

EPL20350 WATER MONITORING RESULTS 2017/2018 - QUARTER 4

LICENCE HOLDER Santos NSW (Eastern) Pty Ltd
PREMISES Narrabri Gas Field
 X Line Road, NARRABRI NSW 2390

LICENCE NUMBER Environment Protection Licence 20350
EPL LINK (EPA SITE) <http://www.epa.nsw.gov.au/prpoeoapp/ViewPOEOLicence.aspx?DOCID=33816&SYSUID=1&LICID=20350>

SCHEDULED ACTIVITY Coal seam gas exploration, assessment and production
REPORTING PERIOD 2017-18, Quarter 4 - February 2018 / April 2018
PUBLISHED DATE May 2018

fie

MONITORING BY Santos
ANALYSIS BY Australian Laboratory Services Pty Ltd

Table 1: EPL20350 WATER MONITORING LOCATIONS

Spatial reference: GDA94 MGA Zone 55

EPA Identification No.	Monitoring type	Location	Easting	Northing
7	Groundwater quality monitoring	BWD27PRORA01	755429.176	6604670.682
8	Groundwater quality monitoring	BWD27PRUPS02	755433.048	6604684.807
9	Groundwater quality monitoring	BWD26PRUPS01	749372.750	6609376.690
10	Groundwater quality monitoring	BWD26PRUPS02	749364.450	6609363.350
11	Groundwater quality monitoring	DWH14PRUPS01	764703.313	6617145.443
12	Groundwater quality monitoring	DWH14PRUPS02	764689.147	6617119.109
13	Groundwater quality monitoring	DWH14PRPUR03	764696.211	6617132.298
14	Groundwater quality monitoring	DWH3PRUPS01	762239.680	6605589.320
15	Groundwater quality monitoring	DWH3PRUPS02	762251.050	6605598.980
16	Groundwater quality monitoring	NYOPRORA01	736293.460	6643110.400
17	Groundwater quality monitoring	NYOPRUPS02	736308.800	6643107.840
18	Groundwater quality monitoring	BWD27PRLPS03	755436.361	6604699.035
20	Groundwater quality monitoring	BHN14PRORA01	747158.130	6626109.120
21	Groundwater quality monitoring	BHN14PRUPS02	747152.710	6626123.910
22	Groundwater quality monitoring	TULPRNAP01	774464.070	6612048.130
23	Groundwater quality monitoring	TULPRDGY02	774466.480	6612032.980
24	Groundwater quality monitoring	BWDMW13D	753863.300	6608108.510
25	Groundwater quality monitoring	BWDMW13S	753864.820	6608109.300
26	Groundwater quality monitoring	BWDMW12S	753830.650	6608202.740
27	Groundwater quality monitoring	BWDMW12D	753831.910	6608203.710
28	Groundwater quality monitoring	BWDMW12I	753832.680	6608202.250
29	Groundwater quality monitoring	BWDMW2	753912.830	6608241.350
30	Groundwater quality monitoring	BWDMW3	753935.870	6608254.020
31	Groundwater quality monitoring	BWDMW4D	753980.810	6608285.740
32	Groundwater quality monitoring	BWDMW4	753984.140	6608288.040
33	Groundwater quality monitoring	BWDMW15S	753868.090	6608258.340
34	Groundwater quality monitoring	BWDMW15D	753867.100	6608256.750
35	Groundwater quality monitoring	BWDMW16S	753858.950	6608316.490
36	Groundwater quality monitoring	BWDMW16D	753856.980	6608315.570
37	Groundwater quality monitoring	LWDMW1D	751387.930	6623862.960
38	Groundwater quality monitoring	LWDMW1S	751388.920	6623862.460
39	Groundwater quality monitoring	LWDMW1I	751390.640	6623861.850
40	Groundwater quality monitoring	LWDMW2S	751102.840	6622293.020
41	Groundwater quality monitoring	LWDMW2D	751101.810	6622293.150
42	Groundwater quality monitoring	LWDMW3D	751876.160	6622163.760
43	Groundwater quality monitoring	LWDMW3S	751876.470	6622164.930
44	Groundwater level monitoring	DWH8AGMB1	765546.740	6616987.990
45	Groundwater level monitoring	DWH8AGMB2	765546.740	6616987.990

EPA Identification No.	Monitoring type	Location	Easting	Northing
46	Groundwater level monitoring	DWH8AGMB3	765546.740	6616987.990
47	Groundwater level monitoring	BWD28QGUPS01	752949.898	6604219.732
48	Groundwater level monitoring	BWD28QGLPS01	752949.898	6604219.732
49	Groundwater level monitoring	BWD28QGPUR01	752949.898	6604219.732
50	Groundwater quality monitoring	WPKMW01	755684.140	6638105.310
51	Groundwater quality monitoring	WPKMW01D	755689.750	6638097.350
52	Groundwater quality monitoring	WPKMW02	755671.200	6638034.290
53	Groundwater quality monitoring	WPKMW04	755632.500	6637993.070
54	Groundwater quality monitoring	WPKMW07	755501.160	6638207.530
55	Groundwater quality monitoring	WPKMW08	755634.110	6638166.870
56	Groundwater quality monitoring	WPKMW09D	755663.980	6637988.200
57	Groundwater quality monitoring	WPKMW09S	755664.400	6637990.540
58	Groundwater quality monitoring	WPKMW12S	755456.180	6638228.910
59	Groundwater quality monitoring	WPKMW13I	755552.650	6638189.560
60	Groundwater quality monitoring	WPKMW13S	755554.880	6638189.050
61	Groundwater quality monitoring	WPKMW14D	755364.510	6638049.060
62	Groundwater quality monitoring	WPKMW14S	755364.770	6638048.260
63	Groundwater quality monitoring	WPKMW15D	755365.480	6638233.360
64	Groundwater quality monitoring	WPKMW15S	755365.500	6638230.740
65	Groundwater quality monitoring	WPKMW16D	755051.030	6637988.500
66	Groundwater quality monitoring	WPKMW16S	755050.530	6637986.640
67	Groundwater quality monitoring	WPKMW17D	756151.060	6638128.320
68	Groundwater quality monitoring	WPKMW17S	756149.540	6638128.050
69	Produced water storage dam	BWDPD2	753875.870	6607995.060
70	Produced water storage dam	BWDPD3	753992.170	6608125.970
71	Produced water storage dam	LWDPD1CELL4	751473.349	6623513.252
72	Produced water storage dam	LWDPD1CELL3	751460.723	6623323.850
73	Produced water storage dam	LWDPD1CELL2	751428.103	6623124.978
74	Produced water storage dam	LWDPD1CELL1	751390.223	6622935.575
75	Produced water storage dam	TFDPD1	755611.600	6638072.850
76	Produced water storage dam	TFDPD2	755480.110	6638099.040
77	Treated water quality monitoring	LWWTDPD1	751648.020	6622508.310
78	Groundwater quality monitoring	WPKMW18S	755944.010	6638100.840
79	Groundwater quality monitoring	WPKMW18I	755945.070	6638105.040
80	Groundwater quality monitoring	LWDMW4	752080.540	6623038.940
81	Groundwater quality monitoring	LWDMW5	752491.080	6623301.160
82	Groundwater quality monitoring	LWDMW6	752667.550	6623165.030

