

## CERTIFICATE OF ANALYSIS

**Work Order** : **EW2104536**  
**Client** : **WOLLONGONG CITY COUNCIL**  
**Contact** : DELLA KUTZNER  
**Address** : 41 BURELLI STREET  
 WOLLONGONG NSW, AUSTRALIA 2500  
**Telephone** : +61 02 4227 7111  
**Project** : Whytes Gully Stage 3 Bores Quarterly  
**Order number** : 1033040  
**C-O-C number** : ----  
**Sampler** : Megan Gould, Robert DaLio  
**Site** : ----  
**Quote number** : WO/005/18 TENDER  
**No. of samples received** : 13  
**No. of samples analysed** : 13

**Page** : 1 of 8  
**Laboratory** : Environmental Division NSW South Coast  
**Contact** : Aneta Prosaroski  
**Address** : 1/19 Ralph Black Dr, North Wollongong 2500 NSW Australia  
**Telephone** : 02 42253125  
**Date Samples Received** : 01-Nov-2021 16:08  
**Date Analysis Commenced** : 01-Nov-2021  
**Issue Date** : 08-Nov-2021 12:20



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

**Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.**

### *Signatories*

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

| <i>Signatories</i> | <i>Position</i>        | <i>Accreditation Category</i>      |
|--------------------|------------------------|------------------------------------|
| Aneta Prosaroski   | Client Liaison Officer | Laboratory - Wollongong, NSW       |
| Ankit Joshi        | Inorganic Chemist      | Sydney Inorganics, Smithfield, NSW |
| Ivan Taylor        | Analyst                | Sydney Inorganics, Smithfield, NSW |



## General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.  
LOR = Limit of reporting  
^ = This result is computed from individual analyte detections at or above the level of reporting  
ø = ALS is not NATA accredited for these tests.  
~ = Indicates an estimated value.

- **Analytical work for this work order will be conducted at ALS Sydney.**
- TDS by method EA-015 may bias high for various samples due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- pH performed by ALS Wollongong via in-house method EA005FD and EN67 PK.
- Electrical conductivity performed by ALS Wollongong via in-house method EA010FD and EN67 PK.
- Sampling and groundwater depth measurements completed by ALS Wollongong via inhouse sampling method EN/67.11 Groundwater Sampling Via Bailer and High Flow Method.
- All field analysis performed by ALS Wollongong were completed at the time of sampling.
- Sample collection of Ground Waters by in-house EN67 where the "surface layer of the aquifer was sampled".
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



