



GROUNDWATER MONITORING REPORT

Coramba Coffs Harbour City Council

4/09/2015



This project has been assisted by the New South Wales Government through the Environmental Trust.

| Issue/revision | DRAFT | REVISION 1 | FINAL | | | | |
|----------------|----------------------------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------|--|--|--|--|
| Remarks | For Client comment | Amended following comments from EPA | Final | | | | |
| Date | 30 June 2015 | 30 July 2015 | 3 September 2015 | | | | |
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| Project number | 00027055 | 00027055 | 00027055 | | | | |
| File reference | 00027055 Coramba Groundwater Monitoring Report_June 2015_DRAFT | 00027055 Coramba Groundwater Monitoring Report_June 2015_DRAFT V2.0 | 00027055 Coramba Groundwater Monitoring Report_June 2015_V2.1 Final | | | | |

Groundwater Monitoring Report

Coramba

Coffs Harbour City Council

4/09/2015

Client

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Executive Summary

WSP Environmental Pty Ltd (WSP) was engaged by Coffs Harbour City Council (CHCC) to conduct a Groundwater Monitoring Event (GME) from previously installed monitoring wells located between the BP service station and the Orara River within the township of Coramba, NSW ("the site")

The most recent previous GME for the site was conducted in March 2015, following approximately 18 months operation of the SVE and air sparge system (the system), which is installed at the site. Based on the results of the investigation in March, a decision was made to switch the system off for a trial period of 3 months.

This investigation is required to update the existing concentrations of contaminants of concern (COC) ((namely TRH (formerly TPH) and BTEX) and to ascertain if there has been a 'rebound' in hydrocarbon impact (increase in reported concentrations of COCs) in the immediate and general vicinity of the system. The GME includes all previously installed monitoring wells at the site.

This report presents the results of the most recent groundwater sampling, including a comparison with results from WSP's previous groundwater monitoring event(s) conducted at the site (in particular the GME undertaken in March, 2015).

Water level gauging and sampling was conducted for twenty (20) existing monitoring wells at the site. WSP notes that two (2) previously installed monitoring wells (MW1 and MW19) could not be located and two (2) monitoring wells (MW2 and MW5) were reported 'dry'. All groundwater samples were analysed for Total Recoverable Hydrocarbons (TRH), ((previously known as Total Petroleum Hydrocarbons (TPH)) and Benzene, Toluene, Ethylbenzene, Xylene (BTEX). In addition, selected samples (MW6, MW11 and MW14) were analysed for natural attenuation factors (Ammonia, Major Cations, Major Anions, Ferrous Iron and Free Carbon Dioxide).

The following provides a summary of the key findings for the GME, including a comparison of results from the previous groundwater monitoring events conducted by WSP at the site. In particular WSP has compared the results of the GME conducted in March 2015 to determine if any identified rebound in hydrocarbon impact is likely attributable to the shut-down of the system;

- BTEX are present within groundwater monitoring wells MW4B, MW6, MW12, MW14, MW16 and MW23 at concentrations above the adopted groundwater assessment criteria. Concentrations of BTEX have been relatively stable or have shown a declining trend since 2013;
- TRH (formerly reported as TPH) is present within groundwater monitoring wells MW4B, MW6, MW11, MW12, MW13, MW14, MW16, MW17 and MW24 at concentrations above adopted groundwater assessment criteria. WSP notes that the adopted assessment criteria for TRH is used as a 'screening' criteria only. The fluctuation in reported TRH concentrations since the GME in 2013 is considered a potential effect of seasonal variations and the highly variable rainfall, which is known to occur at the Site;
- The reported contaminant concentrations for monitoring wells MW14, MW16 and MW23, which are in the vicinity of the service station, are indicative of phase separate hydrocarbons, smearing or high dissolved phase impact;
- Based on a comparison of results with the GME conducted in March, 2015, WSP does not consider that there has been a 'rebound' in hydrocarbon impact at the Site, which is likely attributable to the system being switched off; and
- MNA is occurring within monitoring wells affected by the plume at the site; however, the rate of degradation is likely limited due to a lack of available electron donors.

1 Introduction

1.1 Background

WSP Environmental Pty Ltd (WSP) was engaged by Coffs Harbour City Council (CHCC) to conduct a Groundwater Monitoring Event (GME) from previously installed monitoring wells located between the BP service station and the Orara River within the township of Coramba, NSW ("the site"). The site investigation area and monitoring well network is presented in Figures 1 and 2, **Appendix A**.

The most recent previous GME for the site was conducted in March 2015, following approximately 18 months operation of the SVE and air sparge system (the system), which is installed at the site. Based on the results of the investigation in March, a decision was made to switch the system off for a trial period of 3 months.

This investigation is required to update the existing concentrations of contaminants of concern (COC) ((namely TRH (formerly TPH) and BTEX) and to ascertain if there has been a 'rebound' in hydrocarbon impact (increase in reported concentrations of COCs) in the immediate and general vicinity of the system. The GME includes all previously installed monitoring wells at the site

For consistency with previous investigations conducted at the site and to assist future decision making with respect to monitored natural attenuation (MNA), WSP analysed MNA parameters from three (3) monitoring wells (MW6, MW11 and MW14) at the site (MW2 was reported dry and could not be sampled).

1.2 Aims & Objectives

The aim of the GME was to establish existing concentrations of COC at the Site. The overarching objective of the works was to determine if there has been a 'rebound' in hydrocarbon impact at the Site, which is likely attributable to the system being switched off.

This report presents the results of the most recent groundwater sampling, including a comparison with results from WSP's previous groundwater monitoring event(s) conducted at the site (in particular the results from March, 2015). Based on the outcomes of this GME, WSP understands that a groundwater management program is likely required for on-going management of hydrocarbon impact at the Site

1.3 Scope of Work

The following scope of works was completed as part of the GME:

- Review of previous groundwater monitoring results and in particular the results of the GME conducted in March, 2015 at the time the system was switched off;
- Water level gauging and sampling of twenty-two (22) existing monitoring wells at the site. WSP notes that two (2) previously installed monitoring wells (MW1 and MW19) could not be located;
- Measurement of groundwater field parameters including pH, dissolved oxygen (DO), electrical conductivity (EC), oxygen redox potential (redox) and temperature prior to the collection of groundwater samples;
- Groundwater wells were purged and sampled using either a micropurge or peristaltic low flow pump. Dedicated tubing was used for each groundwater monitoring well to minimise the potential for crosscontamination;
- Submission of all groundwater samples to a NATA certified laboratory (Envirolab) for analysis of total recoverable hydrocarbons (TRH) (previously referred to as TPH) and benzene, toluene, ethyl-benzene and xylenes (BTEX);
- In addition, selected samples (MW2, MW6, MW11 and MW14) were analysed for natural attenuation factors (Ammonia, Major Cations, Major Anions, Ferrous Iron and Free Carbon Dioxide);

- Collection of a Quality Assurance/Quality Control (QA/QC) groundwater sample, which included one duplicate;
- Assessment of analytical data against adopted site criteria; and,
- Preparation of this GME report detailing the findings of the investigation.

1.4 Report Limitations

The findings of this report are based on the scope of work outlined in Section 1.3. WSP performed its services in a manner consistent with the normal level of care and expertise exercised by members of the environmental assessment profession. No warranties, express or implied are made.

Subject to the scope of work, WSP's assessment was limited strictly to identifying the environmental conditions associated with the subject property and does not include evaluation of any other issues. The absence of any identified hazardous or toxic materials should not be interpreted as a guarantee that such materials do not exist on the subject property.

This report does not comment on any regulatory obligations based on the findings. This report relates only to the objectives stated and does not relate to any other work undertaken for the Client. It is a report based on the concentrations of contaminants observed in groundwater at the time of the sample collection. These conditions may change with time and space.

All conclusions and recommendations regarding the property are the professional opinions of the WSP personnel involved with the project, subject to the qualifications made above. While normal assessments of data reliability have been made, WSP assumes no responsibility or liability for errors in any data obtained from regulatory agencies, statements or sources outside of WSP, or developments resulting from situations outside the scope of this project.

WSP is not engaged in environmental assessment and reporting for the purpose of advertising sales promoting, or endorsement of any client interests, including raising investment capital, recommending investment decisions, or other publicity purposes.

2 Site Identification

The investigation area is located in the township of Coramba and the site is defined (WSP, 2011) as the area encompassed by all previously installed monitoring wells located north, east and west of the BP Service Station, extending to the Orara River (approximately 180m north-east from the service station). The site investigation area and monitoring well network are presented in Figure 1 and Figure 2, **Appendix A**, respectively. A conceptual cross section of the Site is shown in Figure 4, **Appendix A**.

3 Methodology

The following outlines the methodology adopted by WSP for the GME, including description of field equipment used, decontamination procedures, field and laboratory quality assurance and control, laboratory analytical methods and sample preservation, transport and handling.

3.1 Boundaries of the Study

The investigation works were limited to previously installed monitoring wells ((by Golder in 2004 (4 wells) and WSP in 2006 (20 wells)), which are located in the vicinity of the BP service station on Gale Rd, Coramba and extending to the Orara River. Monitoring well locations are presented in Figure 2, **Appendix A**.

The temporal boundaries of the study were limited to those dates that the investigation was undertaken.

3.2 Groundwater Well Purging and Sampling

Groundwater samples were collected on 10 - 11 June 2015 using low flow sampling techniques.

Prior to sampling, all wells were gauged with an interface water level meter. Monitoring wells were then purged using either a micropurge or peristaltic pump (depending on observed standing water levels) to ensure minimal losses of Volatile Organic Compounds (VOCs). Purging continued until groundwater parameters stabilised to within 10% of the previous reading. Water quality parameters recorded included pH, redox potential (Eh), electrical conductivity, dissolved oxygen and temperature. Dedicated tubing was used for each individual well and purging equipment was thoroughly decontaminated between purge events with a phosphate free detergent (Decon 90) and rinsed with potable and deionised water.

Samples were placed directly into laboratory supplied sampling containers.

Field records of the groundwater monitoring event are provided in Appendix E.

3.3 Sample Storage and Handling

For preservation and in accordance with NEPM (2013) procedures, samples were immediately placed in an icefilled Esky to ensure that the samples start cooling as soon as possible before reaching the laboratory.

A chain of custody (CoC) form was filled out with the sample ID and required analyses, and dispatched to the laboratory for analysis.

A copy of the chain of custody documentation is included with laboratory certificates in Appendix D.

3.4 Laboratory Analysis and Methods

Sample analysis was conducted by Envirolab Services (NATA No. 2901). All analysis was undertaken in accordance with NATA approved methods as detailed on the laboratory certificates of analysis (**Appendix D**). All groundwater samples were analysed for the previously identified contaminants of concern; TRH and BTEX. Selected groundwater samples (MW6, MW11 and MW14) were analysed for natural attenuation factors (Ammonia, Major Cations, Major Anions, Ferrous Iron and Free Carbon Dioxide)

4 Quality Assurance/Quality Control (QA/QC)

For any given project, all investigation data are potentially subject to sampling and data reduction errors. Quality control (QC) procedures are designed to both increase sample data quality and help interpret discrepancies in results.

All work was conducted in accordance with industry-accepted standards and quality assured procedures. Field quality control included rigorous sample collection, decontamination procedures, and sample documentation.

WSP implemented QC procedures during groundwater sampling by collecting representative QC samples for subsequent laboratory analyses. Following these analyses, laboratory and sampling data quality objectives were analysed and reported in terms of data precision, accuracy, and completeness. WSP standard field procedures require that samples are collected from discrete locations. WSP standard field procedures specify that field duplicates be collected at the rate of at least one sample per twenty samples collected in the field. The following provides a summary of QA/QC samples collected:

- One intra-laboratory duplicate was collected and analysed for contaminants of concern (TRH and BTEX); and
- One trip blank and one field blank was analysed for volatile TRH fractions (vTRH) and BTEX, to determine potential cross contamination by volatiles during sample collection and transportation.

Laboratory Quality Assurance (QA) and Quality Control (QC) procedures included sample spikes for organic analysis. The results of the QC testing are presented in the laboratory reports, which also indicate how much of a particular analyte was recovered. Duplicate testing is undertaken by the laboratory to compare the results obtained in analysing samples.

5 Assessment Criteria

5.1 Contaminants of Concern

Based on a review of the site history and previous groundwater investigations conducted at the site, the following potential contaminants of concern (COC) have been identified:

- Benzene, Toluene, Ethyl-benzene and Xylene (BTEX); and
- Total recoverable hydrocarbons (TRH) including fraction chain lengths consisting of volatile fractions (C₆ C₉) and semi-volatile fractions (C₁₀ C₃₆).

In addition and to allow comparison with results from previous groundwater investigations, the following natural attenuation factors were analysed for monitoring wells MW6, MW11 and MW14:

- Ammonia
- Major anions (alkalinity, nitrate, nitrite, chloride, sulphate);
- Major cations (calcium, magnesium, sodium, potassium);
- Ferrous iron; and
- Free carbon dioxide

5.2 NEPM ASC 2013

The National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPM 1999) was made under the National Environment Protection Council Act 1994 (Cth) and is given effect by individual legislation and guidelines in each state or territory.

On 11 April 2013, the National Environment Protection Council (NEPC) agreed to vary the NEPM 1999 by approving the amending instrument NEPM ASC 2013 (NEPM 2013).

The 12 month transition period for full implementation of the amended ASC NEPM has now expired. WSP considers however, that to meet the overarching objective for the investigation - which is to compare existing and historical groundwater conditions to assess the effectiveness of the remediation system – the assessment criteria should remain consistent with ones used historically.

5.3 Assessment Criteria

This assessment included a comparison of individual sample results to the following published guidelines. These guidelines are considered acceptable, given the sites current landuse setting and for consistency with comparison of results from previous investigations:

- ANZECC (2000) Australian and New Zealand Guidelines for Fresh Water Quality (95% Protection Levels), Groundwater Investigation Levels, Aquatic Ecosystems; and
- National Health and Medical Research Council (NHMRC) & Natural Resource Management Ministerial Council (NRMMC) (2011) Australian Drinking Water Guidelines.

In the absence of relevant state and national guidance for TRH in groundwater, the following guidelines were adopted as screening levels:

- NSW EPA (1994) Contaminated Sites: Service Station Guidelines for petroleum hydrocarbons in groundwater; and
- Ministry of Housing ((Netherland (2000)), Spatial Planning and the Environment (2000) Environment Quality Objectives in the Netherlands for petroleum hydrocarbons in groundwater.

The adopted Groundwater Assessment Criteria (GAC) for the contaminants of concern is presented in Table 5.3 below:

| Table 5.3 Adopte | u Groundwaler Assess | | | |
|-----------------------------------------------------------------------------|------------------------------------------------------|---------------------------------------|-------------------------------------------|--------------------------------|
| Paramater | ANZECC 2000 95% Freshwater ¹ (ug/L) | NSW EPA (1994) ² (ug/L) | Netherlands (2000) ³ (ug/L) | NHMRC ADW (2011)⁴ (ug/L) |
| BTEX | | | | |
| Benzene | 950 | - | - | 1 |
| Toluene | - | 300 | - | 800 |
| Ethyl benzene | - | 140 | - | 300 |
| m & p-xylene | 200 | - | - | |
| o –xylene | 350 | - | - | |
| Xylene total | 550 | - | - | 600 |
| TRH | | | | |
| Total Recoverable Hydrocarbons (TRH) C ₁₀ -C ₃₆ | - | - | 600 | - |

 Table 5.3
 Adopted Groundwater Assessment Criteria

1. ANZECC (2000) Australian and New Zealand Guidelines for Freshwater Quality (95% Protection Levels), the National Environment Protection (Assessment of Site Contamination) Measure (1999) Schedule B(1) *Groundwater Investigation Levels, Aquatic Ecosystems, Freshwaters*;

2. NSW EPA (1994) Service Station Guidelines (screening levels only);

3. Ministry of Housing (Netherlands), Spatial Planning and the Environment (2000) *Environment Quality Objectives in the Netherlands for petroleum hydrocarbons in groundwater (screening levels only)*.

4. National Health and Medical Research Council (NHMRC) & Natural Resource Management Ministerial Council (NRMMC) (2004) *Australian Drinking Water Guidelines;*

5. (-) denotes no applicable criteria

6 Data Quality Assessment

The following QA/QC samples were collected in the field:

DUP 1 (10/06/15) was an intra-laboratory duplicate of primary groundwater sample MW4B; and

In addition, one (1) field blank and one (1) trip blank provided by the primary lab (Envirolab) were analysed for volatiles to determine potential cross contamination during sampling or transportation.

Summary groundwater relative percentage difference (RPD) results are presented in Table 1d, Appendix B.

Laboratory QA/QC comprised of chain-of-custody requirements, sample integrity and holding times, use of acceptable NATA-registered laboratory methods and laboratory QA/QC results (refer to laboratory certificates in **Appendix D**).

The following comments are made as a summary regarding the quality of the field and analytical components of this project:

- Sample integrity and container requirements were documented as acceptable;
- Holding time compliances were documented as acceptable. All samples were received by the laboratory within the relevant holding times;
- A qualitative review of groundwater sample duplicate RPD values indicated that field precision was acceptable. No RPD exceedences were reported;
- The trip blanks reported concentrations for all volatiles below the laboratory limit of reporting indicating that cross contamination of volatiles did not occur during sample collection and transportation;
- The primary (Envirolab) laboratory, including all laboratory test methods were NATA registered at the time of analysis; and,
- All laboratory QA/QC method blanks and field blanks were found to be within acceptable limits.

In summary, the QA/QC data is determined to be of sufficient quality to ensure validity of the conclusions reached for the investigation.

7 Observations and Analytical Results

7.1 Field Observations

The following section presents an overview of field observations of groundwater encountered during the GME. Copies of field observations sheets are provided in **Appendix E**.