Table 2: Water Monitoring Results 4th Quarter – February / April 2018

	Units	EPA Identification No Location Date Sampled Sample obtained Sample Method LOR	7	8	9	10	11	12	13	14
			BWD27PRORA01 10/04/2018 No Well dry* RESULT	BWD27PRUPS02 10/04/2018 Yes In situ RESULT	BWD26PRUPS01 10/04/2018 Yes In situ RESULT	BWD26PRLPS02 10/04/2018 Yes In situ RESULT	DWH14PRUPS01 18/04/2018 Yes In situ RESULT	DWH14PRLPS02 18/04/2018 Yes In situ RESULT	DWH14PRPUR03 18/04/2018 Yes In situ RESULT	DWH3PRUPS01 11/04/2018 Yes In situ RESULT
Aluminium	mg/L	0.01								
Ammonia	mg/L	0.01								
Arsenic	mg/L	0.001								
Barium	mg/L	0.001								
Beryllium	mg/L	0.001								
Bicarbonate	mg/L	1								
Boron	mg/L	0.05								
Bromide	mg/L	0.01								
Cadmium	mg/L	0.0001								
Calcium	mg/L	1								
Carbonate	mg/L	1								
Chloride	mg/L	1								
Chromium	mg/L	0.001								
Cobalt	mg/L	0.001								
Copper	mg/L	0.001								
Dissolved Oxygen	mg/L	-		2.7	0.72	0.1	0.7	0.6	1.0	1.05
Electrical Conductivity	µS/cm	-		137	69	139	212	196	656	128
Fluoride	mg/L	0.1								
Iron	mg/L	0.05								
Lead	mg/L	0.001								
Magnesium	mg/L	1								
Manganese	mg/L	0.001								
Mercury	mg/L	0.0001								
Methane	µg/L	10								
Molybdenum	mg/L	0.001								
Nickel	mg/L	0.001								
Nitrate	mg/L	0.01								
Nitrite	mg/L	0.01								
pH	pH Unit	-		5.7	5.9	6.3	5.91	5.85	7.92	5.5
Potassium	mg/L	1								
Reactive Phosphorus	mg/L	0.01								
Redox Potential	mV	-		170	-125.0	-214.0	142.7	-83.0	-251.0	87
Selenium	mg/L	0.01								
Silica	mg/L									
Sodium	mg/L	1								
Sodium Adsorption Ratio (Storages)	-	0.01								
Standing Water Level	mTOC	-		38.82	29.50	28.96	53.39	54.10	53.64	67.45
Strontium	mg/L	0.001								
Sulfate	mg/L	1								
Total Alkalinity (as CaCO3)	mg/L	1								
Total Dissolved Solids	mg/L	10								
Total Hardness (as CaCO3)	mg/L	1								
Total Nitrogen (as N)	mg/L	0.1								
Total Organic Carbon (Storages)	mg/L	1								
Total Phosphorus (as P)	mg/L	0.01								
Total Residual Chlorine	mg/L									
Turbidity	NTU	0.1								
Uranium	mg/L	0.001								
Vanadium	mg/L	0.01								
Zinc	mg/L	0.005								

*Monitoring event was completed but no water was available for sampling in BWD27PRORA01

