1

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH01.aqt
Date: 06/18/19 Time: 17:05:44

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH01
Test Date: 11/06/2019

AQUIFER DATA

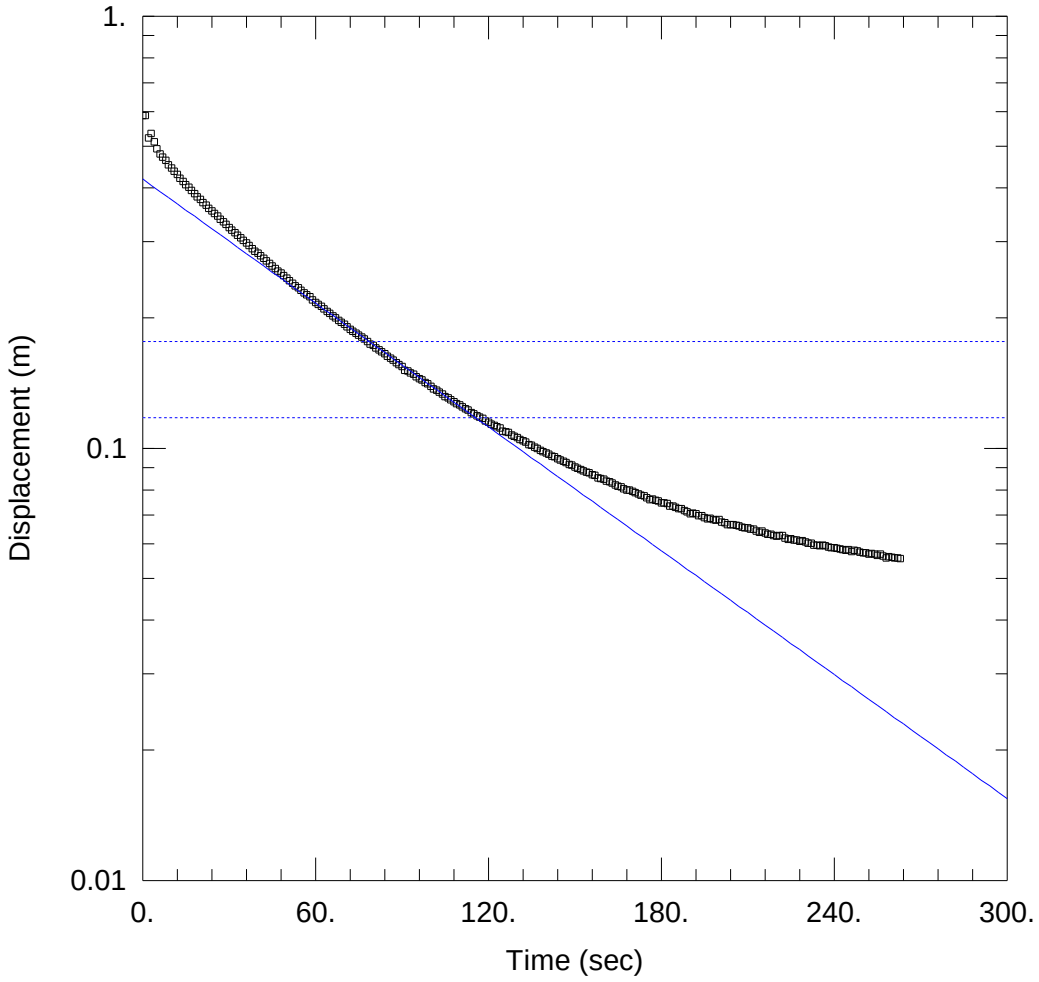
Saturated Thickness: 10. m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (BH01)

Initial Displacement: 0.5697 m
Static Water Column Height: 5.83 m
Total Well Penetration Depth: 5.83 m
Screen Length: 4.5 m
Casing Radius: 0.025 m
Well Radius: 0.1017 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.2196 m/day
y0 = 0.4372 m



BH01 RH2

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH01.aqt
Date: 06/18/19 Time: 17:11:36

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH01
Test Date: 11/06/2019

AQUIFER DATA

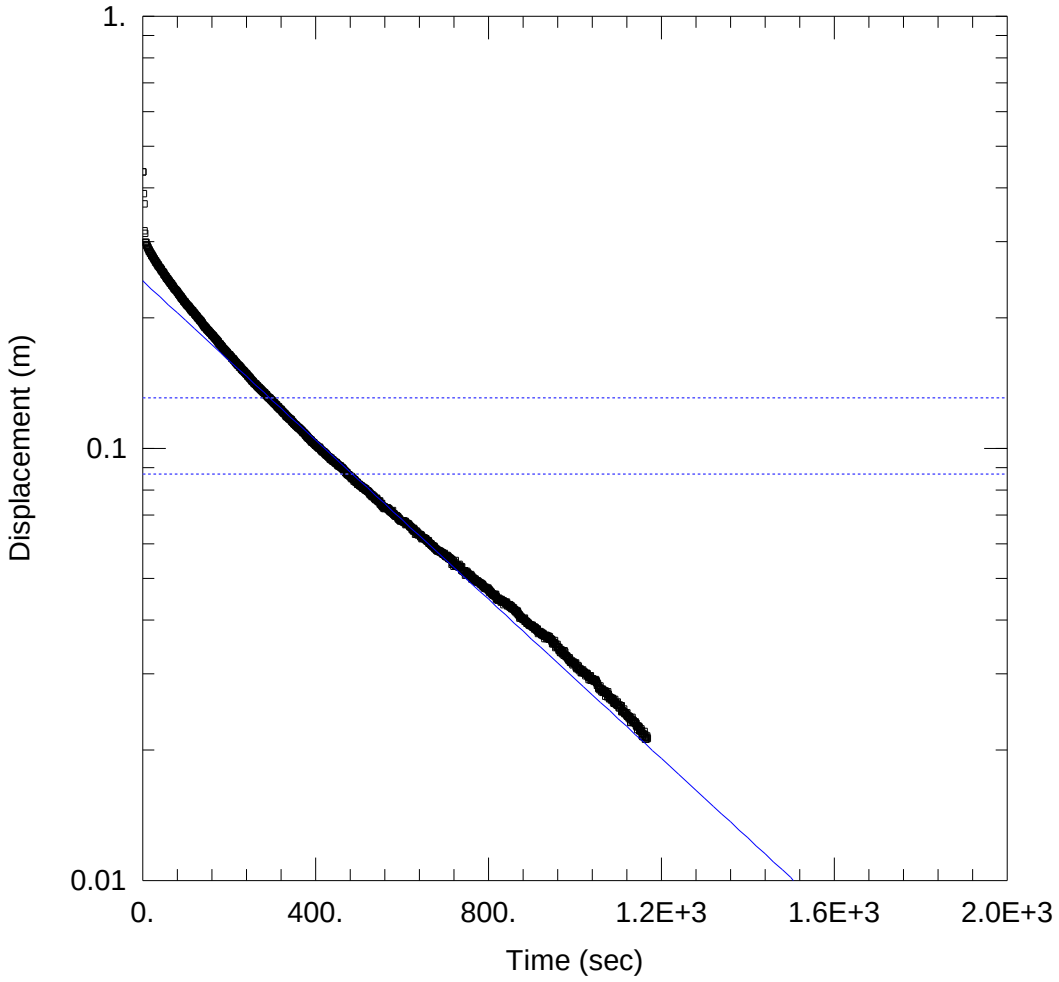
Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (BH01)

