

Built Feature Management Plans (BFMPs) have been prepared by South32 Illawarra Metallurgical Coal (IMC) for landholders above Appin Area 9 Longwalls 901 to 904. Both pre- and post-mining inspections and reports of dams, boreholes and natural features set out by the BFMPs are conducted by the Illawarra Coal Environmental Field Team (IMCEFT) with the consent of the relevant property/infrastructure owner and tenant (where applicable).

This report includes both pre- and post-mining observations and data gathered for relevant features on Lot 1 DP810978, particularly the registered borehole GW110671. Additional inspections may be conducted at the request of the landowner or if required by various triggers in the Extraction Plan (EP). Borehole GW110671 is located approximately 50m east of Longwall 904 (Figure 1).

### **Pre-mining Inspection**

On 15 November 2017, a pre-mining inspection of Lot 1 DP810978 was undertaken. Borehole GW110671 (Photo 1) and a small dam (Photo 4) were inspected. Field observations of the dam were recorded. Water samples were collected from borehole GW110671 and sent to Australian Laboratory Services (ALS) for analysis.

### **Longwall 903 Post-mining Inspection**

On 25 May 2021, a post-mining inspection of Lot 1 DP810978 was undertaken. Borehole GW110671 was inspected (Photo 5), water samples collected, and key observations and field parameters recorded. The dam was inspected (Photo 8) with key observations recorded.

### **Longwall 904 Post-mining Inspection**

On 26 August 2022, a post-mining inspection of property Lot 1 DP810978 was undertaken. Borehole GW110671 was inspected (Photo 9), water samples collected, and key observations and field parameters recorded. The dam was also inspected (Photo 12) with any key observations recorded.

## **Borehole GW110671**

**Location:** 288717 E, 6216340 N

### **Borehole Properties:**

Borehole GW110671 is located approximately 50m east of Longwall 904 (Figure 1). According to the NSW Office of Water Work Summary Report, the borehole was installed on 22 February 2010 and drilled to a depth of 240m. On this date, the standing water level was measured 82m below ground level. During the Longwall 903 post-mining inspection on 25 May 2021 the standing water level was measured to be 69.91m below ground level. During the most recent inspection for Longwall 904 on 26 August 2022 the standing water level was unable to be measured due to pumping equipment obstructing the borehole (Photo 9). The piezometer was downloaded which records groundwater data. Further analysis will be included in the Longwall 904 End of Panel Report.

### **Bore Pumping Purpose and Performance:**

The landholder advised that the borehole is mainly used for watering the lawn and garden. During the Longwall 904 post-mining inspection the landholder advised that the use of the borehole and pump was limited recently due to high rainfall.

### **Water Properties:**

Water samples were initially collected from the borehole on 27 November 2017 and were analysed at ALS laboratory. The borehole was purged for approximately 10 minutes before water samples were collected and field parameters recorded. Results are presented in Table 1 and Table 2, respectively.

During the Longwall 903 post-mining inspection, an odour, likened to hydrogen sulphide, was noted when the bore pump was turned on (Photo 7). The bore was purged for 10 minutes then water samples and field parameters were collected (Photo 6). Results are presented in Table 1 and Table 2, respectively.

During the Longwall 904 post-mining inspection, an odour, likened to hydrogen sulphide, was noted when the bore pump was turned on (Photo 11). The bore was purged for 10 minutes then water samples and field parameters were collected (Photo 10). Results are presented in Table 1 and Table 2, respectively. The water from the bore pump had a slight brown colouration (Photo 10).

### **Dam**

The dam is located towards the north-eastern corner of the property (Figure 1). Observations on 15 November 2017 show that the dam level was relatively low and the water in the dam was considerably turbid (Photo 4).

During the Longwall 903 post-mining inspection on 25 May 2021, the dam level was close to full. The water in the dam was discoloured (dark brown/grey) and turbid. The dam walls were in good condition, with no signs of leaks or slumping (Photo 8).

During the Longwall 904 post-mining inspection on 26 August 2022, the dam level was full. The water in the dam was discoloured (dark brown/grey) and turbid. The dam walls remain in good condition, with no signs of leaks or slumping (Photo 12).

Table 1: Results of chemical analysis for water samples collected on 15 November 2017, 25 May 2021 and 26 August 2022, from borehole GW110671.

| Analyte                                 | Units            | Pre-mining<br>15 November 2017 | Post-mining<br>25 May 2021 | Post-mining 26<br>August 2022 |
|---|------------------|--------------------------------|----------------------------|-------------------------------|
| Electrical Conductivity @ 25 degrees C  | $\mu\text{S/cm}$ | 2050                           | 2240                       | 2220                          |
| Total Dissolved Solids @ 180 degrees C  | $\text{mg/L}$    | 1170                           | 1240                       | 1210                          |
| Suspended Solids                        | $\text{mg/L}$    | <5                             | <5                         | 40                            |
| pH Value                                | $\text{pH Unit}$ | 8.23                           | 7.47                       | 8.08                          |
| Dissolved Sulfate as $\text{SO}_4^{-2}$ | $\text{mg/L}$    | 30                             | 22                         | 14                            |
| Total Iron                              | $\text{mg/L}$    | <0.05                          | 0.33                       | 1.38                          |
| Dissolved Iron                          | $\text{mg/L}$    | <0.05                          | 0.28                       | 0.49                          |
| Dissolved Manganese                     | $\text{mg/L}$    | 0.001                          | 0.013                      | 0.022                         |
| Dissolved Aluminium                     | $\text{mg/L}$    | <0.01                          | <0.01                      | <0.01                         |
| Dissolved Arsenic                       | $\text{mg/L}$    | <0.001                         | <0.001                     | 0.008                         |
| Dissolved Copper                        | $\text{mg/L}$    | 0.002                          | <0.001                     | <0.001                        |
| Dissolved Lead                          | $\text{mg/L}$    | <0.001                         | <0.001                     | <0.001                        |
| Dissolved Nickel                        | $\text{mg/L}$    | <0.001                         | 0.001                      | 0.004                         |
| Dissolved Zinc                          | $\text{mg/L}$    | 0.008                          | 0.017                      | 0.027                         |

Table 2: Field parameters recorded on 15 November 2017, 25 May 2021 and 26 August 2022, from water collected from borehole GW110671, using Horiba water quality probe.

| Parameter                  | Unit                   | Pre-mining<br>15 November<br>2017 | Post-mining<br>25 May 2021 | Post-mining<br>26 August<br>2022 |
|----------------------------|------------------------|-----------------------------------|----------------------------|----------------------------------|
| Temperature                | <i>Degrees Celsius</i> | 20.15                             | 18.79                      | 19.06                            |
| Dissolved Oxygen           | <i>% Saturation</i>    | 66.9                              | 44.9                       | 29.6                             |
| Oxygen Reduction Potential | <i>mV</i>              | 364.40                            | 173.34                     | 86                               |
| pH                         | <i>pH Unit</i>         | 7.53                              | 7.11                       | 6.91                             |
| Electrical Conductivity    | $\mu\text{S/cm}$       | 2200                              | 2220                       | 2320                             |



*Photo 1: Borehole GW110671, taken on 15 November 2017 during pre-mining inspection.*



*Photo 2: Water from GW110671, collected into a bucket. Samples and field parameters were taken from the bucket, photo taken on 15 November 2017.*



*Photo 3: Electric pump for GW110671, photo taken on 15 November 2017.*



*Photo 4: Dam located on Lot 1 DP810978, photo taken on 15 November 2017.*



*Photo 5: Borehole GW110671, photo taken on 25 May 2021 during post-mining inspection.*



*Photo 6: Water from GW110671. collected into a bucket. Samples and field parameters were taken from the bucket, photo taken on 25 May 2021.*





*Photo 7: Electric pump for GW110671, photo taken on 25 May 2021.*



*Photo 8: Dam located on Lot 1 DP810978, photo taken on 25 May 2021.*



*Photo 9: Borehole GW110671, photo taken on 26 August 2022 during post-mining inspection.*



*Photo 10: Water from GW110671. collected into a bucket. Samples and field parameters were taken from the bucket, photo taken on 26 August 2022.*



*Photo 11: Electric pump for GW110671, photo taken on 26 August 2022.*



*Photo 12: Dam located on Lot 1 DP810978, photo taken on 26 August 2022.*





Figure 1: Overview of property Lot 1 DP810978 in relation to Appin Area 9 mining operations.

