

Lot 8 DP 804133 is located within the subsidence bowl of Longwalls 705, 706 and 707 (refer Figure 1). The property contains a dwelling, ancillary structures and a dam identified as E13d01 which is used for infrequent irrigation of vegetation on the property. The location of the dam is shown in Figure 1.

Appin Mine is currently mining Longwall 707 which commenced on 7<sup>th</sup> January 2016.

An inspection of the dam was undertaken on the 6th April 2016 by Illawarra Coal (IC) representatives in response to feedback from the landholder who had observed gas bubbling in the dam and lower dam water levels. The gas emission zone consists of four individual constant gas releases over an area approximately 4m<sup>2</sup>. Gas and water samples were taken at the time of the inspection, with lab testing confirming the presence of strata gas. This gas zone has been recorded as impact AA7\_LW707\_001 as shown in Figure 1.



**Photo 1:** Gas bubbling in dam as seen from edge of dam



**Photo 2:** Close up of main gas release.

Illawarra Coal installed a star picket to assist in determining any further water loss and will supply water to the property as and if required at the request of the landholder. Illawarra Coal will continue to work with the landholder to monitor any changes in the gas release.

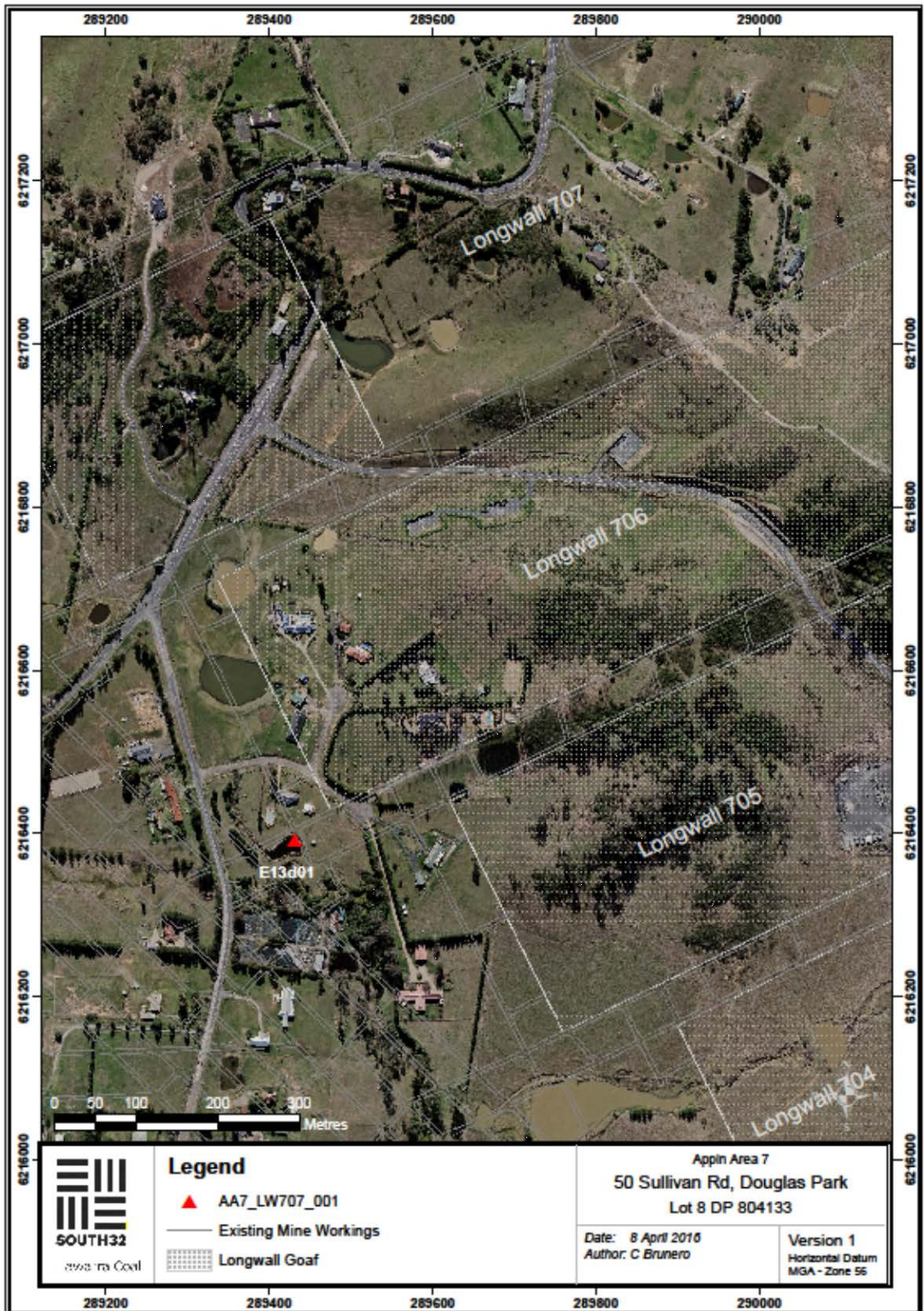


Figure 1: Location of property in relation to mining operations

Built Feature Management Plans (BFMPs) have been prepared by South32 Illawarra Coal for landholders potentially impacted by Appin Area 7 mining. Post-mining inspection of dams, boreholes and natural features set out by the BFMP are conducted by the Illawarra Coal Environmental Field Team (ICEFT) with the consent of the relevant property/infrastructure owner and tenant (if applicable). Baseline (pre-mining) property inspections have been prepared.

This report covers observations and field data gathered for relevant features on Lot 5 DP804133 after the commencement of mining Longwall 707. Additional inspections will be carried out by the ICEFT if required.

### **Pre-mining Inspection**

On the 11/10/13 a baseline inspection of Lot 5 DP804133 was undertaken (Figure 1). During this inspection one borehole was identified (GW102584). GW102584 was inspected and key observations are outlined in this report. In situ water quality parameters were collected from the bore. Water samples were also collected on the 11/10/13 with detailed chemical analysis carried out by Australian Laboratory Services (ALS).

### **Post-mining Inspection:**

On the 14/5/14 and 7/3/16 post-mining inspections of the property were undertaken for completion of Longwall 705 and Longwall 706 respectively (Figure 1). During these inspections GW102584 was inspected and observations recorded. In situ water quality parameters and water samples were collected from the borehole. Detailed chemical analysis of these water samples were carried out by ALS. These observations, water quality parameters and results from lab analysis are outlined in this report and compared to the baseline inspection.

### **Follow-up inspection:**

On the 22/4/16 a follow-up inspection was undertaken at the request of the landholder. The water in the holding tank had iron staining and there was a gas odour and bubbling sounds near the borehole. The borehole is located in a brick shelter (Photo 8). A gas detector did not detect any combustible gases in any location greater than 0.5m from the top of the borehole. Water samples were taken for chemical analysis.

### **Borehole GW102584**

**Location:** E289629, N6216459

**Borehole/Aquifer Properties:** GW102584 is located on the southern end of the property (Figure 1). The borehole was drilled October 1999 and is 186m deep.

**Purpose and Performance:** The borehole and pumping system are in a brick shelter. Water is extracted from the bore for domestic uses. A domestic irrigation system can be attached to the pumping system for the property. Water from the bore can also be stored in a tank which is located adjacent to the borehole. The stated bore yield is approximately 360L/hr. A reverse osmosis filtration system is located near the borehole, water from the bore can be filtered through this when desired. The reverse osmosis filtration system was not used when samples were collected.

**Water Properties:** Sampled water from the bore was noted as being effervescent but clear at the time of the baseline inspection (Photo 1), this effervescence was observed in the inspection carried out on the 7/3/16 but not on the 14/5/14. In situ water quality parameters and water samples were taken from an outlet pipe. The borehole was purged prior to samples being taken. It was noted that prior to the 7/3/16 inspection the bore had been operated for approximately 12 hours over the previous three months as the landholders were overseas (Photo 3).