Initial Displacement: 0.5882 m Static Water Column Height: 5.83 m
Total Well Penetration Depth: 5.83 m Screen Length: 4.5 m
Casing Radius: 0.025 m Well Radius: 0.1017 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 0.2172 m/day y0 = 0.4191 m



BH02 FH1

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH02.aqt
Date: 06/18/19 Time: 17:15:00

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH02
Test Date: 11/06/2019

AQUIFER DATA

Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.2

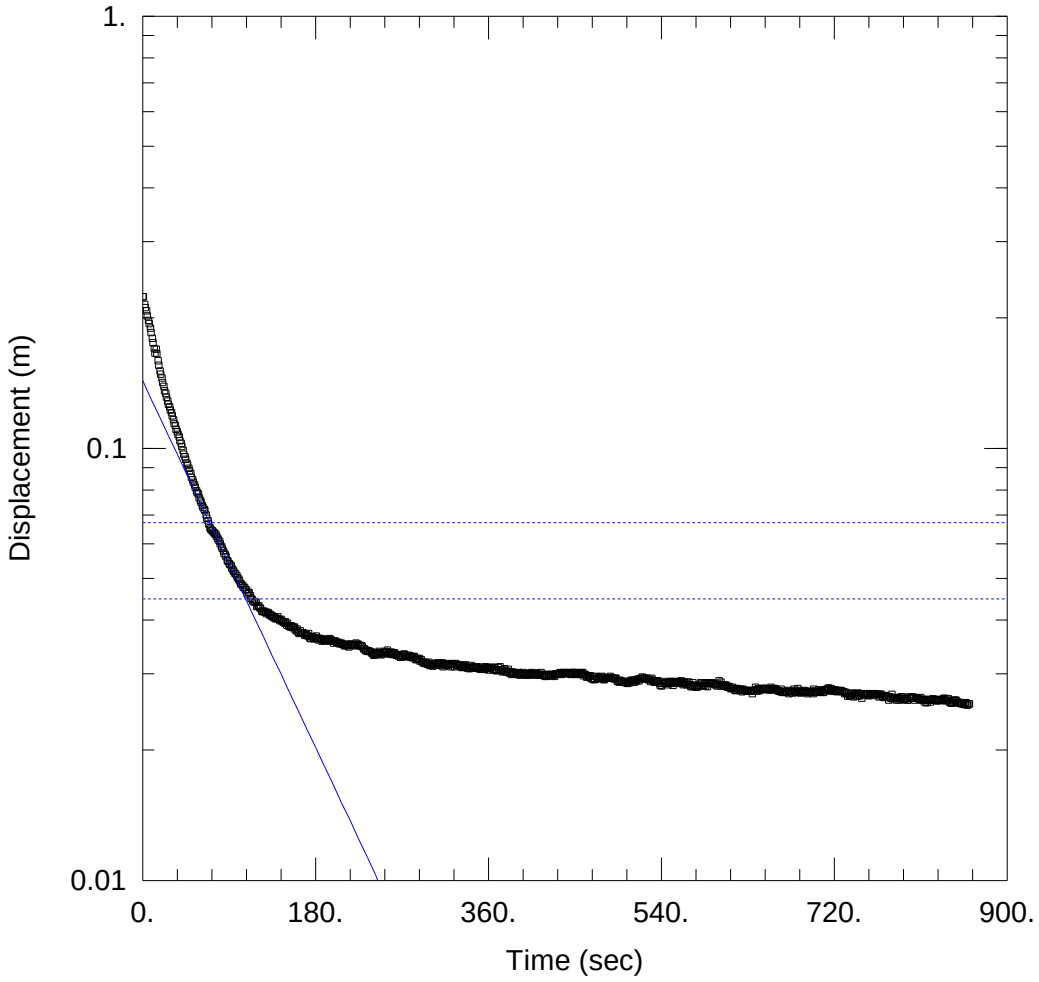
WELL DATA (New Well)

Initial Displacement: 0.4361 m Static Water Column Height: 3.51 m
Total Well Penetration Depth: 3.51 m Screen Length: 1.6 m
Casing Radius: 0.013 m Well Radius: 0.03 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.03471 m/day y0 = 0.2438 m



BH02 FH2

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH02.aqt
Date: 06/18/19 Time: 17:16:27

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH02
Test Date: 11/06/2019

AQUIFER DATA

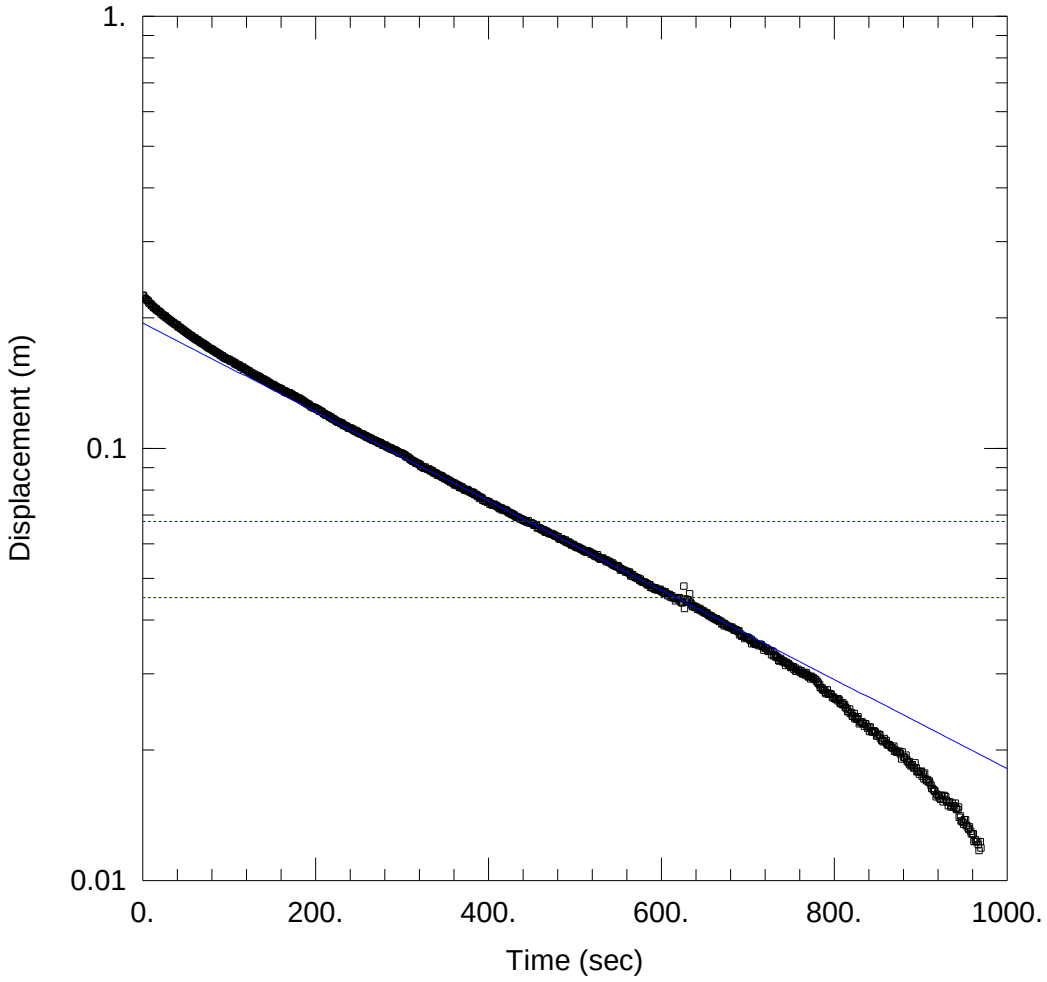
Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (New Well)