Built Feature Management Plans (BFMP's) have been prepared by South32 Illawarra Metallurgical Coal (IMC) for landholders above Appin Area 9 Longwalls 901 to 904. Both pre- and post-mining inspections and reports of dams, boreholes and natural features set out by the BFMP's are conducted by the Illawarra Metallurgical Coal Environmental Field Team (IMCEFT) with the consent of the relevant property/infrastructure owner and tenant (where applicable).

This report includes both pre- and post-mining observations and data gathered for relevant features on Lot 3 DP1133989, particularly the registered borehole GW100673. Additional inspections may be conducted at the request of the landholder or if required by various triggers in the Extraction Plan (EP). Borehole GW100673 is located approximately 390m west of Longwall 904 (Figure 1).

### **Pre-mining Inspection**

On 16 May 2018, a pre-mining inspection of Lot 3 DP1133989 was undertaken at borehole GW100673 with water sample collected (Photo 1 and Photo 2). Field observations were recorded, with samples collected and sent to Australian Laboratory Services (ALS) for analysis.

According to the landholder, approximately two weeks before the inspection, the pump ceased to operate due to a blockage with iron precipitate. Additionally, the landholder noted that the water from the settling tank (where the borehole water is pumped into) had an abnormal odour (Photo 3). The water level was measured at approximately 16m to 18m below the surface however the accuracy was deminished due to the presence of moist iron precipitate and 'mud' in the borehole.

### **Additional Inspection (5 June 2018)**

An additional inspection of borehole GW100673 was undertaken by IMCEFT on 5 June 2018 following a report from the property owner of a smell coming from the bore water. During the inspection a handheld gas meter was used to determine the presence of certain gases around the borehole and settling tank. No methane or hydrogen sulfide was detected at the site. A gas collection apparatus was installed over the borehole to collect a gas sample. The apparatus was removed on 8 June 2018 and the collected sample analysed at the Illawarra Metallurgical Coal Gas Laboratory. Results of the analysis are included in Table 1.

### **Longwall 903 Post-mining Inspection**

On 29 April 2021, a post-mining inspection of Lot 3 DP1133989 was undertaken. The borehole was inspected, water samples collected, and key observations and field parameters recorded.

## **Longwall 904 Post-mining Inspection**

On 26 August 2022, a post-mining inspection of Lot 3 DP1133989 was undertaken. Borehole GW100673 was inspected, water samples collected, and key observations and field parameters recorded (Photo 7).

### **Borehole GW100673**

**Location:** 285906 E, 6215584 N (*Note- initial report included incorrect coordinates, now resolved*)

#### **Borehole Properties:**

According to the NSW Office of Water Work Summary, the borehole was drilled to a depth of 146m. The pump was set at a depth of 122m and on 4 June 1995 the standing water level was measured 49m below ground level. During the Longwall 903 post-mining inspection on 29 April 2021 the standing water level was measured to be 43.13m below ground level. During the most recent inspection for Longwall 904 on 26 August 2022 the standing water level was unable to be measured due to pumping equipment obstructing the borehole (Photo 7). The borehole piezometer was downloaded which records the borehole's groundwater level. Further analysis will be included in the End of Panel Report.

#### **Bore Pumping Purpose and Performance:**

The landholder advised that water is mainly extracted from the borehole for livestock use. The borehole operates on an automatic system (Photo 1 and Photo 4), turning on when the water level in the tank falls below a certain level (Photo 3 and Photo 6).

#### **Water Properties:**

Water samples were initially collected from the borehole on 16 May 2018 (Photo 2). The borehole was purged for approximately 3 minutes before water samples were collected. The samples were analysed at ALS laboratory with results displayed below (Table 2).

During the Longwall 903 post-mining inspection on 29 April 2021, no gas or odours were detected, however the water had a slight brownish colouration (Photo 5). The landowner advised IMCEFT that an orange colour had previously been present within the borewater, but this was not observed by IMCEFT during the inspection. Additionally, the landowner advised that the pump had recently been replaced in the borehole, where they noticed a white substance covering parts of an old pipe. Before sampling, the bore was purged for 3 minutes then water samples collected and field parameters recorded (Photo 5). Results are presented in Table 2 and Table 3, respectively.

During the Longwall 904 post-mining inspection on 26 August 2022, no gas, odours or iron staining were detected. The water sample collected from GW100673 had a very slight brownish colouration but otherwise was clear (Photo 9). Water was sampled from a hose with a valve attached to the borehole pump (Photo 8) with samples collected after purging the borehole for approximately 5 minutes. Samples



were collected for laboratory analysis, and field parameters recorded. Results are presented in Table 2 and Table 3, respectively.

*Table 1: Results of gas composition analysis for gas sample collected from Borehole GW100673 on 7 June 2018.*

| <b>Analyte</b> | <b>7 June 2018<br/>(%v/v)</b> |
|----------------|-------------------------------|
| Oxygen         | 20.5                          |
| Argon          | 0.914                         |
| Nitrogen       | 78.0                          |
| Carbon Dioxide | 0.00775                       |
| Methane        | 0.624                         |

*Table 2: Results of water chemistry analysis for water samples collected from Borehole GW100673 on 16 May 2018, 29 April 2021 and 26 August 2022.*

| <b>Analyte</b>                                     | <b>Units</b> | <b>Pre-mining<br/>16 May 2018</b> | <b>Post-mining<br/>29 April 2021</b> | <b>Post-mining<br/>26 August 2022</b> |
|--|--------------|-----------------------------------|--------------------------------------|---------------------------------------|
| Dissolved Arsenic                                  | mg/L         | <0.001                            | <0.001                               | <0.001                                |
| Dissolved Copper                                   | mg/L         | <0.001                            | <0.001                               | <0.001                                |
| Dissolved Iron                                     | mg/L         | 0.58                              | 1.02                                 | 0.89                                  |
| Dissolved Lead                                     | mg/L         | <0.001                            | <0.001                               | <0.001                                |
| Dissolved Nickel                                   | mg/L         | <0.001                            | <0.001                               | <0.001                                |
| Dissolved Sulfate as SO <sub>4</sub> <sup>2-</sup> | mg/L         | 40                                | 34                                   | 27                                    |
| Dissolved Zinc                                     | mg/L         | 0.005                             | 0.007                                | 0.008                                 |
| Electrical Conductivity @ 25° C                    | µs/cm        | 2770                              | 2910                                 | 2820                                  |
| pH Value   | pH unit      | 7.34                              | 7.30                                 | 7.97                                  |
| Suspended Solids                                   | mg/L         | <5                                | <5                                   | <5                                    |
| Total Aluminium                                    | mg/L         | <0.01                             | <0.01                                | <0.01                                 |
| Total Dissolved Solids @180° C                     | mg/L         | 1420                              | 1620                                 | 1470                                  |
| Total Iron   | mg/L         | 0.78                              | 1.44                                 | 1.55                                  |
| Total Manganese                                    | mg/L         | 0.101                             | 0.054                                | 0.058                                 |
| Methane  | mg/L         | 659                               | n/a                                  | n/a                                   |
| Ethane   | mg/L         | <10                               | n/a                                  | n/a                                   |