During sampling, groundwater was generally observed to be clear or slightly cloudy. With the exception of MW2, MW3, MW5, MW7, MW8, MW9, MW10, MW13, MW15, MW21 and MW24, hydrocarbon odours were noted in 50% of the monitoring wells sampled at the site. Monitoring wells MW1 and MW19 could not be located and were consequently not sampled. In addition, monitoring wells MW2 and MW5 were 'dry' and could not been sampled. Groundwater physicochemical data for each of the wells sampled are presented on field sheets in **Appendix E** and summarised in Table 7.1 below.

| Table 7.1 | Groundwater Field Parameters | | | | | | | | | | | | |
|-----------------------|------------------------------|------------------|------------------------------|-------------------------------------|---------------------------------------|--|--|--|--|--|--|--|--|
| Monitoring Well ID | Temp (°C) | pH (pH units) | Dissolved Oxygen (ppm) | Redox / ORP ¹ (mV) | Electrical Conductivity (µs/cm) | | | | | | | | |
| MW1 | | Could not locate | | | | | | | | | | | |
| MW2 | | | Dry | | | | | | | | | | |
| MW3 | 18.9 | 5.30 | 1.61 | 103.0 | 160.3 | | | | | | | | |
| MW4B | 20.5 | 6.55 | 0.18 | -109.0 | 345.1 | | | | | | | | |
| MW5 | | | Dry | | | | | | | | | | |
| MW6 | 20.9 | 5.76 | 0.16 | -124.0 | 234.0 | | | | | | | | |
| MW7 | 19.6 | 5.82 | 0.82 | 104.0 | 189.1 | | | | | | | | |
| MW8 | 20.5 | 5.46 | 0.28 | 153.3 | 191.8 | | | | | | | | |
| MW9 | 19.3 | 5.02 | 2.10 | 201.0 | 136.8 | | | | | | | | |
| MW10 | 15.4 | 6.78 | 0.39 | -75.0 | 81.3 | | | | | | | | |
| MW11 | 20.5 | 6.49 | 0.33 | -122.0 | 339.0 | | | | | | | | |
| MW12 | 21.5 | 6.44 | 0.69 | -138.0 | 352.9 | | | | | | | | |
| MW13 | 20.6 | 5.61 | 0.78 | -79.0 | 335.0 | | | | | | | | |
| MW14 | 20.7 | 6.45 | 0.25 | -141.0 | 348.0 | | | | | | | | |
| MW15 | 17.9 | 5.52 | 1.21 | 132.0 | 193.0 | | | | | | | | |
| MW16 | 20.4 | 6.42 | 0.21 | -154.0 | 303.2 | | | | | | | | |
| MW17 | 20.0 | 6.34 | 0.25 | -151.0 | 258.3 | | | | | | | | |
| MW18 | 21.3 | 6.28 | 0.28 | -74.0 | 268.1 | | | | | | | | |
| MW19 | | | Could not loca | ate | | | | | | | | | |
| MW20 | 19.8 | 5.61 | 0.37 | -36.0 | 122.7 | | | | | | | | |
| MW21 | 19.9 | 5.46 | 0.57 | 101.0 | 134.6 | | | | | | | | |
| MW22 | 19.9 | 6.27 | 0.67 | -93.0 | 214.1 | | | | | | | | |
| MW23 | 20.5 | 6.68 | 0.23 | -92.0 | 353.1 | | | | | | | | |
| MW24 | 20.8 | 6.41 | 0.32 | 37.0 | 220.5 | | | | | | | | |

In summary, Table 7.1 indicates the following:

The temperature of the groundwater ranged between 15.4°C and 21.5°C, which is typical of seasonal (winter) groundwater conditions at the Site;

- PH ranged between 5.02 and 6.78, indicating acidic to slightly acidic groundwater conditions across the Site;
- Dissolved oxygen in the groundwater ranged from 0.16 and 2.10ppm indicating both anaerobic and aerobic groundwater conditions across the Site;
- Conductivity levels were reported between 81.3 and 348.0 micro Siemens/cm (µs/cm), which indicates fresh groundwater conditions across the site.

With the exception of SWL, groundwater conditions are considered comparable with field observations observed made during the GME conducted in March, 2015.

Reported SWLs were an average 1 - 2m lower than those observed for wells sampled during the March, 2015 monitoring event. Higher groundwater levels in March were considered to be a consequence of the high levels of rainfall observed just prior (1 - 2 weeks) to the monitoring event.

A cursory inspection of Bureau of Meteorology records for the area prior to this sampling event indicates that no notable rainfall events occurred just prior to this GME.

7.2 Analytical Results

Groundwater sampling locations are presented in Figure 2, **Appendix A**. Result summary tables are included in Table 1a, **Appendix B** with copies of laboratory certificates included in **Appendix D**. Current and historical groundwater monitoring results are presented in Table 1b, **Appendix B**.

No phase separated hydrocarbons (PSH) were detected in any well during the GME.

Concentrations of BTEX and TRH $C_{10} - C_{36}$ were reported either below the laboratory detection limit and/or the adopted GAC for all samples submitted for analysis; with the exceptions outlined in Table 7.2

Exceedances of the groundwater assessment criteria are also presented in Figure 3, **Appendix A** and the extent of the dissolved phase benzene plume is shown in Figure 5, **Appendix A** (based on data for the GME in March, 2015).

| | er Exceedences | | |
|-----------------------------|-------------------------------------------|------------------|-------------------------|
| Contaminant | Groundwater Investigation Level (ug/L) | Groundwater Well | Concentration (ug/L) |
| | | MW14 | 7,000 |
| Benzene ¹ | 950 | MW16 | 1,800 |
| | | MW23 | 3,300 |
| | | MW14 | 8,600 |
| Toluene ² | 300 | MW16 | 2,400 |
| | | MW23 | 1,000 |
| | | MW4B | 590 |
| | | MW6 | 420 |
| Ethyl-benzene ² | 140 | MW12 | 480 |
| Ethyl-benzene | 146 | MW14 | 1,600 |
| | | MW16 | 570 |
| | | MW23 | 440 |
| | | MW12 | 592 |
| Xylene (total) ¹ | 550 | MW14 | 7,900 |
| Xylerie (total) | 550 | MW16 | 3,130 |
| | | MW23 | 1,160 |
| | | MW4B | 2,600 |
| | | MW6 | 1,300 |
| | | MW11 | 1,000 |
| | | MW12 | 2,700 |
| TRH $C_{10} - C_{36}^{3}$ | 600 | MW13 | 1,230 |
| | | MW14 | 7,820 |
| | | MW16 | 4,100 |
| | | MW17 | 700 |
| | | MW24 | 1,500 |

 ANZECC (2000) Australian and New Zealand Guidelines for Freshwater Quality (95% Protection Levels), the National Environment Protection (Assessment of Site Contamination) Measure (1999) Schedule B(1) Groundwater Investigation Levels, Aquatic Ecosystems, Freshwaters;

 NSW EPA (1994) Contaminated Sites: Service Station Guidelines for petroleum hydrocarbons in groundwater (screening levels only).

3. Ministry of Housing (Netherlands), Spatial Planning and the Environment (2000) Environment Quality Objectives in the Netherlands for petroleum hydrocarbons in groundwater (screening levels only).

7.3 Monitored Natural Attenuation

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Monitored natural attenuation is the recording and evaluation of naturally occurring physical, chemical and biological parameters to demonstrate via multiple lines of evidence that one or a combination of these processes to reduce the mass, concentration or toxicity of identified hydrocarbon impact is occurring in groundwater.

Current and historical natural attenuation parameter results for selected monitoring wells (MW2 (no access provided in 2014 and 'dry' in June 2015), MW6, MW11 (not located in 2013), MW14 and MW24 (2006 only) are presented in Table 1c, **Appendix B**.

Similar to the findings from the March (2015) GME, there are indications in field measurements and analytical results that biodegradation is occurring within the plume, which is supported by the following. Concentrations of dissolved iron in sampled wells within the plume (MW6, MW11, MW14) are relatively high in comparison with MW24 (below detection limit in 2006), which is located outside of the plume area. The increased iron concentration is generally indicative of reduction of insoluble iron (III) to soluble iron (II) by oxidation (biodegradation) of contamination;

- The Oxidation Reduction Potential is significantly more reducing within the plume than along the edges of the plume (MW24 to the south-east and wells MW3, MW8 and MW9 to the north-west). This is indicative of oxidation of contamination having occurred within the plume;
- Bicarbonate levels (total alkalinity) are reported high in all wells, but highest in monitoring wells MW11 and MW14. This indicates that biodegradation is occurring within these wells. MW2 (based on data reported in March) and MW6 are also undergoing MNA but not at the same rate due to a lower hydrocarbon concentrations; and
- A comparison of relationships between native ions (in particular CI/Fe) indicates that over time conditions in MW11 may be getting more reducing (increasing trend in Fe), while MW14 may have stabilised. The results indicate that the rate of MNA in both wells is likely limited due to a lack of electron donors.

WSP notes that the findings are consistent with those observed for the GMEs undertaken in December 2014 and March 2015.

8 Discussion

The following provides a summary of the key findings for the GME, including a comparison of results from the previous groundwater monitoring events conducted by WSP at the site. In particular WSP has compared the results of the GME conducted in March 2015 to determine if any identified rebound in hydrocarbon impact is likely attributable to the shut-down of the system. Trend analysis of identified benzene concentrations (all wells) and TRH fractions for MW14 and MW23 is represented graphically in **Appendix C**.

- The trial shut-down period for the system commenced on the 3 March 2015 and remains switched off. At the time of sampling for this GME, the system had been shut-down for approximately 3 months;
- With the exception of MW23, monitoring wells which reported concentrations of benzene above adopted site criteria (MW14, MW16 and MW23) observed a decreasing trend in concentrations since the GME conducted in March, 2015. Detectable concentrations of benzene for all other wells have been declining or relatively stable since 2013;
- Concentrations of toluene was reported above adopted site criteria for monitoring wells MW14, MW16 and MW23, which is within the historically defined groundwater plume at the Site. Monitoring wells MW16 and MW23 observed an increase in toluene concentrations since the GME conducted in March, 2015; however the existing concentrations have been declining or relatively stable since 2013;
- Concentrations of ethyl-benzene was reported above adopted site criteria for monitoring wells MW4B, MW6, MW12, MW14, MW16 and MW23, which is within the historically defined groundwater plume at the Site. Monitoring wells MW4B, MW12, MW16 and MW23 observed a slight increase in ethyl-benzene concentrations since the GME conducted in March, 2015; however the existing concentrations have been declining or relatively stable since 2013;
- Concentrations of total xylene was reported above adopted site criteria for monitoring wells MW12, MW14, MW16 and MW23, which is within the historically defined groundwater plume at the Site. Concentrations of total xylene have shown a declining trend since 2013.
- Concentrations of TRH C₁₀ C₃₆ (formerly reported as TPH C₁₀ C₃₆) was reported above the adopted site criteria (screening criteria only) for monitoring wells MW4B, MW6, MW11, MW12, MW13, MW14, MW16, MW17 and MW24. With the exception of MW24, all wells were within the historically defined groundwater plume at the Site. Concentrations of TRH C₁₀ C₃₆ have shown a fluctuating trend since the GME conducted in 2013; and
- MNA is occurring within monitoring wells affected by the hydrocarbon plume at the site. However a comparison of the relationships between native ions (CI/Fe) indicates that the rate of MNA is likely limited due to a lack of electron donors.

9 Conclusions

The following conclusions have been reached based on field observations and review of analytical data for the most recent GME; including a comparison with WSP's previous GME's conducted at the site:

- BTEX are present within groundwater monitoring wells MW4B, MW6, MW12, MW14, MW16 and MW23 at concentrations above the adopted groundwater assessment criteria. Concentrations of BTEX have been relatively stable or have shown a declining trend since 2013;
- TRH (formerly reported as TPH) is present within groundwater monitoring wells MW4B, MW6, MW11, MW12, MW13, MW14, MW16, MW17 and MW24 at concentrations above adopted groundwater assessment criteria. WSP notes that the adopted assessment criteria for TRH is used as a 'screening' criteria only. The fluctuation in reported TRH concentrations since the GME in 2013 is considered a potential effect of seasonal variations and the highly variable rainfall, which is known to occur at the Site;
- The reported contaminant concentrations for monitoring wells MW14, MW16 and MW23, which are in the vicinity of the service station, are indicative of phase separate hydrocarbons, smearing or high dissolved phase impact;
- Based on a comparison of results with the GME conducted in March, 2015, WSP does not consider that there has been a 'rebound' in hydrocarbon impact at the Site, which is likely attributable to the system being switched off; and
- MNA is occurring within monitoring wells affected by the plume at the site; however, the rate of degradation is likely limited due to a lack of available electron donors.

Appendix A – Site Figures



Site Location

Coramba, NSW **FIGURE 1**



Monitoring Well Locations

Coramba, NSW FIGURE 2



KEY



 KEY
 Monitoring Well Location

 Monitoring Well Location
 Analyte –

| nitoring Well | | | |
|---------------|---------------|----------------------|----------------------|
| ation | MW6 | Concentration (ug/L) | |
| | Benzene | | ANZECC (2000) FW 95% |
| Analyte | Ethyl-benzene | | — EPA (1994) FW |
| | тен (С10-С36) | | — Netherlands (2000) |

Groundwater Exceedance Results

GME, Coramba NSW 00027055 **Figure 3**

Metres





| WITED WSP Environmental Pty Ltd Level 5 Midtown Tower, 246 Bourke Street, Melbourne, 3000 Tei: +61 (0) 3 8663 7880 Fax: +01 (0) 3 8663 7800 http:// www.wspgroup.com DO NOT SCALE Figure NOTES: Image: Comparison of the street |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Level 5 Midtown Tower, 246 Bourke Street, Melbourne, 3000 Tel: +61 (0) 3 8663 7880 Fax: +61 (0) 3 8663 7800 http:// www.wspgroup.com DO NOT SCALE FIGURE NOTES: |
| FIGURE NOTES: |
| |
| |
| (ug/L) Benzene Concentration (Exceedence – ANZECC 2000 FW 95%) |
| (ug/L) Benzene Concentration |
| ND – Non-detect |
| Dissolved Benzene Plume (Exceeding adopted guidelines) |
| Dissolved Benzene Plume (Detection above LOR) |
| CLIENT: |
| Coffs Harbour City Council |
| GME Coramba |
| Dissolve Phase Benzene Plume Extent |
| SCALE@SIZE: ISSUE: NOT TO SCALE DRAFT |
| DESIGN/DRAWN: DATE: JB APRIL 2015 |
| PROJECT No: DRAWING No: 00027055 FIGURE 05 |
| © WSP Group plc |

Appendix B – Results Summary Tables



Table 1a, Appendix B Groundwater Summary Results - June 2015

| | | | | | BTE | x | | | PAH | 1 | | TPH | | | Field | | | | | norga | nics | | | <u> </u> | Metals | | |
|--------------------------------|---------|--------------|----------|----------|--------------|----------------|------------|--------------|-------------|---------|-----------|-----------|---------|--------------------------|--------------------|--------------------|------------|---------|----------|--------------|---------------|-------------------|-----------|--------------------|----------------------|----------------------|--|
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | Benzene | Toluene | Ethylbenzene | Xylene (m & p) | Xylene (o) | Xylene Total | Naphthalene | C6 - C9 | C10 - C14 | C15 - C28 | C29-C36 | C10 - C36 (Sum of total) | Alkalinity (total) | Carbonate as CaCO3 | CO2 (Free) | Ammonia | Chloride | Ferrous Iron | lonic Balance | Sodium (Filtered) | Sulphate | Calcium (Filtered) | Magnesium (Filtered) | Potassium (Filtered) | |
| 501 | | | µg/L | µg/L | µg/L | µg/L 2 | µg/L | µg/L | ug/L | µg/L | µg/L | | µg/L | µg/L | mg/L | mg/L | µg/L | mg/L | mg/L | mg/L | % | | mg/L 1 | | | mg/L | |
| EQL NHMRC ADW 2011 | | | 1 | 1 800 | 1 300 | 2 | 1 | ND | 1 | 10 | 50 | 100 | 100 | | 5 | 5 | 0 | 0.005 | 1 | 0.05 | | 0.5 | 1 500 | 0.5 | 0.5 | 0.5 | |
| ANZECC 2000 FW 95% | | | 1 950 | 800 | 300 | 200 | 350 | 600 550 | | | | | | | | | | 0.9 | | | | | 500 | <u> </u> | | | |
| Netherlands (2000) | | | 950 | | | 200 | 300 | 550 | | | | | | 600 | | | | 0.9 | | | | | | <u> </u> | | | |
| EPA 1994 Freshwater Ecosystems | | | | 300 | 140 | | | 380 | | | | | | 000 | | | | | | | | | | <u> </u> | \mapsto | | |
| EPA 1994 Freshwater Ecosystems | | | | 300 | 140 | | | 380 | | | | | | | | | | | | | | | | · | · | _ | |
| Field ID | LocCode | Sampled Date | | | | | | | | | | | | | | | | | | | | | | | | | |
| MW3 | MW3 | 10/06/2015 | <1 | 2 | <1 | <1 | <2 | ND | <1 | <10 | <50 | <100 | | ND | - | - | - | - | - | 1 | - | - | - | - | - | - | |
| MW4B | MW4B | 10/06/2015 | 490 | 88 | 590 | 68 | 470 | 538 | 88 | 4800 | 2600 | <100 | <100 | 2600 | - | - | - | - | - | 1 | - | - | - | - | - | - | |
| MW6 | MW6 | 10/06/2015 | 750 | 37 | 420 | 35 | 200 | 235 | 67 | 3000 | 1300 | <100 | <100 | 1300 | 76 | <5 | 94,000 | 0.072 | 23 | 6.2 | -14 | 36 | 24 | 1.7 | 3.7 | 3 | |
| MW7 | MW7 | 10/06/2015 | <1 | <1 | <1 | <1 | <2 | ND | <1 | <10 | <50 | <100 | <100 | ND | - | - | - | - | - | - | - | - | - | - | - | - | |
| MW8 | MW8 | 11/06/2015 | <1 | <1 | <1 | <1 | <2 | ND | <1 | <10 | <50 | <100 | <100 | ND | - | - | - | - | - | - | - | - | - | - | - 1 | - | |
| MW9 | MW9 | 10/06/2015 | <1 | 1 | <1 | <1 | <2 | ND | <1 | <10 | <50 | <100 | | ND | - | - | - | - | - | - | - | - | - | - | - | - | |
| MW10 | MW10 | 10/06/2015 | <1 | <1 | <1 | <1 | <2 | ND | <1 | <10 | <50 | <100 | | ND | - | - | - | - | - | - | - | - | - | - | - | - | |
| MW11 | MW11 | 10/06/2015 | 640 | 5 | 4 | <1 | 31 | 31 | 57 | 2000 | 1000 | <100 | <100 | 1000 | 130 | <5 | 130,000 | 2 | 19 | 29 | -32 | 17 | <1 | 3.7 | 8.2 | 3.6 | |
| MW12 | MW12 | 10/06/2015 | 930 | 13 | 480 | 2 | 590 | 592 | 78 | 4300 | 2700 | <100 | <100 | 2700 | - | - | - | - | - | - | - | - | - | - | - 1 | - | |
| MW13 | MW13 | 11/06/2015 | 38 | 72 | 61 | 50 | 120 | 170 | 11 | 1200 | 1100 | 130 | <100 | 1230 | - | - | - | - | - | 1 | - | - | - | - | - | - | |
| MW14 | MW14 | 11/06/2015 | 7000 | 8600 | 1600 | 2400 | 5500 | 7900 | 240 | 38,000 | 7400 | 420 | <100 | 7820 | 160 | <5 | 92,000 | < 0.005 | 26 | 9.9 | -26 | 25 | <1 | 3.1 | 10 | 6.5 | |
| MW15 | MW15 | 10/06/2015 | <1 | <1 | <1 | <1 | <2 | ND | <1 | <10 | <50 | <100 | <100 | ND | 27 | <5 | 310,000 | 0.051 | 21 | 2 | 10 | 29 | 16 | 7.4 | 1.1 | 3 | |
| MW16 | MW16 | 11/06/2015 | 1800 | 2400 | 570 | 930 | 2200 | 3130 | 70 | 12,000 | 4000 | 100 | <100 | 4100 | - | - | - | - | - | - | - | - | - | - | - | - | |
| MW17 | MW17 | 11/06/2015 | 140 | 5 | 41 | 3 | 22 | 25 | 9.9 | 720 | 700 | <100 | <100 | 700 | - | - | - | - | - | - | - | - | - | - | - | - | |
| MW18 | MW18 | 11/06/2015 | 130 | 4 | 59 | <1 | 41 | 41 | 9 | 750 | 480 | <100 | <100 | 480 | - | - | - | - | - | - | - | - | - | - | - | - | |
| MW20 | MW20 | 10/06/2015 | 6 | <1 | 10 | <1 | 54 | 54 | 2 | 130 | 82 | <100 | <100 | 82 | - | - | - | - | - | - | - | - | - | - | - | - | |
| MW21 | MW21 | 11/06/2015 | <1 | <1 | <1 | <1 | <2 | ND | <1 | 62 | <50 | <100 | <100 | ND | - | - | - | - | - | - | - | - | - | - | - | - | |
| MW22 | MW22 | 11/06/2015 | 20 | <1 | 16 | <1 | 3 | 3 | 6 | 170 | 160 | <100 | <100 | 160 | - | - | - | - | - | - | - | - | - | - | - | - | |
| MW23 | MW23 | 11/06/2015 | 3300 | 1000 | 440 | 190 | 970 | 1160 | 50 | 8700 | <50 | <100 | <100 | ND | - | - | - | - | - | - | - | - | - | - | - | - | |
| MW24 | MW24 | 11/06/2015 | <1 | <1 | <1 | <1 | <2 | ND | <1 | <10 | 1500 | <100 | <100 | 1500 | - | - | - | - | - | - | - | - | - | - | - | - | |