## Analytical Results

| Sub-Matrix: WATER<br>(Matrix: WATER)                     |             |        |         | Sample ID         | GMW102<br>(Point 9) | GMW103<br>(Point 10) | GMW104<br>(Point 11) | GMW105<br>(Point 12) | GMW106<br>(Point 13) |
|--|-------------|--------|---------|-------------------|---------------------|----------------------|----------------------|----------------------|----------------------|
| Sampling date / time                                     |             |        |         | 01-Nov-2021 00:00 | 01-Nov-2021 00:00   | 01-Nov-2021 00:00    | 01-Nov-2021 00:00    | 01-Nov-2021 00:00    |                      |
| Compound   | CAS Number  | LOR    | Unit    | EW2104536-001     | EW2104536-002       | EW2104536-003        | EW2104536-004        | EW2104536-005        |                      |
|  |             |        |         | Result            | Result              | Result               | Result               | Result               |                      |
| <b>EA005FD: Field pH</b>                                 |             |        |         |                   |                     |                      |                      |                      |                      |
| pH   | ----        | 0.1    | pH Unit | 6.7               | 7.2                 | 7.4                  | 6.2                  | ----                 |                      |
| <b>EA010FD: Field Conductivity</b>                       |             |        |         |                   |                     |                      |                      |                      |                      |
| Electrical Conductivity (Non Compensated)                | ----        | 1      | µS/cm   | 287               | 1740                | 1060                 | 221                  | ----                 |                      |
| <b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b> |             |        |         |                   |                     |                      |                      |                      |                      |
| Total Dissolved Solids @180°C                            | ----        | 10     | mg/L    | 244               | 953                 | 633                  | 392                  | ----                 |                      |
| <b>ED037P: Alkalinity by PC Titrator</b>                 |             |        |         |                   |                     |                      |                      |                      |                      |
| Hydroxide Alkalinity as CaCO3                            | DMO-210-001 | 1      | mg/L    | <1                | <1                  | <1                   | <1                   | ----                 |                      |
| Carbonate Alkalinity as CaCO3                            | 3812-32-6   | 1      | mg/L    | <1                | <1                  | <1                   | <1                   | ----                 |                      |
| Bicarbonate Alkalinity as CaCO3                          | 71-52-3     | 1      | mg/L    | 86                | 534                 | 352                  | 30                   | ----                 |                      |
| Total Alkalinity as CaCO3                                | ----        | 1      | mg/L    | 86                | 534                 | 352                  | 30                   | ----                 |                      |
| <b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>   |             |        |         |                   |                     |                      |                      |                      |                      |
| Sulfate as SO4 - Turbidimetric                           | 14808-79-8  | 1      | mg/L    | 12                | 89                  | 52                   | 10                   | ----                 |                      |
| <b>ED045G: Chloride by Discrete Analyser</b>             |             |        |         |                   |                     |                      |                      |                      |                      |
| Chloride   | 16887-00-6  | 1      | mg/L    | 21                | 221                 | 102                  | 34                   | ----                 |                      |
| <b>ED093F: Dissolved Major Cations</b>                   |             |        |         |                   |                     |                      |                      |                      |                      |
| Calcium  | 7440-70-2   | 1      | mg/L    | 23                | 151                 | 52                   | 5                    | ----                 |                      |
| Magnesium  | 7439-95-4   | 1      | mg/L    | 7                 | 48                  | 30                   | 2                    | ----                 |                      |
| Sodium   | 7440-23-5   | 1      | mg/L    | 27                | 150                 | 128                  | 32                   | ----                 |                      |
| Potassium  | 7440-09-7   | 1      | mg/L    | <1                | <1                  | <1                   | <1                   | ----                 |                      |
| <b>EG020T: Total Metals by ICP-MS</b>                    |             |        |         |                   |                     |                      |                      |                      |                      |
| Aluminium  | 7429-90-5   | 0.01   | mg/L    | ----              | ----                | 8.58                 | ----                 | ----                 |                      |
| Barium   | 7440-39-3   | 0.001  | mg/L    | ----              | ----                | 0.070                | ----                 | ----                 |                      |
| Cadmium  | 7440-43-9   | 0.0001 | mg/L    | ----              | ----                | <0.0001              | ----                 | ----                 |                      |
| Cobalt   | 7440-48-4   | 0.001  | mg/L    | ----              | ----                | 0.016                | ----                 | ----                 |                      |
| Chromium   | 7440-47-3   | 0.001  | mg/L    | ----              | ----                | 0.014                | ----                 | ----                 |                      |
| Copper   | 7440-50-8   | 0.001  | mg/L    | ----              | ----                | 0.030                | ----                 | ----                 |                      |
| Manganese  | 7439-96-5   | 0.001  | mg/L    | ----              | ----                | 1.16                 | ----                 | ----                 |                      |
| Lead   | 7439-92-1   | 0.001  | mg/L    | ----              | ----                | 0.012                | ----                 | ----                 |                      |
| Zinc   | 7440-66-6   | 0.005  | mg/L    | ----              | ----                | 0.065                | ----                 | ----                 |                      |
| <b>EK055G: Ammonia as N by Discrete Analyser</b>         |             |        |         |                   |                     |                      |                      |                      |                      |
| Ammonia as N   | 7664-41-7   | 0.01   | mg/L    | <0.01             | <0.01               | <0.01                | 0.03                 | ----                 |                      |
| <b>EN67 PK: Field Tests</b>                              |             |        |         |                   |                     |                      |                      |                      |                      |