*Table 3: Water field parameters recorded from borehole GW100673 on 29 April 2021 and 26 August 2022, using a Horiba water quality probe*

| <b>Parameter</b>           | <b>Unit</b>     | <b>Post-mining<br/>29 April 2021</b> | <b>Post-mining<br/>26 August 2022</b> |
|----------------------------|-----------------|--------------------------------------|---------------------------------------|
| Temperature                | Degrees Celsius | 17.62                                | 19.39                                 |
| Dissolved Oxygen           | % Saturation    | 29.3                                 | 25.9                                  |
| Oxygen Reduction Potential | mV              | 91                                   | 59                                    |
| pH                         | pH Unit         | 6.80                                 | 6.83                                  |
| Electrical Conductivity    | µS/cm           | 2870                                 | 2840                                  |



*Photo 1: The capped borehole GW100673. Photo taken on 16 May 2018.*



*Photo 2: Water sample taken from GW100673. Photo taken on 16 May 2018.*



*Photo 3: Settling tank where water from GW100673 is pumped. Photo taken on 16 May 2018.*



*Photo 4: The capped borehole GW100673. Photo taken on 29 April 2021.*



*Photo 5: Water sample taken from GW100673. Photo taken on 29 April 2021.*



*Photo 6: Settling tank where water from GW100673 is pumped. Photo taken on 29 April 2021.*





*Photo 7: The capped borehole GW100673. Photo taken on 26 August 2022.*



*Photo 8: Discharge coming out of a hose with a valve from borehole pump. Photo taken on 26 August 2022.*



*Photo 9: Water sample collected from GW100673. Photo taken on 26 August 2022.*



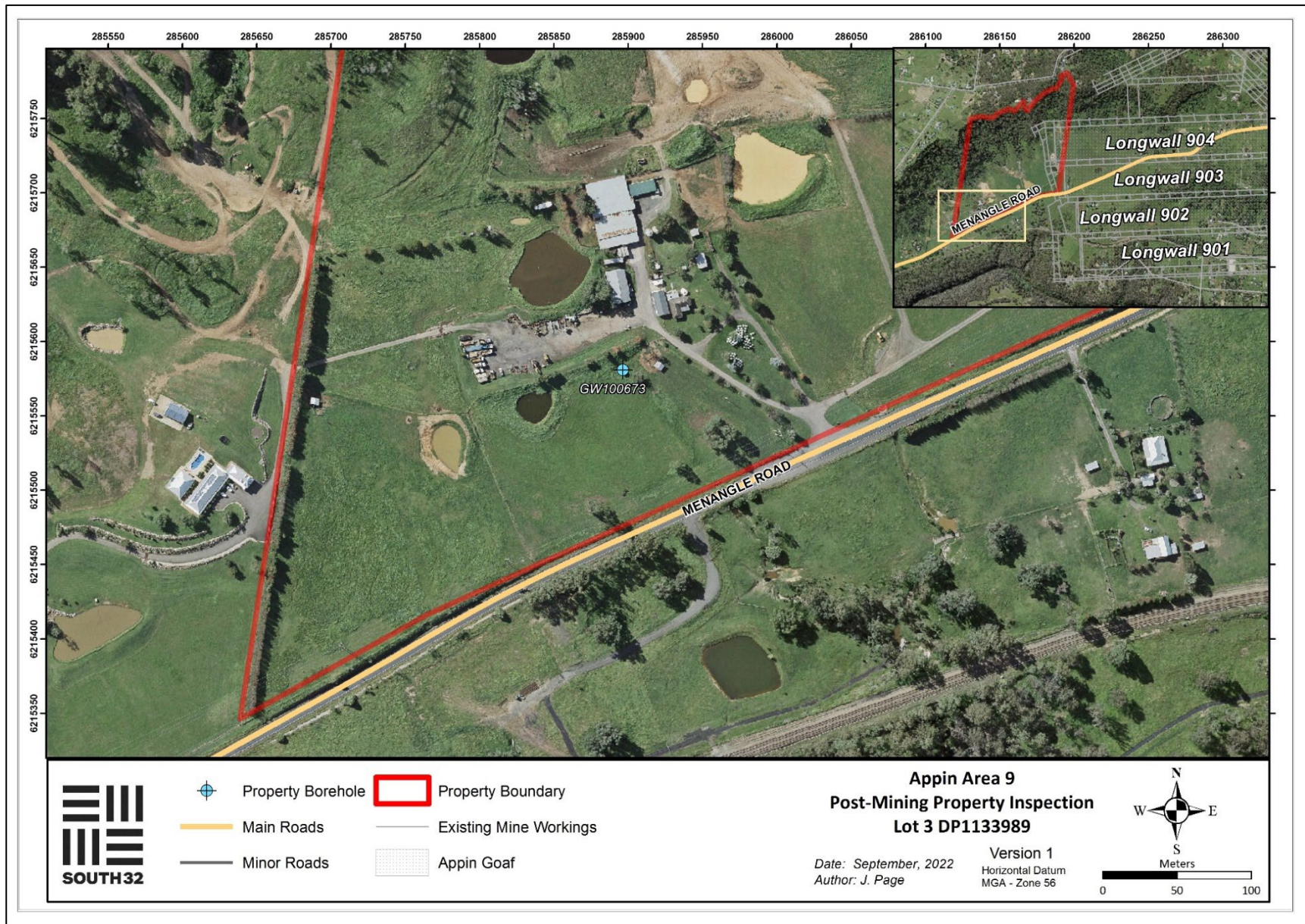


Figure 1: Borehole GW100673 on Lot 3 DP1133989 in relation to Appin Area 9 mining operations.



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This report includes both pre- and post-mining observations and data gathered for relevant features on Lot 9 DP810978, particularly for the registered borehole GW104602. Additional inspections may be conducted at the request of the landowner or if required by various triggers in the Extraction Plan (EP). Borehole GW104602 is located approximately 400m east of Longwall 904 (Figure 1).

### **Pre-mining Inspection**

On 16 April 2018, a pre-mining inspection of Lot 9 DP810978 was undertaken and one borehole, GW104602 was identified, inspected and sampled (Photo 1 to Photo 4). Field observations were recorded with results presented in Table 1. Water samples were collected and sent to Australian Laboratory Services (ALS) for analysis with results presented in Table 2.

### **Longwall 903 Post-mining Inspection**

On 3 May 2021 a post-mining inspection of Lot 9 DP810978 was undertaken. Borehole GW104602 was inspected (Photo 5 to Photo 7), water samples collected, and key observations and field parameters recorded with results presented in Table 1 and Table 2.

### **Longwall 904 Post-mining Inspection**

On 26 August 2022 a post-mining inspection of Lot 9 DP810978 was undertaken. Borehole GW104602 was inspected (Photo 8 and Photo 9), water samples collected, and key observations and field parameters recorded with results presented on Table 1 and Table 2.

### **Borehole: GW104602**

**Location:** 289029 E, 6216307 N

*Note- the the NSW Office of Water Work Summary Report for borehole GW104602 reports a different location. The GPS location used in this report was recorded by IMCEFT during inspection of the borehole.*

### **Borehole Properties:**

Borehole GW104602 is located approximately 60m north of the main dwelling on the property (Figure 1). According to the NSW Office of Water (NoW) Work Summary Report, the borehole was drilled to a depth of 231m, with the standing water level measuring 42m below ground level. No installation date or water level measurement date was included on the NoW Work Summary Report. A pump was installed at a depth of 130m however has since been removed. During the Longwall 903 post-mining inspection on 3 May 2021, the standing water level was measured to be 71.71m below ground level. During the most recent Longwall 904 post-mining inspection the standing water level was unable to be measured due to pumping equipment obstructing the borehole (Photo 8). The piezometer installed in the borehole was downloaded to collect logged groundwater level data. Further analysis will be included in the End of Panel Report.