Table 1b, Appendix B Current and Historical Groundwater Summary Results - BTEX and TPH only

| | | | | BTE | X | | ТРН | | | | | | | | | |
|------------|-----------------------|---------------------------------|----------------|--------------|----------------|------------|----------------|-----------------|----------------|-----------|----------|--------------------------|--|--|--|--|
| - | | | | | | | | | | | | | | | | |
| | | Benzene | Toluene | Ethylbenzene | Xylene (m & p) | Xylene (o) | Xylene Total | C6 - C9 | C10 - C14 | C15 - C28 | C29-C36 | C10 - C36 (Sum of total) | | | | |
| 5.01 | | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | | | | |
| EQL | | 1 | 1 | 1 | 2 | 1 | ND | 10 | 50 | 100 | 100 | ND | | | | |
| NHMRC A | | 1 | 800 | 300 | | | 600 | | | | | | | | | |
| | 000 FW 95% | 950 | | | 200 | 350 | 550 | | | | | | | | | |
| Netherland | | | | | | | | | | | | 600 | | | | |
| EPA 1994 | Freshwater Ecosystems | | 300 | 140 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Field_ID | Sampled Date | | | | | | | | | | | | | | | |
| | 1/05/06 | 2,950 | 960 | 840 | 900 | 450 | 1,350 | 5,800 | 2,840 | ND | 90 | 2,930 | | | | |
| | 29/01/08 | 1,020 | 156 | 375 | 288 | 224 | 512 | 3,150 | 1,440 | ND | ND | 1,440 | | | | |
| | 17/03/2011 | 310 | <100 | 240 | <100 | <100 | ND | 1100 | 620 | <100 | <100 | 720 | | | | |
| MW1 | 22/08/2013 | | | | | | not locate | | | | | | | | | |
| | 4/12/2014 | Not Sampled | | | | | | | | | | | | | | |
| 1 | | Not Sampled Could not locate | | | | | | | | | | | | | | |
| 1 | 4/03/2015 | | | | | | | | | | | | | | | |
| | 11/06/2015 | | | | | Could | I not locate | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| ľ | 1/05/06 | 720 | 15,500 | 1,820 | 8,800 | 3,290 | 12,090 | 28,200 | 10,300 | 300 | 60 | 10,660 | | | | |
| 1 | 29/01/08 | 50 | 1,690 | 853 | 4,750 | 2,050 | 6,800 | 13,000 | 7,030 | ND | ND | 7,030 | | | | |
| 1 | 17/03/2011 | 4 | <1 | 24 | 8 | 3 | 11 | 260 | 690 | <100 | <100 | 790 | | | | |
| MW2 | 21/08/2013 | <1 | <1 | 1 | <2 | <1 | ND | 370 | 210 | <100 | <100 | 310 | | | | |
| 1 | 4/12/2014 | | | | - | | Sampled | | | | | | | | | |
| 1 | 4/03/2015 | 3 | 2 | 3 | 2 | 5 | 7 | 19 | <50 | <100 | <100 | ND | | | | |
| 1 | 11/06/2015 | | 2 | 5 | - | 5 | Dry | 10 | -50 | -200 | -100 | | | | | |
| | | | | | | | DIY | | | | | | | | | |
| | 1/05/06 | <5 | <5 | <5 | <10 | <5 | ND | ND | ND | ND | ND | ND | | | | |
| | 29/01/08 | <1 | <1 | <1 | <2 | <1 | ND | ND | ND | ND | ND | ND | | | | |
| 1 | 17/03/2011 | 5 | <1 | 7 | 3 | <1 | 3 | 260 | 690 | <100 | <100 | 790 | | | | |
| MW3 | 21/08/2013 | <1 | <1 | <1 | <2 | <1 | ND | <10 | <50 | <100 | <100 | ND | | | | |
| IVIVUS | 4/12/2014 | | | | <u>۲</u> ۲ | | Sampled | 410 | -00 | 4100 | -100 | nD | | | | |
| | 4/02/2015 | <1 | <1 | <1 | <1 | <2 | ND | <10 | <50 | <100 | <100 | ND | | | | |
| | 10/06/2015 | <1 | 2 | <1 | <1 | <2 | ND | | | | | | | | | |
| | 10/08/2013 | ~1 | 2 | ~1 | ~1 | ~2 | ND | <10 | <50 | <100 | <100 | ND | | | | |
| - | 15/00/00 | 4 540 | 4 0 4 0 | 700 | 4.020 | 1.050 | E 000 | 0.700 | 4 2 4 0 | ND | ND | 1 240 | | | | |
| | 15/06/06 30/01/08 | 1,510 2,150 | 1,240 3,700 | 700 918 | 4,030 2,300 | 1,950 | 5,980 3,880 | 9,700 13,000 | 1,340 2,130 | ND ND | ND ND | 1,340 2,130 | | | | |
| | | | | | | | | | | | | | | | | |
| | 17/03/2011 | 89 | 110 | 46 | 60 | 65 | 125 | 310 | 570 | <100 | <100 | 670 | | | | |
| MW4B | 19/08/2013 | 82 | 39 | 160 | 64 | 55 | 119 | 1100 | 1200 | <100 | <100 | 1300 | | | | |
| | 4/12/2014 | 15 | 13 | 60 | 70 | 17 | 87 | 900 | 920 | 320 | <100 | 1240 | | | | |
| | 3/03/2015 | 200 | 37 | 210 | 21 | 75 | 96 | 1200 | 580 | <100 | <100 | 580 | | | | |
| | 10/06/2015 | 490 | 88 | 590 | 68 | 470 | 538 | 4800 | 2600 | <100 | <100 | 2600 | | | | |
| | | | | | | | | | | | | | | | | |
| | 15/06/06 | 13,500 | 13,800 | 2,290 | 7,170 | 3,130 | 10,300 | 47,500 | 7,610 | ND | 70 | 7,680 | | | | |
| | 30/01/08 | 7,080 | 8,690 | 2,050 | 5,130 | 3,180 | 8,310 | 28,400 | 11,600 | 36,600 | 1,620 | 49,820 | | | | |
| | 17/03/2011 | 270 | 170 | 77 | 180 | 130 | 310 | 920 | 1000 | <100 | <100 | 1100 | | | | |
| MW6 | 21/08/2013 | 2000 | 190 | 1100 | 700 | 180 | 880 | 8000 | 2700 | 200 | <100 | 2950 | | | | |
| 1 | 3/12/2014 | 410 | 22 | 520 | 270 | 120 | 390 | 2900 | 2000 | 1200 | 110 | 3310 | | | | |
| 1 | 4/03/2015 | 540 | 380 | 670 | 350 | 870 | 1220 | 4400 | 1900 | <100 | <100 | 1900 | | | | |
| 1 | 10/06/2015 | 750 | 37 | 420 | 35 | 200 | 235 | 3000 | 1300 | <100 | <100 | 1300 | | | | |
| | | | | | | | | 5500 | 1300 | -200 | -100 | | | | | |
| | 15/06/06 | 2 | ND | ND | ND | 4 | 4 | ND | ND | ND | ND | ND | | | | |
| 1 | 30/01/08 | <1 | <1 | <1 | <2 | <1 | ND | ND | ND | ND | 130 | 130 | | | | |
| 1 | 17/03/2011 | 1 | 4 | 3 | 8 | 5 | 13 | 17 | 79 | <100 | <100 | 179 | | | | |
| | 19/08/2013 | <1 | <1 | <1 | <2 | <1 | ND | <10 | <50 | <100 | <100 | ND | | | | |
| MW7 | | | | | | | NID | | | | | | | | | |
| 1 | 3/12/2014 | <1 | <1 | <1 | <2 | <1 | ND | <10 | <50 | 190 | <100 | 190 | | | | |
| 1 | 3/03/2015 | <1 | <1 | <1 | <1 | <2 | ND | <10 | <50 | <100 | <100 | ND | | | | |
| L | 10/06/2015 | <1 | <1 | <1 | <1 | <2 | ND | <10 | <50 | <100 | <100 | ND | | | | |
| | | | | | | | | | | | | | | | | |
| | 15/06/06 | 4 | ND | ND | ND | 4 | 4 | ND | ND | ND | ND | ND | | | | |
| 1 | 30/01/08 | <1 | <1 | <1 | <2 | <1 | ND | ND | ND | ND | 140 | 140 | | | | |
| 1 | 17/03/2011 | <1 | 3 | 2 | 6 | 3 | 9 | 14 | 62 | <100 | <100 | 162 | | | | |
| MW8 | 19/08/2013 | <1 | <1 | <1 | <2 | <1 | ND | <10 | <50 | <100 | <100 | ND | | | | |
| | 4/12/2014 | · · · | <u>ا</u> | <u>ا</u> | | | Sampled | | | | | | | | | |
| 1 | 3/03/2015 | 1 | 1 | -11 | -11 | | ND | -10 | -50 | <100 | <100 | ND | | | | |
| 1 | | <1 | <1 | <1 | <1 | <2 | | <10 | <50 | <100 | <100 | ND | | | | |
| | 11/06/2015 | <1 | <1 | <1 | <1 | <2 | ND | <10 | <50 | <100 | <100 | ND | | | | |
| L | | | | | | | | | | | | | | | | |
| | 15/06/06 | 1 | 5 | 2 | 150 | 170 | 320 | 370 | 1550 | ND | ND | 1550 | | | | |
| 1 | 29/01/08 | <1 | <1 | <1 | <2 | <1 | ND | ND | ND | ND | <50 | ND | | | | |
| | 17/03/2011 | <1 | <1 | 1 | <2 | <1 | ND | <10 | <50 | <100 | <100 | ND | | | | |
| MW9 | 21/08/2013 | <1 | <1 | <1 | <2 | <1 | ND | <10 | <50 | <100 | <100 | ND | | | | |
| 1 | 4/12/2014 | | | | - | | Sampled | | | | | | | | | |
| 1 | 4/03/2015 | - 4 | -4 | -4 | -4 | | ND | .40 | | 100 | .100 | NIC | | | | |
| L | -100/2010 | <1 | <1 | <1 | <1 | <2 | чU | <10 | <50 | <100 | <100 | ND | | | | |



Table 1b, Appendix B Current and Historical Groundwater Summary Results - BTEX and TPH only

| | | | | BTE | ТРН | | | | | | | |
|-------------|--------------------------|------------------|------------------|---------------|----------------|---------------|-----------------|------------------|----------------|--------------|----------------------------------|--------------------------|
| | | | | | | | | | | | | ו of total) |
| | | Benzene | Toluene | Ethylbenzene | Xylene (m & p) | Xylene (o) | Xylene Total | ce - co | C10 - C14 | C15 - C28 | c29-C36 | C10 - C36 (Sum of total) |
| EQL | | μg/L 1 | µg/L 1 | μg/L 1 | μg/L 2 | μg/L 1 | μg/L ND | μg/L 10 | μg/L 50 | µg/L 100 | μg/L 100 | μg/L ND |
| NHMRC AD | DW 2011 | 1 | 800 | 300 | _ | | 600 | | | | | |
| | 000 FW 95% | 950 | | | 200 | 350 | 550 | | | | | |
| Netherlands | reshwater Ecosystems | | 300 | 140 | | | | | | | | 600 |
| Field_ID | Sampled Date | | | | | | | | | | | • |
| | 13/06/06 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| | 29/01/08 | <1 | <1 | <1 | <2 | <1 | ND | ND | 190 | 1,780 | 80 | 2,050 |
| MW10 | 16/03/2011 | 8 | 2 | 10 | 19 | 3 | 22 | 44 | <50 | <100 | <100 | ND |
| WWW10 | 20/08/2013 3/12/2014 | <1 <1 | <1 <1 | <1 <1 | <2 <2 | <1 <1 | ND ND | <10 <10 | <50 <50 | <100 <100 | <100 <100 | ND ND |
| | 3/03/2015 | 2 | <1 | <1 | <2 | <2 | ND | 12 | <50 | <100 | <100 | ND |
| | 10/06/2015 | <1 | 1 | <1 | <1 | <2 | ND | <10 | <50 | <100 | <100 | ND |
| | | | | | | | | | | | | |
| | 14/06/06 | 12,200 | 12,200 | 2,190 | 5,950 | 2,950 | 8,900 | 46,200 | 6,800 | ND | ND | 6,800 |
| | 29/01/08 16/03/2011 | 4,520 2500 | 5,740 340 | 1,810 1100 | 4,330 1,500 | 2,790 310 | 7,120 1,810 | 20,600 7900 | 2,810 3400 | ND <100 | ND <100 | 2,810 3500 |
| MW11 | 22/08/2013 | 2500 | 340 | 1100 | 1,500 | | not locate | | 3400 | <100 | <100 | 3500 |
| | 4/12/2014 | 1100 | 8 | 5 | 45 | <1 | 45 | 2600 | 1200 | <100 | <100 | 1200 |
| | 3/03/2015 | 340 | 27 | 17 | 2 | 160 | 162 | 1500 | 890 | <100 | <100 | 890 |
| | 10/06/2015 | 640 | 5 | 4 | <1 | 31 | 31 | 2000 | 1000 | <100 | <100 | 1000 |
| | | | | | | | | | | | | |
| | 14/06/06 30/01/08 | 8,850 4,620 | 7,380 4,710 | 1,510 | 3,990 3,350 | 2,080 | 6,070 5,550 | 28,700 18,300 | 6,490 2,400 | ND ND | ND ND | 6,490 2,400 |
| 1 | 17/03/2011 | 520 | 130 | 110 | 250 | 120 | 370 | 940 | 810 | 100 | <100 | 960 |
| MW12 | 20/08/2013 | 1500 | 32 | 560 | 880 | 3 | 883 | 5000 | 2100 | 150 | <100 | 2300 |
| 1 | 4/12/2014 | | | | | | Sampled | | | | | |
| 1 | 3/03/2015 | 550 | 97 | 470 | 22 | 720 | 742 | 3400 | 2200 | <100 | <100 | 2200 |
| — | 10/06/2015 | 930 | 13 | 480 | 2 | 590 | 592 | 4300 | 2700 | <100 | <100 | 2700 |
| H | 14/06/06 | 3,650 | 8,410 | 910 | 3,770 | 1,410 | 5,180 | 18,500 | 6,790 | ND | ND | 6,790 |
| 1 | 30/01/08 | 1,160 | 5,020 | 1,210 | 4,280 | 1,880 | 6,160 | 15,900 | 2,940 | ND | ND | 2,940 |
| 1 | 16/03/2011 | 18 | 58 | 13 | 49 | 26 | 75 | 220 | 120 | <100 | <100 | 220 |
| MW13 | 20/08/2013 | 220 | 800 | 430 | 1100 | 480 | 1580 | 4300 | 1200 | <100 | <100 | 1300 |
| 1 | 4/12/2013 | | a- | | | | Sampled | | | | | |
| 1 | 3/03/2015 11/06/2015 | 13 | 25 | 30 | 21 | 64 | 85 170 | 610 | 330 | <100 | <100 | 330 1230 |
| <u> </u> | 11/00/2013 | 38 | 72 | 61 | 50 | 120 | 170 | 1200 | 1100 | 130 | <100 | 1230 |
| <u> </u> | 14/06/06 | 17,300 | 19,000 | 2,350 | 8,490 | 3,560 | 12,050 | 69,200 | 11,500 | 250 | ND | 11,750 |
| | 30/01/08 | 22,400 | 41,200 | 3,380 | 12,600 | 6,050 | 18,650 | 89,300 | 7,000 | 240 | 100 | 7,340 |
| | 16/03/2011 21/08/2013 | 3500 | 6900 | 980 2300 | 3,500 8300 | 2,000 3700 | 5,500 12,000 | 15,000 53,000 | 5,900 5,100 | 540 440 | <100 <100 | 6490 5590 |
| MW14 | 4/12/2014 | 10,000 11,000 | 16,000 12,000 | 2300 | 9400 | 3800 | 13,200 | 52,000 | 5,100 | 5,100 | 460 | 81,100 |
| 1 | 2/03/2015 | 9400 | 15,000 | 2700 | 4300 | 9900 | 14,200 | 56,000 | 7400 | 290 | <100 | 7690 |
| | 11/06/2015 | 7000 | 8600 | 1600 | 2400 | 5500 | 7900 | 38,000 | 7400 | 420 | <100 | 7820 |
| | 15/00/00 | | | | | | | | | | | |
| 1 | 15/06/06 29/01/08 | ND <1 | ND <1 | ND <1 | ND <2 | ND <1 | ND ND | ND ND | ND ND | ND | ND | ND ND |
| 1 | 17/03/2011 | 1 | <1 | 2 | <2 | <1 | ND | <10 | <50 | <100 | <100 | ND |
| MW15 | 21/08/2013 | <1 | <1 | <1 | <2 | <1 | ND | <10 | <50 | <100 | <100 | ND |
| 1 | 4/12/2014 | | | | | Not | Sampled | | | | | |
| | 3/03/2015 | 2 | <1 | 2 | <1 | 2 | 2 | <10 | <50 | <100 | <100 | ND |
| <u> </u> | 10/06/2015 | <1 | <1 | <1 | <1 | <2 | ND | <10 | <50 | <100 | <100 | ND |
| | 14/06/06 | 10,600 | 14,000 | 1,690 | 6,770 | 2,760 | 9,530 | 41,700 | 6,810 | ND | ND | 6,810 |
| 1 | 30/01/08 | 7,240 | 12,900 | 1,460 | 5,050 | 2,430 | 7,480 | 31,000 | 2,250 | ND | ND | 2,300 |
| 1 | 16/03/2011 | 9400 | 11,000 | 2300 | 6,800 | 4,000 | 10,800 | 46,000 | 1200 | <100 | <100 | 1300 |
| MW16 | 21/08/2013 | 3200 | 5600 | 1100 | 4300 | 1800 | 6100 | 21,000 | 2900 | 110 | <100 | 3060 |
| | 4/12/2014 | 1000 | 2100 | 400 | 660 | | sampled | 0000 | 2400 | .100 | -100 | 2400 |
| | 2/03/2015 11/06/2015 | 1900 1800 | 2100 2400 | 420 570 | 660 930 | 1500 2200 | 2160 3130 | 9000 | 2400 4000 | <100 100 | <100 <100 | 2400 4100 |
| L | | 1000 | 2400 | 010 | 000 | 2200 | 0100 | 12,000 | 4000 | 100 | <t00< td=""><td>4100</td></t00<> | 4100 |