Initial Displacement: 0.224 m
Total Well Penetration Depth: 3.51 m
Casing Radius: 0.013 m
Static Water Column Height: 3.51 m
Screen Length: 1.6 m
Well Radius: 0.03 m

SOLUTION

Aquifer Model: Unconfined
K = 0.1777 m/day
Solution Method: Bouwer-Rice
y0 = 0.1432 m



BH03 FH1

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH03.aqt
Date: 06/18/19 Time: 17:18:22

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH03
Test Date: 11/06/2019

AQUIFER DATA

Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.2

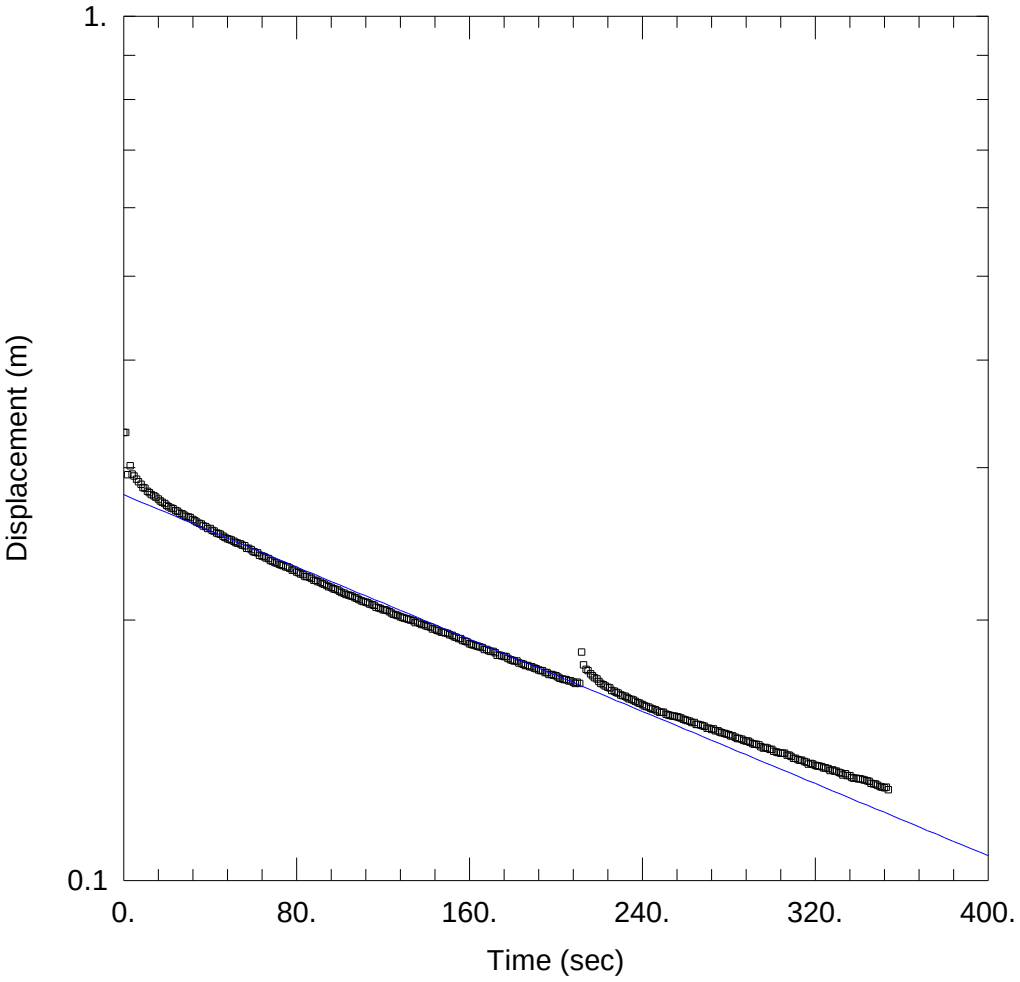
WELL DATA (New Well)

Initial Displacement: 0.2257 m
Total Well Penetration Depth: 3.61 m
Casing Radius: 0.013 m
Static Water Column Height: 3.61 m
Screen Length: 2.1 m
Well Radius: 0.03 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.03068 m/day
y0 = 0.1948 m



BH03 FH2

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH03.aqt
Date: 06/18/19 Time: 17:19:37