### **Bore Pumping Purpose and Performance:**

During the Longwall 903 post-mining inspection the landholder advised that the borehole is used for approximately 30-90 mins per day and that water is predominantly used for the garden and lawn via an underground sprinkler system. No pump was installed during the Longwall 903 post-mining inspection period.

During the Longwall 904 post-mining inspection the landholder advised that the borehole pump hadn't been turned on in a few months due to high rainfall on the property. During this inspection it was identified that an electric pump system had been installed and was in working order (Photo 8).

### **Water Properties:**

Water samples were initially collected from the borehole for a pre-mining water quality assessment on 16 April 2018 via the pump, which were sent to Australian Laboratory Services (ALS) for analysis. The borehole was purged for approximately 10 minutes before water samples and field parameters were collected. There were no observable indicators of iron precipitate or hydrogen sulfide during this inspection (Photo 3), however the water was noticeably effervescent after leaving the borehole outlet (Photo 4).

During the Longwall 903 post-mining inspection on 3 May 2021, a hand bailer was used to collect water samples from the borehole as the pump had been removed (Photo 7). The borehole was therefore unable to be purged to the extent undertaken in the pre-mining inspection. A slight odour was identified, likened to hydrogen sulfide, when the water was removed from the borehole, however there were no signs of iron staining or salinity observed (Photo 5 and Photo 7). The water removed for sampling was slightly brown in colour (Photo 6). Field water quality parameters were recorded (Table 1) and samples were analysed at ALS laboratory with results in Table 2.

During the Longwall 904 post-mining inspection on 26 August 2022, the electric pump was used to collect water samples from the borehole. The water was purged for approximately 10 minutes then water samples were collected. During this time a strong odour was identified, likened to hydrogen sulphide. The water sample collected from the borehole first exhibited a milky and cloudy appearance, likely fine bubbles in the aerated water (Photo 10) and after approximately 2 minutes the water sample became clear (Photo 11). Field water quality parameters were recorded (Table 1) and water samples collected where they were later analysed at ALS laboratory, with results presented in Table 2.

Table 1: Results of field water parameters recorded for water from borehole GW104602 on 16 April 2018, 3 May 2021 and 26 August 2022.

| Parameter               | Units            | Pre-mining<br>16 April 2018 | Post-mining<br>3 May 2021 | Post-mining<br>26 August 2022 |
|-------------------------|------------------|-----------------------------|---------------------------|-------------------------------|
| Temperature             | Degrees Celsius  | 23.12                       | 20.35                     | 21.12                         |
| Electrical Conductivity | $\mu\text{s/cm}$ | 1830                        | 1630                      | 1930                          |
| pH                      | pH Unit          | 7.28                        | 7.40                      | 7.09                          |
| Dissolved Oxygen        | % Saturation     | 56.9                        | 32.9                      | 13.0                          |
| Converted ORP           | mV               | 360                         | 35                        | 109                           |

Table 2: Results of chemical analyses for water samples collected from borehole GW104602 on 16 April 2018, 3 May 2021 and 26 August 2022

| Analytes                                | Units            | Pre-mining<br>16 April 2018 | Post-mining<br>3 May 2021 | Post-mining<br>26 August 2022 |
|---|------------------|-----------------------------|---------------------------|-------------------------------|
| Dissolved Arsenic                       | mg/L             | <0.001                      | 0.003                     | <0.001                        |
| Dissolved Copper                        | mg/L             | <0.001                      | <0.001                    | <0.001                        |
| Dissolved Iron                          | mg/L             | 0.1                         | 0.12                      | 0.37                          |
| Dissolved Lead                          | mg/L             | <0.001                      | <0.001                    | <0.001                        |
| Dissolved Nickel                        | mg/L             | <0.001                      | 0.001                     | <0.001                        |
| Dissolved Sulfate as $\text{SO}_4^{2-}$ | mg/L             | 8                           | 11                        | 13                            |
| Dissolved Zinc                          | mg/L             | <0.005                      | 0.014                     | <0.005                        |
| Electrical Conductivity @ 25 °C         | $\mu\text{s/cm}$ | 1700                        | 1640                      | 1900                          |
| pH Value                                | pH Unit          | 7.79                        | 7.81                      | 8.03                          |
| Suspended Solids                        | mg/L             | <5                          | 37                        | <5                            |
| Total Aluminium                         | mg/L             | <0.01                       | 0.05                      | <0.01                         |
| Total Dissolved Solids @180 °C          | mg/L             | 954                         | 1020                      | 1040                          |
| Total Iron                              | mg/L             | 0.14                        | 0.54                      | 0.47                          |
| Total Manganese                         | mg/L             | 0.048                       | 0.095                     | 0.042                         |



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



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



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



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

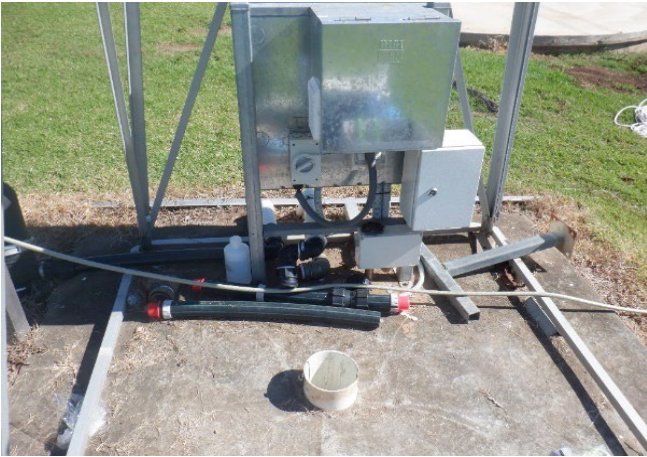


*Photo 5: Closeup of borehole GW104602. Taken on 3 May 2021.*



*Photo 6: Closeup of water sample taken from borehole via bailing from borehole. Taken on 3 May 2021.*





*Photo 7: Borehole GW104602 showing the borehole with pump removed. Taken on 3 May 2021*



*Photo 8: Closeup of borehole GW104602 and pump. Taken on 26 August 2022.*



*Photo 9: Borehole GW104602 showing the current set-up. Taken on 26 August 2022.*



*Photo 10: Closeup of water sample taken from borehole via pump. Very cloudy water with white/grey colour is visible in water sampled from borehole. Taken on 26 August 2022.*



*Photo 11: Closeup of water taken from borehole via pump. Shows water after letting settle for 2 minutes. Water became very clear. Taken on 26 August 2022.*