Table 1b, Appendix B Current and Historical Groundwater Summary Results - BTEX and TPH only

27055 GME Coramba Coffs Harbour City Council June 2015

| — | | | | BTE | X | | ТРН | | | | | | | |
|-----------------------------|-----------------------------------|----------------|-------------------|---------------|-----------------------------|--------------------------|------------------|------------------------------|-------------------------------------|--------------|-------------------------------|------------------------------|--|--|
| EQL | | Benzene 1-0 | b toluene 1 | L thylbenzene | ک الک کرافین Xylene (m & p) | T المراجع (o) کاروند (c) | Z 년 □ □ | 62 - 92 μg/L 10 | 05 7/б 1 С10 - С14 | 001 7/бл | 238-C38 μg/L 100 | 전 6 C10 - C36 (Sum of total) | | |
| NHMRC AD | | 1 | 800 | 300 | | | 600 | | | | | | | |
| | 000 FW 95% | 950 | | | 200 | 350 | 550 | | | | | | | |
| Netherlands | s (2000) Freshwater Ecosystems | | 300 | 140 | | | | | | | | 600 | | |
| Field_ID Sampled Date | | | | | | | | | | | | | | |
| | 15/06/06 | 5,940 | 8,560 | 2,090 | 7,130 | 2,800 | 9,930 | 27,400 | 4,960 | ND | ND | 4,960 | | |
| | 30/01/08 | 2,930 | 1,250 | 1,280 | 2,130 | 1,510 | 3,640 | 10,600 | 2,020 | ND | ND | 2,020 | | |
| | 16/03/2011 | 96 | 8 | 27 | 37 | 13 | 37 | 190 | 520 | <100 | <100 | 620 | | |
| MW17 | 20/08/2013 | 130 | 2 | 22 | 10 | 2 | 12 | 470 | 400 | <100 | <100 | 500 | | |
| 1 | 4/12/2014 | | | | | Not | Sampled | | | | | | | |
| 1 | 2/03/2015 | 150 | 41 | 90 | 63 | 280 | 343 | 1600 | 890 | <100 | <100 | 890 | | |
| L | 11/06/2015 | 140 | 5 | 41 | 3 | 22 | 25 | 720 | 700 | <100 | <100 | 700 | | |
| | 14/06/06 | 4,940 | 2,830 | 850 | 3,220 | 1,160 | 4,380 | 13,000 | 7,540 | ND | ND | 7,540 | | |
| | 30/01/08 | 905 | 204 | 434 | 931 | 290 | 1,221 | 4,980 | 3,810 | ND | ND | 3,810 | | |
| 1 | 17/03/2011 | 76 | 5 | 26 | 32 | 2 | 34 | 210 | 520 | <100 | <100 | 620 | | |
| MW18 | 20/08/2013 | 290 | 6 | 150 | 110 | <1 | 110.5 Compled | 1,800 | 970 | 130 | <100 | 1,150 | | |
| | 4/12/2014 3/03/2015 | 140 | 20 | 62 | 2 | - | Sampled 62 | 1000 | 620 | -100 | -100 | 630 | | |
| | 11/06/2015 | 140 | 28 4 | 62 59 | 3 <1 | 59 41 | 41 | 1000 750 | 630 480 | <100 <100 | <100 <100 | 480 | | |
| | 11/00/2013 | 130 | 4 | - 59 | 1 | 41 | 41 | 750 | 460 | <100 | <100 | 400 | | |
| | 15/06/06 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | | |
| | 30/01/2008 | <1 | <1 | 2 | 3 | 2 | 5 | ND | ND | ND | ND | ND | | |
| | 17/03/2011 | | | | | | I not locate | | | | | | | |
| MW19 | 22/08/2013 | | | | - | | not locate | | | | | ND | | |
| | 4/12/2014 4/03/3015 | <1 | <1 | <1 | <2 | <1 | ND | <10 | <50 | <100 | <100 | ND | | |
| | | | | | | | I not locate | | | | | | | |
| 11/06/2015 Could not locate | | | | | | | | | | | | | | |
| | 14/06/06 | 1,390 | 62 | 160 | 360 | 55 | 415 | 2,080 | 410 | ND | ND | 410 | | |
| | 30/01/08 | <1 | <1 | <1 | 16 | 8 | 24 | 50 | ND | ND | ND | ND | | |
| | 17/03/2011 | 21 | 3 | 31 | 110 | 4 | 114 | 180 | 110 | <100 | <100 | 210 | | |
| MW20 | 20/08/2013 | 6 | <1 | 5 | 31 | <1 | 31.5 | 100 | <50 | <100 | <100 | ND | | |
| | 3/12/2014 | <1 | <1 | 1 | 8 | <1 | 8 | 36 | 71 | 520 | <100 | 591 | | |
| | 3/03/2015 10/06/2015 | 2 | <1 <1 | 1 10 | <1 <1 | 5 54 | 5 54 | 17 130 | <50 82 | <100 <100 | <100 <100 | ND 82 | | |
| | 10/00/2010 | 0 | 1 | 10 | 1 | 54 | 04 | 150 | 02 | <100 | <100 | 82 | | |
| | 14/06/06 | 190 | 94 | 490 | 2,590 | 890 | 3,480 | 6,070 | 9,200 | ND | ND | 9,200 | | |
| | 30/01/08 | 1370 | 196 | 731 | 2,020 | 830 | 2,850 | 7,040 | 6,430 | ND | ND | 6,430 | | |
| | 17/03/2011 | 250 | <1 | 27 | <2 | <1 | ND | 420 | 690 | <100 | <100 | 790 | | |
| MW21 | 20/08/2013 | <1 | <1 | 3 | <2 | <1 | ND | 140 | 400 | <100 | <100 | 500 | | |
| 1 | 4/12/2014 | L | | 1 | | | Sampled | | | | | | | |
| 1 | 4/03/2015 | 45 | <1 | <1 | 2 | <2 | 2 | 130 | 73 | <100 | <100 | 73 | | |
| <u> </u> | 11/06/2015 | <1 | <1 | <1 | <1 | <2 | ND | 62 | <50 | <100 | <100 | ND | | |
| | 14/06/06 | 2,960 | 260 | 140 | 280 | 130 | 410 | 3,910 | 1,050 | ND | ND | 1,050 | | |
| 1 | 30/01/08 | 1,720 | 456 | 395 | 686 | 378 | 1,064 | 4,130 | 780 | ND | ND | 780 | | |
| 1 | 17/03/2011 | 120 | 9 | 42 | 52 | 5 | 57 | 260 | 250 | <100 | <100 | 350 | | |
| MW22 | 20/08/2013 | 16 | <1 | 14 | 6 | <1 | 6.5 | 140 | 140 | <100 | <100 | 240 | | |
| 1 | 4/12/2014 3/03/2015 | | | | | | Sampled ND | a- | | | | N- | | |
| 1 | 3/03/2015 11/06/2015 | <1 20 | <1 <1 | <1 16 | <1 <1 | <2 3 | ND 3 | 35 170 | <50 160 | <100 <100 | <100 <100 | ND 160 | | |
| <u> </u> | | 20 | ~1 | 10 | 1 | э | | 1/0 | 100 | ~100 | ~100 | 100 | | |
| | 14/06/2006 | 9,870 | 1750 | 190 | 660 | 350 | 1,010 | 13,900 | 2,030 | ND | ND | 2030 | | |
| 1 | 30/01/2008 | 7,340 | 570 | 223 | 202 | 130 | 332 | 9,870 | 600 | ND | ND | 600 | | |
| MW23 | 17/03/2011 | 2500 | 750 | 180 | 300 | 180 | 480 | 3300 | 720 | 130 | <100 | 900 | | |
| WIVV23 | 20/08/2013 4/12/2014 | 4600 | 1100 | 600 | 1000 | 210 | 1210 Sampled | 11,000 | 1500 | 180 | <100 | 1730 | | |
| 1 | 2/03/2015 | 2000 | 110 | 210 | 14 | 280 | Sampled 294 | 4000 | 690 | <100 | <100 | 690 | | |
| | 11/06/2015 | 3300 | 1000 | 440 | 190 | 970 | 1160 | 8700 | <50 | <100 | <100 | ND | | |
| | 45/00/00 | 6 | | 1/2 | N/S | NO | N.S. | N/S | N/D | NO | NO | NO | | |
| 1 | 15/06/06 30/01/08 | 3 <1 | ND <1 | ND <1 | ND <2 | ND <1 | ND ND | ND ND | ND ND | ND ND | ND ND | ND ND | | |
| 1 | 17/03/2011 | 5 | 4 | 4 | 12 | 6 | 18 | 25 | <50 | <100 | <100 | <250 | | |
| MW24 | 20/08/2013 | <1 | <1 | <1 | <2 | <1 | ND | <10 | <50 | <100 | <100 | ND | | |
| | 4/12/2014 | | | ı | | | Sampled | | | | | | | |
| 1 | 4/03/2015 | <1 | <1 | <1 | <1 | <2 | ND | <10 | <50 | <100 | <100 | ND | | |
| 1 | 11/06/2015 | <1 | <1 | <1 | <1 | <2 | ND | <10 | 1500 | <100 | <100 | 1500 | | |
| - | | | | - | - | | | | | | | | | |

*ND - Non Detect



Table 1c, Appendix B Current and Historical Groundwater Summary Results - MNA Parameters only

| | | Field | | | | | | Inorga | nics | | | | | Metals | |
|-------------|--------------------------|-------------------------|-------------------------|--------------------|------------------|-----------------------------------------------------------------------------------------------------------------|----------|--------------|-------------------|-----------------|-------------------|-------------|--------------------|-------------|------------------------|
| | | Dall Alkalinity (total) | D Carbonate as CaCO3 | rco2 (Free) | Mmonia Mmonia | Discription by the second s | Chloride | Ferrous Iron | hall Hydroxide | % Ionic Balance | Zodium (Filtered) | Sulphate | Zalcium (Filtered) | ⊠ ∏ ∏ | b Potassium (Filtered) |
| EQL | | 5 | -mg/∟ 5 | <u>µg</u> /∟ 0 | 0.005 | 11g/L | 1 1 | 0.05 | 5000 | 70 | 0.5 | 11 <u>1</u> | 0.5 | 0.5 | 0.5 |
| | DW 2011 | 5 | 5 | 0 | 0.005 | 5 | | 0.05 | 3000 | | 0.5 | 500 | 0.5 | 0.5 | 0.5 |
| | 000 FW 95% | | | | 0.9 | L | | | | | | 300 | | L | |
| Field ID | Sampled Date | | | | | | | | | | | | | | |
| | 3/07/2006 | 36 | - | - | 0 | - | 21 | 29 | - | - | 23 | 14 | 3 | 2 | 3 |
| | 29/01/2008 | 33 | - | 83,000 | 0 | - | 21 | 1 | - | - | 25 | 10 | 4 | 2 | 3 |
| | 17/03/2011 | 100 | - | 44,000 | 0 | - | 27 | 26 | - | - | 22 | 3 | 5 | 4 | 2 |
| MW2 | 21/08/2013 | 59 | <5 | 150,000 | 0.024 | 59 | 33 | 29 | <5000 | -22 | 19 | 7 | 4.2 | 4.2 | 1.6 |
| | 4/12/2014 | | | | | | | o acces | SS | | | 1 | | | 1 |
| | 4/03/2015 | <5 | <5 | 71,000 | 0.018 | - | 37 | < 0.05 | | -2.1 | 16 | 2 | 0.7 | 3.3 | 1.3 |
| | Not Applicable | | | | | | | Dry | | | | | | | |
| | 00/04/0000 | 144 | | 50.000 | -0.04 | | 04 | 10 | | | 00 | 0 | 4 | 44 | |
| | 30/01/2008 | 92 | - | 58,000 | < 0.01 | - | 21 | 9 | - | - | 26 | 2 | 4 | 11 | 4 |
| | 17/03/2011 21/08/2013 | 92 130 | - <5 | 240,000 120,000 | 0.009 | - 130 | 18 25 | 9 10 | - <5000 | -25 | 29 26 | 9 4 | 2 | 4 7.9 | 3 3.5 |
| MW6 | 3/12/2014 | 120 | <5 <5 | 120,000 | 0.009 | 120 | 25 | 4.4 | <5000 | -25 | 37 | 4 | 1.9 | 7.9 | 3.5 2.8 |
| | 4/03/2015 | 82 | <5 | 90.000 | 0.033 | - | 23 | 4.4 9 | -5000 | -15 | | 19 | 2.3 | 5 4.4 | 2.0 |
| | 10/06/2015 | 76 | <5 | 94,000 | 0.038 | - | 23 | 6.2 | - | -15 -14 | 33 36 | 24 | 1.7 | 3.7 | 3 |
| | 10/00/2013 | 70 | ~5 | 34,000 | 0.072 | - | 20 | 0.2 | - | -14 | 30 | 24 | 1.7 | 5.7 | 5 |
| | 3/07/2006 | 120 | - | _ | 1 | - | 24 | 7 | - | - | 24 | <2 | 6 | 12 | 4 |
| | 29/01/2008 | 152 | - | 76,000 | 0 | - | 20 | 15 | - | - | 21 | <2 | 5 | 12 | 4 |
| | 16/03/2011 | 160 | - | 11.000 | 0 | - | 20 | 14 | - | - | 20 | <1 | 4 | 9 | 4 |
| MW11 | 22/08/2013 | | | ,000 | , v | r | - | ld not lo | | | | | | Ŭ | |
| | 4/12/2014 | 140 | <5 | 140,000 | 0.65 | 140 | 21 | 31 | <5000 | -26 | 18 | <1 | 4.3 | 10 | 3.2 |
| | 3/03/2015 | 120 | <5 | 86,000 | 0.14 | - | 21 | 27 | - | -25 | 16 | <1 | 4.5 | 9.1 | 3.7 |
| | 10/06/2015 | 130 | <5 | 130 | 2 | - | 19 | 29 | - | -32 | 17 | <1 | 3.7 | 8.2 | 3.6 |
| | | | - | | - | | | | | | | • | | | |
| | 4/07/2006 | 130 | - | - | 0 | - | 27 | 4 | - | - | 28 | 2 | 4 | 11 | 6 |
| | 30/01/2008 | 136 | - | 68,000 | < 0.01 | - | 23 | 6 | - | - | 27 | 2 | 3 | 10 | 5 |
| | 16/03/2011 | 140 | - | 310,000 | 0 | - | 21 | 9 | - | - | 25 | <1 | 3 | 8 | 6 |
| MW14 | 21/08/2013 | 150 | <5 | 970,000 | < 0.005 | 150 | 26 | 10 | <5000 | -33 | 20 | <1 | 3.1 | 9 | 5.4 |
| | 4/12/2014 | 160 | <5 | 90,000 | <0.02 | 160 | 24 | 7.6 | <5000 | -22 | 28 | <1 | 3.8 | 12 | 5.4 |
| | 2/03/2015 | 160 | <5 | 85,000 | 0.055 | 29 | - | 0.97 | - | -25 | 26 | <1 | 3.7 | 11 | 6.1 |
| | 11/06/2015 | 160 | <5 | 92,000 | < 0.005 | - | 26 | 9.9 | - | -26 | 25 | <1 | 3.1 | 10 | 6.5 |
| | | | | | | | | | | | | | | | |
| MW24 | 4/07/2006 | 44 | - | - | <0.01 | - | 27 | <0.5 | - | 1 | 30 | 7 | 13 | 4 | 3 |
| (-) Not ana | lysed | | | | | | | | | | - | | | | |



