



CERTIFICATE OF ANALYSIS

Work Order : **EW1403534**

Client : **WOLLONGONG CITY COUNCIL**

Contact : MR WAYDE PETERSON

Address : 41 BURELLI STREET
WOLLONGONG NSW, AUSTRALIA 2500

E-mail : wpeterson@wollongong.nsw.gov.au

Telephone : +61 02 4227 7111

Facsimile : +61 02 4227 7277

Project : Helensburgh Groundwater Quarterly

Order number : 3030159

C-O-C number : ----

Sampler : Craig Wilson

Site : ----

Quote number : SY/454/14 Tender

Page : 1 of 4

Laboratory : Environmental Division NSW South Coast

Contact : Glenn Davies

Address : 99 Kenny Street, Wollongong 2500
Unit 4 / 13 Geary Place, PO Box 3105, North Nowra 2541
AUSTRALIA

E-mail : glenn.davies@alsglobal.com

Telephone : 02 4225 3125

Facsimile : 02 4225 3128

QC Level : NEPM 2013 Schedule B(3) and ALS QCS3 requirement

Date Samples Received : 21-NOV-2014

Issue Date : 28-NOV-2014

No. of samples received : 9

No. of samples analysed : 9

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

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

| Signatories | Position | Accreditation Category |
|-----------------|---------------------------------------|-------------------------|
| Ashesh Patel | Inorganic Chemist | Sydney Inorganics |
| Glenn Davies | Environmental Services Representative | Laboratory - Wollongong |
| Shobhna Chandra | Metals Coordinator | Sydney Inorganics |



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by 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

- **Field tests completed on day of sampling/receipt.**
- **Sampling and sample data supplied by ALS Wollongong.**
- **Sampling completed as per FWI-EN001 Groundwater Sampling.**



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

| | | | | BH 1 (Point 5) | BH 2 | BH 4 (Point 7) | GWMB 5 (Point 16) | GWMB 6 (Point 6) |
|--|-------------|------|---------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | | | | 21-NOV-2014 10:15 | 21-NOV-2014 10:45 | 21-NOV-2014 11:35 | 21-NOV-2014 11:45 | 21-NOV-2014 11:25 |
| Compound | CAS Number | LOR | Unit | EW1403534-001 | EW1403534-002 | EW1403534-003 | EW1403534-004 | EW1403534-005 |
| EA005FD: Field pH | | | | | | | | |
| pH | ---- | 0.1 | pH Unit | 5.2 | 6.0 | 4.4 | 4.4 | 5.7 |
| EA015: Total Dissolved Solids | | | | | | | | |
| Total Dissolved Solids @180°C | ---- | 1 | mg/L | ---- | 538 | ---- | ---- | ---- |
| Total Dissolved Solids @180°C | ---- | 1 | mg/L | 385 | ---- | 300 | 120 | 202 |
| ED037P: Alkalinity by PC Titrator | | | | | | | | |
| 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 | 8 | 265 | <1 | <1 | 43 |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | 8 | 265 | <1 | <1 | 43 |
| ED041G: Sulfate (Turbidimetric) as SO4 2- by DA | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | 137 | 70 | 96 | 27 | 56 |
| ED045G: Chloride Discrete analyser | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | 116 | 130 | 96 | 44 | 41 |
| ED093T: Total Major Cations | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | 30 | 18 | <1 | 4 | 14 |
| Magnesium | 7439-95-4 | 1 | mg/L | 23 | 9 | 5 | 5 | 8 |
| Sodium | 7440-23-5 | 1 | mg/L | 54 | 176 | 93 | 25 | 40 |
| Potassium | 7440-09-7 | 1 | mg/L | <1 | 28 | <1 | <1 | 1 |
| EK055G: Ammonia as N by Discrete Analyser | | | | | | | | |
| Ammonia as N | 7664-41-7 | 0.01 | mg/L | 0.29 | 21.8 | 0.06 | <0.01 | <0.01 |
| EP005: Total Organic Carbon (TOC) | | | | | | | | |
| Total Organic Carbon | ---- | 1 | mg/L | <1 | 18 | <1 | <1 | 3 |
| FWI-EN/001: Groundwater Sampling - Depth | | | | | | | | |
| Depth | ---- | 0.01 | m | 3.46 | 2.27 | 4.60 | 5.55 | 3.44 |



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

| | | | | LGMB1 (Point 12) | LGMB2 (Point 13) | LGMB3 (Point 14) | LGMB4 (Point 15) | ---- |
|--|-------------|------|---------|-------------------|-------------------|-------------------|-------------------|------|
| | | | | 21-NOV-2014 10:05 | 21-NOV-2014 10:25 | 21-NOV-2014 10:40 | 21-NOV-2014 10:35 | ---- |
| Compound | CAS Number | LOR | Unit | EW1403534-006 | EW1403534-007 | EW1403534-008 | EW1403534-009 | ---- |
| EA005FD: Field pH | | | | | | | | |
| pH | ---- | 0.1 | pH Unit | 4.7 | 4.8 | 5.5 | 4.8 | ---- |
| EA015: Total Dissolved Solids | | | | | | | | |
| Total Dissolved Solids @180°C | ---- | 1 | mg/L | 128 | 132 | 71 | 128 | ---- |
| ED037P: Alkalinity by PC Titrator | | | | | | | | |
| 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 | 5 | 3 | 23 | 2 | ---- |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | 5 | 3 | 23 | 2 | ---- |
| ED041G: Sulfate (Turbidimetric) as SO4 2- by DA | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | 74 | 33 | 20 | 39 | ---- |
| ED045G: Chloride Discrete analyser | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | 20 | 50 | 22 | 9 | ---- |
| ED093T: Total Major Cations | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | 6 | 6 | 7 | 8 | ---- |
| Magnesium | 7439-95-4 | 1 | mg/L | 4 | 6 | 4 | 3 | ---- |
| Sodium | 7440-23-5 | 1 | mg/L | 31 | 29 | 11 | 8 | ---- |
| Potassium | 7440-09-7 | 1 | mg/L | 2 | <1 | 2 | 21 | ---- |
| EK055G: Ammonia as N by Discrete Analyser | | | | | | | | |
| Ammonia as N | 7664-41-7 | 0.01 | mg/L | 0.01 | <0.01 | 0.21 | <0.01 | ---- |
| EP005: Total Organic Carbon (TOC) | | | | | | | | |
| Total Organic Carbon | ---- | 1 | mg/L | 6 | <1 | <1 | 4 | ---- |
| FWI-EN/001: Groundwater Sampling - Depth | | | | | | | | |
| Depth | ---- | 0.01 | m | 2.87 | 3.18 | 3.12 | 3.14 | ---- |