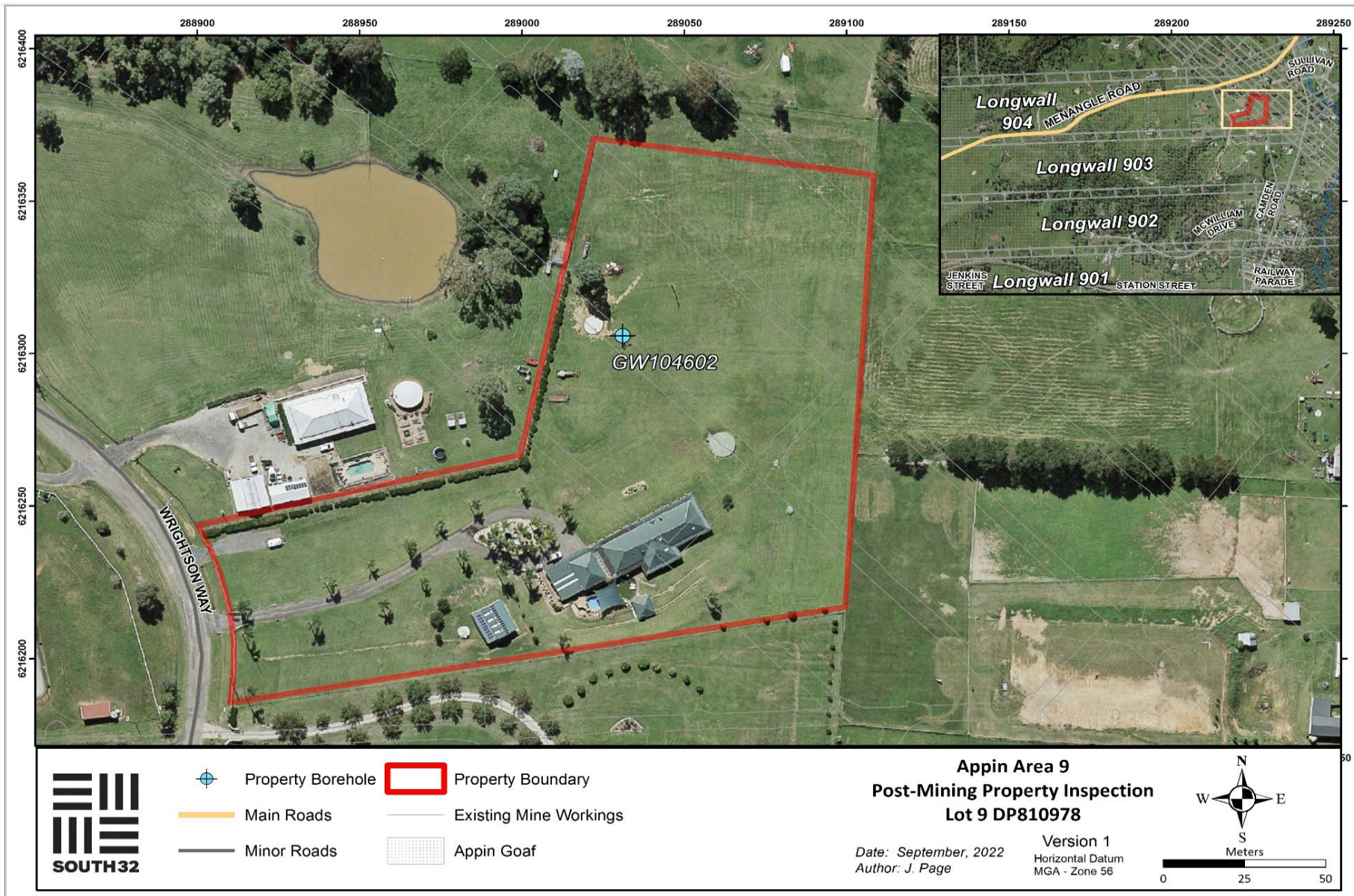


Figure 1: Map showing GW104602 in relation to Appin Area 9 mining operations.

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This report includes both pre- and post-mining observations and data gathered for the borehole and dam on Lot 15 DP803255 (Figure 1), particularly the registered borehole GW112437. Additional inspections may be conducted at the request of the landholder or if required by various triggers in the Extraction Plan (EP). Borehole GW112437 is located approximately 685m south of Longwall 904 (Figure 1).

### **Pre-mining Inspection**

On 2 November 2017 a pre-mining inspection of Lot 15 DP803255 property was undertaken and one borehole, GW112437 was identified, inspected and sampled (Photo 13 and Photo 14). Field observations were recorded, with samples collected and sent to Australian Laboratory Services (ALS) for analysis (Table 1 and Table 2).

The landholder advised IMCEFT that water is extracted from the dam and feeds to ten outlets on the property. Water is extracted for approximately 6 hours, twice a week. During the pre-mining inspection, flow was measured at approximately 2 L/s (Photo 1).

### **Longwall 902 Post-mining Inspection**

On 6 June 2019, a post-mining inspection of Lot 15 DP803255 was undertaken for Longwall 902, including borehole GW112437 (Figure 1). The borehole and dam were inspected, water samples collected, and key observations and field parameters recorded (Photo 5 to Photo 8).

### **Longwall 903 Post-mining Inspection**

On 29 April 2021, a post-mining inspection of Lot 15 DP803255 was undertaken for Longwall 903, including borehole GW112437 (Figure 1). The borehole and dam were inspected, water samples collected, and key observations and field parameters recorded (Photo 9 to Photo 12).

### **Longwall 904 Post-mining Inspection**

On 5 October 2022, a post-mining inspection of Lot 15 DP803255 was undertaken for Longwall 904, including borehole GW112437 (Figure 1). The borehole and dam were inspected, water samples collected, and key observations and field parameters recorded (Photo 13 to Photo 17).

**Borehole: GW112437**

**Location:** 288697 E, 6215458 N

**Borehole Properties:**

Borehole GW112437 is located approximately 685m south of Longwall 904 (Figure 1). According to NSW Office of Water Work Summary, the borehole is 156 m deep and was installed on 15 June 2010. The borehole has pumping equipment attached which feeds water into the adjacent dam, referred to herein as Dam 1, used as a holding lagoon (Photo 3, Photo 7, Photo 11, and Photo 15).

During the post-mining inspection for Longwall 902 (6 June 2019), the standing water level in borehole GW112437 was measured at 70.71m (+/- 0.2m). On 29 April 2021, the standing water level in the borehole was measured at 77.05m (+/- 0.2m). However, this water level measurement was taken after the pump had been running as the property owner had started the pump prior to the sampling team's arrival. In the most recent post-mining inspection for Longwall 904, on 5 October 2022, the water level was unable to be measured due to a pump, now installed, which has blocked access to the borehole (Photo 16).

**Bore Pumping Purpose and Performance:**

Water is extracted from the bore for land care and domestic uses, including all garden watering. Water is first held in Dam 1 (Photo 3, Photo 7, Photo 11, and Photo 15). During both Longwall 902 and 903 post-mining inspections, the bore flow was measured at the outflow into the dam. Pumping was measured as approximately 2 L/s, matching that observed during the pre-mining inspection (Photo 1). During Longwall 904 post-mining inspection, there were two outflow points of the bore water; one outflowing directly into the dam as previously measured, and a secondary hose connected directly to the borehole pump (Photo 16). Due to safety reasons, flow was measured from the hose directly connected to the pump instead of the original location. The bore was pumping approximately 1 L/s (Photo 14). This reduced rate could be a result of taking the measurement at a different location, and the influence of two outflow points operating at the same time.

Water from the bore was purged for 10 minutes then key observations and field water quality parameters recorded, as well as water samples collected (Photo 2, Photo 6, Photo 10, and Photo 14). Water samples were also taken from Dam 1 on the property (Photo 4, Photo 8 and Photo 12).

**Water Properties:**

Water taken from borehole GW112437 appeared clear with no signs of iron staining or salinity in the water, around the borehole or around the outlet (Photo 13 and Photo 14). Water taken from Dam 1 appeared discoloured with evidence of algae growth around the perimeter of the dam and no visible signs of iron staining, salinity, or gas release (Photo 15). A sulfur-like odour was present from the dam pump outflow. In the 2021 post-mining inspection, Dam 1 was lower than previous inspections, due to the dam level being lowered to remove weed from dam. The water level in the Longwall 904 post-mining inspection was high.

The comparison between pre- and post-mining in-situ water quality parameters are provided in Table 1. Water samples from borehole GW112437 and Dam 1 were sent to ALS for laboratory analysis. The results of the ALS laboratory analyses for both pre-mining and post-mining inspections are included in Table 2.