On the follow-up inspection 22/4/16 no signs of iron staining or salinity were visible in the water directly from the borehole (Photo 5). The area surrounding the borehole had a strata gas odour and there was the sound of bubbling coming from within the borehole. A gas detector confirmed the presence of combustible gases directly above the collar of the borehole.

The holding tank showed evidence of iron staining compared to the post mining impact carried out on 7/3/16 (Photo 4 & 6). A sample of water in the tank was also taken for testing. The results of these analyses from baseline and post-mining inspections are included below (Tables 1 & 2 respectively). Results from the follow up inspection have not yet been received from the laboratory.

During this inspection the landholder stated that there was a second, inactive borehole (BH2) located on the property (Photo 7 & Figure 1). The cap to this borehole was removed and was giving off an odour, bubbling sound and low reading of combustible gas. The landholder stated that this borehole was not used.



Photo 1: Flow from outlet pipe and storage tank during baseline inspection. Photo taken on the 11/10/13.



Photo 2: Flow from outlet pipe and storage tank during post-mining inspection. Photo taken on the 14/05/14.



Photo 3: Collection of water from the bore after one hour of flushing. Photo taken on 7/3/16.



Photo 4: Collection of water from the holding tank with presence of orange film. Photo taken on 7/3/16.



Photo 5: Collection of water from the bore after 5 minutes of flushing. Photo taken on 22/4/16.



Photo 6: Collection of water from the holding tank with presence of orange film. Photo taken on 22/4/16.



Photo 7: Picture of second borehole located on follow up inspection on 22/4/16. Photo taken on 22/4/16.



Photo 8: Borehole located in brick shelter. Photo taken on 22/4/16.

Parameter	Borehole GW102584				Holding Tank	
	Baseline (11/10/13)	Post Mining Longwall 705 (14/5/14)	Post Mining Longwall 706 (7/3/16)	Follow up inspection (22/4/16)	Post Mining Longwall 706 (7/3/16)	Follow up inspection (22/4/16)
Temperature (°C)	20.06	15.62	19.61	19.00	21.17	18.59
Conductivity (µS/cm)	4040	4470	3590	3820	3560	3700
pH	6.72	7.29	6.63	6.89	6.89	7.01
ORP (mV)	444	327	120	110	161	238
Dissolved Oxygen (% sat.)	94.9	81.1	13.9	30.9	18.3	13.7

Table 1: Baseline, post-mining and follow up inspection results of field water quality parameters.

Analyte	GW102584 Baseline (12/10/13)	GW102584 Post Mining Longwall 705 (14/5/14)	GW102584 Post Mining Longwall 706 (7/3/16)	Holding Tank Post Mining Longwall 706 (7/3/16)
Sample Number	ES1322257	ES1410809	EW1600933001	EW1600933002
Total Dissolved Solids @ 180°C (TDS) (mg/L)	2300	1960	2060	2010
Suspended Solids (SS) (mg/L)	<5	<5	14	5
Hydroxide as CaCO <sub>3</sub> (mg/L)	<1	<1	<1	<1
Carbonate as CaCO <sub>3</sub> (mg/L)	<1	<1	<1	<1
Bicarbonate as CaCO <sub>3</sub> (mg/L)	651	823	728	685
Total Alkalinity as CaCO <sub>3</sub> (mg/L)	651	823	728	685
Sulfate as SO <sub>4</sub> <sup>2-</sup> (mg/L)	84	62	49	54

Chloride (mg/L)	856	777	777	767
Ca Filt (mg/L)	150	163	121	108
Mg Filt (mg/L)	148	152	139	143
Na Filt (mg/L)	450	430	457	476
K Filt (mg/L)	13	16	11	11
Al Filt (mg/L)	0.02	<0.01	<0.01	<0.01
As Filt (mg/L)	<0.001	<0.001	0.004	<0.001
Cu Filt (mg/L)	<0.001	<0.001	<0.001	<0.001
Pb Filt (mg/L)	<0.001	<0.001	<0.001	<0.001
Mn Filt(mg/L)	0.147	0.239	1.09	1.05
Ni Filt (mg/L)	0.002	0.002	0.003	0.003
Se Filt (mg/L)	<0.01	<0.01	<0.01	<0.01
Zn Filt (mg/L)	0.059	0.011	0.008	<0.005
Fe Filt (mg/L)	<0.05	0.57	6.56	1.29
Br Filt (mg/L)	2.1	2.0	2.0	2.0
I Filt (mg/L)	<0.1	<0.1	<0.1	<0.1
Al Tot (mg/L)	<0.01	0.11	0.02	<0.01
Mn Tot (mg/L)	0.151	0.252	1.07	1.12
Fe Tot (mg/L)	<0.05	0.92	7.26	1.75
Ammonia as N (mg/L)	0.35	0.60	0.26	0.17
Nitrite and Nitrate as N (mg/L)	0.05	<0.01	<0.01	<0.01
Total Kjeldahl Nitrogen as N (mg/L)	0.5	0.8	0.3	0.3
Total Phosphorus as P (mg/L)	<0.01	<0.01	0.02	0.02
Reactive Phosphorus as P (mg/L)	<0.01	<0.01	0.01	0.01
Total Anions (meq/L)	38.9	39.6	37.5	36.4
Total Cations (meq/L)	39.6	39.8	47.6	38.1
Ionic Balance (%)	0.84	0.12	0.19	2.26
DOC (mg/L)	9	4	2	2

Table 2: Comparison of water chemistry analysis for sample collected from bore GW102584. Results of laboratory analyses for 22/04/2016 not yet received.

The changes observed at borehole GW102584 have been recorded as impact AA9\_LW707\_002 (Figure 1). Illawarra Coal will continue to work with the landholder to monitor any further changes to the borehole and will supply water to the landholder if required. An Illawarra Coal representative advised the landholder to avoid using electrical equipment in the brick shelter where the borehole is located. Doors on the shelter were secured open to ensure good ventilation. During the inspection on 22/4/16 a gas detector did not record combustible gases in the shelter unless the detector was within 0.5m of the borehole.