	Units	EPA Identification No Location Date Sampled Sample obtained Sample Method LOR	15	16	17	18	20	21	22	23
			DWH3PRLPS02 11/04/2018 Yes In situ RESULT	NYOPRORA01 12/04/2018 Yes In situ RESULT	NYOPRUPS02 12/04/2018 Yes In situ RESULT	BWD27PRLPS03 10/04/2018 Yes In situ RESULT	BHN14PRORA01 17/04/2018 Yes In situ RESULT	BHN14PRUPS02 17/04/2018 Yes In situ RESULT	TULPRNAP01 17/04/2018 Yes In situ RESULT	TULPRDGY02 17/04/2018 Yes In situ RESULT
Aluminium	mg/L	0.01								
Ammonia	mg/L	0.01								
Arsenic	mg/L	0.001								
Barium	mg/L	0.001								
Beryllium	mg/L	0.001								
Bicarbonate	mg/L	1								
Boron	mg/L	0.05								
Bromide	mg/L	0.01								
Cadmium	mg/L	0.0001								
Calcium	mg/L	1								
Carbonate	mg/L	1								
Chloride	mg/L	1								
Chromium	mg/L	0.001								
Cobalt	mg/L	0.001								
Copper	mg/L	0.001								
Dissolved Oxygen	mg/L	-	0.8	0	0.01	0.1	0.1	0.1	0.5	0.9
Electrical Conductivity	µS/cm	-	133	1311	1280	214	502	481	7523	8636
Fluoride	mg/L	0.1								
Iron	mg/L	0.05								
Lead	mg/L	0.001								
Magnesium	mg/L	1								
Manganese	mg/L	0.001								
Mercury	mg/L	0.0001								
Methane	µg/L	10								
Molybdenum	mg/L	0.001								
Nickel	mg/L	0.001								
Nitrate	mg/L	0.01								
Nitrite	mg/L	0.01								
pH	pH Unit	-	5.6	8.35	8.40	6.0	7.34	7.28	7.03	6.91
Potassium	mg/L	1								
Reactive Phosphorus	mg/L	0.01								
Redox Potential	mV	-	100	-360	-268.0	18.5	-217.0	-211.0	-214.0	-215.0
Selenium	mg/L	0.01								
Silica	mg/L									
Sodium	mg/L	1								
Sodium Adsorption Ratio (Storages)	-	0.01								
Standing Water Level	mTOC	-	67.64	0	0	38.32	26.43	15.19	91.26	73.75
Strontium	mg/L	0.001								
Sulfate	mg/L	1								
Total Alkalinity (as CaCO3)	mg/L	1								
Total Dissolved Solids	mg/L	10								
Total Hardness (as CaCO3)	mg/L	1								
Total Nitrogen (as N)	mg/L	0.1								
Total Organic Carbon (Storages)	mg/L	1								
Total Phosphorus (as P)	mg/L	0.01								
Total Residual Chlorine	mg/L									
Turbidity	NTU	0.1								
Uranium	mg/L	0.001								
Vanadium	mg/L	0.01								
Zinc	mg/L	0.005								

	Units	EPA Identification No Location Date Sampled Sample obtained Sample Method LOR	24	25	26	27	28	29	30	31
			BWDMW13D 27/03/2018 Yes No sample* RESULT	BWDMW13S 27/03/2018 No Dry well* RESULT	BWDMW12S 27/03/2018 No Dry well* RESULT	BWDMW12D 27/03/2018 Yes Grab sample RESULT	BWDMW12I 27/03/2018 Yes Grab sample RESULT	BWDMW2 27/03/2018 No Dry well* RESULT	BWDMW3 27/03/2018 Yes Grab sample RESULT	BWDMW4D 27/03/2018 Yes No sample* RESULT
Aluminium	mg/L	0.01				< 0.01	< 0.01		0.02	
Ammonia	mg/L	0.01				0.03	< 0.01		0.61	
Arsenic	mg/L	0.001				< 0.001	< 0.001		0.002	
Barium	mg/L	0.001				2.97	8.57		0.160	
Beryllium	mg/L	0.001				< 0.001	< 0.001		< 0.001	
Bicarbonate	mg/L	1				4360	7150		60	
Boron	mg/L	0.05				< 0.05	< 0.05		< 0.05	
Bromide	mg/L	0.01				6.53	10.7		0.770	
Cadmium	mg/L	0.0001				< 0.0001	< 0.0001		< 0.0001	
Calcium	mg/L	1				20	4		5	
Carbonate	mg/L	1				< 1	< 1		< 1	
Chloride	mg/L	1				1360	2160		241	
Chromium	mg/L	0.001				< 0.001	0.002		< 0.001	
Cobalt	mg/L	0.001				0.001	0.011		0.009	
Copper	mg/L	0.001				< 0.001	< 0.001		< 0.001	
Dissolved Oxygen	mg/L	-				2.61	2.33		0.76	
Electrical Conductivity	µS/cm	-				10366	15789		926	
Fluoride	mg/L	0.1				1.3	1.0		< 0.1	
Iron	mg/L	0.05				< 0.05	< 0.05		12.9	
Lead	mg/L	0.001				< 0.001	< 0.001		< 0.001	
Magnesium	mg/L	1				343	631		15	
Manganese	mg/L	0.001				0.004	0.012		0.766	
Mercury	mg/L	0.0001				< 0.0001	< 0.0001		< 0.0001	
Methane	µg/L	10				< 10	< 10		98	
Molybdenum	mg/L	0.001				0.002	0.002		< 0.001	
Nickel	mg/L	0.001				0.002	0.005		0.008	
Nitrate	mg/L	0.01				0.10	0.35		< 0.01	
Nitrite	mg/L	0.01				< 0.01	< 0.01		< 0.01	
pH	pH Unit	-				7.11	7.12		5.63	
Potassium	mg/L	1				44	57		12	
Reactive Phosphorus	mg/L	0.01				< 0.05	0.30		< 0.01	
Redox Potential	mV	-				-80.10	-78.60		-64.0	
Selenium	mg/L	0.01				< 0.01	< 0.01		< 0.01	
Silica	mg/L									
Sodium	mg/L	1				1870	3160		123	
Sodium Adsorption Ratio (Storages)	-	0.01								
Standing Water Level	mTOC	-	30.22			30.55	20.56		30.85	30.25
Strontium	mg/L	0.001				0.898	0.292		0.084	
Sulfate	mg/L	1				42	< 5		35	
Total Alkalinity (as CaCO3)	mg/L	1				4360	7150		60	
Total Dissolved Solids	mg/L	10				6010	9960		524	
Total Hardness (as CaCO3)	mg/L	1								
Total Nitrogen (as N)	mg/L	0.1								
Total Organic Carbon (Storages)	mg/L	1								
Total Phosphorus (as P)	mg/L	0.01								
Total Residual Chlorine	mg/L									
Turbidity	NTU	0.1								
Uranium	mg/L	0.001				0.068	0.150		< 0.001	
Vanadium	mg/L	0.01				< 0.01	0.05		< 0.01	
Zinc	mg/L	0.005				0.007	< 0.005		0.021	