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH03
Test Date: 11/06/2019

AQUIFER DATA

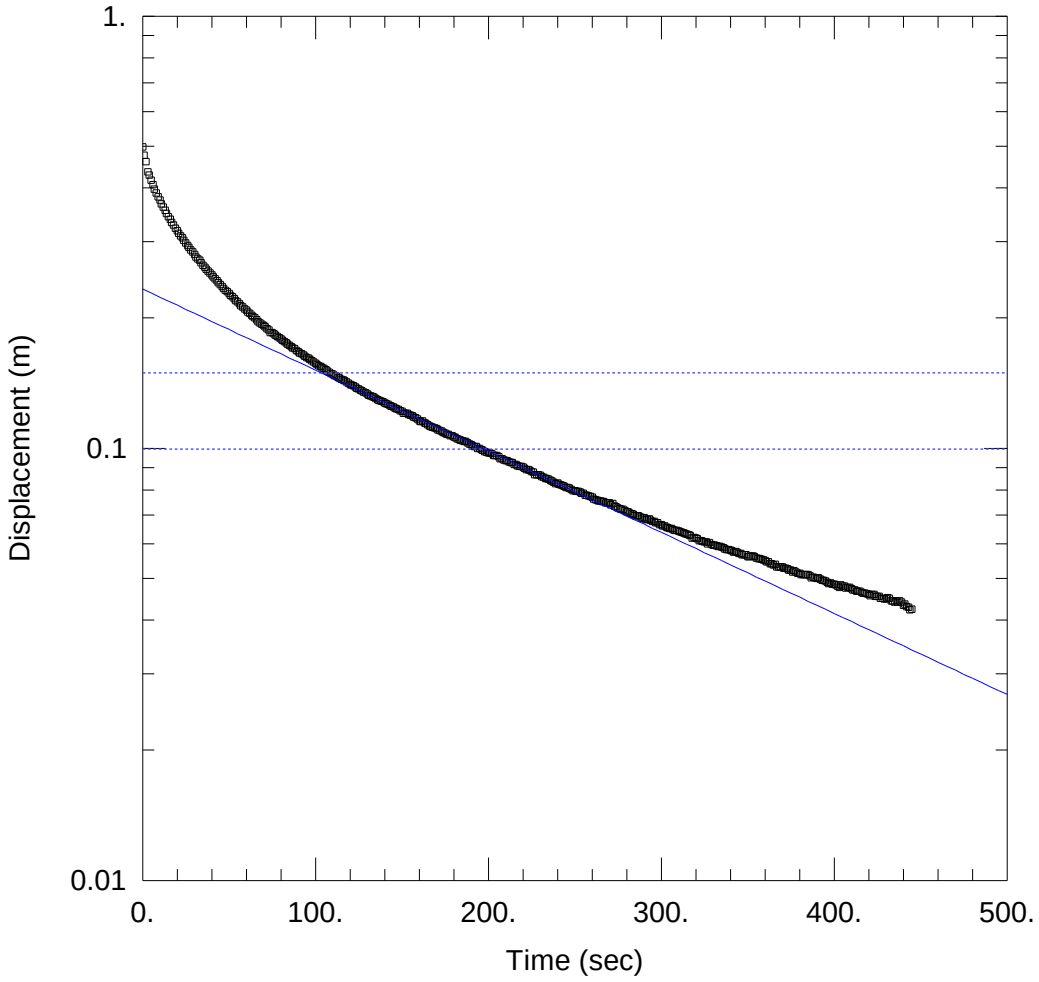
Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (New Well)

Initial Displacement: 0.3296 m Static Water Column Height: 3.61 m
Total Well Penetration Depth: 3.61 m Screen Length: 2.1 m
Casing Radius: 0.013 m Well Radius: 0.03 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 0.03108 m/day y0 = 0.2793 m



BH04 FH1

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH04.aqt
Date: 06/18/19 Time: 17:24:14

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH04
Test Date: 11/06/2019

AQUIFER DATA

Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.2

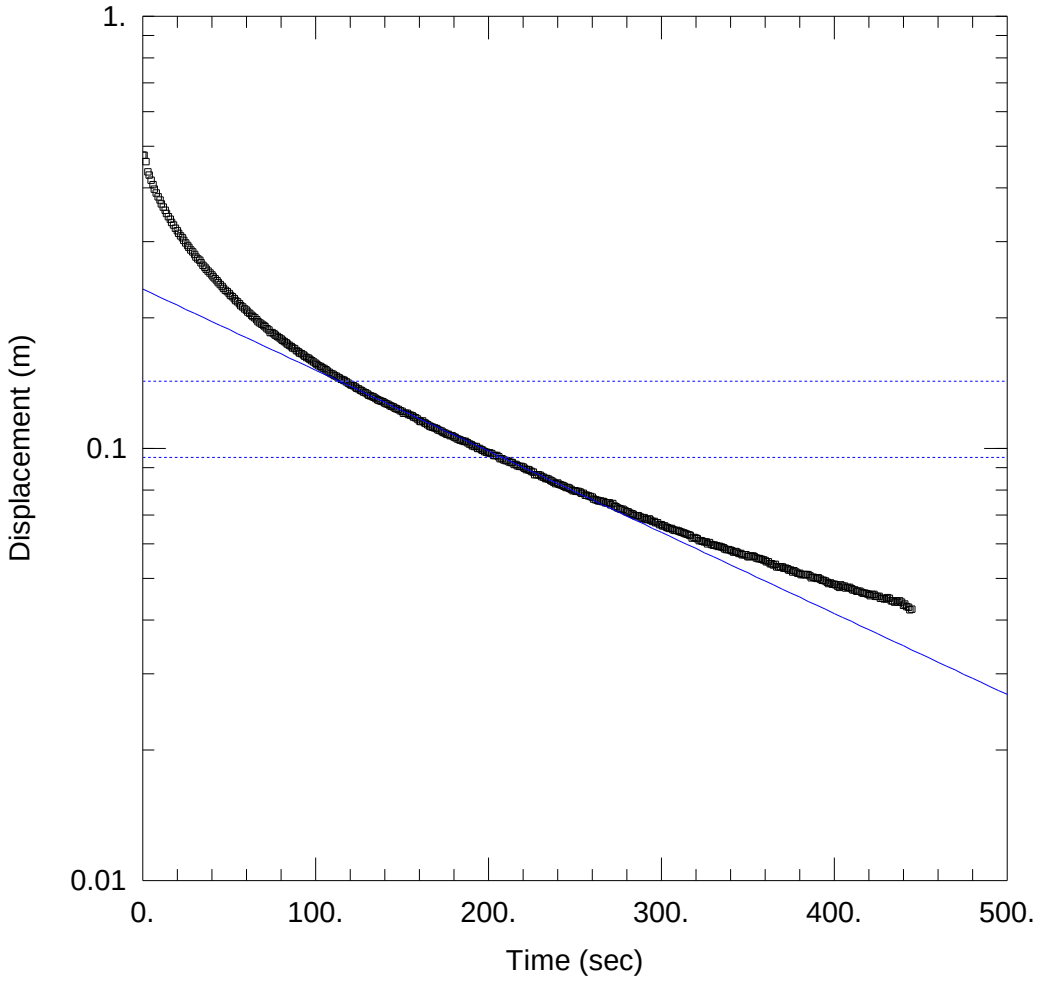
WELL DATA (New Well)

Initial Displacement: 0.497 m
Total Well Penetration Depth: 5.67 m
Casing Radius: 0.025 m
Static Water Column Height: 5.666 m
Screen Length: 4.4 m
Well Radius: 0.1017 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.08663 m/day
y0 = 0.2334 m



BH04 RH1

Data Set: J:\IE\Projects\03_Southern\IS288600\07 Technical\6 - Slug test\BH04.aqt
Date: 06/18/19 Time: 17:26:15

PROJECT INFORMATION

Company: Jacobs
Client: Barwon Water
Project: IS288600
Location: Yeodene Swamp
Test Well: BH04
Test Date: 11/06/2019