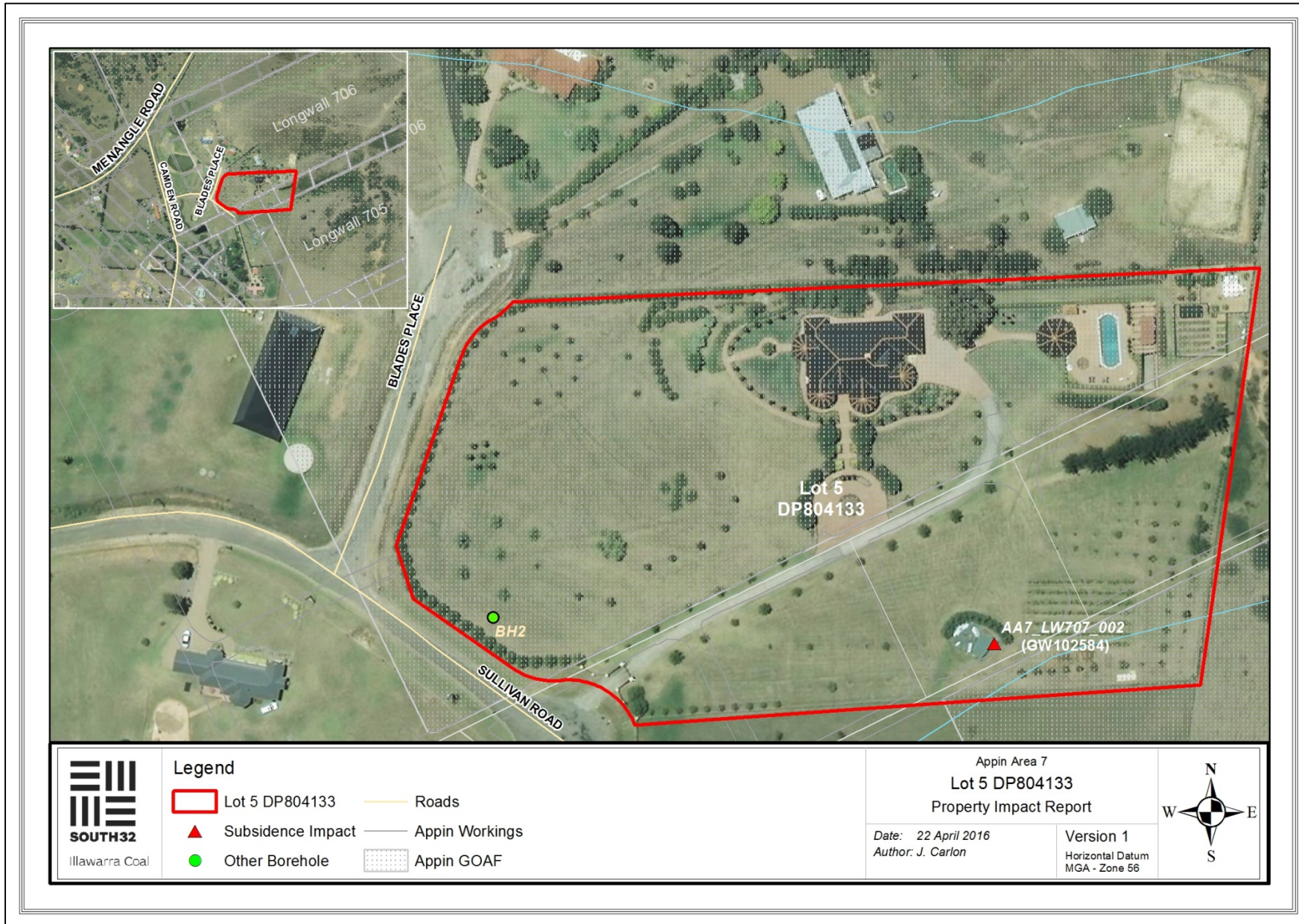


Figure 1: Map of Lot 5 DP804133 property in relation to Longwalls 705 and 706.

Built Feature Management Plans (BFMPs) have been prepared by South32 Illawarra Coal for landholders above Appin Area 7 Longwalls 702 to 710. Post-mining inspections of dams, boreholes and natural features set out by the BFMPs are conducted by the Illawarra Coal Environmental Field Team (ICEFT) with the consent of the relevant property/infrastructure owner and tenant (if applicable).

Previously a gas release, likely resulting from subsidence, was identified in the dam of Lot 8 DP804133. The details of the gas release can be found in Illawarra Coal Impact Report dated 8<sup>th</sup> April 2016. This post-mining impact report covers observations and field data gathered for relevant features on Lot 8 DP804133, namely dam E13d01

### Post-mining Inspection

A post-mining inspection of Lot 8 DP804133 was conducted by the ICEFT on the 16<sup>th</sup> May 2018.

#### Property Dam (E13d01)

The initial inspection on the 6<sup>th</sup> April 2016 revealed gas bubbling from the dam (Photo 1 and 2). During the post-mining inspection, no gas release was observed. Observations showed that the dam was at a relatively low level (Photo 3 and Photo 4). Water samples collected from the dam were dark in colour and turbid (Photo 5).

Table 1: Field water quality parameters collected on the 6<sup>th</sup> April 2016 and 16<sup>th</sup> May 2018.

Parameter	Property Dam E13d01 6 <sup>th</sup> April 2016	Property Dam E13d01 16 <sup>th</sup> May 2018
Temperature (°C)	23.86	16.42
Conductivity (µS/cm)	700	1190
pH	7.64	8.41
ORP (mV)	347	174
Dissolved Oxygen (% sat.)	53.4	71.3

Table 2: Results of water chemistry analyses for water samples collected on the 6<sup>th</sup> April 2016 and the 16<sup>th</sup> May 2018. \* Note: The sample collected on the 6<sup>th</sup> April 2016 was a gas sample used to determine the composition of the gas release; the sample taken on the 16<sup>th</sup> May 2018 was a water sample used to determine the concentration of methane in the dam water. Therefore not all analytes from these two dates are comparable.

Analyte (mg/L unless stated)	Property Dam E13d01 6 <sup>th</sup> April 2016	Property Dam E13d01 16 <sup>th</sup> May 2018
Dissolved Arsenic	<0.001	0.002
Dissolved Copper	<0.001	<0.001
Dissolved Iron	<0.001	0.1
Dissolved Lead	<0.001	<0.001
Dissolved Nickel	<0.001	0.002
Dissolved Sulfate as SO <sub>4</sub> 2-	3	-

<b>Analyte (mg/L unless stated)</b>	<b>Property Dam E13d01 6<sup>th</sup> April 2016</b>	<b>Property Dam E13d01 16<sup>th</sup> May 2018</b>
Dissolved Zinc	<0.005	<0.005
Electrical Conductivity @ 25° C (µs/cm)	634	-
pH Value (pH Unit)	7.8	-
Suspended Solids	10	-
Total Aluminium	0.12	2.06
Total Dissolved Solids @180° C	412	-
Total Iron	0.4	4.76
Total Manganese	0.239	0.712
Methane*	-	52
Ethane*	-	<10