*Monitoring event was completed but insufficient water was available for sampling in BWDMW13S, BWDMW12S, BWDMW2, BWDMW13D and BWDMW4D

	Units	EPA Identification No Location Date Sampled Sample obtained Sample Method LOR	32	33	34	35	36	37	38	39
			BWDMW4 27/03/2018 No Dry well* RESULT	BWDMW15S 27/03/2018 No Dry well* RESULT	BWDMW15D 27/03/2018 Yes Grab sample RESULT	BWDMW16S 27/03/2018 No Dry well* RESULT	BWDMW16D 27/03/2018 Yes Grab sample RESULT	LWDMW1D 14/03/2018 Yes Grab sample RESULT	LWDMW1S 14/03/2018 No Dry well* RESULT	LWDMW1I 14/03/2018 No Dry well* RESULT
Aluminium	mg/L	0.01			0.10			0.01	< 0.01	
Ammonia	mg/L	0.01			0.11			0.02	0.01	
Arsenic	mg/L	0.001			0.001			< 0.001	0.001	
Barium	mg/L	0.001			0.045			0.069	0.400	
Beryllium	mg/L	0.001			< 0.001			< 0.001	< 0.001	
Bicarbonate	mg/L	1			44			8	197	
Boron	mg/L	0.05			< 0.05			< 0.05	0.22	
Bromide	mg/L	0.01			0.274			0.263	1.23	
Cadmium	mg/L	0.0001			< 0.0001			< 0.0001	< 0.0001	
Calcium	mg/L	1			2			< 1	6	
Carbonate	mg/L	1			< 1			< 1	< 1	
Chloride	mg/L	1			85			92	654	
Chromium	mg/L	0.001			0.001			< 0.001	< 0.001	
Cobalt	mg/L	0.001			0.001			< 0.001	< 0.001	
Copper	mg/L	0.001			< 0.001			< 0.001	0.002	
Dissolved Oxygen	mg/L	-			3.25			3.51	0.92	
Electrical Conductivity	µS/cm	-			442			375.7	2272	
Fluoride	mg/L	0.1			< 0.1			< 0.1	0.2	
Iron	mg/L	0.05			0.73			< 0.05	< 0.05	
Lead	mg/L	0.001			< 0.001			< 0.001	< 0.001	
Magnesium	mg/L	1			4			2	12	
Manganese	mg/L	0.001			0.034			0.007	0.017	
Mercury	mg/L	0.0001			< 0.0001			< 0.0001	< 0.0001	
Methane	µg/L	10			14			< 10	< 10	
Molybdenum	mg/L	0.001			< 0.001			< 0.001	0.001	
Nickel	mg/L	0.001			0.003			0.003	0.007	
Nitrate	mg/L	0.01			0.46			0.17	0.11	
Nitrite	mg/L	0.01			< 0.01			< 0.01	< 0.01	
pH	pH Unit	-			5.8			5.29	6.4	
Potassium	mg/L	1			8			5	12	
Reactive Phosphorus	mg/L	0.01			< 0.01			< 0.01	0.08	
Redox Potential	mV	-			-74.0			-33.50	24	
Selenium	mg/L	0.01			< 0.01			< 0.01	< 0.01	
Silica	mg/L									
Sodium	mg/L	1			62			52	442	
Sodium Adsorption Ratio (Storages)	-	0.01								
Standing Water Level	mTOC	-			30.29			30.10	29.95	
Strontium	mg/L	0.001			0.011			0.007	0.126	
Sulfate	mg/L	1			32			1	18	
Total Alkalinity (as CaCO3)	mg/L	1			44			8	197	
Total Dissolved Solids	mg/L	10			271			238	1120	
Total Hardness (as CaCO3)	mg/L	1								
Total Nitrogen (as N)	mg/L	0.1								
Total Organic Carbon (Storages)	mg/L	1								
Total Phosphorus (as P)	mg/L	0.01								
Total Residual Chlorine	mg/L									
Turbidity	NTU	0.1								
Uranium	mg/L	0.001			< 0.001			< 0.001	< 0.001	
Vanadium	mg/L	0.01			< 0.01			< 0.01	< 0.01	
Zinc	mg/L	0.005			0.028			0.015	< 0.005	

*Monitoring event was completed because no water was available for sampling in BWDMW4, BWDMW15S, BWDMW16S, LWDMW1S and LWDMW1I