*Photo 1: Borehole outlet into Dam 1. Taken on 2 November 2017.*



*Photo 2: Image of water from borehole discharge. Taken on 2 November 2017.*



*Photo 3: Dam 1. Taken on 2 November 2017.*



*Photo 4: Image of water taken from dam. Taken on 2 November 2017.*



*Photo 5: Borehole outlet into Dam 1. Taken on 6 June 2019.*



*Photo 6: Image of water from borehole discharge. Taken on 6 June 2019.*





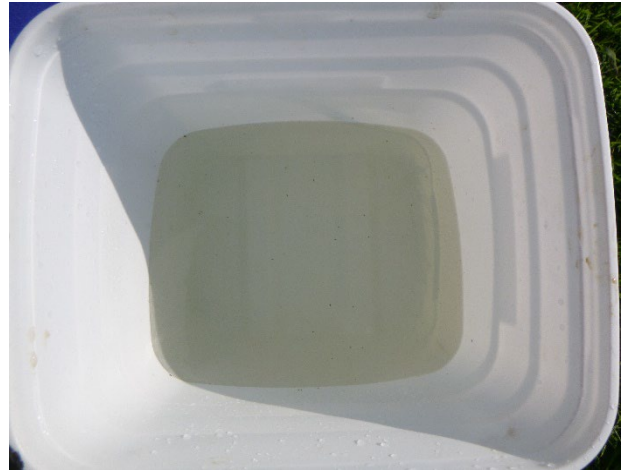
*Photo 7: Dam 1. Taken on 6 June 2019.*



*Photo 8: Image of water taken from dam. Taken on 6 June 2019.*



*Photo 9: Borehole outlet into Dam 1. Taken on 29 April 2021*



*Photo 10: Image of water from borehole discharge. Taken on 29 April 2021.*



*Photo 11: Dam 1. Taken on 29 April 2021.*



*Photo 12: Image of water taken from dam. Taken on 29 April 2021*





Photo 13: Borehole outlet into Dam 1. Taken on 5 October 2022.



Photo 14: Image of water from borehole discharge. Taken on 5 October 2022.



Photo 15: Dam 1. Taken on 5 October 2022.



Photo 16: New pump installed for the borehole. Taken 5 October 2022.



Photo 17: Discharge coming from hose on borehole. Taken 5 October 2022.

Table 1: Field water quality parameters for borehole GW112437 and Dam 1, collected on 2 November 2017, 6 June 2019, 29 April 2021 and 5 October 2022.

| <b>Parameter</b>              | <b>Units</b>               | <b>GW112437<br/>Pre-mining 2<br/>November<br/>2017</b> | <b>GW112437<br/>Post-mining<br/>6 June 2019</b> | <b>GW112437<br/>Post-<br/>mining 29<br/>April 2021</b> | <b>GW112437<br/>Post-mining 5<br/>October 2022</b> | <b>Dam 1<br/>Pre-mining<br/>2 November<br/>2017</b> | <b>Dam 1<br/>Post-mining<br/>6 June 2019</b> | <b>Dam 1<br/>Post-mining<br/>29 April 2021</b> | <b>Dam 1<br/>Post-mining 5<br/>October 2022</b> |
|-------------------------------|----------------------------|--|---|--|--|---|--|--|---|
| Temperature                   | <i>Degrees<br/>Celsius</i> | 19.61  | 16.90   | 19.04  | 19.23  | 21.98   | 16.65  | 17.66  | 17.14   |
| Dissolved Oxygen              | <i>% Saturation</i>        | 61.7   | 64.3  | 25.5   | 18.3   | 146.8   | 94.0   | 115.6  | 38.6  |
| Electrical<br>Conductivity    | <i>µS/cm</i>               | 2150   | 2030  | 2030   | 2110   | 1780  | 1130   | 1020   | 323   |
| pH                            | <i>pH Value</i>            | 7.13   | 7.55  | 7.05   | 6.98   | 8.95  | 8.42   | 9.09   | 7.63  |
| Oxygen Reduction<br>Potential | <i>mV</i>                  | 10   | 58  | -4   | -7   | 94  | 70   | 147  | 155   |



Table 2: Results of chemical analysis for the water samples collected from borehole GW112437 and Dam 1 on the 2 November 2017, 6 June 2019, 29 April 2021 and 5 October 2022.

| Analyte   | Units      | GW112437<br>Pre-mining<br>2<br>November<br>2017 | GW112437<br>Post-mining 6<br>June 2019 | GW112437<br>Post-mining<br>29 April 2021 | GW112437<br>Post-mining<br>5 October<br>2022 | Dam 1<br>Pre-mining 2<br>November<br>2017 | Dam 1<br>Post-mining 6<br>June 2019 | Dam 1<br>Post-mining<br>29 April 2021 | Dam 1<br>Post-mining 5<br>October 2022 |
|---|------------|---|--|--|--|---|-------------------------------------|---------------------------------------|--|
| Dissolved Copper                                      | mg/L       | <0.001  | <0.001                                 | <0.001                                   | <0.001                                       | <0.001                                    | <0.001                              | <0.001                                | 0.002                                  |
| Dissolved Iron  | mg/L       | 0.25  | 0.44                                   | 0.97                                     | 0.56   | <0.05                                     | <0.05                               | <0.05                                 | <0.05                                  |
| Dissolved Manganese                                   | mg/L       | 0.026   | 0.028                                  | 0.034                                    | 0.030  | 0.023                                     | 0.03                                | 0.023                                 | 0.009                                  |
| Dissolved Nickel                                      | mg/L       | <0.001  | <0.001                                 | <0.001                                   | <0.001                                       | <0.001                                    | <0.001                              | <0.001                                | 0.001                                  |
| Dissolved Sulfate<br>as SO <sub>4</sub> <sup>2-</sup> | mg/L       | 22  | 23                                     | 20                                       | 20   | 11  | 12                                  | 8                                     | 11                                     |
| Dissolved Zinc  | mg/L       | 0.011   | <0.005                                 | <0.005                                   | <0.005                                       | <0.005                                    | <0.005                              | <0.005                                | 0.012                                  |
| Electrical<br>Conductivity @<br>25°C                  | µS/cm      | 2080  | 2160                                   | 2030                                     | 2080   | 1740                                      | 1240                                | 1060                                  | 323                                    |
| pH Value  | pH<br>Unit | 7.76  | 8.29                                   | 7.51                                     | 7.94   | 8.8                                       | 8.41                                | 8.68                                  | 7.74                                   |
| Total Aluminum  | mg/L       | <0.01   | <0.01                                  | <0.01                                    | <0.01  | <0.01                                     | 0.12                                | 0.10                                  | 0.08                                   |
| Total Iron  | mg/L       | 0.43  | 0.54                                   | 1.44                                     | 0.63   | 0.34                                      | 0.23                                | 0.19                                  | 0.16                                   |
| Total Manganese                                       | mg/L       | 0.026   | 0.031                                  | 0.034                                    | 0.030  | 0.023                                     | 0.046                               | 0.034                                 | 0.040                                  |