*Photo 1: E13d01, gas bubbling from dam. Taken 6th April 2016.*



*Photo 2: E13d01, close up of gas bubbling. Taken 6th April 2016.*



*Photo 3: E13d01, looking south-east. Taken 16th May 2018.*



*Photo 4: E13d01, looking south-west. Taken 16th May 2018.*



*Photo 5: Water sample from E13d01. Taken 16th May 2018.*

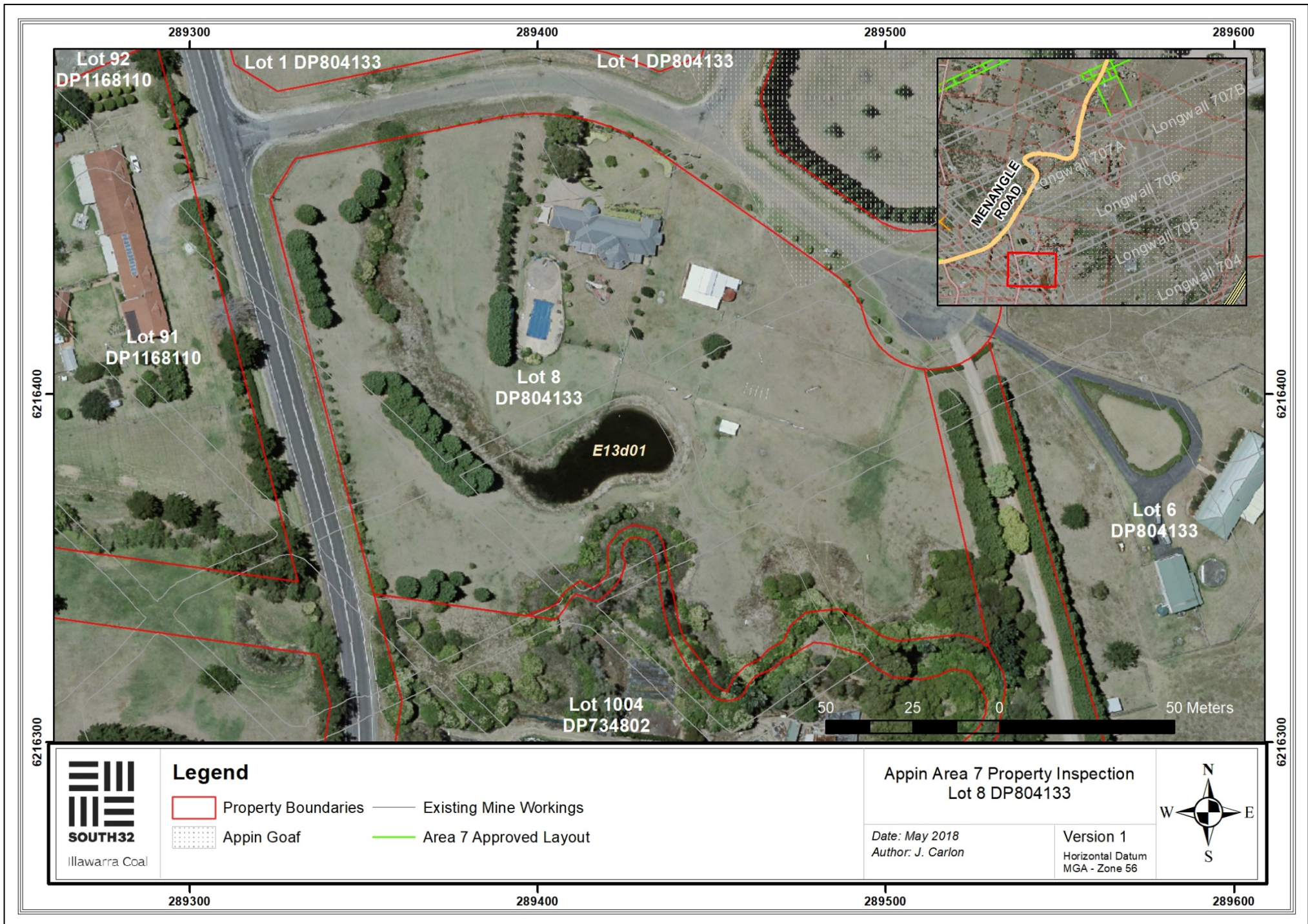


Figure 1: Location of property in relation to mining operations.

Built Feature Management Plans (BFMPs) have been prepared by South32 Illawarra Coal for landholders above Appin Area 7 and 9. Inspections and reports of dams, boreholes and natural features set out by the BFMPs are conducted by the Illawarra Coal Environmental Field Team (ICEFT) with the consent of the relevant property/infrastructure owner and tenant (if applicable).

This report includes observations and field data gathered for relevant features on Lot 9 DP810978, namely the private borehole GW104602. Additional inspections may be conducted by Illawarra Coal at the request of the landowner and/or if required by the triggers in the Subsidence Management Plan (SMP). GW104602 is located approximately 400 m from the Appin Longwall 707.

## **Post-mining Inspection**

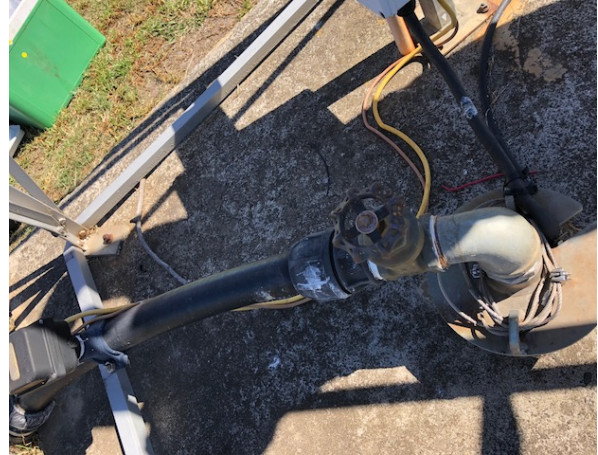
### **Borehole GW104602 (289029 E, 6216307 N)**

Borehole GW104602 has a drilled depth of 231 m, with the pump set at 130 m depth. The landholder advised that the borehole is used for approximately 30 – 90 mins per day; the water is predominantly used for the garden and lawn via an underground sprinkler system. The landholder advised that approximately 6 – 8 months prior to the inspection a decrease in borehole pressure and yield was observed (approximately 60 – 180 mins pumping reduced to approximately 30 mins).

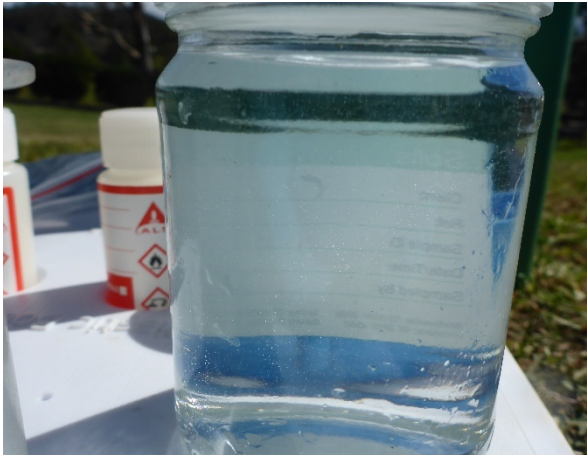
Water samples were collected from GW104602 via the pump (Photo 1 and Photo 2). There were no observable indicators of iron precipitate or hydrogen sulfide during sampling. (Photo 3). The water was noticeably effervescent during sampling (Photo 4).



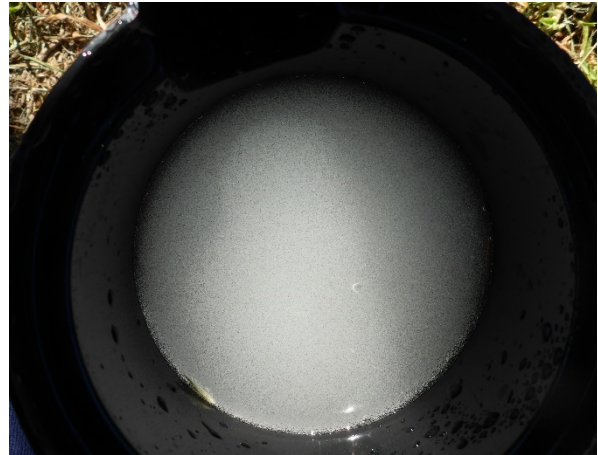
*Photo 1: Water pressure from pump. Taken on 16/04/2018.*



*Photo 2: Closeup of borehole GW104602. Taken on 16/04/2018.*



*Photo 3: Closeup of water sample taken from the borehole via the pump. Taken on 16/04/2018.*



*Photo 4: Closeup of water sample taken from borehole via the pump. The effervescent nature of the water is exhibited. Taken on 16/04/2018.*

Table 1: Water quality parameters of water sample collected from GW104602 on the 16<sup>th</sup> April 2018; measured using a Horiba water quality probe.

Parameter	Value
Temperature (°C)	23.12
Electrical Conductivity (µs/cm)	1830
pH	7.28
Dissolved Oxygen (%)	56.9
Converted ORP (mV)	360

Table 2: Results of chemical analyses for water samples collected from GW104602 on the 16<sup>th</sup> April 2018.

