

ENVIRONMENT PROTECTION LICENCE 20350 MONITORING DATA

Licence Holder: Santos NSW (Eastern) Pty Ltd
Premises: Narrabri Gas Field
X-Line Road, Narrabri, NSW 2390

Licence No: 20350
EPL LINK: <https://apps.epa.nsw.gov.au/prpoeoapp/Detail.aspx?instid=20350&id=20350&option=licence&searchrange=licence&range=POEO%20lice>
Version 11 APRIL 2021

EPL Period: May 1st 2022 to April 30th 2023
Reporting Period: **Quarter 2 August 2022 - October 2022**
Published Date: **Nov 2022** Version 1
May 2023 Version 2 Data Update

“This report was updated on the 11 May 2023 to correct data transcription errors discovered in the initial publication of the monitoring data. The corrected values are not significantly different from the initially published data, and neither the initial or corrected values indicate any effects on the environment due to CSG activities.”

Monitoring Location: Refer to Table 1
Scheduled Activity: Coal seam gas exploration, assessment and production

General Notes: Monitoring Point 80, 81 & 82 - no sample required in accordance with EPL20350 Condition M2.11
Monitoring Point 77 - no sample required in accordance with EPL20350 Condition M2.7
Monitoring Point 69, 70, 75 & 76 - no sample required in accordance with EPL20350 Condition M2.8 and M2.9
Monitoring Point 83, 84, 85 & 86 - no sample required in accordance with EPL20350 Condition M2.11
Monitoring points visited and reported dry : 18,26,38,39,40,43,66 and 78.
Monitoring points visited with insufficient recharge to collect a lab sample: 28 & 62
Monitoring points 47, 48 and 49: no water level results available.
Only in-situ parameters were recorded within the monitoring period for the Groundwater monitoring points.

Table 1: EPL20350 Water Monitoring Locations

EPA Identification No.	Monitoring type	Location	Easting	Northing
7	Groundwater quality monitoring	BWD27PRUPS02	755433.048	6604684.807
8	Groundwater quality monitoring	BWD27PRLPS03	755436.361	6604699.035
9	Groundwater quality monitoring	BWD26PRUPS01	749372.75	6609376.69
10	Groundwater quality monitoring	BWD26PRLPS02	749364.45	6609363.35
11	Groundwater quality monitoring	DWH14PRUPS01	764703.313	6617145.443
12	Groundwater quality monitoring	DWH14PRLPS02	764689.147	6617119.109
13	Groundwater quality monitoring	DWH14PRPUR03	764696.211	6617132.298
14	Groundwater quality monitoring	DWH3PRUPS01	762239.68	6605589.32
15	Groundwater quality monitoring	DWH3PRLPS02	762251.05	6605598.98
16	Groundwater quality monitoring	NYOPRORA01	736293.46	6643110.4
17	Groundwater quality monitoring	NYOPRUPS02	736308.8	6643107.84
18	Groundwater quality monitoring	BWD27PRORA01	755429.176	6604670.682
20	Groundwater quality monitoring	BHN14PRORA01	747158.13	6626109.12
21	Groundwater quality monitoring	BHN14PRUPS02	747152.71	6626123.91
22	Groundwater quality monitoring	TULPRNAP01	774464.07	6612048.13
23	Groundwater quality monitoring	TULPRDGY02	774466.48	6612032.98
24	Groundwater quality monitoring	BWDMW13D	753863.3	6608108.51
25	Groundwater quality monitoring	BWDMW13S	753864.82	6608109.3
26	Groundwater quality monitoring	BWDMW12S	753830.65	6608202.74
27	Groundwater quality monitoring	BWDMW12D	753831.91	6608203.71
28	Groundwater quality monitoring	BWDMW12I	753832.68	6608202.25
29	Groundwater quality monitoring	BWDMW2	753912.83	6608241.35
30	Groundwater quality monitoring	BWDMW3	753935.87	6608254.02
31	Groundwater quality monitoring	BWDMW4D	753980.81	6608285.74
32	Groundwater quality monitoring	BWDMW4	753984.14	6608288.04
33	Groundwater quality monitoring	BWDMW15S	753868.09	6608258.34
34	Groundwater quality monitoring	BWDMW15D	753867.1	6608256.75
35	Groundwater quality monitoring	BWDMW16S	753858.95	6608316.49
36	Groundwater quality monitoring	BWDMW16D	753856.98	6608315.57
37	Groundwater quality monitoring	LWDMW1D	751387.93	6623862.96
38	Groundwater quality monitoring	LWDMW1S	751388.92	6623862.46
39	Groundwater quality monitoring	LWDMW1I	751390.64	6623861.85
40	Groundwater quality monitoring	LWDMW2S	751102.84	6622293.02
41	Groundwater quality monitoring	LWDMW2D	751101.81	6622293.15
42	Groundwater quality monitoring	LWDMW3D	751876.16	6622163.76
43	Groundwater quality monitoring	LWDMW3S	751876.47	6622164.93
44	Groundwater level monitoring	DWH8AGMB1	765546.74	6616987.99
45	Groundwater level monitoring	DWH8AGMB2	765546.74	6616987.99
46	Groundwater level monitoring	DWH8AGMB3	765546.74	6616987.99