## Analytical Results

| Sub-Matrix: WATER<br>(Matrix: WATER)         |            |      |      | Sample ID         | GMW102<br>(Point 9) | GMW103<br>(Point 10) | GMW104<br>(Point 11) | GMW105<br>(Point 12) | GMW106<br>(Point 13) |
|--|------------|------|------|-------------------|---------------------|----------------------|----------------------|----------------------|----------------------|
| Sampling date / time                         |            |      |      | 01-Nov-2021 00:00 | 01-Nov-2021 00:00   | 01-Nov-2021 00:00    | 01-Nov-2021 00:00    | 01-Nov-2021 00:00    |                      |
| Compound                                     | CAS Number | LOR  | Unit | EW2104536-001     | EW2104536-002       | EW2104536-003        | EW2104536-004        | EW2104536-005        |                      |
|  |            |      |      | Result            | Result              | Result               | Result               | Result               |                      |
| <b>EN67 PK: Field Tests - Continued</b>      |            |      |      |                   |                     |                      |                      |                      |                      |
| Field Observations                           | ----       | 0.01 | --   | ----              | ----                | ----                 | ----                 | ----                 | DRY                  |
| <b>EP005: Total Organic Carbon (TOC)</b>     |            |      |      |                   |                     |                      |                      |                      |                      |
| Total Organic Carbon                         | ----       | 1    | mg/L | 4                 | <1                  | <1                   | 5                    | ----                 |                      |
| <b>QWI-EN 67.11 Sampling of Groundwaters</b> |            |      |      |                   |                     |                      |                      |                      |                      |
| Depth  | ----       | 0.01 | m    | 4.01              | 7.52                | 7.29                 | 11.2                 | ----                 |                      |



## Analytical Results

| Sub-Matrix: WATER<br>(Matrix: WATER)                     |             |        |         | Sample ID         | GMW108S<br>(Point 14) | GMW108D<br>(Point 15) | GMW109S<br>(Point 16) | GMW109D<br>(Point 19) | GMW110<br>(Point 17) |
|--|-------------|--------|---------|-------------------|-----------------------|-----------------------|-----------------------|-----------------------|----------------------|
| Sampling date / time                                     |             |        |         | 01-Nov-2021 00:00 | 01-Nov-2021 00:00     | 01-Nov-2021 00:00     | 01-Nov-2021 00:00     | 01-Nov-2021 00:00     |                      |
| Compound   | CAS Number  | LOR    | Unit    | EW2104536-006     | EW2104536-007         | EW2104536-008         | EW2104536-009         | EW2104536-010         |                      |
|  |             |        |         | Result            | Result                | Result                | Result                | Result                |                      |
| <b>EA005FD: Field pH</b>                                 |             |        |         |                   |                       |                       |                       |                       |                      |
| pH   | ----        | 0.1    | pH Unit | 6.8               | 6.7                   | 6.2                   | 6.8                   | 6.9                   |                      |
| <b>EA010FD: Field Conductivity</b>                       |             |        |         |                   |                       |                       |                       |                       |                      |
| Electrical Conductivity (Non Compensated)                | ----        | 1      | µS/cm   | 1290              | 2930                  | 1450                  | 1980                  | 4260                  |                      |
| <b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b> |             |        |         |                   |                       |                       |                       |                       |                      |
| Total Dissolved Solids @180°C                            | ----        | 10     | mg/L    | 1010              | 1720                  | 890                   | 1210                  | 2600                  |                      |
| <b>ED037P: Alkalinity by PC Titrator</b>                 |             |        |         |                   |                       |                       |                       |                       |                      |
| Hydroxide Alkalinity as CaCO3                            | DMO-210-001 | 1      | mg/L    | <1                | <1                    | <1                    | <1                    | <1                    |                      |
| Carbonate Alkalinity as CaCO3                            | 3812-32-6   | 1      | mg/L    | <1                | <1                    | <1                    | <1                    | <1                    |                      |
| Bicarbonate Alkalinity as CaCO3                          | 71-52-3     | 1      | mg/L    | 243               | 352                   | 191                   | 225                   | 588                   |                      |
| Total Alkalinity as CaCO3                                | ----        | 1      | mg/L    | 243               | 352                   | 191                   | 225                   | 588                   |                      |
| <b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>   |             |        |         |                   |                       |                       |                       |                       |                      |
| Sulfate as SO4 - Turbidimetric                           | 14808-79-8  | 1      | mg/L    | 68                | 171                   | 122                   | 25                    | 336                   |                      |
| <b>ED045G: Chloride by Discrete Analyser</b>             |             |        |         |                   |                       |                       |                       |                       |                      |
| Chloride   | 16887-00-6  | 1      | mg/L    | 224               | 632                   | 246                   | 512                   | 902                   |                      |
| <b>ED093F: Dissolved Major Cations</b>                   |             |        |         |                   |                       |                       |                       |                       |                      |
| Calcium  | 7440-70-2   | 1      | mg/L    | 58                | 127                   | 78                    | 106                   | 206                   |                      |
| Magnesium  | 7439-95-4   | 1      | mg/L    | 33                | 75                    | 47                    | 51                    | 146                   |                      |
| Sodium   | 7440-23-5   | 1      | mg/L    | 147               | 348                   | 112                   | 190                   | 441                   |                      |
| Potassium  | 7440-09-7   | 1      | mg/L    | 3                 | 3                     | 2                     | 1                     | 2                     |                      |
| <b>EG020T: Total Metals by ICP-MS</b>                    |             |        |         |                   |                       |                       |                       |                       |                      |
| Aluminium  | 7429-90-5   | 0.01   | mg/L    | ----              | ----                  | 19.6                  | ----                  | ----                  |                      |
| Barium   | 7440-39-3   | 0.001  | mg/L    | ----              | ----                  | 0.414                 | ----                  | ----                  |                      |
| Cadmium  | 7440-43-9   | 0.0001 | mg/L    | ----              | ----                  | 0.0009                | ----                  | ----                  |                      |
| Cobalt   | 7440-48-4   | 0.001  | mg/L    | ----              | ----                  | 0.056                 | ----                  | ----                  |                      |
| Chromium   | 7440-47-3   | 0.001  | mg/L    | ----              | ----                  | 0.025                 | ----                  | ----                  |                      |
| Copper   | 7440-50-8   | 0.001  | mg/L    | ----              | ----                  | 0.074                 | ----                  | ----                  |                      |
| Manganese  | 7439-96-5   | 0.001  | mg/L    | ----              | ----                  | 4.33                  | ----                  | ----                  |                      |
| Lead   | 7439-92-1   | 0.001  | mg/L    | ----              | ----                  | 0.043                 | ----                  | ----                  |                      |
| Zinc   | 7440-66-6   | 0.005  | mg/L    | ----              | ----                  | 0.242                 | ----                  | ----                  |                      |
| <b>EK055G: Ammonia as N by Discrete Analyser</b>         |             |        |         |                   |                       |                       |                       |                       |                      |
| Ammonia as N   | 7664-41-7   | 0.01   | mg/L    | 0.06              | 0.04                  | 0.32                  | 0.09                  | <0.01                 |                      |
| <b>EP005: Total Organic Carbon (TOC)</b>                 |             |        |         |                   |                       |                       |                       |                       |                      |