Analytes (mg/L unless stated)	Result
Dissolved Arsenic	<0.001
Dissolved Copper	<0.001
Dissolved Iron	0.1
Dissolved Lead	<0.001
Dissolved Nickel	<0.001
Dissolved Sulfate as SO <sub>4</sub> <sup>2-</sup>	8
Dissolved Zinc	<0.005
Electrical Conductivity @ 25° C (µs/cm)	1700
pH Value (pH Unit)	7.79
Suspended Solids	<5
Total Aluminium	<0.01
Total Dissolved Solids @180° C	954
Total Iron	0.14
Total Manganese	0.048



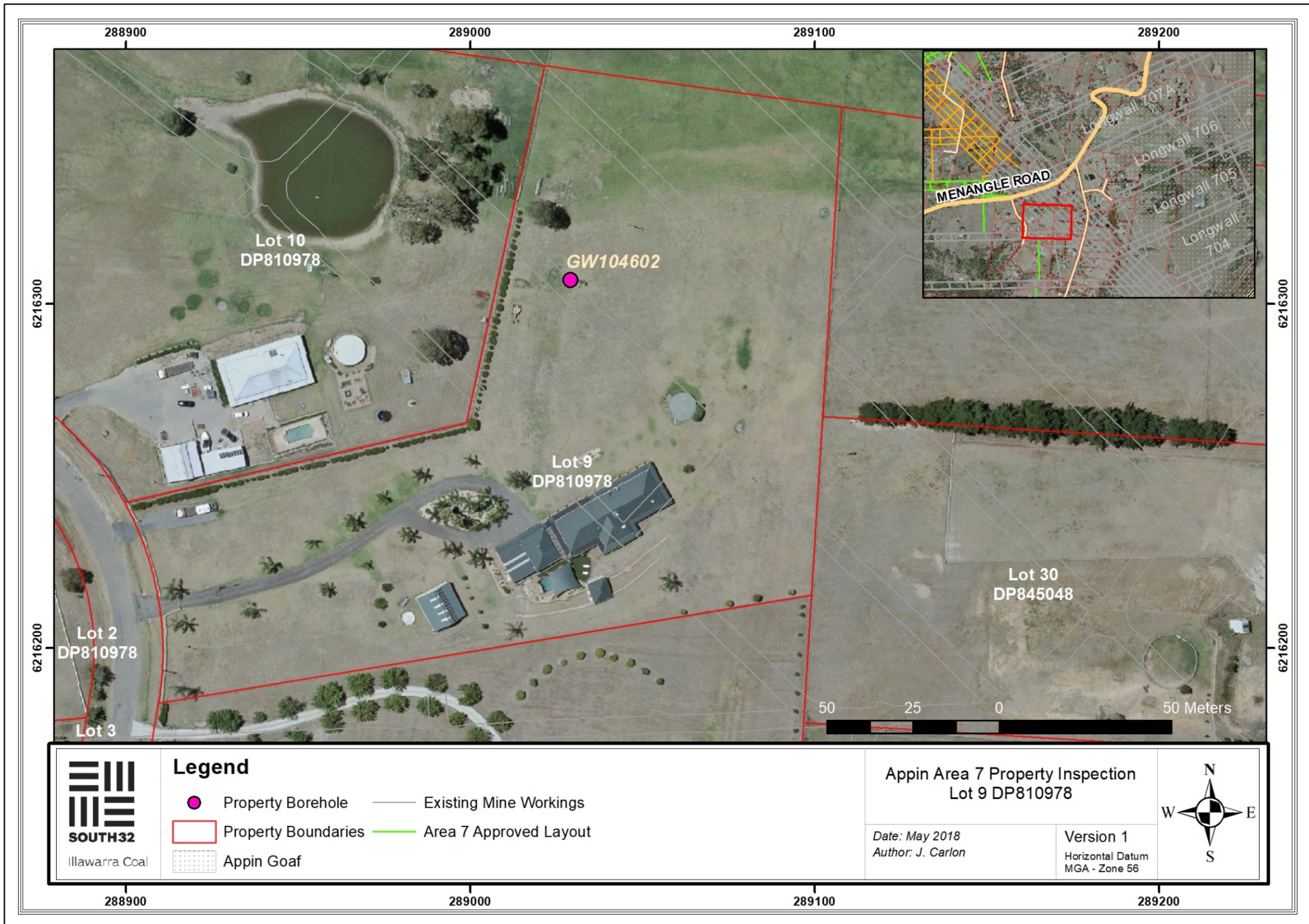


Figure 1: Map showing GW104602 in relation to Appin mining operations.

Built Feature Management Plans (BFMPs) have been prepared by South32 Illawarra Coal for all landholders for the Appin Longwall 707. Inspections of built features are conducted with the consent of the relevant property/infrastructure owner and any tenant (if applicable). Inspections of dams and boreholes are conducted by the Illawarra Coal Environmental Field Team (ICEFT).

This post-mining impact report includes observations and field data collected for relevant features on Lot 16 DP251063 following extraction of Longwall 707. Additional inspections may be conducted at the request of the landowner upon observations of events possibly linked to subsidence, or if required by the various triggers in the Subsidence Management Plan (SMP).

### Pre-mining Inspection

On the 23<sup>rd</sup> of August 2017, a pre-mining inspection of Lot 16 DP251063 was undertaken. A single borehole was identified (GW105534), as was dam. Observations were recorded and water samples were collected.

### Post-mining Inspection

A post-mining inspection of Lot 16 DP251063 was conducted by the ICEFT on the 25<sup>th</sup> July 2018. The borehole and dam were inspected to identify any potential changes due to mining. No observable changes were identified.

### Borehole GW105534

**Location:** E288637, N6217300

**Borehole/Aquifer Properties:** Borehole GW105534 is located on the eastern side of the property (Figure 1). The outlet from the borehole pipe is located 20m from the borehole, and flows into the dam. The borehole is 207m deep and was drilled in 2003. On the 23<sup>rd</sup> of August 2017 a pre-mining inspection was completed on the property and field water quality was measured and samples were taken for laboratory analysis. On the 25<sup>th</sup> of July 2018 a Longwall 707 post-mining inspection was completed on the property with measurements of field parameters and samples being taken.

**Bore Pumping Purpose and Performance:** The landholder advised that water is extracted from the borehole once per fortnight for all main domestic uses (Photo 1). The water is transferred by pipes into multiple storage tanks on the property. The water is also used to irrigate the property, which includes supplying the drinking and cleaning water for dog kennels, and providing water to the dam that houses freshwater Silver Perch, also located on the property (Photo 2).

**Water properties:** No signs of iron or salinity staining were observed in the water, or around the borehole outlet during the pre-mining and post-mining inspections (Photo 1 to 6). A strong sulphide odour was present around the borehole outlet during the pre-mining inspection while it was dispelling water however this dissipated after approximately 10 minutes of use. No odour was present during the post-mining inspection. In situ water quality parameters and water samples were taken after the water was purged through the pump for approximately 5 minutes during both pre-mining and post-mining inspections (Photo 3 and 4; Table 1). Samples were also taken from the property dam during both inspections (Table 1). Samples were sent to ALS for laboratory for analysis with results included below (Table 2). No signs of subsidence impacts were observed in the dam wall during the post-mining inspection (Photo 7 and 8).



**Photo 1:** Borehole GW105534 and pump. Taken on 23<sup>rd</sup> Aug 2017.



**Photo 2:** Main property dam where GW105534 outlet flows into. Taken on 23<sup>rd</sup> Aug 2017.



**Photo 3:** GW105534 outlet discharge. Taken 23<sup>rd</sup> Aug 2017.



**Photo 4:** GW105534 outlet discharge. Taken 25<sup>th</sup> July 2018.



**Photo 5:** Water collected and sampled from GW105534. Taken 23<sup>rd</sup> Aug 2017.



**Photo 6:** Water collected and sampled from GW105534. Taken 25<sup>th</sup> July 2018.



**Photo 7:** Image of Dam Wall. Taken at 010 degrees on the 23<sup>rd</sup> Aug 2017.



**Photo 8:** Image of Dam Wall. Taken at 260 degrees on the 25<sup>th</sup> July 2018.

**Table 1:** Field water quality parameters taken during the pre-mining inspection on the 23<sup>rd</sup> of August 2017 and the post-mining inspection on the 25<sup>th</sup> of July 2018 from borehole GW105534 and property dam.

Parameter	GW105534		Dam	
	Pre-Mining	Post-Mining	Pre-Mining	Post-Mining
Mining Status				
Temperature (°C)	19.75	20.84	12.77	8.01
DO (% sat)	64.6	35.8	84.4	88.7
SpC (us/cm)	3530	2460	2100	2320
pH	6.90	7.15	8.09	8.31
Converted ORP (mV)	109.66	134.91	256.56	204.89

**Table 2:** Results of water chemistry analysis for samples collected during the pre-mining inspection on the 23<sup>rd</sup> of August 2017 and the post-mining inspection on the 25<sup>th</sup> of July 2018 from borehole GW105534 and property dam.