EPA Identification No.	Monitoring type	Location	Easting	Northing
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	755684.14	6638105.31
51	Groundwater quality monitoring	WPKMW01D	755689.75	6638097.35
52	Groundwater quality monitoring	WPKMW02	755671.2	6638034.29
53	Groundwater quality monitoring	WPKMW04	755632.5	6637993.07
55	Groundwater quality monitoring	WPKMW08	755634.11	6638166.87
56	Groundwater quality monitoring	WPKMW09D	755663.98	6637988.2
57	Groundwater quality monitoring	WPKMW09S	755664.4	6637990.54
58	Groundwater quality monitoring	WPKMW12S	755456.18	6638228.91
59	Groundwater quality monitoring	WPKMW13I	755552.65	6638189.56
60	Groundwater quality monitoring	WPKMW13S	755554.88	6638189.05
61	Groundwater quality monitoring	WPKMW14D	755364.51	6638049.06
62	Groundwater quality monitoring	WPKMW14S	755364.77	6638048.26
63	Groundwater quality monitoring	WPKMW15D	755365.48	6638233.36
64	Groundwater quality monitoring	WPKMW15S	755365.5	6638230.74
65	Groundwater quality monitoring	WPKMW16D	755051.03	6637988.5
66	Groundwater quality monitoring	WPKMW16S	755050.53	6637986.64
67	Groundwater quality monitoring	WPKMW17D	756151.06	6638128.32
68	Groundwater quality monitoring	WPKMW17S	756149.54	6638128.05
69	Produced water storage dam	BWDPD2	753875.87	6607995.06
70	Produced water storage dam	BWDPD3	753992.17	6608125.97
71	Produced water storage dam	LWDPD1CELL4	751473.349	6623513.252
72	Produced water storage dam	LWDPD1CELL3	751460.723	6623323.85
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	755611.6	6638072.85
76	Produced water storage dam	TFDPD2	755480.11	6638099.04
77	Treated water quality monitoring	LWWTDM1	751648.02	6622508.31
78	Groundwater quality monitoring	WPKMW18S	755944.01	6638100.84
79	Groundwater quality monitoring	WPKMW18I	755945.07	6638105.04
80	Groundwater quality monitoring	LWDMW4	752080.54	6623038.94
81	Groundwater quality monitoring	LWDMW5	752491.08	6623301.16
82	Groundwater quality monitoring	LWDMW6	752667.55	6623165.03
83	Soil quality monitoring	LWDSMP1	751942.34	6622941.21
84	Soil quality monitoring	LWDSMP2	752164.06	6623143.83
85	Soil quality monitoring	LWDSMP3	752572.6	6623126.32
86	Soil quality monitoring	LWDSMP4	752457.14	6622764.26