AQUIFER DATA

Saturated Thickness: 10. m Anisotropy Ratio (Kz/Kr): 0.2

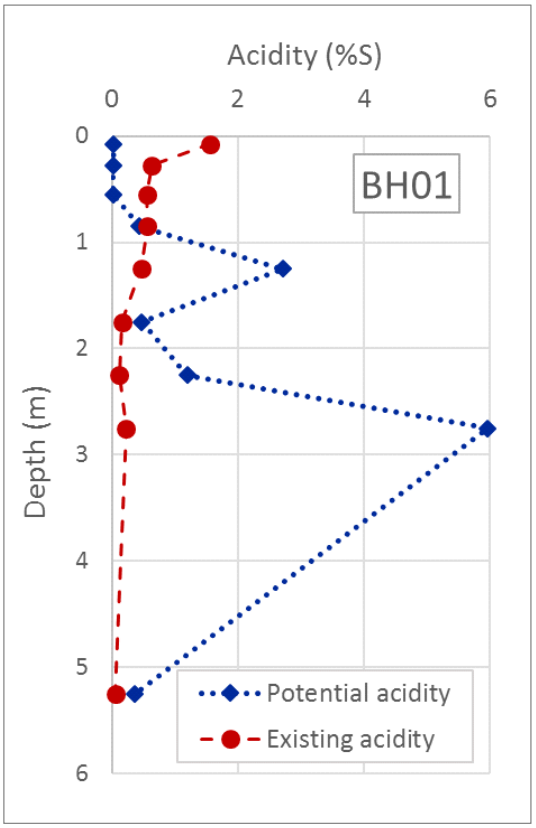
WELL DATA (New Well)

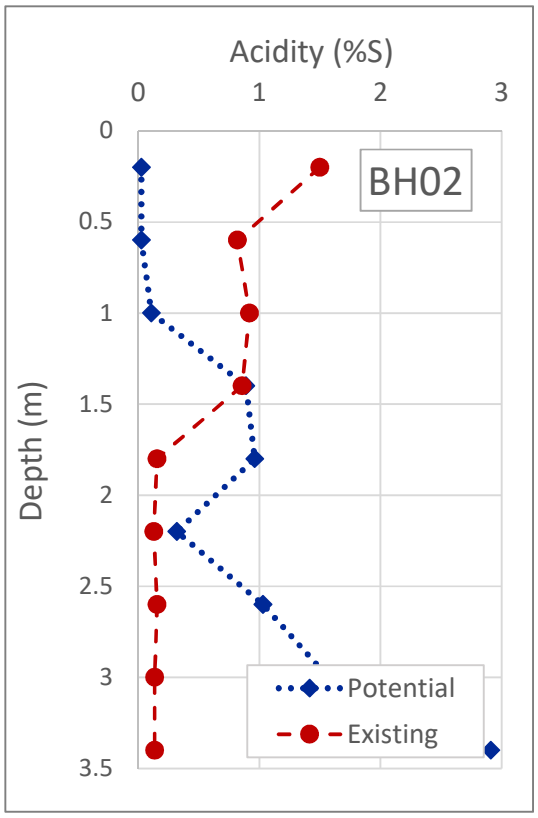
Initial Displacement: 0.4756 m Static Water Column Height: 5.666 m
Total Well Penetration Depth: 5.67 m Screen Length: 4.4 m
Casing Radius: 0.025 m Well Radius: 0.1017 m

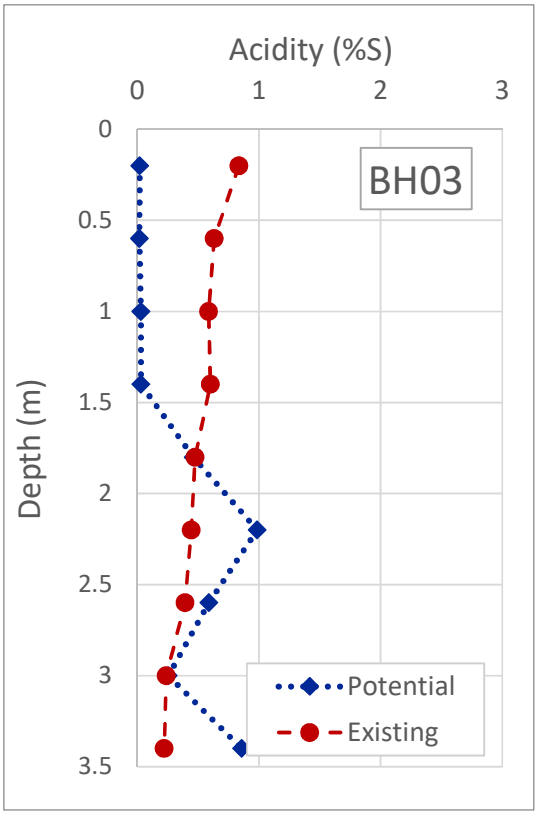
SOLUTION

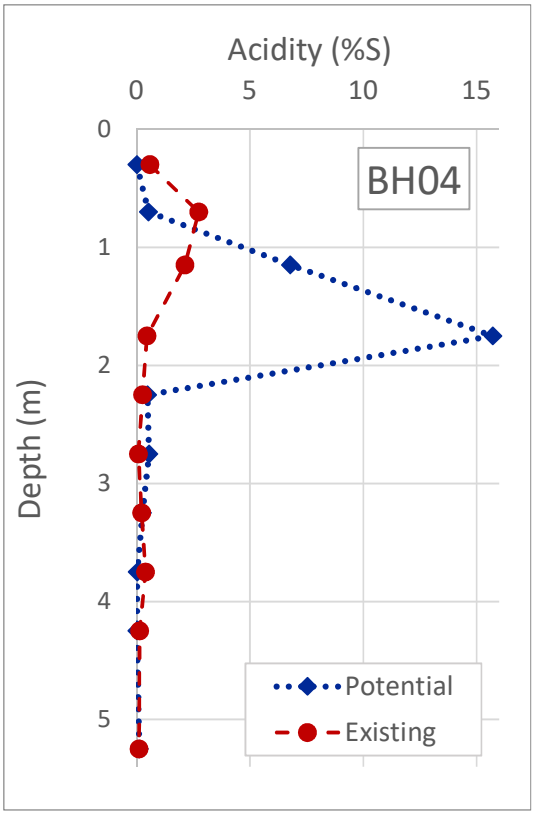
Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 0.08663 m/day y0 = 0.2334 m