Analyte (mg/L unless stated)	GW105534		Dam	
	Pre-Mining	Post-Mining	Pre-Mining	Post-Mining
Dissolved Copper	<0.001	<0.001	<0.001	<0.001
Dissolved Iron	-	1.18	-	<0.05
Dissolved Manganese	-	0.014	-	<0.001
Dissolved Nickel	<0.001	<0.001	<0.001	<0.001
Dissolved Sulphate as SO <sub>4</sub> 2-	25	38	19	24
Dissolved Zinc	<0.005	<0.005	<0.005	<0.005
Electrical Conductivity @ 25 C (µs/cm)	3170	2530	1980	2280
pH Value (Ph Unit)	7.47	7.84	7.98	8.28
Total Aluminium	0.02	<0.01	0.05	0.08
Total Iron	1.15	1.52	<0.05	0.05
Total Manganese	0.012	0.015	0.006	0.003

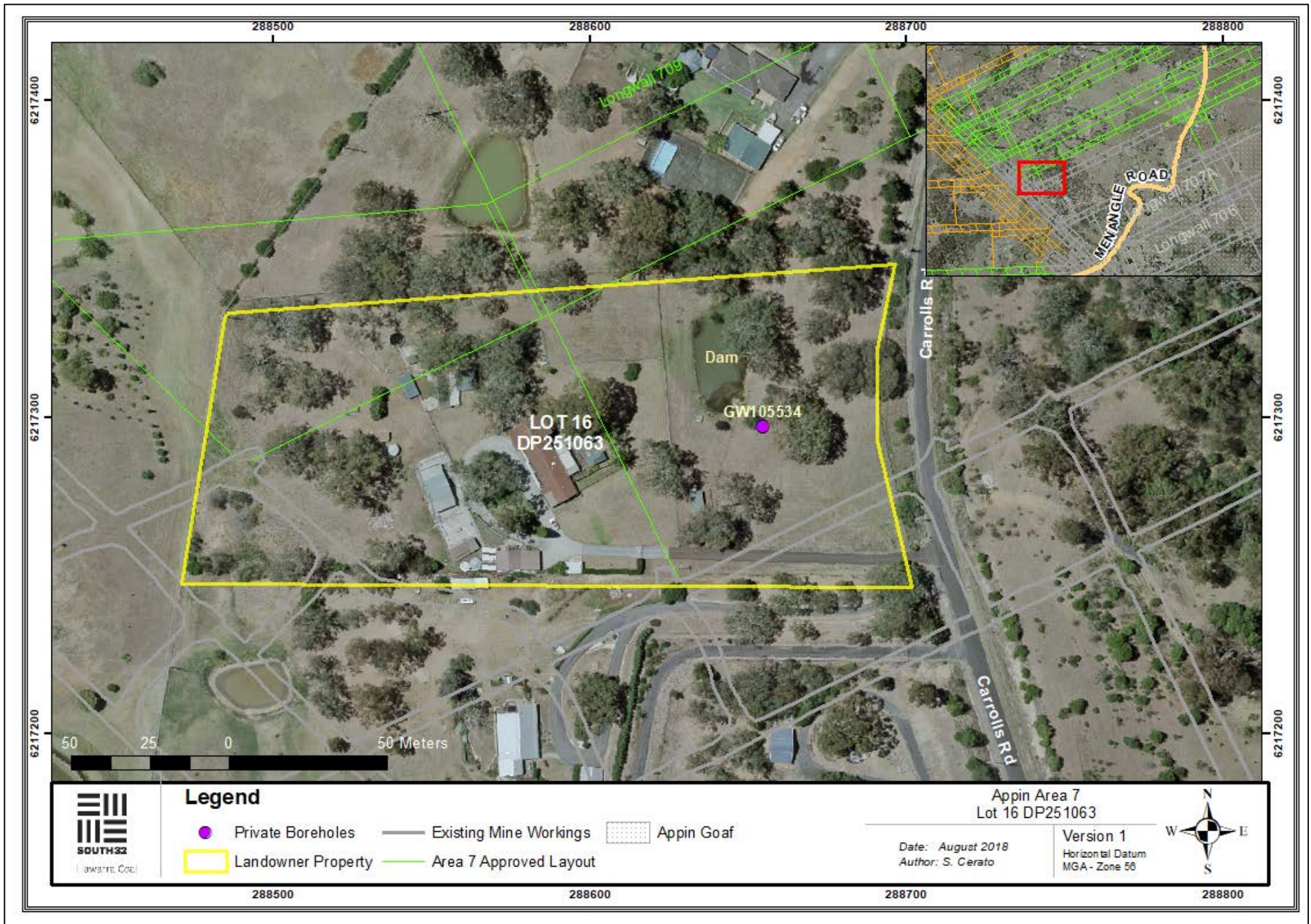


Figure 1: Map showing location of inspected borehole GW105534 and dam on Lot16 DP 251063.

# Longwall 707 Post-Mining Property Inspection

Lot 73 DP883462

25<sup>th</sup> July 2018



Built Feature Management Plans (BFMPs) have been prepared by South32 Illawarra Coal for landholders above Appin Area 7 Longwalls 702 to 710. Post-mining inspections of dams and boreholes set out by the BFMPs are conducted by the Illawarra Coal Environmental Field Team (ICEFT) with the consent of the relevant property/infrastructure owner and tenant (if applicable).

This post-mining impact report includes observations and field data gathered for relevant features on Lot 73 DP883462, including borehole GW105376 and the property dam. Additional inspections may be conducted by Illawarra Coal at the request of the landowner and/or if required by the various triggers in the Subsidence Management Plan (SMP).

## **Pre-mining Inspection**

On the 19<sup>th</sup> of February 2018 pre-mining inspection of the property Lot 73 DP883462 was conducted by ICEFT. Borehole GW105376 and property dam were inspected and key observations recorded. Samples were also taken for laboratory analysis.

## **Post-mining Inspection**

A post-mining inspection of Lot 73 DP883462 was conducted by the ICEFT on the 25<sup>th</sup> July 2018. The borehole and dam were inspected to compare key observations and water chemistry results to those found in the pre-mining inspection.

## **Private Borehole (GW105376)**

**Location:** E289486, N6218358

**Borehole/Aquifer Properties:** The borehole is located adjacent to the residence and is pumped around the property by several pipes (Figure 1 and Photo 1). The landholder has advised that the borehole was drilled in 2002 to a depth of 218m and had a standing water level of 76m following installation. On the 19<sup>th</sup> of February 2018 a pre-mining inspection was completed and field water parameters and water samples were taken for laboratory analysis. On the 25<sup>th</sup> of July 2018 a post-mining inspection was completed and field water parameters and samples were taken.



**Bore Pumping Purpose and Performance:** Water is extracted from the borehole consistently on a daily basis. The landowner has advised that on occasion when day-time temperatures are high, the borehole is used only at night. Water is extracted from the bore multiple uses, including landcare, dam water supply, and care of horses also kept on the property. The pressure of the borehole has been advised to remain consistent and has been since establishment. Water from the bore was allowed to purge for 5 - 10 minutes before water quality measurements, samples and observations were taken during both pre-mining and post-mining inspections (Photo 2).

**Water Properties:** No signs of iron, salinity staining or gas were observed in the water or around the borehole, however, the landowner has advised that iron is present in the water. Water quality parameters were measured in-situ and water samples were taken for laboratory analysis during both pre-mining and post-mining inspections (Table 1 and Table 2).