Table 1d, Appendix B Groundwater RPD Summary Results

| Field Duplicates (water) Filter: ALL | | SDG Field_ID Sampled_Date-Time | ENVIROLAB 2015-06-12T00:00:00 MW4B 10/06/2015 | ENVIROLAB 2015-06-12T00:00:00 DUP1 10/06/2015 | RPD |
|-----------------------------------------|-----------------|--------------------------------------|-----------------------------------------------------|-----------------------------------------------------|-----|
| Chem_Group | ChemNamUnits | EQL | | | Т |
| BTEX | Benzene µg/L | 1 | 490.0 | 480.0 | 2 |
| | Toluene μg/L | 1 | 88.0 | 84.0 | 5 |
| | Ethylbenzeµg/L | 1 | 590.0 | 580.0 | 2 |
| | Xylene (o) µg/L | 1 | 68.0 | 66.0 | 3 |
| | Xylene (m µg/L | 2 | 470.0 | 470.0 | 0 |
| PAH/Phenols | Naphthale µg/L | 1 | 88.0 | 86.0 | 2 |
| Total Recoverable Hydrocarbons | C6 - C9 μg/L | 10 | 4800.0 | 4100.0 | 16 |
| | C10 - C14 µg/L | 50 | 2600.0 | 2600.0 | 0 |
| | C15 - C28 µg/L | 100 | <100.0 | 110.0 | 10 |
| | C29-C36 µg/L | 100 | <100.0 | <100.0 | 0 |
| | C6-C10 µg/L | 10 | 6000.0 | 5100.0 | 16 |
| | >C10-C16 µg/L | 50 | 1300.0 | 1400.0 | 7 |
| | >C16-C34 μg/L | 100 | <100.0 | <100.0 | 0 |
| | >C34-C40 µg/L | 100 | <100.0 | <100.0 | 0 |
| | F1 C6-C10 μg/L | 10 | 4300.0 | 3400.0 | 23 |
| | F2 C10-C16µg/L | 50 | 1300.0 | 1300.0 | 0 |

*RPDs have only been considered where a concentration is greater than 0 times the EQL.

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 100 (0-5 x EQL); 75 (5-10 x EQL); 30 (> 10 x EQL))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Appendix C – Benzene and TRH Trend Analysis



Benzene Trend Analysis (All Wells – 2006 – 2015)



Benzene Trend Analysis (All Wells – 2006 – 2015)



Benzene Trend Analysis (All Wells – 2006 – 2015)


Benzene Trend Analysis (All Wells – 2006 – 2015)



Benzene Trend Analysis (All Wells – 2006 – 2015)



Benzene Trend Analysis (All Wells – 2006 – 2015)



TRH Fractions – Trend Analysis for MW14 and MW23 (2006 – 2015)



TRH Fractions – Trend Analysis for MW14 and MW23 (2006 – 2015)



Appendix D – Laboratory Certificates

coc 12/6 3:26pm.

CHAIN OF CUSTODY - Client

ENVIROLAB SERVICES

| (Env)rolab) |
|-------------|
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| | | | · | ATE | | | | | | | | | | | | | | |
|------------------------|-----------------------------------|-----------------|-------------------------------------------------------------------|-------------------------------------------------|-------------------------|--------------|---------------|-----------|-----------|----------------------------------------------------------|------------------------------------------|--------------|------------------------|-------------------|----------|----------|-------------------|---------------------------------------------------------------|
| | WSP Environmental Pty L | | Client Project Name and Number: 27055.03 Coramba GME June 2015 | | | | | | | Envirolab Services 12 Ashley St, Chatswood, NSW, 2067 | | | | | | | | |
| | Peter Moore (peter.moore | @wspgroup.co | m) | | | | | | | | | | | | icy JL, | Ciidts | w000 | 1, 13 11 , 2007 |
| | Aaron Young | | | PO No.: 27055.03 | | | | | | Phone: 02 9910 6200 | | | | | | | | |
| Address: | Lev 1, 41 McLaren St | | : | | olab Se | | <u> </u> | No. : | | | * | | | | | | | • |
| | North Sydney | | · | | results | | | | | • | | | | Fax: | | 10 62 | | ••••• |
| | aaron.young@wspgrou | p.com | · | | oose | | _ | • | | | - | | · . | E-mail: | ahie | envir | olabs | services.com.au |
| | 89256700, mobile: 0448 977 940 | Fax: | 89070999 | | nform lat. ge applie | | nce if un | gent turr | naround i | is require | d - | | | Contac | t: Ailee | en Hie | | |
| r none. | Sample info | | | 7 | | - | | | | Tests | Requi | red | | 1 | | | | Comments |
| State of the second | Sample into | | | · | | | 2 | | <u> </u> | | | | | <u> </u> | | | T | |
| Envirolab Sample ID | Client Sample ID | Date sampled | Type of sample | ТКН (С6-С9) | ткн (с10-с36) | ткн (се-с10) | ткн (с10-с40) | BTEX | Ammonia | Major Cations | Major Anions | Ferrous Iron | Free Carbon Dioxide | НОГР | - | | | Provide as much information about the sample as you can |
| 1 | MW3 | 10/06/2015 | Water | X | X | Х | Х | Х | | | | | | | | | | Sample my have |
| 2 | MW4B | 10/06/2015 | Water | X | X | х | х | х | | | | | 2 | | | | | Scaple my have high TRH 3/01 BTEX. |
| 3 | • MW6 | 10/06/2015 | Water | X | X | Х | Х | х | х | X | X | X | Х | | | | | BTEX. |
| 4 | MW7 | 10/06/2015 | Water | X | X | Х | X | Х | | | | | | | | | | |
| 5 | MW8 | 11/06/2015 | Water | X | X | X | X | Х | | | | | • | | | | | · |
| 6 | MW9 | 10/06/2015 | Water | X | X | X | X | Х | | | | | | | | | | Envirollab Services |
| ٦ | MW10 | 10/06/2015 | Water | X | X | X | ́х | X | | | | | | | | 6 | WIRDL | Chatswood NSW 2057 |
| 8 | • MW11 | 10/06/2015 | , Water | X | X | х | Х | Х | . х | X | Х | X | Х | | | | op No | Ph: (02) 9910 6200 |
| 9 | MW12 | 10/06/2015 | Water | X | X | х | х | • X | | | | | | | | | | :129468 |
| ю | MW13 | 11/06/2015 | Water | X | X | x | Х | X | | | | | | | | D | ale Re | ceived: 12.6.2015 |
| | MW14 | 11/06/2015 | Water | x | X | X | X ´ | x | X | X | Х | X | X | | | | inte Re ocoivo | ceived: 10.30, |
| 12 | • MW15 | 10/06/2015 | Water | X | X | X | X | x | X | X | X | X | X | | | - T | emp: C | bollambient |
| 13 | MW16 | 11/06/2015 | Water | X | X | X | X | х | | | | | | | | | opling: | kellepack) |
| 14 | MW17 | 11/06/2015 | Water | X | X | X | х | X | | | | | | | | S | ecunty | Intaed Broken/None |
| 15 | MW18 | 11/06/2015 | Water | X | X | x | x | X | | 1 | | | | | | | | |
| · · · · · | d by (company): | WSP | 1 <u></u> 1 <u>e</u> | Recei | ved bv | (com | any): | Fas | <u> </u> | • | | | | Samples | Receive | ed: Cool | or Am | bient (circle one) |
| Print Name: | | Aaron Young | | Received by (company): FLS Print Name: P. RQ | | | | | | | Temperature Recieved at: (if applicable) | | | | | | | |
| Date & Time | | | pn | Date & Time: 12.6.15 16.30 | | | | | | | Transported by: Hand delivered / courier | | | | | | | |
| Signature: | | A | r | Signature: P | | | | | | | | | | Page No: 1 of £ 2 | | | | |

Form: 302. - Chain of Custody-Client, Issued (4/02/08) tersion 3, Page 1 of 1.

CHAIN OF CUSTODY - Client

ENVIROLAB SERVICES

| | | | | | | | | | _ | | | | ··· · | - | | | • | | |
|------------------------|-----------------------------------|-----------------|----------------|------------------------------|------------------------|--------------|---------------|-----------|------------------------------------|------------------------------------------|------------------------------------------------|--------------|------------------------|---------------------|---------|----------|----------|------|---------------------------------------------------------------|
| Client: | WSP Environmental Pty Lt | :d | | | Projec | | | | | | | | | Envirolab Services | | | | | |
| Project Mgr | Peter Moore (peter.moore | @wspgroup.co | m) | | | | | | 12 Ashley St, Chatswood, NSW, 2067 | | | | | | | | | | |
| Sampler: | Aaron Young | | | PO No | .: | | | 270 | 55.03 | | | | | | | | | | |
| Address: | Lev 1, 41 McLaren St | | | Enviro | olab Se | rvices | Quote | No. : | | | | | | Phone: 02 9910 6200 | | | | | |
| | North Sydney | | | Date | results | requir | ed: | | | | | | | Fax: | | | 0 620 | | |
| Email: | aaron.young@wspgroup | <u>.com</u> | · •··· | Or ch | osee | tanda | d) | | · - | | , | | | E-ma | il: al | hie@e | enviro | labs | services.com.au |
| Phone: | 89256700, mobile: 0448 977 940 | Fax: | 89070999 | | nform lat ge applie | | nce if urg | gent turn | around i | is require | : d - | | | Cont | act: A | lileen | Hie | | |
| | Sample infor | | | | | | | . · | | Tests | Requir | ed | ar the | i se seguri | 1. g. 1 | • • | | | Comments |
| | | | | | G | <u> </u> | 6 | | | r | | | - | | | | | | |
| Envirolab Sample ID | Client Sample ID | Date sampled | Type of sample | ткн (с6-с9) | TRH (C10-C36) | ткн (се-с10) | ТКН (С10-С40) | втех | Ammonia | Major Cations | Major Anions | Ferrous Iron | Free Carbon Dioxide | НОГD | | • | | | Provide as much information about the sample as you can |
| 16 | MW20 | 10/06/2015 | Water | Х | X | X | Х | Х | | | | | | | | | ļ. | | 4 |
| 17 | MW21 | 11/06/2015 | Water | X | X | Х | Х | X | | | | | | | | | L | | |
| 18 | MW22 | 11/06/2015 | Water | X | X | X | Х | X | | L | | | | | | | ļ | | |
| 19 | MW23 | 11/06/2015 | Water | X | X | X | Х | X | | | | | | | | | ļ | L | · · · · · · · · · · · · · · · · · · · |
| · 20 | MW24 | 11/06/2015 | Water | X | X | X | Х | X | | <u> </u> | | ļ | | ļ | | | _ | ļ | |
| 21 | DUP1 | 10/06/2015 | Water | X | X | X | Х | X | | ļ | · · · · · | | | | | ļ | <u> </u> | ļ | |
| 22 | TRIP1 | 10/06/2015 | Water | | | | | | | ļ | | | | X | | ļ | ļ | I | |
| 23 | TB1 | 10/06/2015 | Water | X | | X | | | | | | | | | | Ļ | ļ | ļ | |
| 24 | TB2 | 11/06/2015 | Water | × | | X | | | ļ | <u> </u> | | | | _ | | | <u> </u> | | |
| | | | | <u> </u> | | | | | | - | | | <u> </u> | <u> </u> | , | | | | |
| | | | | | | | | | <u> </u> | <u> </u> | | <u> </u> | | | | <u> </u> | | | |
| | | | · · · · · | | | · · | | | | | | | | 1 | | <u> </u> | | | \$ |
| ····· | 5 | | | . | 1 | | | | <u> </u> | 1 | | | | | | | | , · | |
| | | | | | | | | | | | | | | | | | | | |
| Relinquishe | ed by (company): | WSP | | Received by (company): 단스 | | | | | | | Samples Received: Cool or Ambient (circle one) | | | | | | | | |
| Print Name | | Aaron Young | 1 | Print Name: P.Raj | | | | | | | Temperature Recieved at: (if applicable) | | | | | | | | |
| Date & Tim | e: 12/6/15 | 31~ | · | Date & Time: 12-6-2015 16-20 | | | | | | Transported by: Hand delivered / courier | | | | | | | | | |
| Signature: | l'At | this_ | | Signature: 🛛 🖉 | | | | | | Page No: HELLOFZ | | | | | | | | | |

Form: 302 - Chain of Custody-Client, Issued 14/02/08, Version 3, Page 1 of 1.



SAMPLE RECEIPT ADVICE

| Client Details | |
|----------------|---------------------------|
| Client | WSP Environmental Pty Ltd |
| Attention | Peter Moore, Aaron Young |

| Sample Login Details | |
|--------------------------------------|---------------------------------|
| Your Reference | 27055.03, Coramba GME June 2015 |
| Envirolab Reference | 129468 |
| Date Sample Received | 12/06/2015 |
| Date Instructions Received | 12/06/2015 |
| Date Results Expected to be Reported | 19/06/2015 |

| Sample Condition | | | | | | | |
|--------------------------------------------------------|-----------|--|--|--|--|--|--|
| Samples received in appropriate condition for analysis | YES | | | | | | |
| No. of Samples Provided | 25 Waters | | | | | | |
| Turnaround Time Requested | Standard | | | | | | |
| Temperature on receipt (°C) | 10.2 | | | | | | |
| Cooling Method | Ice | | | | | | |
| Sampling Date Provided | YES | | | | | | |

Comments

Samples will be held for 1 month for water samples and 2 months for soil samples from date of receipt of samples

Please direct any queries to:

| Aileen Hie | Jacinta Hurst | | | | | | | |
|--------------------------------------|----------------------------------------|--|--|--|--|--|--|--|
| Phone: 02 9910 6200 | Phone: 02 9910 6200 | | | | | | | |
| Fax: 02 9910 6201 | Fax: 02 9910 6201 | | | | | | | |
| Email: ahie@envirolabservices.com.au | Email: jhurst@envirolabservices.com.au | | | | | | | |

Sample and Testing Details on following page



Envirolab Services Pty Ltd ABN 37 112 535 645 12 Ashley St Chatswood NSW 2067 ph 02 9910 6200 fax 02 9910 6201 enquiries@envirolabservices.com.au www.envirolabservices.com.au

| Sample Id | Ammonia as N in water | Ferrous Iron | Free Carbon Dioxide as CO2 | lon Balance | svTRH (C10-C40) in Water | vTRH(C6- C10)/BTEXN in Water | On Hold |
|-----------|--------------------------|--------------|-------------------------------|-------------|-----------------------------|------------------------------------|---------|
| MW3 | | | | | 1 | 1 | |
| MW4B | | | | | 1 | ~ | |
| MW6 | 1 | 1 | 1 | 1 | 1 | 1 | |
| MW7 | | | | | 1 | 1 | |
| MW8 | | | | | 1 | 1 | |
| MW9 | | | | | 1 | 1 | |
| MW10 | | | | | 1 | ~ | |
| MW11 | 1 | 1 | 1 | 1 | 1 | 1 | |
| MW12 | | | | | 1 | 1 | |
| MW13 | | | | | 1 | 1 | |
| MW14 | ✓ | ✓ | ✓ | 1 | 1 | 1 | |
| MW15 | 1 | 1 | 1 | 1 | 1 | 1 | |
| MW16 | | | | | 1 | ~ | |
| MW17 | | | | | 1 | 1 | |
| MW18 | | | | | 1 | 1 | |
| MW20 | | | | | 1 | 1 | |
| MW21 | | | | | 1 | 1 | |
| MW22 | | | | | 1 | 1 | |
| MW23 | | | | | 1 | 1 | |
| MW24 | | | | | 1 | 1 | |
| DUP1 | | | | | 1 | 1 | |
| TRIP1 | | | | | | | 1 |
| TB1 | | | | | | ✓ ✓ | |
| TB2 | | | | | | 1 | |



Envirolab Services Pty Ltd ABN 37 112 535 645 12 Ashley St Chatswood NSW 2067 ph 02 9910 6200 fax 02 9910 6201 enquiries@envirolabservices.com.au www.envirolabservices.com.au

CERTIFICATE OF ANALYSIS

129468

WSP Environmental Pty Ltd

Level 1, 41 McLaren St North Sydney NSW 2060

Client:

Attention: Peter Moore, Aaron Young

Sample log in details:

Your Reference:27055.03, Coramba GME June 2015No. of samples:25 WatersDate samples received / completed instructions received12/06/1512/06/15/

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data. Samples were analysed as received from the client. Results relate specifically to the samples as received. Results are reported on a dry weight basis for solids and on an as received basis for other matrices. *Please refer to the last page of this report for any comments relating to the results.*

Report Details:

 Date results requested by: / Issue Date:
 19/06/15
 /
 19/06/15

 Date of Preliminary Report:
 Not Issued

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 Accredited for compliance with ISO/IEC 17025.

 Tests not covered by NATA are denoted with *.