Spatial Reference: GDA94 MGA Zone 55

Note: Monitoring points removed in accordance with Environmental Protection Licence (EPL) 23050 amended 11th April 2021 (16, 17, 22, 23, 24, 25, 29, 30, 31, 32, 33, 34, 35, 36, 50, 51, 52, 53, 55, 58, 67 and 68)

TABLE 2: GROUNDWATER QUALITY MONITORING

		EPA Identification No	7	8	9	10	11	12
		Location	BWD27PRUPS02	BWD27PRLPS03	BWD26PRUPS01	BWD26PRLPS02	DWH14PRUPS01	DWH14PRLPS02
		Date	27/09/2022	27/09/2022	24/09/2022	24/09/2022	26/09/2022	26/09/2022
		Sample Method	in situ	in situ	in situ	in situ	in situ	in situ
Parameter	Units	LOR	RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
Dissolved Oxygen	mg/L	-	2.1	0.71	4.9	1.5	1.9	1.6
Electrical Conductivity	µS/cm	-	134	231	77	142	250	191
pH	pH Unit	-	5.62	6.01	5.52	5.55	5.92	5.72
Redox Potential	mV	-	25	-41	9	-41	-71	-6
Standing Water Level	mTOC	-	38.92	38.41	29.62	29.01	53.43	54.32

		EPA Identification No	13	14	15	18	20	21
		Location	DWH14PRPUR03	DWH3PRUPS01	DWH3PRLPS02	BWD27PRORA01	BHN14PRORA01	BHN14PRUPS02
		Date	26/09/2022	25/09/2022	25/09/2022	27/09/2022	17/10/2022	17/10/2022
		Sample Method	in situ	in situ	in situ	No sample - dry	in situ	in situ
Parameter	Units	LOR	RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
Dissolved Oxygen	mg/L	-	0.7	1.79	0.9	-	1.27	0.92
Electrical Conductivity	µS/cm	-	718	140	130	-	506	482
pH	pH Unit	-	7.12	5.19	5.29	-	6.84	7.22
Redox Potential	mV	-	-130	-14	-40	-	-66	27
Standing Water Level	mTOC	-	53.43	67.71	67.63	-	26.36	15.15

		EPA Identification No	26	27	28	37	38	39
		Location	BWDMW12S	BWDMW12D	BWDMW12I	LWDMW1D	LWDMW1S	LWDMW1I
		Date	19/09/2022	19/09/2022	44823.375	44824.41667	20/09/2022	20/09/2022
		Sample Method	No sample - dry	in situ	No sample - dry	in situ	No sample - dry	No sample - dry
Parameter	Units	LOR	RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
Dissolved Oxygen	mg/L	-	-	2.98	-	0.97	-	-
Electrical Conductivity	µS/cm	-	-	5128	-	2199	-	-
pH	pH Unit	-	-	6.97	-	7	-	-
Redox Potential	mV	-	-	-6	-	-11	-	-
Standing Water Level	mTOC	-	-	30.93	-	29.81	-	-

		EPA Identification No	40	41	42	43	56	57
		Location	LWDMW2S	LWDMW2D	LWDMW3D	LWDMW3S	WPKMW9D	WPKMW9S
		Date	20/09/2022	20/09/2022	20/09/2022	44824.54167	18/09/2022	18/09/2022
		Sample Method	No sample - dry	in situ	in situ	No sample - dry	in situ	in situ
Parameter	Units	LOR	RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
Dissolved Oxygen	mg/L	-	-	0.71	0.9	-	0.38	0.94
Electrical Conductivity	µS/cm	-	-	2050	972	-	1225	3814
pH	pH Unit	-	-	7.03	6.5	-	8.29	7.64
Redox Potential	mV	-	-	-6	-95	-	-35	-72
Standing Water Level	mTOC	-	-	25.96	21.07	-	15.38	15.64

TABLE 2: GROUNDWATER QUALITY MONITORING (In situ - Quarterly)