### Property Dam

The dam is located to the northeast of the residence (Figure 1, Photo 3 and 4), and is routinely supplied with water from the borehole. During the pre-mining inspection the landholder advised that the dam was relatively low. Soil cracking was found around the extent of the dam and on the dam during the pre-mining inspection (Photo 5), with major soil cracking also found on the walls of the dam. No observable changes were found in the soil cracking during the post-mining inspection (Photo 4). Water quality parameters were measured in-situ and water samples were also taken from the dam located on the property during both inspections.

*Table 1: Field water quality parameters collected on the 19<sup>th</sup> of Feb 2018 and 25<sup>th</sup> of July 2018 for GW105376 and dam. Note- pre-mining conductivity readings were removed from table following comparison with laboratory conductivity for the same date (19/02/2017). It is likely that the instrument was reading incorrectly. Post-mining conductivity parameters appear consistent with those from the laboratory.*

Parameter	GW105376		Property Dam		
	Mining Status	Pre-Mining	Post-Mining	Pre-Mining	Post-Mining
Temperature (°C)		21.97	16.52	25.52	12.72
Conductivity (µS/cm)		-	3070	-	2500
pH		7.15	7.20	7.47	8.33
ORP (mV)		291	179	184	270
Dissolved Oxygen (% sat.)		63.0	32.0	38.2	95.3

Table 2: Results of water chemistry analyses for water samples collected on the 19<sup>th</sup> of February 2018 and 25<sup>th</sup> of July 2018.

Analyte (mg/L unless stated)	GW105376		Property Dam		
	Mining Status	Pre-Mining	Post-Mining	Pre-Mining	Post-Mining
Dissolved Arsenic		<0.001	<0.001	0.002	0.001
Dissolved Copper		0.005	<0.001	0.003	<0.001
Dissolved Iron		0.07	0.37	<0.05	<0.05
Dissolved Lead		<0.001	<0.001	<0.001	<0.001
Dissolved Manganese		0.031	0.02	0.2	0.018
Dissolved Nickel		<0.001	<0.001	0.002	0.001
Dissolved Sulfate as SO <sub>4</sub> <sup>2-</sup>		13	17	9	21
Dissolved Zinc		0.008	<0.005	<0.005	<0.005
Electrical Conductivity @ 25° C (µs/cm)		2280	3070	1950	2470
pH Value (pH Unit)		7.87	7.66	8.05	8.32
Suspended Solids		8	-	114	-
Total Aluminium		<0.01	0.02	2.5	0.25
Total Dissolved Solids @180° C		1100	-	985	-
Total Iron		0.13	0.39	5.24	0.97
Total Manganese		0.03	0.023	0.248	0.079



**Photo 1:** Borehole GW105376 location. Taken on 19<sup>th</sup> Feb 2018.



**Photo 2:** Borehole outlet purging during post-mining inspection. Taken on 25<sup>th</sup> July 2018.



**Photo 3:** Dam located east of the residence during pre-mining inspection. Taken on 19<sup>th</sup> Feb 2018.



**Photo 4:** Dam during post-mining inspection. Taken on 25<sup>th</sup> July 2018.



**Photo 5:** Soil cracking present around extent of dam edges observed during pre-mining inspection. Taken on 19<sup>th</sup> Feb 2018.



**Photo 6:** Soil cracking observed around dam during post-mining inspection. Taken 25<sup>th</sup> July 2018.



**Photo 7:** Water collected and sampled from GW105376 during pre-mining inspection. Taken on 19<sup>th</sup> Feb 2018.



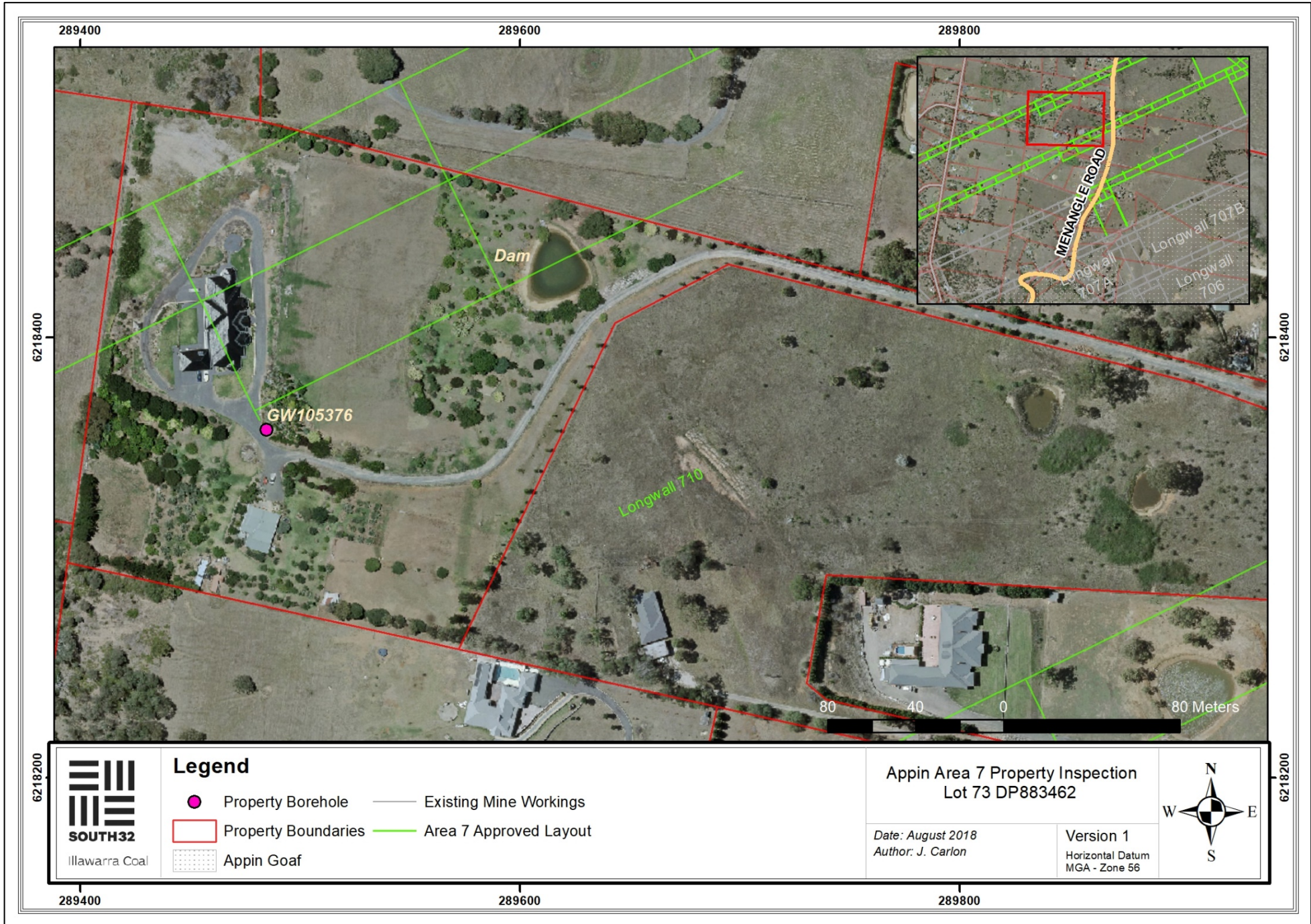
**Photo 8:** Water collected and sampled from GW105376 during post-mining inspection. Taken on 25<sup>th</sup> July 2018.



**Photo 9:** Image of dam wall during post-mining inspection, looking southeast. Taken on 25<sup>th</sup> July 2018.



**Photo 10:** Image of dam wall during post-mining inspection, looking northwest. Taken on 25<sup>th</sup> July 2018.



Built Feature Management Plans (BFMPs) have been prepared by South32 Illawarra Coal for landholders above Appin Area 7 (AA7) Longwalls 705 to 710. Post-mining inspection of dams and boreholes set out by the BFMPs are conducted by the Illawarra Coal Environmental Field Team (ICEFT) with the consent of the relevant property/infrastructure owner or tenant (if applicable).