### Analytical Results

| Sub-Matrix: WATER<br>(Matrix: WATER)                 |            |      |      | Sample ID         | GMW108S<br>(Point 14) | GMW108D<br>(Point 15) | GMW109S<br>(Point 16) | GMW109D<br>(Point 19) | GMW110<br>(Point 17) |
|--|------------|------|------|-------------------|-----------------------|-----------------------|-----------------------|-----------------------|----------------------|
| Sampling date / time                                 |            |      |      | 01-Nov-2021 00:00 | 01-Nov-2021 00:00     | 01-Nov-2021 00:00     | 01-Nov-2021 00:00     | 01-Nov-2021 00:00     |                      |
| Compound   | CAS Number | LOR  | Unit | EW2104536-006     | EW2104536-007         | EW2104536-008         | EW2104536-009         | EW2104536-010         |                      |
|  |            |      |      | Result            | Result                | Result                | Result                | Result                |                      |
| <b>EP005: Total Organic Carbon (TOC) - Continued</b> |            |      |      |                   |                       |                       |                       |                       |                      |
| Total Organic Carbon                                 | ----       | 1    | mg/L | 7                 | 3                     | 6                     | <1                    | <1                    |                      |
| <b>QWI-EN 67.11 Sampling of Groundwaters</b>         |            |      |      |                   |                       |                       |                       |                       |                      |
| Depth  | ----       | 0.01 | m    | 2.69              | 2.24                  | 3.49                  | 2.16                  | 4.14                  |                      |