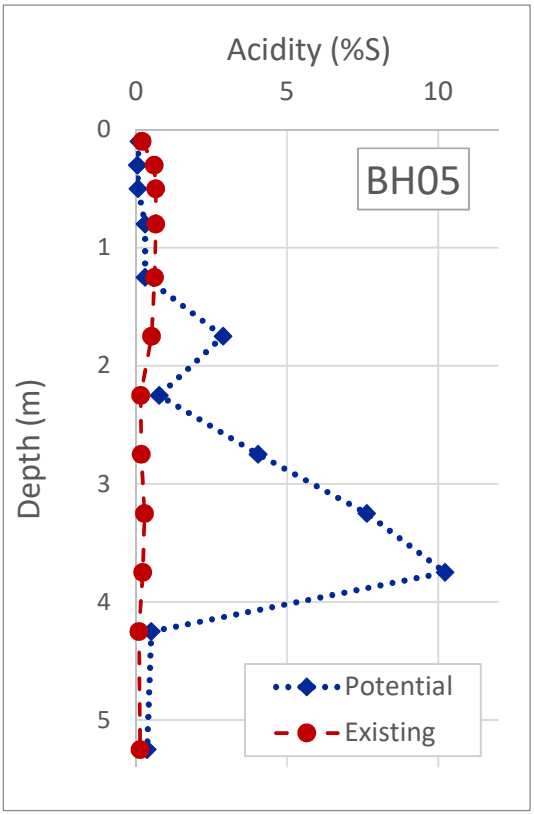
Appendix G. Laboratory results

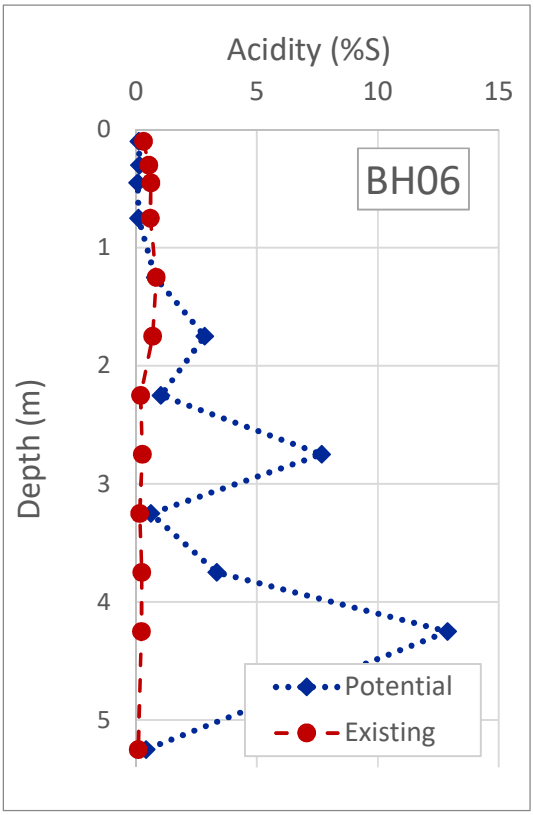

Acidity (%S)
0
2
4
6
0
1
2
3
4
5
6
Depth (m)
BH01
Potential acidity
Existing acidity