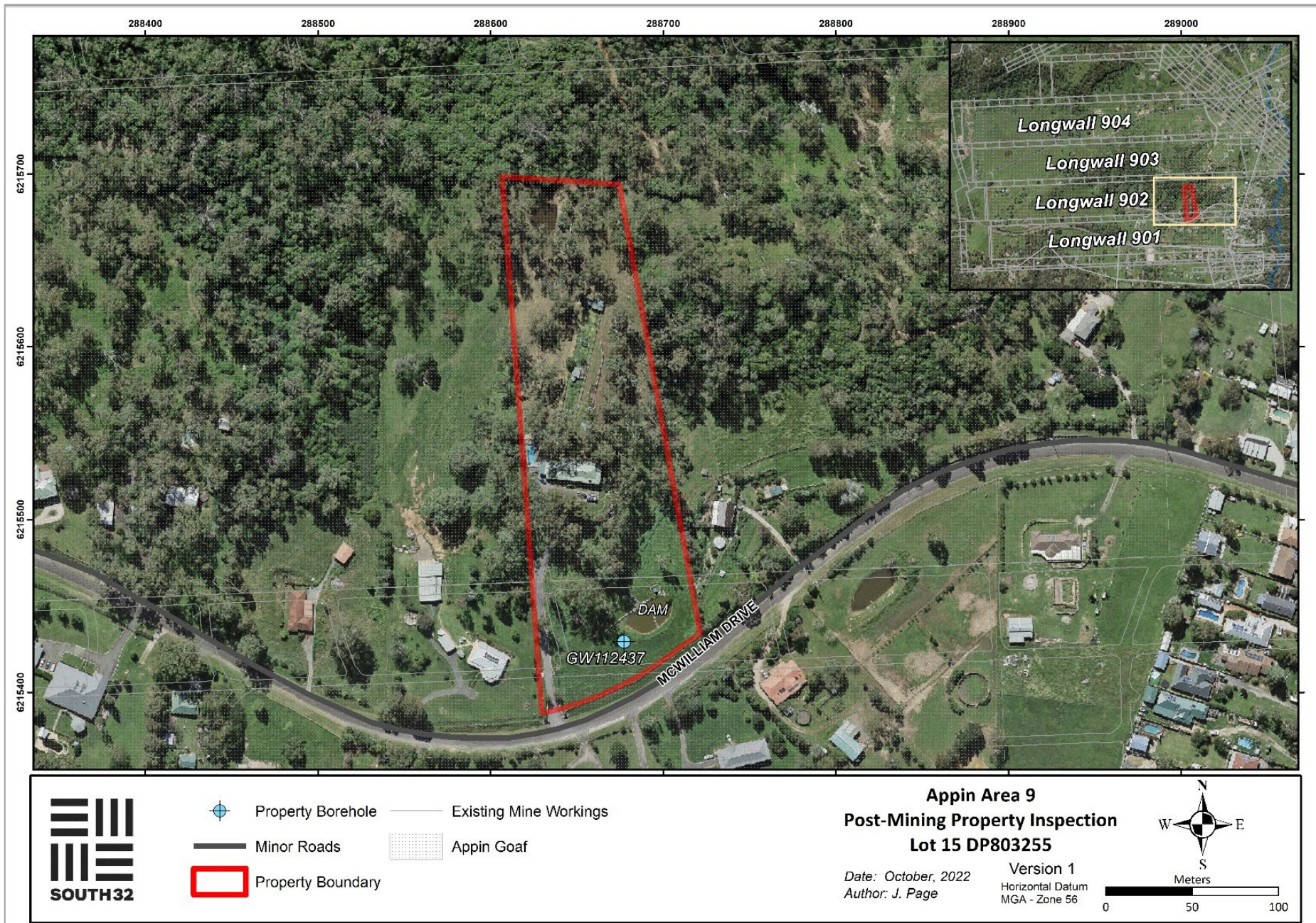


Figure 1: Map showing property and features in relation to Appin Area 9 mining operations.



Built Feature Management Plans (BFMPs) have been prepared by South32 Illawarra Metallurgical Coal (IMC) for landholders above Appin Area 9 Longwalls 901 to 904. Both pre- and post-mining inspections and reports of dams, boreholes and natural features set out by the BFMP's are conducted by the Illawarra Metallurgical Coal Environmental Field Team (IMCEFT) with the consent of the relevant property/infrastructure owner and/or tenant (where applicable).

This report includes pre- and post-mining observations and data gathered for relevant features on Lot 22 DP803255, particularly the registered borehole GW074429. Additional inspections may be conducted at the request of the landowner and/or if required by various triggers in the Extraction Plan (EP). Borehole GW072249 is located approximately 600m south of Longwall 904 (Figure 1).

### **Pre-mining Inspection**

On 29 June 2015, a pre-mining inspection of property Lot 22 DP803255 was undertaken and one borehole-GW072249 was identified, inspected, and sampled (Photo 1 and Photo 3). Field water quality parameters were recorded (Table 1), and water samples collected for analysis at Australian Laboratory Services (ALS), results for which are presented in Table 2. The pre-mining inspection identified water pressure was stable for greater than 10 minutes at a flow rate of 0.5 – 1 L/s.

### **Longwall 901 Post-mining Inspection**

On 2 November 2017, a post-mining inspection was undertaken at Lot 22 DP803255 (Figure 1). The borehole was inspected, samples were collected, and field observations were recorded (Photo 4). Field water quality parameters were recorded (Table 1), and samples collected were sent to Australian Laboratory Services (ALS) for analysis with results presented in (Table 2). The post-mining inspection identified the water pressure from the borehole was stable at rate of approximately 0.5 – 1 L/s, reducing significantly after 5 minutes. This change in water pressure indicated that longwall mining activities had likely reduced the amount of water accessible to be extracted from the borehole and as such, a Water Management Plan was prepared for the property.

### **Longwall 902 Post-mining Inspection**

On 6 June 2019, a post-mining inspection of Lot 22 DP803255 was undertaken. The borehole was inspected, samples were collected, and field observations were recorded (Photo 5 and Photo 6). Field water quality parameters are presented in Table 1. Water samples were again collected for laboratory analysis, with results presented in Table 2.



## **Longwall 904 Post-mining Inspection**

On 26 August 2022, a post-mining inspection of Lot 22 DP803255 was undertaken. Borehole GW072249 was inspected, and field water quality parameters were recorded Table 1. Water samples were collected with results of laboratory analysis presented in Table 2.

### **Borehole GW072249**

**Location:** 288072 E, 6215479 N

#### ***Borehole Properties:***

The borehole is located approximately 20 metres south of the main dwelling on this property (Figure 1; Photo 1). According to the NSW Office of Water Work Summary, the borehole was drilled to a depth of 97m and was completed on 31 March 1994. During the Longwall 902 post-mining inspection on 6 June 2019 the standing water level was dipped at 65.4m (+/- 0.2m) below ground level. During the Longwall 904 post-mining inspection on 26 August 2022 the standing water level was unable to be measured due to pumping equipment obstructing the borehole (Photo 8).

#### ***Bore Pumping Purpose and Performance:***

During the Longwall 902 post-mining inspection, the landholder advised that the water is extracted from the bore for land care and domestic uses. No test of pumping pressure was undertaken due to the absence of pumping equipment. Instead, water was hand-bailed from the bore.

During the Longwall 904 post-mining inspection, pumping equipment was present with water released via a tap (Photo 8 and Photo 9). No test of pumping pressure was undertaken.

#### ***Water Properties:***

During the Longwall 902 post-mining inspection the water appeared to be slightly discoloured when compared to previous photos from the inspection on 2 November 2017 (Photo 4 and Photo 6). However, there were no signs of iron staining or salinity in the water, or around the borehole outlet. No gas or odours were identified during the inspection. In-situ water quality parameters were recorded (Table 1). A sample was taken from the borehole. The sample was sent to ALS for laboratory analysis and the results are included below (Table 2).

During the Longwall 904 post-mining inspection the water appeared clear (Photo 10). There were no signs of iron staining or salinity in the water, or around the borehole outlet. No gas or odours were identified during the inspection. In-situ water quality parameters were recorded (Table 1). A sample was taken from the borehole. The sample was sent to ALS for laboratory analysis and the results are included below (Table 2).



Photo 1: Borehole GW072249. Taken on 29 June 2015.



Photo 2: Borehole GW072249 – pumping equipment. Taken on 2 November 2017.