## Analytical Results

| Sub-Matrix: WATER<br>(Matrix: WATER)                     |             | Sample ID         |         | GMW111<br>(Point 18) | GABH02<br>(Point 5) | BH6<br>(Point 20) | ----  | ----  |
|--|-------------|-------------------|---------|----------------------|---------------------|-------------------|-------|-------|
| Sampling date / time                                     |             | 01-Nov-2021 00:00 |         | 01-Nov-2021 00:00    | 01-Nov-2021 00:00   | 01-Nov-2021 00:00 | ----  | ----  |
| Compound   | CAS Number  | LOR               | Unit    | EW2104536-011        | EW2104536-012       | EW2104536-013     | ----- | ----- |
|  |             |                   |         | Result               | Result              | Result            | ----  | ----  |
| <b>EA005FD: Field pH</b>                                 |             |                   |         |                      |                     |                   |       |       |
| pH   | ----        | 0.1               | pH Unit | 7.0                  | 6.8                 | 6.9               | ----  | ----  |
| <b>EA010FD: Field Conductivity</b>                       |             |                   |         |                      |                     |                   |       |       |
| Electrical Conductivity (Non Compensated)                | ----        | 1                 | µS/cm   | 3770                 | 4410                | 1450              | ----  | ----  |
| <b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b> |             |                   |         |                      |                     |                   |       |       |
| Total Dissolved Solids @180°C                            | ----        | 10                | mg/L    | 2160                 | 2600                | 820               | ----  | ----  |
| <b>ED037P: Alkalinity by PC Titrator</b>                 |             |                   |         |                      |                     |                   |       |       |
| Hydroxide Alkalinity as CaCO3                            | DMO-210-001 | 1                 | mg/L    | <1                   | <1                  | <1                | ----  | ----  |
| Carbonate Alkalinity as CaCO3                            | 3812-32-6   | 1                 | mg/L    | <1                   | <1                  | <1                | ----  | ----  |
| Bicarbonate Alkalinity as CaCO3                          | 71-52-3     | 1                 | mg/L    | 578                  | 729                 | 347               | ----  | ----  |
| Total Alkalinity as CaCO3                                | ----        | 1                 | mg/L    | 578                  | 729                 | 347               | ----  | ----  |
| <b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>   |             |                   |         |                      |                     |                   |       |       |
| Sulfate as SO4 - Turbidimetric                           | 14808-79-8  | 1                 | mg/L    | 210                  | 114                 | 34                | ----  | ----  |
| <b>ED045G: Chloride by Discrete Analyser</b>             |             |                   |         |                      |                     |                   |       |       |
| Chloride   | 16887-00-6  | 1                 | mg/L    | 793                  | 876                 | 179               | ----  | ----  |
| <b>ED093F: Dissolved Major Cations</b>                   |             |                   |         |                      |                     |                   |       |       |
| Calcium  | 7440-70-2   | 1                 | mg/L    | 147                  | 247                 | 67                | ----  | ----  |
| Magnesium  | 7439-95-4   | 1                 | mg/L    | 109                  | 133                 | 34                | ----  | ----  |
| Sodium   | 7440-23-5   | 1                 | mg/L    | 476                  | 453                 | 181               | ----  | ----  |
| Potassium  | 7440-09-7   | 1                 | mg/L    | 2                    | 16                  | 3                 | ----  | ----  |
| <b>EK055G: Ammonia as N by Discrete Analyser</b>         |             |                   |         |                      |                     |                   |       |       |
| Ammonia as N   | 7664-41-7   | 0.01              | mg/L    | 0.28                 | 0.32                | 0.60              | ----  | ----  |
| <b>EP005: Total Organic Carbon (TOC)</b>                 |             |                   |         |                      |                     |                   |       |       |
| Total Organic Carbon                                     | ----        | 1                 | mg/L    | 2                    | 6                   | 12                | ----  | ----  |
| <b>QWI-EN 67.11 Sampling of Groundwaters</b>             |             |                   |         |                      |                     |                   |       |       |
| Depth  | ----        | 0.01              | m       | 6.59                 | 5.09                | 1.50              | ----  | ----  |



### ***Inter-Laboratory Testing***

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP005: Total Organic Carbon (TOC)

(WATER) EK055G: Ammonia as N by Discrete Analyser

(WATER) ED045G: Chloride by Discrete Analyser

(WATER) ED041G: Sulfate (Turbidimetric) as SO<sub>4</sub><sup>2-</sup> by DA

(WATER) ED037P: Alkalinity by PC Titrator

(WATER) ED093F: Dissolved Major Cations

(WATER) EA015: Total Dissolved Solids dried at 180 ± 5 °C

(WATER) EG020T: Total Metals by ICP-MS