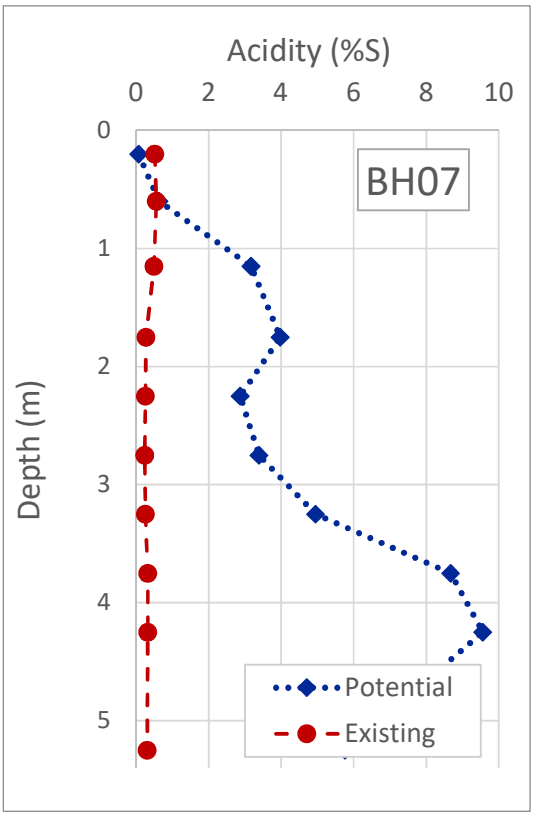

Acidity (%S)
0
1
2
3
0
0.5
1
1.5
2
2.5
3
3.5
Depth (m)
BH02
Potential
Existing

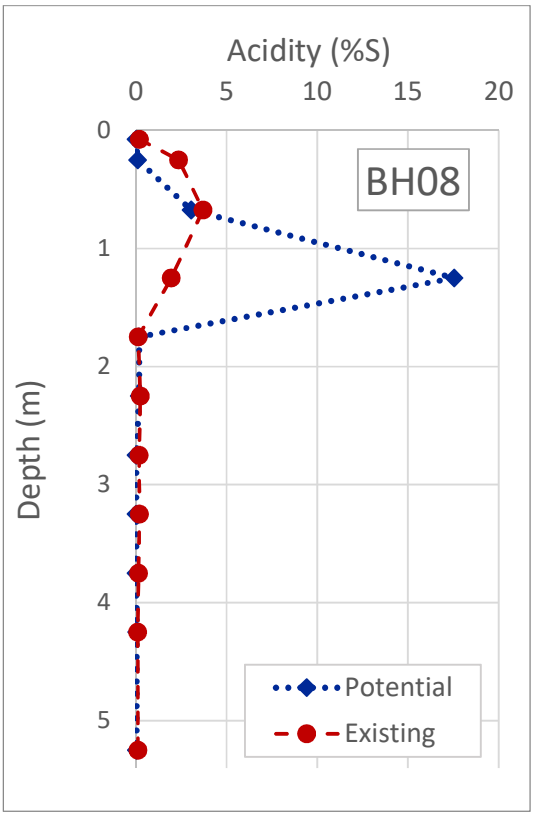

Acidity (%S)
0
1
2
3
0
0.5
1
1.5
2
2.5
3
3.5
Depth (m)
BH03
Potential
Existing

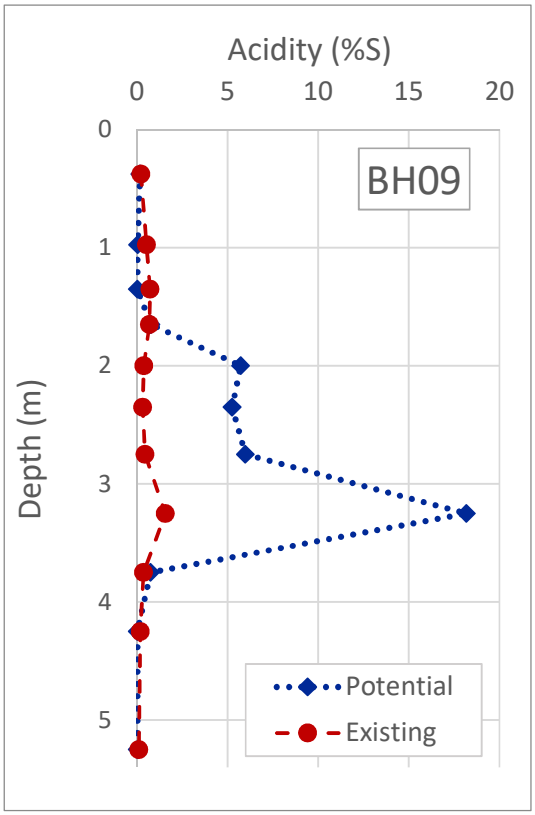

Acidity (%S)
0
5
10
15
0
1
2
3
4
5
Depth (m)
BH04
Potential
Existing

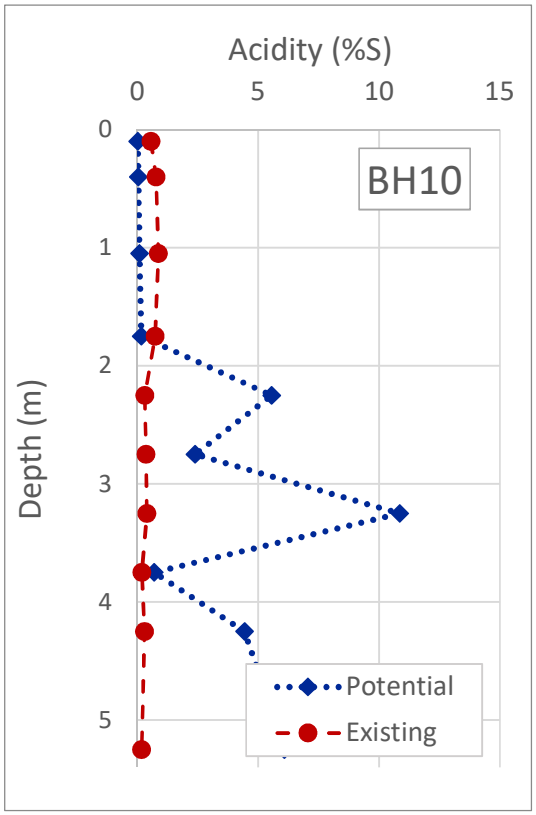

Acidity (%S)
0
5
10
Depth (m)
0
1
2
3
4
5
BH05
Potential
Existing

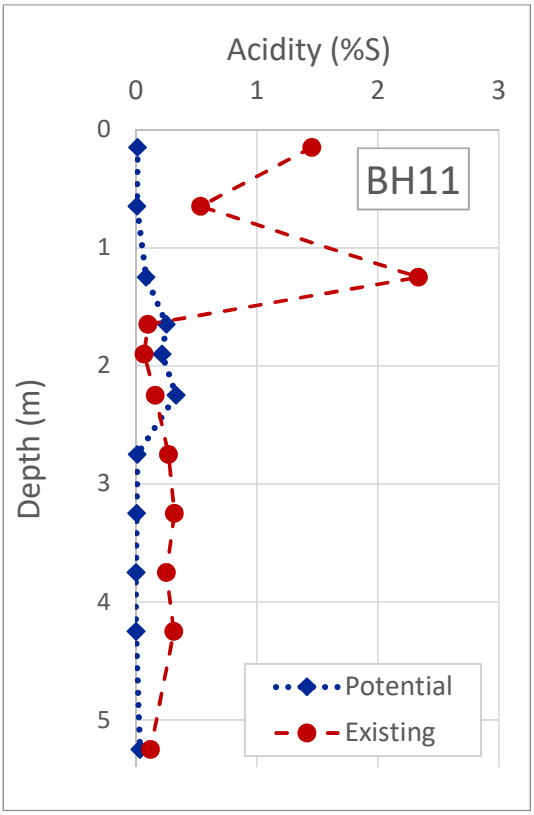

Acidity (%S)
0
5
10
15
Depth (m)
0
1
2
3
4
5
BH06
Potential
Existing

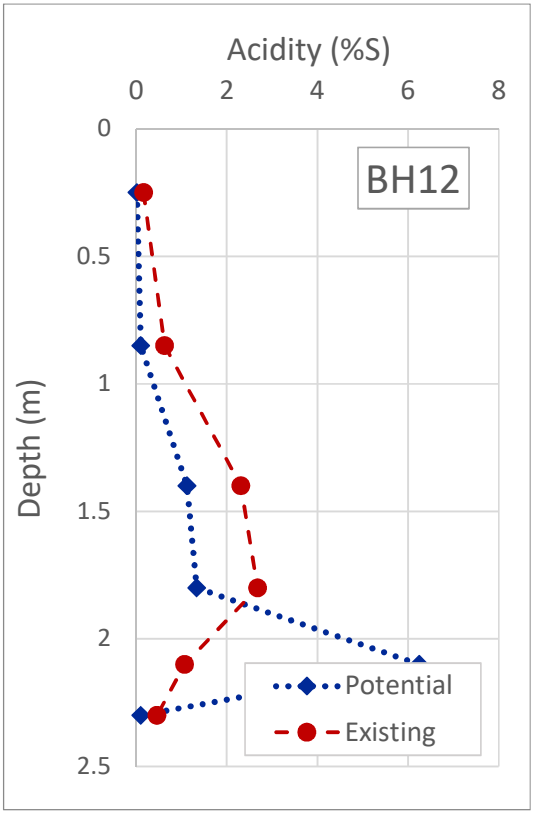

Acidity (%S)
0
2
4
6
8
10
Depth (m)
0
1
2
3
4
5
BH07
Potential
Existing

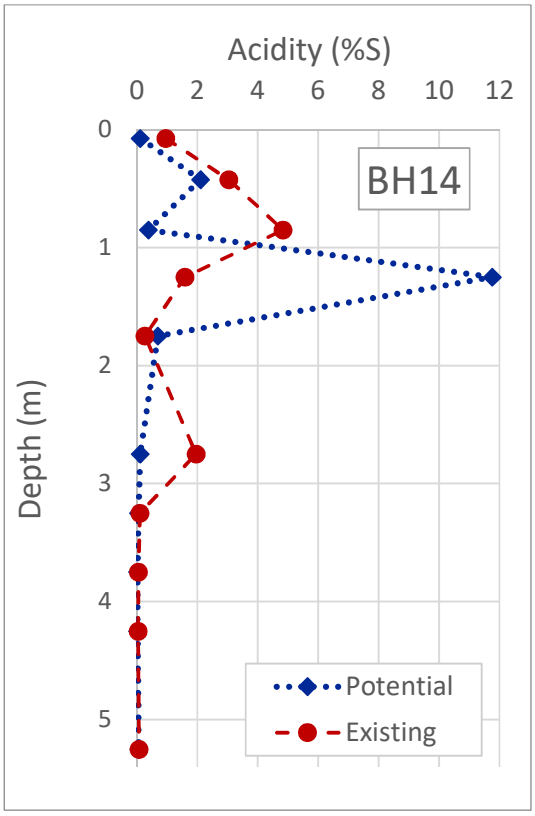

Acidity (%S)
0
5
10
15
20
Depth (m)
0
1
2
3
4
5
BH08
Potential
Existing

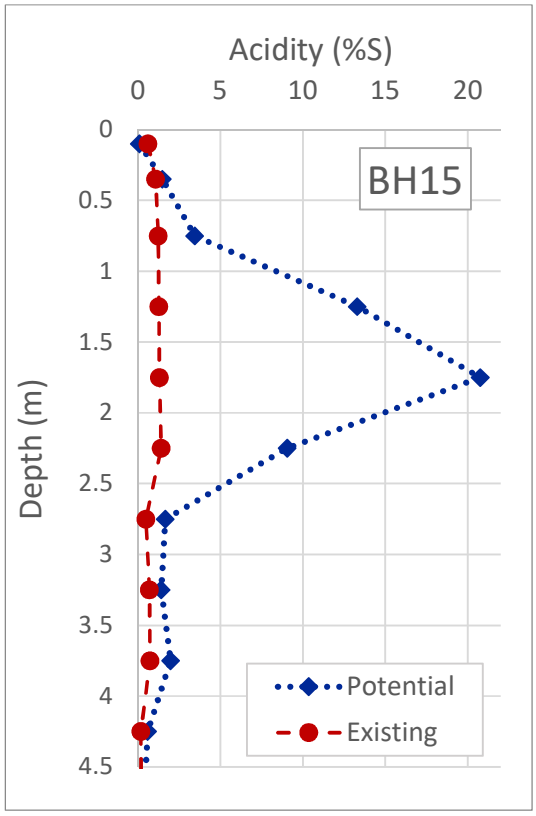