Photo 3: Water from Borehole GW072249. Taken on 29 June 2015.



Photo 4: water collected from borehole discharge. Taken on 2 November 2017



Photo 5: Borehole GW072249 Taken on 6 June 2019.



Photo 6: Image of water taken from bore. Taken on 6 June 2019.





*Photo 7: Borehole GW072249 Taken on 26 August 2022.*



*Photo 8: Borehole GW072249 – pumping equipment. Taken on 26 August 2022.*



*Photo 9: Tap which water samples were collected from. Taken on 26 August 2022.*



*Photo 10: Water collected from borehole tap after purging for approximately 2 minutes. Taken on 26 August 2022.*



Table 1: Field water quality results for borehole GW072249. Recorded on 29 June 2015, 2 November 2017, 6 June 2019 and 26 August 2022.

| Analyte                    | Units                   | Pre-mining<br>29 June 2015 | Post-Longwall 901<br>2 November 2017 | Post-Longwall 902<br>6 June 2019 | Post-Longwall 904<br>26 August 2022 |
|----------------------------|-------------------------|----------------------------|--------------------------------------|----------------------------------|-------------------------------------|
| Temperature                | Degrees Celsius         | 17.04                      | 18.97                                | 17.27                            | 18.06                               |
| Dissolved Oxygen           | % Saturation            | 10.5                       | 46.2                                 | 47.3                             | 69.7                                |
| Electrical Conductivity    | $\mu\text{s}/\text{cm}$ | 2600                       | 2780                                 | 3290                             | 3760                                |
| pH                         | pH Value                | 7.17                       | 7.14                                 | 7.54                             | 7.13                                |
| Oxygen Reduction Potential | mV                      | 265                        | 265                                  | 114                              | 192                                 |

Table 2: Results of water chemistry analysis for samples collected from borehole GW072249. Samples collected on 29 June 2015, 2 November 2017, 6 June 2019 and 26 August 2022. Note that some parameters were not tested between pre-mining and post-mining inspections.

| Analyte                                 | Units                   | Pre-mining<br>29 June 2015 | Post-Longwall 901<br>2 November 2017 | Post-Longwall 902<br>6 June 2019 | Post-Longwall 904<br>26 August 2022 |
|---|-------------------------|----------------------------|--------------------------------------|----------------------------------|-------------------------------------|
| Dissolved Copper                        | mg/L                    | <0.001                     | 0.001                                | <0.001                           | 0.015                               |
| Dissolved Iron                          | mg/L                    | 0.32                       | 0.08                                 | <0.05                            | <0.05                               |
| Dissolved Manganese                     | mg/L                    | 0.043*                     | 0.032                                | 0.046                            | 0.082                               |
| Dissolved Nickel                        | mg/L                    | <0.001                     | <0.001                               | <0.001                           | 0.008                               |
| Dissolved Sulfate as $\text{SO}_4^{2-}$ | mg/L                    | -                          | 21                                   | 30                               | 26                                  |
| Dissolved Zinc                          | mg/L                    | 0.008                      | 0.007                                | 0.028                            | 0.060                               |
| Electrical Conductivity @ 25°C          | $\mu\text{s}/\text{cm}$ | 2680                       | 2700                                 | 3570                             | 3780                                |
| pH Value                                | pH Unit                 | 7.33                       | 7.73                                 | 8.24                             | 8.04                                |
| Total Aluminium                         | mg/L                    | <0.01                      | 0.03                                 | 0.05                             | <0.01                               |
| Total Iron                              | mg/L                    | 0.34                       | 0.38                                 | 0.96                             | 0.07                                |
| Total Manganese                         | mg/L                    | 0.042                      | 0.032                                | 0.075                            | 0.086                               |

\* Previous report incorrectly reported the 'Dissolved Magnesium' value. Result has now been corrected to 'Dissolved Manganese'.



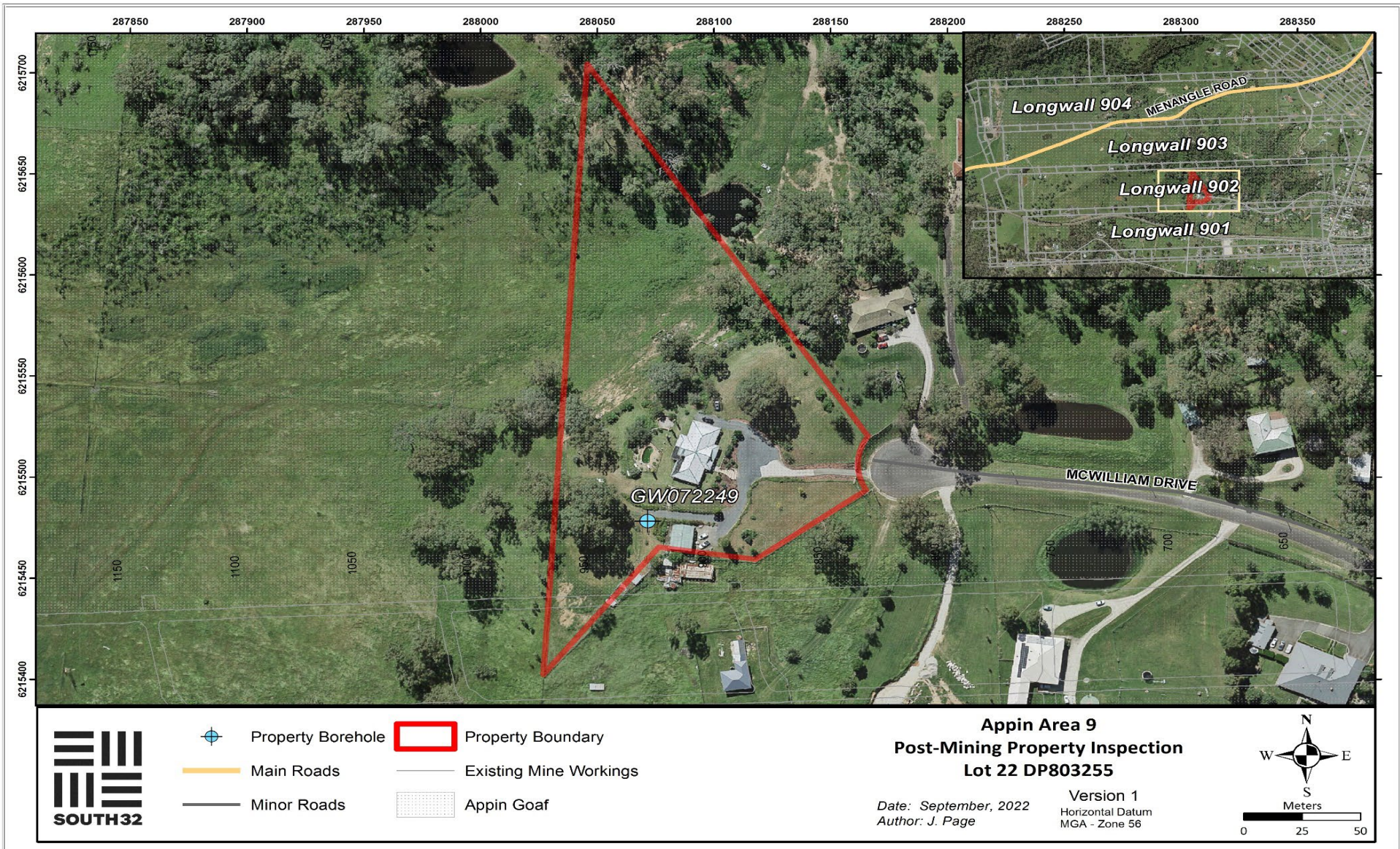


Figure 1: Borehole GW072249 on Lot 22 DP803255 in relation to Appin Area 9 mining operations.