This post-mining report includes observations and field data gathered for Lot 900 DP1072947 following completion of Longwall 707. Additional inspections may be undertaken by Illawarra Coal at the request of the landowner and/or if required by the various triggers in the Subsidence Management Plan (SMP).

### Pre-mining Inspection

On the 22<sup>nd</sup> of February 2018, a pre-mining inspection of the property Lot 900 DP1072947 was undertaken. The one borehole on the property was identified and inspected. During this inspection water quality was measured using the water in the trough (Photo 1). Water samples were collected from water that was pumped directly from the bore into a glass container (Photo 2).



Photo 1: Photo of GW101986 and pump, taken 22/2/2018.



Photo 2: Photo of water sample taken from GW101986, taken 22/2/2018.

### Post-mining Inspection

A post-mining inspection of Lot 900 DP1072947 was conducted by the ICEFT on the 6th August 2018. The borehole was inspected to compare key observations and water chemistry results to the results found in the pre-mining inspection. Water that was pumped directly from the bore into a bucket was used to measure water quality and to collect water samples during this inspection (Photo 4). No observable changes to the borehole were identified.



Photo 3: Photo of GW101986 and pump, taken 6/8/2018.



Photo 4: Photo of water sample taken from GW101986, taken 6/8/2018.

### **Property Borehole (GW101986)**

**Location:** E288261, N6217360

**Borehole/Aquifer Properties:** The borehole is located approximately 200 metres northeast of the residence (Figure 1). The borehole was drilled to a depth of 210m and was completed on 20<sup>th</sup> of February 1998. On the 22<sup>nd</sup> of February 2018 a pre-mining inspection was completed on the property and field water quality was measured and samples were taken for laboratory analysis. On the 6<sup>th</sup> of August 2018 a post-mining inspection was completed on the property and field water quality was measured and samples taken.

**Bore Pumping Purpose and Performance:** According to the landholder, the borehole is pumped three times per day, for approximately 40 mins per pumping session. Each pumping session supplies approximately 400L, thus, providing approximately 1200 L per day. The landowner stated that there has been no observed changes in bore pumping performance following the completion of Longwall 707. Water from the bore was allowed to purge for 5-10 minutes before water quality measurements, samples and observations were taken on both pre-mining and post-mining inspection days..

**Water Properties:** No signs of iron, salinity staining or gas were observed in the water, around the borehole or around the outlet. Field water quality parameters for pre-mining and post-mining are included below in Table 1. Samples were sent to ALS for laboratory analysis and the results for pre-mining and post-mining are included below in Table 2.

Table 1: Water quality parameters measured using Horiba water quality probe on the 22/2/2018 and the 6/8/2018.

Parameter	Pre-mining	Post-mining
Temperature (°C)	21.35	17.73
Electrical Conductivity (µs/cm)	1518	3780
pH	8.25	6.99
Dissolved Oxygen (%)	51.0	55.9
Converted ORP (mV)	288.56	204.09

Table 2: Results of water chemistry analyses for water samples collected from GW101986 on the 22/2/2018 and the 6/8/2018.

Analytes (mg/L unless stated)	Pre-mining	Post-mining
Dissolved Arsenic	<0.001	-
Dissolved Copper	0.001	<0.001
Dissolved Iron	0.14	0.72
Dissolved Lead	<0.001	-
Dissolved Nickel	<0.001	<0.001
Dissolved Sulfate as SO <sub>4</sub> <sup>2-</sup>	47	28
Dissolved Zinc	0.011	0.008
Electrical Conductivity @ 25° C (µs/cm)	5650	3570
pH Value (pH Unit)	7.76	7.34
Suspended Solids	28	8
Total Aluminium	<0.01	<0.01
Total Dissolved Solids @ 180° C	2900	1900
Total Iron	0.29	0.82
Total Manganese	0.007	0.006



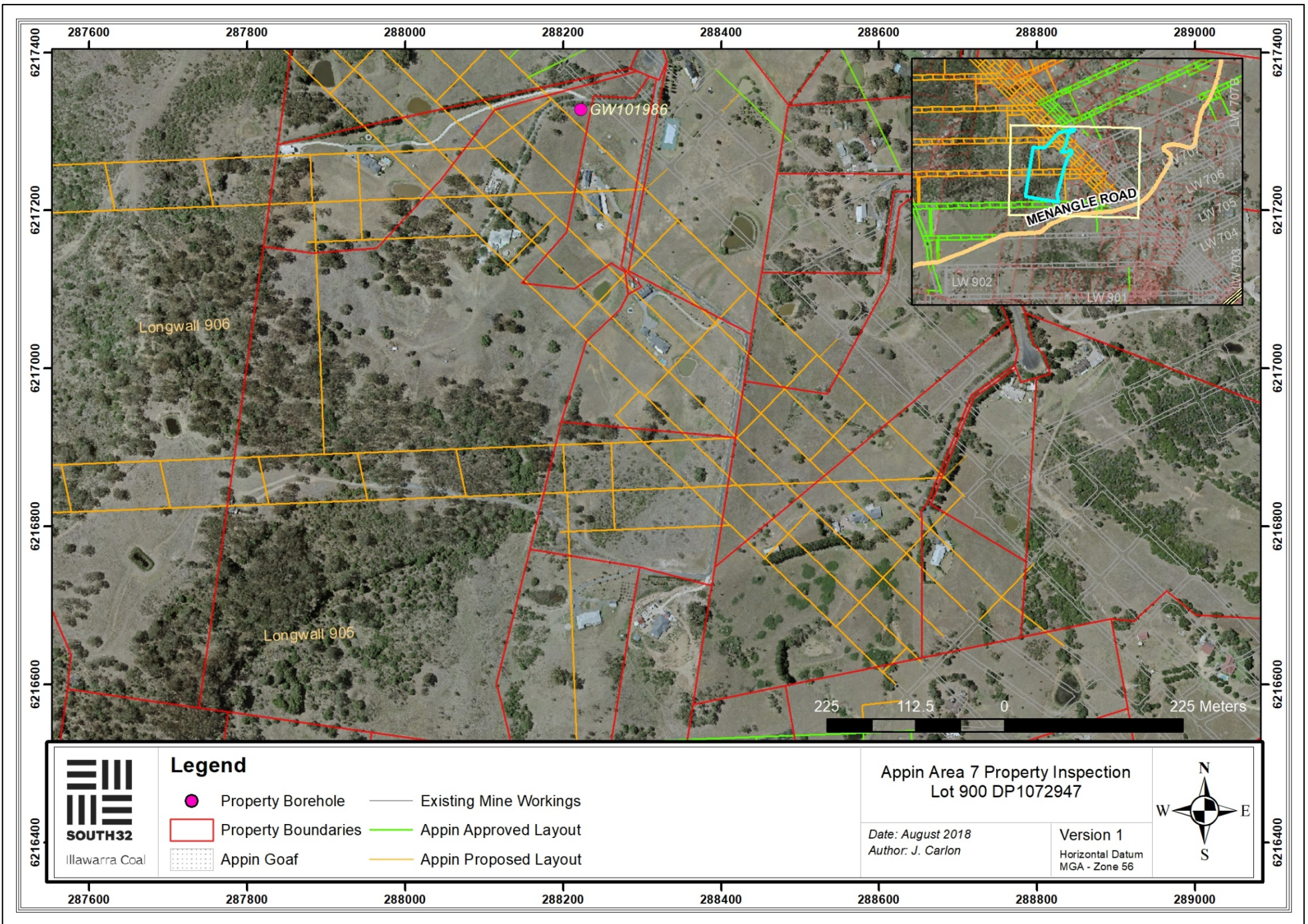


Figure 1: Map showing property and borehole GW101986 in relation to Appin mine plan.