Acidity (%S)
0
5
10
15
20
Depth (m)
0
1
2
3
4
5
BH09
Potential
Existing

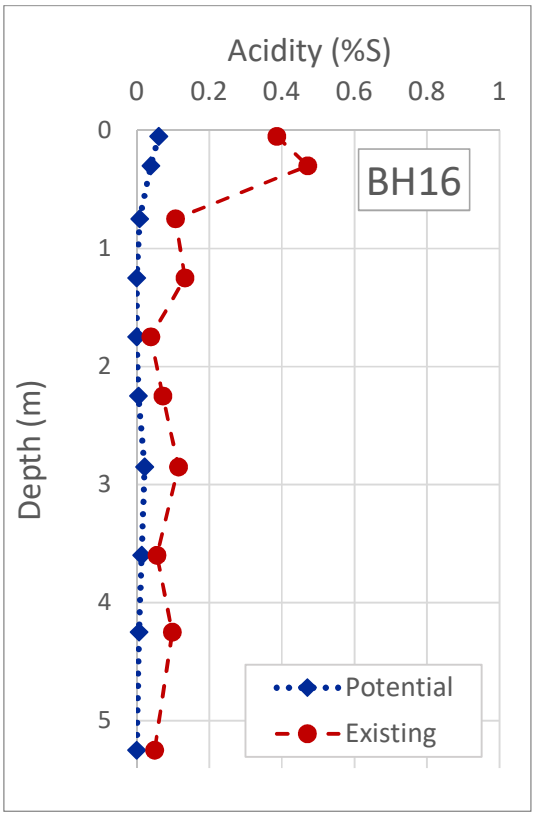

Acidity (%S)
0
5
10
15
Depth (m)
0
1
2
3
4
5
BH10
Potential
Existing

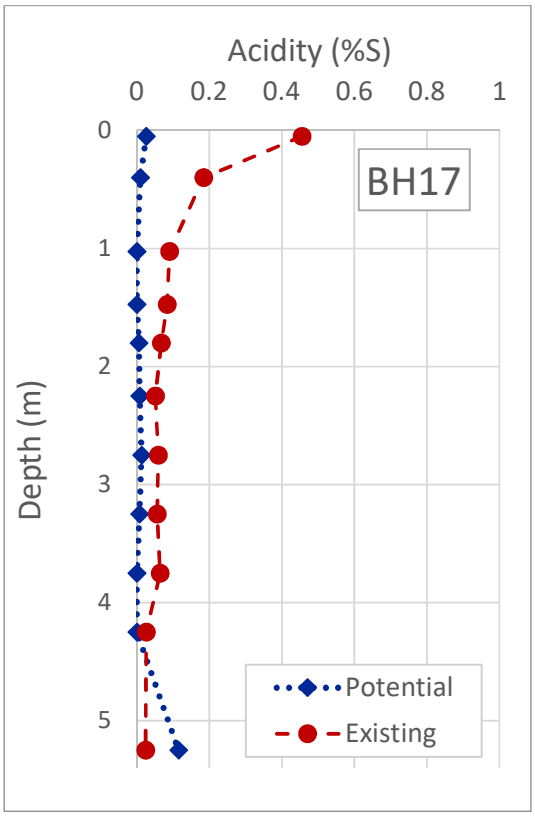

Acidity (%S)
0
1
2
3
Depth (m)
0
1
2
3
4
5
BH11
Potential
Existing

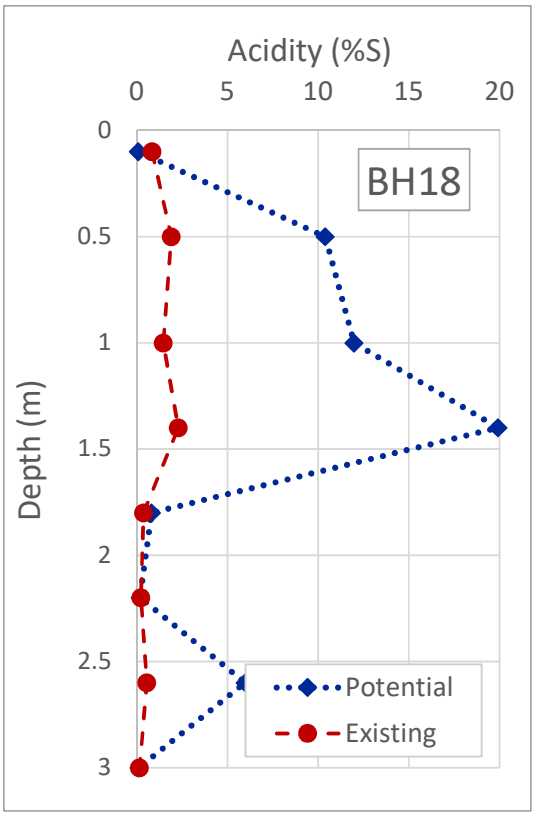

Acidity (%S)
0
2
4
6
8
Depth (m)
0
0.5
1
1.5
2
2.5
BH12
Potential
Existing


Acidity (%S)
0
2
4
6
8
10
12
BH14
Depth (m)
0
1
2
3
4
5
Potential
Existing


Acidity (%S)
0
5
10
15
20
BH15
Depth (m)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
Potential
Existing


Acidity (%S)
0
0.2
0.4
0.6
0.8
1
BH16
Depth (m)
0
1
2
3
4
5
Potential
Existing


Acidity (%S)
0
0.2
0.4
0.6
0.8
1
BH17
Depth (m)
0
1
2
3
4
5
Potential
Existing


Acidity (%S)
0
5
10
15
20
0
0.5
1
1.5
2
2.5
3
Depth (m)
BH18
Potential
Existing