Results Approved By:

Jacinta/Hurst

Jacinta/Hurst Laboratory Manager



| vTRH(C6-C10)/BTEXN in Water | | | | | | |
|--------------------------------|-------|------------|------------|------------|------------|------------|
| Our Reference: | UNITS | 129468-1 | 129468-2 | 129468-3 | 129468-4 | 129468-5 |
| Your Reference | | MW3 | MW4B | MW6 | MW7 | MW8 |
| Date Sampled | | 10/06/2015 | 10/06/2015 | 10/06/2015 | 10/06/2015 | 11/06/2015 |
| Type of sample | | Water | Water | Water | Water | Water |
| Date extracted | - | 17/06/2015 | 17/06/2015 | 17/06/2015 | 17/06/2015 | 17/06/2015 |
| Date analysed | - | 17/06/2015 | 18/06/2015 | 18/06/2015 | 17/06/2015 | 17/06/2015 |
| TRHC6 - C9 | μg/L | <10 | 4,800 | 3,000 | <10 | <10 |
| TRHC 6 - C10 | µg/L | <10 | 6,000 | 3,600 | <10 | <10 |
| TRHC6 - C10 less BTEX (F1) | µg/L | <10 | 4,300 | 2,200 | <10 | <10 |
| Benzene | µg/L | <1 | 490 | 750 | <1 | <1 |
| Toluene | µg/L | 2 | 88 | 37 | <1 | <1 |
| Ethylbenzene | µg/L | <1 | 590 | 420 | <1 | <1 |
| m+p-xylene | µg/L | <2 | 470 | 200 | <2 | <2 |
| o-xylene | µg/L | <1 | 68 | 35 | <1 | <1 |
| Naphthalene | μg/L | <1 | 88 | 67 | <1 | <1 |
| Surrogate Dibromofluoromethane | % | 101 | 88 | 88 | 102 | 101 |
| Surrogate toluene-d8 | % | 103 | 106 | 101 | 103 | 103 |
| Surrogate 4-BFB | % | 102 | 104 | 105 | 102 | 101 |

| vTRH(C6-C10)/BTEXN in Water | | | | | | |
|--------------------------------|-------|------------|------------|------------|------------|------------|
| Our Reference: | UNITS | 129468-6 | 129468-7 | 129468-8 | 129468-9 | 129468-10 |
| Your Reference | | MW9 | MW10 | MW11 | MW12 | MW13 |
| Date Sampled | | 10/06/2015 | 10/06/2015 | 10/06/2015 | 10/06/2015 | 11/06/2015 |
| Type of sample | | Water | Water | Water | Water | Water |
| Date extracted | - | 17/06/2015 | 17/06/2015 | 17/06/2015 | 17/06/2015 | 17/06/2015 |
| Date analysed | - | 17/06/2015 | 17/06/2015 | 18/06/2015 | 18/06/2015 | 17/06/2015 |
| TRHC6 - C9 | µg/L | <10 | <10 | 2,000 | 4,300 | 1,200 |
| TRHC6 - C10 | µg/L | <10 | <10 | 2,200 | 4,900 | 1,500 |
| TRHC6 - C10 less BTEX (F1) | µg/L | <10 | <10 | 1,500 | 2,900 | 1,200 |
| Benzene | µg/L | <1 | <1 | 640 | 930 | 38 |
| Toluene | µg/L | 1 | <1 | 5 | 13 | 72 |
| Ethylbenzene | µg/L | <1 | <1 | 4 | 480 | 61 |
| m+p-xylene | µg/L | <2 | <2 | 31 | 590 | 120 |
| o-xylene | µg/L | <1 | <1 | <1 | 2 | 50 |
| Naphthalene | µg/L | <1 | <1 | 57 | 78 | 11 |
| Surrogate Dibromofluoromethane | % | 103 | 100 | 96 | 95 | 95 |
| Surrogate toluene-d8 | % | 103 | 103 | 106 | 107 | 108 |
| Surrogate 4-BFB | % | 101 | 101 | 106 | 106 | 108 |

| vTRH(C6-C10)/BTEXN in Water | | | | | | |
|--------------------------------|-------|------------|------------|------------|------------|------------|
| Our Reference: | UNITS | 129468-11 | 129468-12 | 129468-13 | 129468-14 | 129468-15 |
| Your Reference | | MW14 | MW15 | MW16 | MW17 | MW18 |
| Date Sampled | | 11/06/2015 | 10/06/2015 | 11/06/2015 | 11/06/2015 | 11/06/2015 |
| Type of sample | | Water | Water | Water | Water | Water |
| Date extracted | - | 17/06/2015 | 17/06/2015 | 17/06/2015 | 17/06/2015 | 17/06/2015 |
| Date analysed | - | 18/06/2015 | 17/06/2015 | 18/06/2015 | 18/06/2015 | 17/06/2015 |
| TRHC6 - C9 | μg/L | 38,000 | <10 | 12,000 | 720 | 750 |
| TRHC 6 - C10 | μg/L | 45,000 | <10 | 15,000 | 820 | 870 |
| TRHC6 - C10 less BTEX (F1) | μg/L | 20,000 | <10 | 7,100 | 610 | 640 |
| Benzene | μg/L | 7,000 | <1 | 1,800 | 140 | 130 |
| Toluene | μg/L | 8,600 | <1 | 2,400 | 5 | 4 |
| Ethylbenzene | µg/L | 1,600 | <1 | 570 | 41 | 59 |
| m+p-xylene | µg/L | 5,500 | <2 | 2,200 | 22 | 41 |
| o-xylene | µg/L | 2,400 | <1 | 930 | 3 | <1 |
| Naphthalene | µg/L | 240 | <1 | 70 | 9.9 | 9 |
| Surrogate Dibromofluoromethane | % | 90 | 96 | 88 | 91 | 94 |
| Surrogate toluene-d8 | % | 102 | 103 | 101 | 106 | 106 |
| Surrogate 4-BFB | % | 105 | 103 | 107 | 104 | 107 |

| vTRH(C6-C10)/BTEXN in Water | | | | | | |
|--------------------------------|-------|------------|------------|------------|------------|------------|
| Our Reference: | UNITS | 129468-16 | 129468-17 | 129468-18 | 129468-19 | 129468-20 |
| Your Reference | | MW20 | MW21 | MW22 | MW23 | MW24 |
| Date Sampled | | 10/06/2015 | 11/06/2015 | 11/06/2015 | 11/06/2015 | 11/06/2015 |
| Type of sample | | Water | Water | Water | Water | Water |
| Date extracted | - | 17/06/2015 | 17/06/2015 | 17/06/2015 | 17/06/2015 | 17/06/2015 |
| Date analysed | - | 18/06/2015 | 18/06/2015 | 18/06/2015 | 18/06/2015 | 18/06/2015 |
| TRHC6 - C9 | µg/L | 130 | 62 | 170 | 8,700 | <10 |
| TRHC6 - C10 | µg/L | 220 | 85 | 210 | 9,400 | <10 |
| TRHC6 - C10 less BTEX (F1) | µg/L | 150 | 85 | 170 | 3,500 | <10 |
| Benzene | µg/L | 6 | <1 | 20 | 3,300 | <1 |
| Toluene | µg/L | <1 | <1 | <1 | 1,000 | <1 |
| Ethylbenzene | µg/L | 10 | <1 | 16 | 440 | <1 |
| m+p-xylene | µg/L | 54 | <2 | 3 | 970 | <2 |
| o-xylene | µg/L | <1 | <1 | <1 | 190 | <1 |
| Naphthalene | µg/L | 2 | <1 | 6 | 50 | <1 |
| Surrogate Dibromofluoromethane | % | 92 | 93 | 87 | 78 | 93 |
| Surrogate toluene-d8 | % | 102 | 104 | 102 | 108 | 103 |
| Surrogate 4-BFB | % | 106 | 105 | 106 | 106 | 104 |

| Client | Reference: |
|---------|------------|
| 0.00110 | |

| vTRH(C6-C10)/BTEXN in Water Our Reference: Your Reference Date Sampled Type of sample | UNITS | 129468-21 DUP1 10/06/2015 Water | 129468-23 TB1 10/06/2015 Water | 129468-24 TB2 11/06/2015 Water |
|---------------------------------------------------------------------------------------------------|-------|------------------------------------------|-----------------------------------------|-----------------------------------------|
| Date extracted Date analysed | - | 17/06/2015 18/06/2015 | 17/06/2015 17/06/2015 | 17/06/2015 17/06/2015 |
| TRHC6 - C9 | µg/L | 4,100 | <10 | <10 |
| TRHC6 - C10 | µg/L | 5,100 | <10 | <10 |
| TRHC6 - C10 less BTEX (F1) | µg/L | 3,400 | <10 | <10 |
| Benzene | µg/L | 480 | <1 | <1 |
| Toluene | µg/L | 84 | <1 | <1 |
| Ethylbenzene | µg/L | 580 | <1 | <1 |
| m+p-xylene | µg/L | 470 | <2 | <2 |
| o-xylene | µg/L | 66 | <1 | <1 |
| Naphthalene | μg/L | 86 | <1 | <1 |
| Surrogate Dibromofluoromethane | % | 81 | 97 | 96 |
| Surrogate toluene-d8 | % | 105 | 103 | 103 |
| Surrogate 4-BFB | % | 103 | 102 | 103 |

27055.03, Coramba GME June 2015

| | | 1 | 1 | | 1 | |
|--------------------------------------------|-------|-----------------|------------|------------------|------------|-------------------|
| svTRH (C10-C40) in Water | | | | | | |
| Our Reference: | UNITS | 129468-1 | 129468-2 | 129468-3 | 129468-4 | 129468-5 |
| Your Reference | | MW3 | MW4B | MW6 | MW7 | MW8 |
| Date Sampled | | 10/06/2015 | 10/06/2015 | 10/06/2015 | 10/06/2015 | 11/06/2015 |
| Type of sample | | Water | Water | Water | Water | Water |
| Date extracted | - | 16/06/2015 | 16/06/2015 | 16/06/2015 | 16/06/2015 | 16/06/2015 |
| Date analysed | - | 17/06/2015 | 17/06/2015 | 17/06/2015 | 17/06/2015 | 17/06/2015 |
| TRHC 10 - C 14 | μg/L | <50 | 2,600 | 1,300 | <50 | <50 |
| TRHC 15 - C28 | μg/L | <100 | <100 | <100 | <100 | <100 |
| TRHC 29 - C 36 | μg/L | <100 | <100 | <100 | <100 | <100 |
| TRH>C10 - C16 | μg/L | <50 | 1,300 | 670 | <50 | <50 |
| TRH>C10 - C16 less Naphthalene (F2) | µg/L | <50 | 1,300 | 600 | <50 | <50 |
| TRH>C16 - C34 | μg/L | <100 | <100 | <100 | <100 | <100 |
| TRH>C34 - C40 | μg/L | <100 | <100 | <100 | <100 | <100 |
| Surrogate o-Terphenyl | % | 87 | 85 | 90 | 87 | 86 |
| | | | | | | |
| svTRH (C10-C40) in Water Our Reference: | UNITS | 129468-6 | 129468-7 | 129468-8 | 129468-9 | 129468-10 |
| Your Reference | UNITS | 129466-6 MW9 | MW10 | 129466-6 MW11 | MW12 | 129466-10 MW13 |
| Date Sampled | | 10/06/2015 | 10/06/2015 | 10/06/2015 | 10/06/2015 | 11/06/2015 |
| Type of sample | | Water | Water | Water | Water | Water |
| Date extracted | _ | 16/06/2015 | 16/06/2015 | 16/06/2015 | 16/06/2015 | 16/06/2015 |
| Date analysed | _ | 17/06/2015 | 17/06/2015 | 17/06/2015 | 17/06/2015 | 17/06/2015 |
| TRHC10 - C14 | μg/L | <50 | <50 | 1,000 | 2,700 | 1,100 |
| TRHC 15 - C28 | μg/L | <100 | <100 | <100 | <100 | 130 |
| TRHC ₂₉ - C ₃₆ | μg/L | <100 | <100 | <100 | <100 | <100 |
| TRH>C10 - C16 | μg/L | <50 | <50 | 710 | 1,600 | 720 |
| TRH>C10 - C16 less Naphthalene (F2) | µg/L | <50 | <50 | 660 | 1,500 | 710 |
| TRH>C16 - C34 | µg/L | <100 | <100 | <100 | <100 | <100 |
| | | 1 | 1 | | 1 | 1 |

| TRH>C34 - C40 | µg/L | <100 | <100 | <100 | <100 | <100 |
|----------------------|-------|------------|------------|------------|------------|------------|
| Surrogate o-Terphe | | 94 | 87 | 91 | 93 | 98 |
| | | | | | | |
| svTRH (C10-C40) in V | /ater | | | | | |
| Our Reference: | UNITS | 129468-11 | 129468-12 | 129468-13 | 129468-14 | 129468-15 |
| Your Reference | | MW14 | MW15 | MW16 | MW17 | MW18 |
| Date Sampled | | 11/06/2015 | 10/06/2015 | 11/06/2015 | 11/06/2015 | 11/06/2015 |
| Type of sample | | Water | Water | Water | Water | Water |
| Date extracted | - | 16/06/2015 | 16/06/2015 | 16/06/2015 | 16/06/2015 | 16/06/2015 |
| Date analysed | - | 17/06/2015 | 17/06/2015 | 17/06/2015 | 17/06/2015 | 17/06/2015 |
| TRHC 10 - C 14 | μg/L | 7,400 | <50 | 4,000 | 700 | 480 |
| TRHC 15 - C28 | µg/L | 420 | <100 | 100 | <100 | <100 |

| TRHC 15 - C28 | µg/L | 420 | <100 | 100 | <100 | <100 |
|----------------------------------------|------|-------|------|-------|------|------|
| TRHC29 - C36 | µg/L | <100 | <100 | <100 | <100 | <100 |
| TRH>C10 - C16 | µg/L | 3,600 | <50 | 2,100 | 400 | 300 |
| TRH>C10 - C16 less Naphthalene (F2) | µg/L | 3,300 | <50 | 2,000 | 390 | 290 |
| TRH>C16 - C34 | µg/L | 200 | <100 | <100 | <100 | <100 |
| TRH>C34 - C40 | μg/L | <100 | <100 | <100 | <100 | <100 |
| Surrogate o-Terphenyl | % | 96 | 69 | 95 | 83 | 82 |

| svTRH (C10-C40) in Water | | | | | | |
|----------------------------------------|-------|------------|------------|------------|------------|------------|
| Our Reference: | UNITS | 129468-16 | 129468-17 | 129468-18 | 129468-19 | 129468-20 |
| Your Reference | | MW20 | MW21 | MW22 | MW23 | MW24 |
| Date Sampled | | 10/06/2015 | 11/06/2015 | 11/06/2015 | 11/06/2015 | 11/06/2015 |
| Type of sample | | Water | Water | Water | Water | Water |
| Date extracted | - | 16/06/2015 | 16/06/2015 | 16/06/2015 | 16/06/2015 | 16/06/2015 |
| Date analysed | - | 17/06/2015 | 17/06/2015 | 17/06/2015 | 17/06/2015 | 17/06/2015 |
| TRHC 10 - C14 | µg/L | 82 | <50 | 160 | <50 | 1,500 |
| TRHC 15 - C28 | µg/L | <100 | <100 | <100 | <100 | <100 |
| TRHC29 - C36 | µg/L | <100 | <100 | <100 | <100 | <100 |
| TRH>C10 - C16 | µg/L | <50 | <50 | 120 | <50 | 760 |
| TRH>C10 - C16 less Naphthalene (F2) | µg/L | <50 | <50 | 120 | <50 | 760 |
| TRH>C16 - C34 | μg/L | <100 | <100 | <100 | <100 | <100 |
| TRH>C34 - C40 | µg/L | <100 | <100 | <100 | <100 | <100 |
| Surrogate o-Terphenyl | % | 91 | 86 | 93 | 86 | 81 |

| svTRH (C10-C40) in Water | | |
|----------------------------------------|-------|------------|
| Our Reference: | UNITS | 129468-21 |
| Your Reference | | DUP1 |
| Date Sampled | | 10/06/2015 |
| Type of sample | | Water |
| Date extracted | - | 16/06/2015 |
| Date analysed | - | 18/06/2015 |
| TRHC 10 - C14 | µg/L | 2,600 |
| TRHC 15 - C28 | µg/L | 110 |
| TRHC29 - C36 | µg/L | <100 |
| TRH>C10 - C16 | µg/L | 1,400 |
| TRH>C10 - C16 less Naphthalene (F2) | µg/L | 1,300 |
| TRH>C16 - C34 | µg/L | <100 |
| TRH>C34 - C40 | µg/L | <100 |
| Surrogate o-Terphenyl | % | 87 |

| Ion Balance Our Reference: Your Reference Date Sampled Type of sample | UNITS | 129468-3 MW6 10/06/2015 Water | 129468-8 MW11 10/06/2015 Water | 129468-11 MW14 11/06/2015 Water | 129468-12 MW15 10/06/2015 Water |
|-----------------------------------------------------------------------------------|-----------|----------------------------------------|-----------------------------------------|------------------------------------------|------------------------------------------|
| Date prepared | - | 12/06/2015 | 12/06/2015 | 12/06/2015 | 12/06/2015 |
| Date analysed | - | 12/06/2015 | 12/06/2015 | 12/06/2015 | 12/06/2015 |
| Calcium - Dissolved | mg/L | 1.7 | 3.7 | 3.1 | 7.4 |
| Potassium - Dissolved | mg/L | 3.0 | 3.6 | 6.5 | 3.0 |
| Sodium - Dissolved | mg/L | 36 | 17 | 25 | 29 |
| Magnesium - Dissolved | mg/L | 3.7 | 8.2 | 10 | 1.1 |
| Hydroxide Alkalinity (OH ⁻) as CaCO3 | mg/L | <5 | <5 | <5 | <5 |
| Bicarbonate Alkalinity as CaCO3 | mg/L | 76 | 130 | 160 | 27 |
| Carbonate Alkalinity as CaCO3 | mg/L | <5 | <5 | <5 | <5 |
| Total Alkalinity as CaCO3 | mg/L | 76 | 130 | 160 | 27 |
| Sulphate, SO4 | mg/L | 24 | <1 | <1 | 16 |
| Chloride, Cl | mg/L | 23 | 19 | 26 | 21 |
| Ionic Balance | % | -14 | -32 | -26 | 10 |

| Miscellaneous Inorganics | | | | | |
|----------------------------|-------|------------|------------|------------|------------|
| Our Reference: | UNITS | 129468-3 | 129468-8 | 129468-11 | 129468-12 |
| Your Reference | | MW6 | MW11 | MW14 | MW15 |
| Date Sampled | | 10/06/2015 | 10/06/2015 | 11/06/2015 | 10/06/2015 |
| Type of sample | | Water | Water | Water | Water |
| Date prepared | - | 12/06/2015 | 12/06/2015 | 12/06/2015 | 12/06/2015 |
| Date analysed | - | 12/06/2015 | 12/06/2015 | 12/06/2015 | 12/06/2015 |
| Ammonia as N in water | mg/L | 0.072 | 2.0 | <0.005 | 0.051 |
| Ferrous Iron | mg/L | 6.2 | 29 | 9.9 | 2.0 |
| Free Carbon Dioxide as CO2 | mg/L | 94 | 130 | 92 | 310 |