		EPA Identification No	59	60	61	62	63	64
		Location	WPKMW13I	WPKMW13S	WPKMW14D	WPKMW14S	WPKMW15D	WPKMW15S
		Date	18/09/2022	18/09/2022	18/09/2022	18/09/2022	18/09/2022	18/09/2022
		Sample Method	in situ	in situ	in situ	No sample - dry	in situ	in situ
Parameter	Units	LOR	RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
Dissolved Oxygen	mg/L	-	0.31	0.33	0.61	-	0.72	0.81
Electrical Conductivity	µS/cm	-	1301	3199	1101	-	1299	8842
pH	pH Unit	-	7.92	7.21	7.83	-	8.01	7.9
Redox Potential	mV	-	-21	-54	-32	-	-38	-61
Standing Water Level	mTOC	-	16.82	16.99	20.94	-	22.19	22.41

		EPA Identification No	65	66	78	79
		Location	WPKMW16D	WPKMW16S	WPKMW18S	WPKMW18I
		Date	18/09/2022	18/09/2022	18/09/2022	18/09/2022
		Sample Method	in situ	No sample - dry	No sample - dry	in situ
Parameter	Units	LOR	RESULT	RESULT	RESULT	RESULT
Dissolved Oxygen	mg/L	-	0.31	-	-	0.87
Electrical Conductivity	µS/cm	-	1003	-	-	1218
pH	pH Unit	-	8.12	-	-	7.61
Redox Potential	mV	-	-54	-	-	-21
Standing Water Level	mTOC	-	16.82	-	-	16.03

TABLE 3: TREATED WATER QUALITY MONITORING

		EPA Identification No		77	77	77
		Location		LWWTPDM1	LWWTPDM1	LWWTPDM1
		Date		Aug-22	Sep-22	Oct-22
		Sample Method		No sample - plant not operating	No sample - plant not operating	No sample - plant not operating
Parameter	Units	LOR	RESULT	RESULT	RESULT	
Ammonia as N	mg/L	0.01	-	-	-	
Bicarbonate Alkalinity as CaCO3	mg/L	1	-	-	-	
Boron	mg/L	0.05	-	-	-	
Calcium	mg/L	1	-	-	-	
Carbonate Alkalinity as CaCO3	mg/L	1	-	-	-	
Chloride	mg/L	1	-	-	-	
Electrical Conductivity	µS/cm	-	-	-	-	
Fluoride	mg/L	0.1	-	-	-	
Magnesium	mg/L	1	-	-	-	
Nitrate as N	mg/L	0.01	-	-	-	
Nitrite as N	mg/L	0.01	-	-	-	
pH	pH Unit	-	-	-	-	
Potassium	mg/L	1	-	-	-	
Reactive Silica	mg/L	1	-	-	-	
Sodium Adsorption Ratio	-	0.01	-	-	-	
Sodium	mg/L	1	-	-	-	
Sulfate as SO4 2-	mg/L	1	-	-	-	
Total Alkalinity (as CaCO3)	mg/L	1	-	-	-	
Total Dissolved Solids @180°C	mg/L	10	-	-	-	
Total Hardness (as CaCO3)	mg/L	1	-	-	-	
Total Nitrogen (as N)	mg/L	0.5	-	-	-	
Total Phosphorus (as P)	mg/L	0.01	-	-	-	
Total Residual Chlorine	mg/L		-	-	-	
Turbidity	NTU	0.1	-	-	-	