	Units	EPA Identification No Location Date Sampled Sample obtained Sample Method LOR	40	41	42	43	50	51	52	53
			LWDMW2S 14/03/2018 No Dry well* RESULT	LWDMW2D 14/03/2018 Yes Grab sample RESULT	LWDMW3D 14/03/2018 Yes Grab sample RESULT	LWDMW3S 14/03/2018 No Dry well* RESULT	WPKMW1 27/03/2018 Yes Grab sample RESULT	WPKMW1D 27/03/2018 Yes Grab sample RESULT	WPKMW2 27/03/2018 Yes Grab sample RESULT	WPKMW4 27/03/2018 Yes Grab sample RESULT
Aluminium	mg/L	0.01		< 0.01	< 0.01		< 0.01	0.01	< 0.01	< 0.01
Ammonia	mg/L	0.01		0.08	0.05		< 0.01	0.14	< 0.01	0.03
Arsenic	mg/L	0.001		0.001	0.002		0.002	0.004	< 0.004	0.004
Barium	mg/L	0.001		0.385	0.082		0.020	0.104	0.051	0.016
Beryllium	mg/L	0.001		< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001
Bicarbonate	mg/L	1		375	121		691	625	1400	959
Boron	mg/L	0.05		0.18	0.13		0.21	0.25	0.28	0.29
Bromide	mg/L	0.01		0.728	0.414		0.481	0.354	1.50	0.910
Cadmium	mg/L	0.0001		< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001
Calcium	mg/L	1		16	1		2	6	4	1
Carbonate	mg/L	1		< 1	< 1		< 1	< 1	< 1	5
Chloride	mg/L	1		489	266		118	57	499	238
Chromium	mg/L	0.001		< 0.001	0.003		< 0.001	< 0.001	< 0.001	< 0.001
Cobalt	mg/L	0.001		0.002	0.002		< 0.001	< 0.001	< 0.001	< 0.001
Copper	mg/L	0.001		< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001
Dissolved Oxygen	mg/L	-		0.7	0.43		1.49	0.6	0.6	0.75
Electrical Conductivity	µS/cm	-		2005	995		1498	1177	3530	2287
Fluoride	mg/L	0.1		0.3	0.2		0.6	0.8	0.7	1.2
Iron	mg/L	0.05		0.09	0.98		< 0.05	< 0.05	< 0.05	< 0.05
Lead	mg/L	0.001		< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001
Magnesium	mg/L	1		23	4		< 1	1	2	< 1
Manganese	mg/L	0.001		0.085	0.018		0.001	0.101	0.004	< 0.001
Mercury	mg/L	0.0001		< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001
Methane	µg/L	10		< 10	17		< 10	67	< 10	< 10
Molybdenum	mg/L	0.001		0.004	0.005		< 0.001	< 0.001	0.002	0.001
Nickel	mg/L	0.001		0.008	0.027		< 0.001	< 0.001	< 0.001	< 0.001
Nitrate	mg/L	0.01		< 0.01	< 0.01		0.09	< 0.01	0.02	0.11
Nitrite	mg/L	0.01		< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
pH	pH Unit	-		6.7	6.4		7.88	8.07	7.91	7.95
Potassium	mg/L	1		24	9		3	3	7	5
Reactive Phosphorus	mg/L	0.01		0.11	0.05		0.41	0.08	0.60	0.61
Redox Potential	mV	-		-109.0	-153.0		-72.70	-20	-123.70	-187.90
Selenium	mg/L	0.01		< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Silica	mg/L									
Sodium	mg/L	1		367	188		328	264	798	521
Sodium Adsorption Ratio (Storages)	-	0.01								
Standing Water Level	mTOC	-		25.95	21.06		16.21	15.98	15.35	16.05
Strontium	mg/L	0.001		0.240	0.027		0.031	0.054	0.072	0.028
Sulfate	mg/L	1		23	6		< 1	< 1	< 5	< 1
Total Alkalinity (as CaCO3)	mg/L	1		375	121		691	625	1400	964
Total Dissolved Solids	mg/L	10		1040	580		940	620	2090	1240
Total Hardness (as CaCO3)	mg/L	1								
Total Nitrogen (as N)	mg/L	0.1								
Total Organic Carbon (Storages)	mg/L	1								
Total Phosphorus (as P)	mg/L	0.01								
Total Residual Chlorine	mg/L									
Turbidity	NTU	0.1								
Uranium	mg/L	0.001		0.001	< 0.001		< 0.001	< 0.001	0.003	0.001
Vanadium	mg/L	0.01		< 0.01	< 0.01		< 0.01	< 0.01	0.01	0.01
Zinc	mg/L	0.005		< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005

*Monitoring event was completed but no water was available for sampling in LWDMW2S and LWDMW3S

	Units	EPA Identification No Location Date Sampled Sample obtained Sample Method LOR	55	56	57	58	59	60	61	62
			WPKMW8 27/03/2018 Yes Grab sample RESULT	WPKMW9D 27/03/2018 Yes Grab sample RESULT	WPKMW9S 27/03/2018 Yes Grab sample RESULT	WPKMW12S 27/03/2018 No Dry well* RESULT	WPKMW13I 27/03/2018 Yes Grab sample RESULT	WPKMW13S 27/03/2018 Yes Grab sample RESULT	WPKMW14D 27/03/2018 Yes Grab sample RESULT	WPKMW14S 27/03/2018 No Dry well* RESULT
Aluminium	mg/L	0.01	< 0.01	< 0.01	0.03		0.02	< 0.01	< 0.01	
Ammonia	mg/L	0.01	0.01	0.02	0.01		< 0.01	0.06	0.06	
Arsenic	mg/L	0.001	0.002	0.004	0.002		0.002	0.002	0.002	
Barium	mg/L	0.001	0.029	0.069	0.282		0.040	0.099	0.277	
Beryllium	mg/L	0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	
Bicarbonate	mg/L	1	998	608	1960		644	1230	631	
Boron	mg/L	0.05	0.27	0.22	0.41		0.21	0.33	0.20	
Bromide	mg/L	0.01	1.05	0.457	1.85		0.268	1.78	0.348	
Cadmium	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	
Calcium	mg/L	1	3	4	11		3	4	6	
Carbonate	mg/L	1	< 1	19	< 1		< 1	< 1	< 1	
Chloride	mg/L	1	312	57	446		66	437	57	
Chromium	mg/L	0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	
Cobalt	mg/L	0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	
Copper	mg/L	0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	
Dissolved Oxygen	mg/L	-	1.60	0.35	0.23		0.63	0.69	0.26	
Electrical Conductivity	µS/cm	-	2523	1220	4592		1272	3265	1215	
Fluoride	mg/L	0.1	0.6	1.1	0.8		0.8	0.6	0.8	
Iron	mg/L	0.05	< 0.05	0.07	0.10		< 0.05	0.16	< 0.05	
Lead	mg/L	0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	
Magnesium	mg/L	1	< 1	< 1	4		< 1	1	1	
Manganese	mg/L	0.001	< 0.001	0.050	0.082		0.073	0.078	0.019	
Mercury	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	
Methane	µg/L	10	< 10	< 10	< 10		< 10	< 10	< 10	
Molybdenum	mg/L	0.001	0.002	0.003	0.002		0.002	0.003	0.002	
Nickel	mg/L	0.001	< 0.001	0.003	< 0.001		0.005	< 0.001	0.002	
Nitrate	mg/L	0.01	0.45	< 0.01	< 0.01		1.96	< 0.01	< 0.01	
Nitrite	mg/L	0.01	< 0.01	< 0.01	< 0.01		0.09	< 0.01	< 0.01	
pH	pH Unit	-	7.64	8.21	7.78		8.14	7.48	8.07	
Potassium	mg/L	1	6	3	10		4	9	4	
Reactive Phosphorus	mg/L	0.01	0.36	0.25	0.34		0.26	0.26	0.19	
Redox Potential	mV	-	-57.00	-214.50	-211.70		-43.0	0.3	-55.30	
Selenium	mg/L	0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	
Silica	mg/L									
Sodium	mg/L	1	538	272	1100		295	743	260	
Sodium Adsorption Ratio (Storages)	-	0.01					16.83			
Standing Water Level	mTOC	-	16.66	15.53	15.70			16.94	20.98	
Strontium	mg/L	0.001	0.040	0.058	0.144		0.018	0.046	0.042	
Sulfate	mg/L	1	< 1	< 1	136		5	< 5	< 1	
Total Alkalinity (as CaCO3)	mg/L	1	998	627	1960		644	1230	631	
Total Dissolved Solids	mg/L	10	1450	730	2920		772	1980	782	
Total Hardness (as CaCO3)	mg/L	1								
Total Nitrogen (as N)	mg/L	0.1								
Total Organic Carbon (Storages)	mg/L	1								
Total Phosphorus (as P)	mg/L	0.01								
Total Residual Chlorine	mg/L									
Turbidity	NTU	0.1								
Uranium	mg/L	0.001	0.001	< 0.001	0.009		< 0.001	0.002	< 0.001	
Vanadium	mg/L	0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	
Zinc	mg/L	0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	