Client Reference: 27055.03, Coramba GME June 2015

| MethodID | Methodology Summary |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Org-016 | Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. |
| Org-013 | Water samples are analysed directly by purge and trap GC-MS. |
| Org-003 | Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. |
| | F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. |
| Metals-020 ICP- AES | Determination of various metals by ICP-AES. |
| Inorg-006 | Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320-B. |
| Inorg-081 | Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. |
| Inorg-041 | Gravimetric determination of the total solids content of water based on APHA latest edition 2540B. |
| Inorg-057 | Ammonia - determined colourimetrically, based on APHA latest edition 4500-NH3 F. Soils are analysed following a KCI extraction. |
| Inorg-076 | A sample is determined colourimetrically by discrete analyser based on APHA latest edition 3500-Fe B. |
| APHA 4500-CO2 | Dissolved CO ₂ -determined titrimetrically . Based on APHA , 4500-CO ₂ D. |

| Client Reference: 27055.03, Coramba GME June 2015 | | | | | | | | | | | |
|-----------------------------------------------------|-------|-----|-----------------------|----------------|------------------|----------------------------|-----------|---------------------|--|--|--|
| QUALITYCONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery | | | |
| vTRH(C6-C10)/BTEXNin Water | | | | | | Base II Duplicate II % RPD | | | | | |
| Date extracted | - | | | 17/06/2 015 | 129468-1 | 17/06/2015 18/06/2015 | LCS-W1 | 17/06/2015 | | | |
| Date analysed | - | | | 18/06/2 015 | 129468-1 | 17/06/2015 18/06/2015 | LCS-W1 | 17/06/2015 | | | |
| TRHC6 - C9 | µg/L | 10 | Org-016 | <10 | 129468-1 | <10 <10 | LCS-W1 | 102% | | | |
| TRHC6 - C10 | µg/L | 10 | Org-016 | <10 | 129468-1 | <10 <10 | LCS-W1 | 102% | | | |
| Benzene | µg/L | 1 | Org-016 | <1 | 129468-1 | <1 <1 | LCS-W1 | 104% | | | |
| Toluene | µg/L | 1 | Org-016 | <1 | 129468-1 | 2 2 RPD:0 | LCS-W1 | 103% | | | |
| Ethylbenzene | µg/L | 1 | Org-016 | <1 | 129468-1 | <1 <1 | LCS-W1 | 101% | | | |
| m+p-xylene | µg/L | 2 | Org-016 | ~2 | 129468-1 | <2 <2 | LCS-W1 | 101% | | | |
| o-xylene | µg/L | 1 | Org-016 | <1 | 129468-1 | <1 <1 | LCS-W1 | 101% | | | |
| Naphthalene | µg/L | 1 | Org-013 | <1 | 129468-1 | <1 <1 | [NR] | [NR] | | | |
| Surrogate Dibromofluoromethane | % | | Org-016 | 67 | 129468-1 | 101 100 RPD:1 | LCS-W1 | 92% | | | |
| Surrogate toluene-d8 | % | | Org-016 | 101 | 129468-1 | 103 102 RPD:1 | LCS-W1 | 101% | | | |
| Surrogate 4-BFB | % | | Org-016 | 105 | 129468-1 | 102 105 RPD:3 | LCS-W1 | 105% | | | |
| QUALITYCONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery | | | |
| svTRH (C10-C40) in Water | | | | | | Base II Duplicate II %RPD | | | | | |
| Date extracted | - | | | 17/06/2 015 | 129468-4 | 16/06/2015 16/06/2015 | LCS-W3 | 16/06/2015 | | | |
| Date analysed | - | | | 18/06/2 015 | 129468-4 | 17/06/2015 18/06/2015 | LCS-W3 | 17/06/2015 | | | |
| TRHC 10 - C14 | µg/L | 50 | Org-003 | <50 | 129468-4 | <50 <50 | LCS-W3 | 129% | | | |
| TRHC 15 - C28 | µg/L | 100 | Org-003 | <100 | 129468-4 | <100 <100 | LCS-W3 | 118% | | | |
| TRHC₂ - C36 | µg/L | 100 | Org-003 | <100 | 129468-4 | <100 <100 | LCS-W3 | 92% | | | |
| TRH>C10 - C16 | µg/L | 50 | Org-003 | <50 | 129468-4 | <50 <50 | LCS-W3 | 129% | | | |
| TRH>C16 - C34 | µg/L | 100 | Org-003 | <100 | 129468-4 | <100 <100 | LCS-W3 | 118% | | | |
| TRH>C34 - C40 | µg/L | 100 | Org-003 | <100 | 129468-4 | <100 <100 | LCS-W3 | 92% | | | |
| Surrogate o-Terphenyl | % | | Org-003 | 80 | 129468-4 | 87 100 RPD: 14 | LCS-W3 | 83% | | | |
| QUALITYCONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery | | | |
| Ion Balance | | | | | | Base II Duplicate II % RPD | | | | | |
| Date prepared | - | | | 12/06/2 015 | 129468-3 | 12/06/2015 12/06/2015 | LCS-1 | 12/06/2015 | | | |
| Date analysed | - | | | 12/06/2 015 | 129468-3 | 12/06/2015 12/06/2015 | LCS-1 | 12/06/2015 | | | |
| Calcium - Dissolved | mg/L | 0.5 | Metals-020 ICP-AES | <0.5 | 129468-3 | 1.7 [N/T] | LCS-1 | 95% | | | |
| Potassium - Dissolved | mg/L | 0.5 | Metals-020 ICP-AES | <0.5 | 129468-3 | 3.0 [N/T] | LCS-1 | 124% | | | |
| Sodium - Dissolved | mg/L | 0.5 | Metals-020 ICP-AES | <0.5 | 129468-3 | 36 [N/T] | LCS-1 | 113% | | | |
| Magnesium - Dissolved | mg/L | 0.5 | Metals-020 ICP-AES | <0.5 | 129468-3 | 3.7 [N/T] | LCS-1 | 97% | | | |
| Hydroxide Alkalinity (OH ⁻) as CaCO3 | mg/L | 5 | Inorg-006 | <5 | 129468-3 | <5 <5 | [NR] | [NR] | | | |

| QUALITYCONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | 1 | icate results | Spike Sm# | Spike % Recovery |
|--------------------------------------------------|-------|-------|------------------|----------------|------------------------------------------------|------|-----------------------|--------------|---------------------|
| Ion Balance | | | | | | Base | ll Duplicate II %RPD | | |
| Bicarbonate Alkalinity as CaCO3 | mg/L | 5 | Inorg-006 | 45 | 129468-3 | | 76 78 RPD:3 | [NR] | [NR] |
| Carbonate Alkalinity as CaCO3 | mg/L | 5 | Inorg-006 | ব্য | 129468-3 | | <5 <5 | [NR] | [NR] |
| Total Alkalinity as CaCO3 | mg/L | 5 | Inorg-006 | ব্য | 129468-3 | | 76 78 RPD:3 | LCS-1 | 98% |
| Sulphate, SO4 | mg/L | 1 | Inorg-081 | <1 | 129468-3 | | 24 23 RPD:4 | LCS-1 | 118% |
| Chloride, Cl | mg/L | 1 | Inorg-081 | <1 | 129468-3 | | 23 23 RPD:0 | LCS-1 | 113% |
| Ionic Balance | % | | Inorg-041 | [NT] | 129468-3 | | -14 [N/T] | [NR] | [NR] |
| QUALITYCONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | | icate results | Spike Sm# | Spike % Recovery |
| Miscellaneous Inorganics | | | | | | Base | II Duplicate II % RPD | | |
| Date prepared | - | | | 12/06/2 015 | 129468-3 | 12/0 | 06/2015 12/06/2015 | LCS-W1 | 12/06/2015 |
| Date analysed | - | | | 12/06/2 015 | 129468-3 | 12/0 | 06/2015 12/06/2015 | LCS-W1 | 12/06/2015 |
| Ammonia as N in water | mg/L | 0.005 | Inorg-057 | <0.005 | 129468-3 | 0.0 | 72 0.065 RPD: 10 | LCS-W1 | 108% |
| Ferrous Iron | mg/L | 0.05 | Inorg-076 | <0.05 | 129468-3 | 6 | 6.2 6.3 RPD:2 | LCS-W1 | 119% |
| Free Carbon Dioxide as CO2 | mg/L | 0 | APHA 4500-CO2 | 0 | 129468-3 | | 94 91 RPD:3 | LCS-W1 | 91% |
| QUALITYCONTROL vTRH(C6-C10)/BTEXN in Water | UNITS | 6 [| Dup. Sm# | | Duplicate Spike Sm# Base + Duplicate + %RPD | | Spike Sm# | Spike % Reco | very |
| Date extracted | - | 1 | 29468-10 | 17/06/2 | 015 18/06/201 | 5 | LCS-W2 | 17/06/201 | 5 |
| Date analysed | - | 1 | 29468-10 | 17/06/2 | 015 18/06/201 | 5 | LCS-W2 | 17/06/201 | 5 |
| TRHC6 - C9 | µg/L | 1 | 29468-10 | 1200 | 1000 RPD:18 | | LCS-W2 | 92% | |
| TRHC6 - C10 | µg/L | 1 | 29468-10 | 1500 | 1300 RPD:14 | | LCS-W2 | 92% | |
| Benzene | µg/L | 1 | 29468-10 | 38 | 36 RPD:5 | | LCS-W2 | 98% | |
| Toluene | µg/L | 1 | 29468-10 | 72 | 66 RPD:9 | | LCS-W2 | 95% | |
| Ethylbenzene | μg/L | | 29468-10 | | 55 RPD: 10 | | LCS-W2 | 90% | |
| m+p-xylene | μg/L | | 29468-10 | | 110 RPD:9 | | LCS-W2 | 89% | |
| o-xylene | µg/L | | 29468-10 | - | 45 RPD:11 | | LCS-W2 | 90% | |
| Naphthalene | µg/L | | 29468-10 | | 10 RPD:10 | | [NR] | [NR] | |
| <i>Surrogate</i> Dibromofluoromethane | % | | 29468-10 | | 98 RPD:3 | | LCS-W2 | 88% | |
| Surrogate toluene-d8 | % | 1 | 29468-10 | 108 | 106 RPD:2 | | LCS-W2 | 103% | |
| Surrogate 4-BFB | % | | 29468-10 | | 107 RPD:1 | | LCS-W2 | 104% | |

| | _ | Client Referenc | e: 27055.03, Coramb | a GME June 2015 | i |
|-----------------------------------------------------|-------|-----------------|--------------------------------------|-----------------|------------------|
| QUALITY CONTROL svTRH (C10-C40) in Water | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
| Date extracted | - | 129468-17 | 16/06/2015 18/06/2015 | 129468-1 | 16/06/2015 |
| Date analysed | - | 129468-17 | 17/06/2015 19/06/2015 | 129468-1 | 18/06/2015 |
| TRHC 10 - C14 | µg/L | 129468-17 | <50 <50 | 129468-1 | 84% |
| TRHC 15 - C28 | µg/L | 129468-17 | <100 <100 | 129468-1 | 78% |
| TRHC29 - C36 | µg/L | 129468-17 | <100 <100 | 129468-1 | 75% |
| TRH>C10 - C16 | µg/L | 129468-17 | <50 <50 | 129468-1 | 84% |
| TRH>C16 - C34 | µg/L | 129468-17 | <100 <100 | 129468-1 | 78% |
| TRH>C34 - C40 | µg/L | 129468-17 | <100 <100 | 129468-1 | 75% |
| Surrogate o-Terphenyl | % | 129468-17 | 86 84 RPD:2 | 129468-1 | 64% |
| QUALITY CONTROL Ion Balance | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
| Date prepared | - | [NT] | [NT] | 129468-8 | 12/06/2015 |
| Date analysed | - | [NT] | [NT] | 129468-8 | 12/06/2015 |
| Calcium - Dissolved | mg/L | [NT] | [NT] | [NR] | [NR] |
| Potassium - Dissolved | mg/L | [NT] | [NT] | [NR] | [NR] |
| Sodium - Dissolved | mg/L | [NT] | [NT] | [NR] | [NR] |
| Magnesium - Dissolved | mg/L | [NT] | [NT] | [NR] | [NR] |
| Hydroxide Alkalinity (OH ⁻) as CaCO3 | mg/L | [NT] | [NT] | [NR] | [NR] |
| Bicarbonate Alkalinity as CaCO3 | mg/L | [NT] | [NT] | [NR] | [NR] |
| Carbonate Alkalinity as CaCO3 | mg/L | [NT] | [NT] | [NR] | [NR] |
| Total Alkalinity as CaCO3 | mg/L | [NT] | [NT] | [NR] | [NR] |
| Sulphate, SO4 | mg/L | [NT] | [NT] | 129468-8 | 112% |
| Chloride, Cl | mg/L | [NT] | [NT] | 129468-8 | 107% |
| Ionic Balance | % | [NT] | [NT] | [NR] | [NR] |

| Cliont | Reference: |
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| | | Client Referenc | e: 27055.03, Coramb | a Givie June 2015 | |
|--------------------------------------------------|-------|-----------------|--------------------------------------|-------------------|------------------|
| QUALITY CONTROL Miscellaneous Inorganics | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
| Date prepared | - | [NT] | [NT] | 129468-8 | 12/06/2015 |
| Date analysed | - | [NT] | [NT] | 129468-8 | 12/06/2015 |
| Ammonia as N in water | mg/L | [NT] | [NT] | 129468-8 | 94% |
| Ferrous Iron | mg/L | [NT] | [NT] | 129468-8 | 116% |
| Free Carbon Dioxide as CO2 | mg/L | [NT] | [NT] | [NR] | [NR] |
| QUALITY CONTROL vTRH(C6-C10)/BTEXNin Water | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | | |
| Date extracted | - | 129468-16 | 17/06/2015 18/06/2015 | | |
| Date analysed | - | 129468-16 | 18/06/2015 18/06/2015 | | |
| TRHC6 - C9 | µg/L | 129468-16 | 130 120 RPD:8 | | |
| TRHC6 - C10 | µg/L | 129468-16 | 220 200 RPD:10 | | |
| Benzene | µg/L | 129468-16 | 6 6 RPD:0 | | |
| Toluene | µg/L | 129468-16 | <1 <1 | | |
| Ethylbenzene | µg/L | 129468-16 | 10 9 RPD:11 | | |
| m+p-xylene | µg/L | 129468-16 | 54 50 RPD:8 | | |
| o-xylene | µg/L | 129468-16 | <1 <1 | | |
| Naphthalene | µg/L | 129468-16 | 2 2 RPD:0 | | |
| Surrogate Dibromofluoromethane | % | 129468-16 | 92 97 RPD:5 | | |
| Surrogate toluene-d8 | % | 129468-16 | 102 101 RPD:1 | | |
| Surrogate 4-BFB | % | 129468-16 | 106 108 RPD:2 | | |

Report Comments:

The mass inbalance in sample #8 and #11 may be caused by other ions that have not been measured.

| Asbestos ID was analysed by Approved Identifier: | Not applicable for t |
|---------------------------------------------------|----------------------|
| Asbestos ID was authorised by Approved Signatory: | Not applicable for t |

INS: Insufficient sample for this test NA: Test not required <: Less than PQL: Practical Quantitation Limit RPD: Relative Percent Difference >: Greater than NT: Not tested NA: Test not required LCS: Laboratory Control Sample

this job this job

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples. **Duplicate**: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Appendix E – Field Sheets



Field Reporting Form Sheet to be printed on green paper

| | o Information | and construction |
|----------------------------------------------------------------------------------------------|------------------------------|------------------|
| Date: 10 June 2015 | Time: arrive depart | |
| Project Name: Groundwater Monitoring | Project Number: 27055 | |
| Site Location: Martin St, Coramba NSW | Operator: AY | |
| Pur | pose of Visit | and we |
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| Sami | pling Details | 1004.00 |
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| COC Number: TB1 | August 1 | - |
| Primary Lab: | | Part Shad and |
| Secondary Lab: | | 5 |
| Eiold Eo | | |
| PID: | N Calibrated / tested: | |
| FID: | N Calibrated / tested: | Y N NA |
| ID. | N Calibrated / tested: | Y N NA |
| Water Quality Matra | N Calibrated / tested: | M NA |
| Pump: Milano | N Calibrated / tested: | Y N NA |
| Other: 2 110 | N Calibrated / tested: | Y N NA |
| Other | N Calibrated / tested: | Y N NA |
| Other Outet | | Y N NA |
| | nding Action Items | |
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Field Reporting Form