TABLE 4: PRODUCED WATER STORAGE QUALITY MONITORING

		EPA Identification No	69	70	71	72	73	74	75
		Location	BWDPD2	BWDPD3	LWDPD1CELL4	LWDPD1CELL3	LWDPD1CELL2	LWDPD1CELL1	TFDPD1
		Date			20/09/2022	20/09/2022	20/09/2022	20/09/2022	19/09/2022
		Sample Method	No produced water	No produced water	Field Measurement Only	Field Measurement Only	Field Measurement Only	Field Measurement Only	Field Measurement Only
Parameter	Units	LOR	RESULT	RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
Aluminium	mg/L	0.1	-	-	-	-	-	-	-
Ammonia as N	mg/L	0.01	-	-	-	-	-	-	-
Arsenic	mg/L	0.01	-	-	-	-	-	-	-
Barium	mg/L	0.01	-	-	-	-	-	-	-
Beryllium	mg/L	0.01	-	-	-	-	-	-	-
Bicarbonate Alkalinity as CaCO3	mg/L	1	-	-	-	-	-	-	-
Boron	mg/L	0.1	-	-	-	-	-	-	-
Bromide	mg/L	0.01	-	-	-	-	-	-	-
Cadmium	mg/L	0.001	-	-	-	-	-	-	-
Calcium	mg/L	1	-	-	-	-	-	-	-
Carbonate Alkalinity as CaCO3	mg/L	1	-	-	-	-	-	-	-
Chloride	mg/L	1	-	-	-	-	-	-	-
Chromium	mg/L	0.01	-	-	-	-	-	-	-
Cobalt	mg/L	0.01	-	-	-	-	-	-	-
Copper	mg/L	0.01	-	-	-	-	-	-	-
Dissolved Oxygen	mg/L	-	-	-	4.2	4.5	3.4	4	4.77
Electrical Conductivity	µS/cm	-	-	-	55122	31048	66242	30738	5894
Iron	mg/L	0.1	-	-	-	-	-	-	-
Lead	mg/L	0.01	-	-	-	-	-	-	-
Magnesium	mg/L	1	-	-	-	-	-	-	-
Manganese	mg/L	0.01	-	-	-	-	-	-	-
Mercury	mg/L	0.001	-	-	-	-	-	-	-
Molybdenum	mg/L	0.01	-	-	-	-	-	-	-
Nickel	mg/L	0.01	-	-	-	-	-	-	-
Nitrate as N	mg/L	0.1	-	-	-	-	-	-	-
Nitrite as N	mg/L	0.01	-	-	-	-	-	-	-
pH	pH Unit	-	-	-	10.36	9.82	9.81	9.73	10.17
Potassium	mg/L	1	-	-	-	-	-	-	-
Redox potential	mV	-	-	-	31	37	36	45	51
Selenium	mg/L	0.1	-	-	-	-	-	-	-
Sodium Adsorption Ratio	-	0.1	-	-	-	-	-	-	-
Sodium	mg/L	1	-	-	-	-	-	-	-
Strontium	mg/L	0.01	-	-	-	-	-	-	-
Sulfate as SO4 2-	mg/L	1	-	-	-	-	-	-	-
Total Dissolved Solids @180°C	mg/L	10	-	-	-	-	-	-	-
Total Organic Carbon	mg/L	1	-	-	-	-	-	-	-
Total Phosphorus as P	mg/L	0.1	-	-	-	-	-	-	-
Uranium	mg/L	0.01	-	-	-	-	-	-	-
Vanadium	mg/L	0.1	-	-	-	-	-	-	-
Zinc	mg/L	0.05	-	-	-	-	-	-	-

TABLE 6: GROUNDWATER LEVEL MONITORING

EPA Identification No	44	45	46	47	48	49
Location	Dewhurst 8A-1 (DWH8AQGDGY01)	Dewhurst 8A-2 (DWH8AQGARK02)	Dewhurst 8A-3 (DWH8AQGPOR03)	Biblewindi 28A (BWD28QGUPS01)	Biblewindi 28B (BWD28QGLPS01)	Bilbbewindi 28C (BWD28QGPUR01)
Start Date	1/08/2022	1/08/2022	1/08/2022	1/08/2022	1/08/2022	1/08/2022
End Date	31/10/2022	31/10/2022	31/10/2022	31/10/2022	31/10/2022	31/10/2022
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	-37.046	16.406	-47.356	-	-	-
Mean of sample	-36.701	16.465	-46.752	-	-	-
Highest sample value	-36.383	16.538	-46.271	-	-	-

Note: Monitoring points 47,48 and 49: Sensor is recording pressure data in psi since 21 September 2022. Water Level not available.