*Monitoring event was completed but no water was available for sampling in WPKMW12S and WPKMW14S

	Units	EPA Identification No Location Date Sampled Sample obtained Sample Method LOR	63	64	65	66	67	68	78	79
			WPKMW15D 27/03/2018 Yes Grab sample RESULT	WPKMW15S 27/03/2018 Yes Grab sample RESULT	WPKMW16D 27/03/2018 Yes Grab sample RESULT	WPKMW16S 27/03/2018 No Dry well* RESULT	WPKMW17D 27/03/2018 Yes Grab sample RESULT	WPKMW17S 27/03/2018 No Dry well* RESULT	WPKMW18S 27/03/2018 No Dry well* RESULT	WPKMW18I 27/03/2018 Yes Grab sample RESULT
Aluminium	mg/L	0.01	< 0.01	< 0.01	< 0.01		< 0.01			< 0.01
Ammonia	mg/L	0.01	0.12	0.02	< 0.01		0.07			0.03
Arsenic	mg/L	0.001	0.002	0.003	0.003		0.002			0.001
Barium	mg/L	0.001	0.244	2.06	0.182		0.124			0.077
Beryllium	mg/L	0.001	< 0.001	< 0.001	< 0.001		< 0.001			< 0.001
Bicarbonate	mg/L	1	659	3680	615		571			570
Boron	mg/L	0.05	0.17	0.68	0.08		< 0.05			0.21
Bromide	mg/L	0.01	0.400	4.18	0.370		0.205			0.229
Cadmium	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001		< 0.0001			< 0.0001
Calcium	mg/L	1	6	7	6		3			1
Carbonate	mg/L	1	< 1	< 1	< 1		< 1			< 1
Chloride	mg/L	1	53	1090	65		58			52
Chromium	mg/L	0.001	< 0.001	0.010	< 0.001		< 0.001			< 0.001
Cobalt	mg/L	0.001	< 0.001	< 0.001	< 0.001		< 0.001			< 0.001
Copper	mg/L	0.001	< 0.001	< 0.001	< 0.001		< 0.001			< 0.001
Dissolved Oxygen	mg/L	-	0	2.3	0.83		0.17			0.98
Electrical Conductivity	µS/cm	-	1365	8720	1272		1163			1161
Fluoride	mg/L	0.1	0.5	1.0	0.5		0.8			0.6
Iron	mg/L	0.05	0.34	< 0.05	< 0.05		0.05			< 0.05
Lead	mg/L	0.001	< 0.001	< 0.001	< 0.001		< 0.001			< 0.001
Magnesium	mg/L	1	2	14	2		< 1			< 1
Manganese	mg/L	0.001	0.097	< 0.001	< 0.001		0.043			< 0.001
Mercury	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001		< 0.0001			< 0.0001
Methane	µg/L	10	80	< 10	< 10		< 10			< 10
Molybdenum	mg/L	0.001	0.013	0.004	0.006		0.007			0.003
Nickel	mg/L	0.001	0.002	0.001	0.004		< 0.001			< 0.001
Nitrate	mg/L	0.01	< 0.01	0.58	0.03		< 0.01			2.71
Nitrite	mg/L	0.01	< 0.01	< 0.01	< 0.01		< 0.01			< 0.01
pH	pH Unit	-	8.03	7.83	7.85		7.34			7.88
Potassium	mg/L	1	6	35	10		6			4
Reactive Phosphorus	mg/L	0.01	0.29	0.64	0.26		0.05			0.32
Redox Potential	mV	-	-197.10	-48.10	-163.80		-167.10			-120.30
Selenium	mg/L	0.01	< 0.01	< 0.01	< 0.01		< 0.01			< 0.01
Silica	mg/L									
Sodium	mg/L	1	289	2260	277		255			261
Sodium Adsorption Ratio (Storages)	-	0.01								
Standing Water Level	mTOC	-	22.2	22.44	26.54		18.60			16.18
Strontium	mg/L	0.001	0.066	0.264	0.052		0.020			0.012
Sulfate	mg/L	1	10	12	13		2			< 1
Total Alkalinity (as CaCO3)	mg/L	1	659	3680	615		571			570
Total Dissolved Solids	mg/L	10	812	5810	786		704			672
Total Hardness (as CaCO3)	mg/L	1								
Total Nitrogen (as N)	mg/L	0.1								
Total Organic Carbon (Storages)	mg/L	1								
Total Phosphorus (as P)	mg/L	0.01								
Total Residual Chlorine	mg/L									
Turbidity	NTU	0.1								
Uranium	mg/L	0.001	< 0.001	0.012	0.005		0.001			< 0.001
Vanadium	mg/L	0.01	< 0.01	0.03	0.01		< 0.01			< 0.01
Zinc	mg/L	0.005	< 0.005	< 0.005	< 0.005		< 0.005			< 0.005

*Monitoring event was completed but no water was available for sampling in WPKMW16S, WPKMW17S and WPKMW18S

		EPA Identification No Location Date Sampled Sample obtained Sample Method	80 LWDMW4 14/03/2018 Yes Grab sample RESULT	81 LWDMW5 14/03/2018 Yes Grab sample RESULT	82 LWDMW6 14/03/20187 Yes Grab sample RESULT	77 LWWTPDM1 19/02/2018 Yes Grab sample RESULT	77 LWWTPDM1 14/03/2018 Yes Grab sample RESULT	77 LWWTPDM1 04/04/2018 Yes Grab sample RESULT
	Units	LOR						
Aluminium	mg/L	0.01	< 0.01	< 0.01	< 0.01			
Ammonia	mg/L	0.01	0.03	0.03	0.02	0.11	< 0.01	0.12
Arsenic	mg/L	0.001	0.002	0.002	0.001			
Barium	mg/L	0.001	0.340	0.352	0.282			
Beryllium	mg/L	0.001	< 0.001	< 0.001	< 0.001			
Bicarbonate	mg/L	1	275	222	93	23	22	22
Boron	mg/L	0.05	0.12	0.15	0.09	< 0.05	< 0.05	0.05
Bromide	mg/L	0.01	0.625	0.766	0.901			
Cadmium	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001			
Calcium	mg/L	1	8	3	4	6	6	6
Carbonate	mg/L	1	< 1	< 1	< 1	< 1	< 1	< 1
Chloride	mg/L	1	416	414	406	22	23	21
Chromium	mg/L	0.001	< 0.001	< 0.001	< 0.001			
Cobalt	mg/L	0.001	< 0.001	< 0.001	< 0.001			
Copper	mg/L	0.001	< 0.001	< 0.001	< 0.001			
Dissolved Oxygen	mg/L	-	1.0	0.2	0.5			
Electrical Conductivity	µS/cm	-	1641	1575	1368	120	104	112
Fluoride	mg/L	0.1	0.2	0.3	0.2	0.6	< 0.1	< 0.1
Iron	mg/L	0.05	2.83	4.95	5.57			
Lead	mg/L	0.001	< 0.001	< 0.001	< 0.001			
Magnesium	mg/L	1	10	5	6	< 1	< 1	< 1
Manganese	mg/L	0.001	0.260	0.471	0.193			
Mercury	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001			
Methane	µg/L	10	1150	555	147			
Molybdenum	mg/L	0.001	< 0.001	< 0.001	< 0.001			
Nickel	mg/L	0.001	0.001	0.002	< 0.001			
Nitrate	mg/L	0.01	0.03	< 0.01	< 0.01	0.06	< 0.01	0.03
Nitrite	mg/L	0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01
pH	pH Unit	-	7.0	6.7	6.5	7.15	7.20	7.34
Potassium	mg/L	1	17	12	14	< 1	< 1	< 1
Reactive Phosphorus	mg/L	0.01	< 0.01	< 0.01	< 0.01			
Redox Potential	mV	-	-220	-161.0	-157.0			
Selenium	mg/L	0.01	< 0.01	< 0.01	< 0.01			
Silica	mg/L					< 0.1	< 0.1	< 0.1
Sodium	mg/L	1	318	298	248	18	17	16
Sodium Adsorption Ratio	-	0.01				2.02	1.79	1.68
Standing Water Level	mTOC	-	23.54	25.20	20.26			
Strontium	mg/L	0.001	0.093	0.043	0.053			
Sulfate	mg/L	1	12	2	16	< 1	< 1	< 1
Total Alkalinity (as CaCO3)	mg/L	1	275	222	93	23	22	22
Total Dissolved Solids	mg/L	10	965	897	744	69	55	56
Total Hardness (as CaCO3)	mg/L	1				15	15	15
Total Nitrogen (as N)	mg/L	0.1				0.2	< 0.1	0.2
Total Organic Carbon (Storages)	mg/L	1						
Total Phosphorus (as P)	mg/L	0.01				< 0.01	< 0.01	< 0.01
Total Residual Chlorine	mg/L					< 0.02	< 0.02	< 0.02
Turbidity	NTU	0.1				0.1	< 0.1	1.4
Uranium	mg/L	0.001	< 0.001	< 0.001	< 0.001			
Vanadium	mg/L	0.01	< 0.01	< 0.01	< 0.01			
Zinc	mg/L	0.005	< 0.005	< 0.005	< 0.005			

	Units	EPA Identification No Location Date Sampled Sample obtained Sample Method LOR	69	70	71	72	73	74	75	76
			BWDPD2 15/01/2018 No Not operational* RESULT	BWDPD3 15/01/2018 No Not operational* RESULT	LWDPD1CELL4 18/12/2017 Yes Grab sample RESULT	LWDPD1CELL3 18/12/2017 Yes Grab sample RESULT	LWDPD1CELL2 18/12/2017 Yes Grab sample RESULT	LWDPD1CELL1 18/12/2017 Yes Grab sample RESULT	TFDPD1 20/12/2017 Yes Grab sample RESULT	TFDPD2 20/12/2017 Yes Grab sample RESULT
Aluminium	mg/L	0.01			< 0.10	0.01	< 0.10	< 0.10	< 0.10	< 0.10
Ammonia	mg/L	0.01			< 0.05	0.54	< 0.05	< 0.05	< 0.05	0.40
Arsenic	mg/L	0.001			0.018	0.001	< 0.010	0.016	< 0.010	< 0.010
Barium	mg/L	0.001			14.6	3.80	4.39	5.50	3.53	2.02
Beryllium	mg/L	0.001			< 0.010	< 0.001	< 0.010	< 0.010	< 0.010	< 0.010
Bicarbonate	mg/L	1			31200	3490	10600	19400	5070	11000
Boron	mg/L	0.05			6.69	0.54	2.37	5.43	1.35	2.27
Bromide	mg/L	0.01			41.6	4.16	10.6	42.6	14.3	22.8
Cadmium	mg/L	0.0001			< 0.0010	< 0.0001	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Calcium	mg/L	1			29	9	10	19	18	14
Carbonate	mg/L	1			30100	3040	11100	30200	13800	24600
Chloride	mg/L	1			9560	892	3120	8710	3370	6560
Chromium	mg/L	0.001			< 0.010	< 0.001	< 0.010	< 0.010	< 0.010	< 0.010
Cobalt	mg/L	0.001			< 0.010	< 0.001	< 0.010	< 0.010	< 0.010	< 0.010
Copper	mg/L	0.001			0.012	< 0.001	0.016	0.013	0.022	< 0.010
Dissolved Oxygen	mg/L	-			3.01	5.27	4.25	4.00	0	1.58
Electrical Conductivity	µS/cm	-			80610	12890	35986	71055	35267	56915
Fluoride	mg/L	0.1			46.2	4.4	10.4	30.0	9.3	13.8
Iron	mg/L	0.05			< 0.10	< 0.05	< 0.10	< 0.10	< 0.10	< 0.10
Lead	mg/L	0.001			< 0.010	< 0.001	< 0.010	< 0.010	< 0.010	< 0.010
Magnesium	mg/L	1			57	6	14	32	10	14
Manganese	mg/L	0.001			0.031	0.002	< 0.010	< 0.010	0.018	< 0.010
Mercury	mg/L	0.0001			< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Methane	µg/L	10			< 10	348	628	122	1840	155
Molybdenum	mg/L	0.001			0.016	< 0.001	< 0.010	0.035	< 0.010	< 0.010
Nickel	mg/L	0.001			< 0.010	< 0.001	< 0.010	< 0.010	< 0.010	< 0.010
Nitrate	mg/L	0.01			< 0.1	0.02	< 0.1	< 0.1	< 0.1	< 0.1
Nitrite	mg/L	0.01			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
pH	pH Unit	-			9.45	9.45	9.50	9.66	9.85	9.83
Potassium	mg/L	1			819	44	221	945	174	218
Reactive Phosphorus	mg/L	0.01								
Redox Potential	mV	-			-43.0	-59.0	-26.0	-15.0	-25.50	-92.00
Selenium	mg/L	0.01			< 0.10	< 0.01	< 0.10	< 0.10	< 0.10	< 0.10
Silica	mg/L									
Sodium	mg/L	1			43200	3920	14500	34300	13700	17500
Sodium Adsorption Ratio (Storages)	-	0.01			1070	248	694	1110	642	791
Standing Water Level	mTOC	-								
Strontium	mg/L	0.001			4.48	0.878	1.37	2.49	3.17	2.12
Sulfate	mg/L	1			13	4	164	< 10	161	188
Total Alkalinity (as CaCO3)	mg/L	1			61300	6530	21700	49600	18900	35600
Total Dissolved Solids	mg/L	10			90400	9050	30800	69100	27300	53900
Total Hardness (as CaCO3)	mg/L	1								
Total Nitrogen (as N)	mg/L	0.1								
Total Organic Carbon (Storages)	mg/L	1			72	28	92	9	61	94
Total Phosphorus (as P)	mg/L	0.01			2.85	0.08	0.97	5.91	1.22	0.58
Total Residual Chlorine	mg/L									
Turbidity	NTU	0.1								
Uranium	mg/L	0.001			< 0.010	< 0.001	< 0.010	< 0.010	< 0.010	< 0.010
Vanadium	mg/L	0.01			< 0.10	< 0.01	< 0.10	< 0.10	< 0.10	< 0.10
Zinc	mg/L	0.005			< 0.050	< 0.005	0.089	< 0.050	0.084	0.061

*Monitoring event was completed but no water was available as ponds are not in operation.

Table 3: GROUNDWATER LEVEL RESULTS FOR 4th QUARTER – February / April 2018

EPA Identification No	44	45	46	47	48	49
Location	Dewhurst 8A-1 (DWH8AQGGY01)	Dewhurst 8A-2 (DWH8AQGARK)	Dewhurst 8A-3 (DWH8AQGPOR03)	Biblewindi 28A (BWD28QGUPS01)	Biblewindi 28B (BWD28QGLPS01)	Biblewindi 28C (BWD28QGPUR01)
Date Sampled	February – April 2018	February – April 2018	February – April 2018	February – April 2018	February – April 2018	February – April 2018
Sample Obtained	Standing Water Level	Standing Water Level	Standing Water Level	Standing Water Level	Standing Water Level	Standing Water Level
Number of Samples Required	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous
Lowest sample value	-35.7	17.5	-62.9	11.4	4.5	14.7
Mean of sample	-35.52	17.68	-62.27	11.79	4.50	15.31
Highest sample value	-35.3	17.9	-61.6	11.8	4.5	15.4