Sheet to be printed on green paper

| Job Information | | | | | | | | | | | |
|---------------------------------------|-------|------|-------------------------------|---|---|-------|--|--|--|--|--|
| Date: June 2015 | | | Time: arrive depart | | | | | | | | |
| Project Name: Groundwater Monitoring | | | Project Number: 27055 | | | | | | | | |
| Site Location: Martin St, Coramba NSW | | | Operator: AY | | | | | | | | |
| Purpose of Visit | | | | | | | | | | | |
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| | | | | | | 2 | | | | | |
| Sampling Details | | | | | | | | | | | |
| Sampling Conducted: Y N NA MWE, MWZ1 | | | | | | | | | | | |
| Matrix: SWOMWIT | w | 16 | 1 MW14, MW13, MU23 1 MW24. | | | | | | | | |
| COC Form Submitted: Y N NA MULS | 5 | 22 | , MW 29. | | | | | | | | |
| COC Number: | | | 1 | | | | | | | | |
| Primary Lab: | | | | | | | | | | | |
| Secondary Lab: | | | | | | | | | | | |
| Fie | ld E | quip | oment Used | | | | | | | | |
| PID: | Y | N | Calibrated / tested: | Y | Ν | NA | | | | | |
| FID: | Y | N | Calibrated / tested: | Y | N | NA | | | | | |
| IP: | Y | N | Calibrated / tested: | Y | Ν | NA | | | | | |
| Water Quality Metre: | Y | N | Calibrated / tested: | Y | Ν | NA | | | | | |
| Pump: | Y | N | Calibrated / tested: | Y | N | NA | | | | | |
| Other: | Y | N | Calibrated / tested: | Y | Ν | NA | | | | | |
| Other: | Y | N | Calibrated / tested: | Y | Ν | NA | | | | | |
| Other O | utst | and | ling Action Items | | | 1 | | | | | |
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No.

| | Date: | 10 | June | 201 | 5 | ang sa Mariga Nation Salaha | Job Information |
|----------------------------------|-----------------------------------------------|---------------------------------------------|--------------------------|--------------------|------------|--------------------------------|-------------------------------------------------------------------------------------------------------------------|
| P | roject N | Name: | | | | | |
| S | ite Loca | ation: | Groun | | er Mo | onitor | ring Project Number: 27055 |
| W | ell ID: | MWZ | Martin | I St. | Cor | amba | NSW Operator: AY |
| 100 | The Opena | 120 | | | | | Weather: |
| | Section 2 | | | | | - Martine Parts | |
| VVa | ater qua | ality equip | ment desc | ription (| please cir | cle). TPS | Equipment S90FLMV Hanna HI9828 V.O.T. |
| | | | inel (bleas | se circle |): Dippe | r PPO | 151 |
| | ging eq ase cirl | Illinmont. | Bail | er type: | | astic | Herron IP Geotech IP |
| | | | | np type: | | | Teflon |
| 1.20 | 112 | | all in | 1 700. | | ristaltic | Micro-purge Amazon |
| Casi | ng Diar | motor | A. She | | V | Vell Gaug | Iging and Purge Volume Calculations |
| Conv | ersion | Footon | | 25mm | 50mn | 100m | 125mm 150mm 150 |
| wolum | e in factor | r L/m | | 0.98 | 1.96 | 7.85 | 5 21.4 Volume of water in well / V |
| 4 | 73 | epth (-) | Water leve | l (=) W | ater Colur | nn | 43.1 70.7 125.7 196.3 Frxrxh |
| | - | Depth to Product (if present) $P = 3.14159$ | | | | | |
| | | | | Wat | er Colum | n (x) Con | nversion Factor (=) Litres per 1 Well Volume |
| | | | | | | m (x) | (=) (=) |
| Begin | ine | | 1 | | at a st | N | |
| | | ge time: | | | | 1 | Water Quality Parameters |
| Litres | Tim | e pH | Temp | | nd D | O Red | Ending purge time: |
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| Criteria | | +/- 0.05 | +/- 10% | +/- 3% | +/- 10% | +/- 10% | Example Commonter |
| | | Total We | II Volume | | | . 1078 | Example Comments: clear / slightly cloudy / turbid / very turbid / no odour / slight odour / odour / strong odour |
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| | | | | | I |)id field no | *pH, temp, cond readings not necessary if well is purged d |
| | | and the state | ang sang sang | | | ord neid pa | parameters stabilise? Y N NA Was the well dry purged? Y N |
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| Projec | | Ground | | r M- | | | Time: arriv | e | | depart |
| Site Lo | ocation: N | lartin | c+ | r Mon | itori | ng | Project Numbe | er: 270 |)55 | |
| Well ID | : MWZ | | SL, | Corar | nba NS | SW | 0 | Y | | 1 |
| Notes and a | | | | | | | Weather: | | | |
| | | | | | | Equi | oment | 1.4.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1 | | MI. |
| Water o | quality equip | ment descr | ription (ple | ase circle |): TPS90 | | Constanting of the second secon | 1 | | X |
| Interfac | e probe nun | ber (pleas | e circle): | Dipper F | | Herron IP | lanna HI9828 | YSI | 1 | |
| Purging (please | equipment: cirlce) | Baile | er type: | Plas | 100 | Teflon | Geotech IP | | 12 | |
| | | Pum | p type: | Peris | staltic | Submersi | | | | |
| 1.00 | | | C.4-0.83 | | and the second se | and the second se | | urge | Amazon | Other: |
| Casing D | Diameter | 0 | 25mm | We | II Gaugii | ng and Purge | e Volume Calci | ulations | | |
| | on Eactor | | | 5011111 | 100mm | | 50mm 200mm | 250mm | 300mm | Volume of the inwoll/W |
| Total Well | Dopth () | Water love | 0.98 | 1.96 | 7.85 | 31.4 | 19.1 70.7 | 125.7 | 196.3 | Volume of water in well / V = Prxrx h |
| | m (-) _ | 4.97m | (=) Wat | er Column | m | | Depth to Produ | | | V = volume in litres P = 3.14159 |
| | | | | | | | Depth to Produ | _ m | sin() | r = radius in cm h = height of water column in |
| | | | | m | (x) Conve (x) | ersion Factor(| =) Litres per 1 W | ell Volume | | |
| | a contraction | all in | L. Spill | | Statement of the statem | Contraction of the International Contractional Contractiona | A PROPERTY OF A | L | | |
| Beginning | purge time: | | <u>8</u> | | Wa | ter Quality F | arameters | | 1. 2.1 | |
| Litres 7 | Fime pl | H Temp | C Con | | | E | nding purge time: | | | |
| 1 | | | m8/c | | i icuo | x | Mine . | Co | mments | |
| 2 | 5.3 | 0 18-9 | 160 | 3 1.61 | 103 | Park 1 | rown. Turb | | 1 9 | |
| | | | | | | -web | own. Ind | id_ | | 1999 C |
| 3 | | | | - | | | 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1 | mar h | | |
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| | 6 | | | | | | | | | and the second |
| | | | | | | | 2 | | 12. | |
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| | | | | | | hsufficent | - volure | of wo | Le L | Cadi a un |
| | | | | | | hsufficent | - volure a | of wo | de b | confine using |
| abilisation | +/- 0.05 | +/- 10% | | | | micropu | rge. | | | contine using |
| Criteria | +/- 0.05 | | | +/- 10% | +/- 10% | micropu | ments: clear / sl | | | confine my |
| tabilisation Criteria | +/- 0.05 | /ell Volum | | | +/- 10% | micropu | nments: clear / sl slight od | lightly cloud | dy / turbid / | /very turbid / no odour / |
| Criteria | +/- 0.05 | | | sampling | | Example Con | nments: clear / slight od *pł | lightly cloud | dy / turbid / | paour |
| Criteria | +/- 0.05 | /ell Volum | | sampling | | micropu | nments: clear / slight od *pł | lightly cloud lour / odou H, temp, con | dy / turbid , r / strong c d readings r | not necessary if well is purged dry |
| Criteria 3 | +/- 0.05 Total M Actual a | /ell Volume mount of wat | e ter prior to s | sampling D | id field pa | Example Con | nments: clear / sl slight od *pf ise? V N N | lightly cloud lour / odou H, temp, con | dy / turbid , r / strong c d readings r | paour |
| Criteria 3 pre-cleanin | +/- 0.05 Total M Actual an | /ell Volume mount of wat | e er prior to s | sampling D | id field pa | Example Con | ments: clear / sl slight od *p/ ise? | lightly cloud lour / odou H, temp, con | dy / turbid , r / strong c d readings r | not necessary if well is purged dry |
| Criteria 3 pre-cleanin pre-cleanin | +/- 0.05 Total W Actual an | /ell Volume mount of wat equipment equipment | e ter prior to s used for t | sampling D | id field pa | Example Con | ments: clear / slight od slight od *pH ise? N N (S N | lightly cloud lour / odou H, temp, con | dy / turbid , r / strong c d readings r | not necessary if well is purged dry |
| Criteria 3 pre-cleanin pre-cleanin documentat | +/- 0.05 Total W Actual an g sampling g sampling tion of equip | Vell Volume mount of wat equipment equipment ment cond | e er prior to s used for t properly p ucted? | sampling D hese sam protected f | id field pa | Example Con rameters stabil Id QC Check mination? | ments: clear / slight od *pH ise? N N KS N N N | lightly cloud lour / odou H, temp, con | dy / turbid , r / strong c d readings r | not necessary if well is purged dry |
| Criteria 3 pre-cleanin pre-cleanin documentai air bubbles | +/- 0.05 Total M Actual and ng sampling g sampling g sampling tion of equip | Vell Volume mount of wat equipment equipment ment cond vials at time | e ter prior to s used for t properly p ucted? | sampling D hese sam protected f | id field pa | Example Con rameters stabil Id QC Check mination? | ments: clear / sl slight od *pf ise? Y N N cs Y N Y N Y N Y N Y N Y N Y N Y N | lightly cloud lour / odou H, temp, con | dy / turbid , r / strong c d readings r | not necessary if well is purged dry |
| Criteria 3 pre-cleanin pre-cleanin documentat air bubbles sample for r | +/- 0.05 Total W Actual an | Vell Volume mount of wat equipment equipment ment cond vials at time | e ter prior to s used for t properly p ucted? | sampling D hese sam protected f | id field pa | Example Con rameters stabil Id QC Check mination? | ments: clear / slight od slight od *pf ise? N N (S N NA N NA N NA N NA | lightly cloud lour / odou H, temp, con | dy / turbid , r / strong c d readings r | not necessary if well is purged dry |

UTM/MGA system

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| Detri | | | | | | Job I | nformatio | n | | N. S. S. | |
| | | ne 201 | | | 1.7.3 | | Time: arrive depart | | | | |
| Project Name | | undwa | | | | | Project Number: 27055 | | | | |
| Site Location | | cin S | t, Co | ramba | a NSW | | Operat | or: AY | 7 | 7 | |
| Well ID: | Mwy | 15 | | | _ | | Weath | er: | 1 | | |
| | | | | | | Equ | uipment | | Alter Contraction | | |
| Water quality | equipment | descriptio | n (please | circle): | TPS90FLI | ٧N | Hanna HI | 9828 (| YSI | f. | |
| Interface prob | e number (| please cir | cle): D | ipper PRC | Her | ron IP | Geotec | h IP | | | |
| Purging equip (please cirlce) | | Bailer ty Pump ty | 2 | Plastic Peristal | | Teflon Subme | rsible | Micro-pu | irge | Amazon | Other: |
| an ann an an | | | | Well | Gauging | and Pu | rge Volur | ne Calcu | lations | | - Tar |
| Casing Diame | ter | 25 | 5 5 5 5 5 | 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | A.4 | 125mm | 150mm | 200mm | 250mm | 200- | |
| Conversion Fa | | 0 | .98 | 1.96 | 7.85 | 31.4 | 49.1 | 70.7 | 125.7 | 300mm | Volume of water in well / V = Pr x r x h |
| Total Well Dep | oth (-) Wat | er level (= | =) Water | Column | | | | 11-10-1-1 | uct (if prese | . 196.3 | V = volume in litres P = 3.14159 |
| 0,00 | | <u> </u> | and the | olumn (x |) Conver | sion Fact | or (=) Litre _ (=) | es per 1 W | /ell Volume | | h = height of water column in cm |
| | | 1.1. 1.1. 1.4 | | | Wate | er Quali | ty Param | eters | | | |
| Beginning purg | ge time: | | | | | 1.4 | Ending | ourge time |): | an Ann an a | |
| Litres Time | e pH | Temp C | Cond mS/cm | | Redox mV | | it and | 1- | Co | omments | |
| 2 | 6.56 | 20.5 | 337.7 | 0.93 | -123 | ile | é. H | C odo | w. | | |
| 4 | 6.56 | 20.5 | 344. | 0 0.80 | -111 | 4 | | | | | |
| 6 | 6.55 | 20.5 | 345.1 | 0.66 | -109 | Jane 1 | tay 1 | | | | |
| | | | | | | | ang N | | 4 | | |
| | | | | | | | 1 | | | | ale pair and the |
| | | | | | | | 1 | | | | |
| | - | | | . V. | - | 3 | 1.1 | | | | a start and a start |
| | | | | . (| | | | | 12 | | |
| | | | | · / \ | | | | | | | |
| | | | | s(- 54 | | | 2. | | | | |
| Stabilisation Criteria | +/- 0.05 | +/- 10% | +/- 3% | +/- 10% | +/- 10% | Examp | le Comme | nts: clear | / slightly c | loudy / tur | bid / very turbid / no odour / |
| 6 | Total W | ell Volum | e | 1 | | | 8.5 | Sign | t odour / od *pH, temp, | | ng odour ngs not necessary if well is purged dry |
| 3 | | nount of wa | ter prior to | G | | | | | , , , , | | |
| | | | | | | | s stabilise? | N (Y) N | NA | Was the v | vell dry purged? Y |
| /as pre-cleanin /as pre-cleanin /as documentat /ere air bubbles /as sample for r uplicate sample | g sampling lion of equi present in metals field | equipmen pment con vials at tir filtered pr | t properly iducted? ne of colle | v protected | mples? d from cor | | Checks | N NA NA NA NA NA | Duplicate |)W? | TPU, BTEX. |

| | | 1 | | | | Job Information | | | | | |
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| Date: 10 | June | 2015 | 5 | 1.122.2 | | Time: arrive depart | | | | | |
| Project Name: | Grou | ndwat | er Mo | nito | ring | Project Number: 27055 | | | | | |
| Site Location: | Mart | in St | , Cor | amba | NSW | Operator: AY | | | | | |
| Well ID: ML | 5 | | | | | Weather: | | | | | |
| | | | | | | Equipment | | | | | |
| Water quality e | quipment d | escription | (please c | ircle): TF | S90FLM | | | | | | |
| Interface probe | | | | per PRO | 200 J.7 | ron IP Geotech IP | | | | | |
| Purging equipr | nent: | Bailer type | e: | Plastic | - | Teflon | | | | | |
| (please cirlce) | | Pump type | e: | Peristalti | c | Submersible Micro-purge Amazon Other: | | | | | |
| Well Gauging and Purge Volume Calculations | | | | | | | | | | | |
| Casing Diamet | ər | 25n | nm 50 | | | 125mm 150mm 200mm 250mm 300mm Volume of water in well / V | | | | | |
| Conversion Fa | ctor | 0.9 | 98 1. | | | 31.4 49.1 70.7 125.7 196.3 V = volume in litres | | | | | |
| (volume in factor L/i Total Well Dep | h (-) Wate | r level (=) | Water C | olumn | | Depth to Product (if present) P = 3.14159 r = radius in cm | | | | | |
| 6.6 | $\underline{-6.6}_{m} (-) \underbrace{1.66}_{m} $ | | | | | | | | | | |
| Water Column (x) Conversion Factor (=) Litres per 1 Well Volume m (x) (=)L | | | | | | | | | | | |
| Water Quality Parameters | | | | | | | | | | | |
| Beginning purg | e time: | | <u>.</u> | | 174 | Ending purge time: | | | | | |
| Litres Time | pН | Temp C | Cond | DO | Redox | | | | | | |
| | | | mS/cm | ppm | mV | 50 | | | | | |
| | | | | | | Dry. | | | | | |
| | | | | | | | | | | | |
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| Stabilisation Criteria | +/- 0.05 | +/- 10% | +/- 3% | +/- 10% | +/- 10% | Example Comments: clear / slightly cloudy / turbid / very turbid / no odour / slight odour / odour / strong odour | | | | | |
| | | /ell Volum mount of wa | | sampling | | *pH, temp, cond readings not necessary if well is purged dr | | | | | |
| | | | | | Did field | parameters stabilise? Y N NA Was the well dry purged? Y N | | | | | |
| | , in the second s | | 20.53 | | F | Field QC Checks | | | | | |
| Was pre-cleani | ng sampling | equipme | nt used fo | r these sa | 12.44 | Y N | | | | | |
| Was pre-cleani | | | | | | | | | | | |
| Was document | ation of equ | ipment co | nducted? | Alexanders | | Y N NA | | | | | |
| Were air bubble | es present in | n vials at t | me of col | lection? | | Y N NA | | | | | |
| Was sample fo | metals field | d filtered p | rior to pre | servation | s? | Y N NA | | | | | |
| Duplicate samp | le collected | ? | | | | Y N Duplicate sample ID | | | | | |
| Groundwater - well sampling data | form.cdr GPS | Coor | dina | tes (| UTM/N | MGA system): | | | | | |

| | | | | | | | Job Infe | ormation | 1 | | | |
|--------------------------------------------------------------|------------------|---------------------------|-------------|----------------|------------|-------------|-----------|---------------------|--------------------|------------------------------|-----------------------------|-----------------------------------------------|
| Date: | 10 | June | 2015 | 1 | | | | Time: arrive depart | | | | |
| Project Na | ame: | Grour | ndwat | er Mc | nito | ring | | Project | Number: | 2705 | 5 | × |
| Site Locat | | Marti | n St, | Cor | amba | NSW | | Operate | or: AY | | | |
| Well ID: | MW | 6 | | | | | | Weathe | er: | | | |
| | | 1. S. e. 1 | K. | 900 <u>2</u> 1 | | 1941 (M | Equi | oment | | 0 | | |
| Water qua | ality equ | ipment de | scription | (please ci | rcle): TP | S90FLM | V I | Hanna HI | 9828 (| YSI | | |
| Interface p | probe ni | umber (ple | ase circle | e): Dipp | ber PRO | Herro | on IP | Geotec | n IP | | | |
| Purging eo (please cir | | nt: B | ailer type | e: 1 | Plastic | | Teflon | | | | | 21 |
| Pump type: Peristaltic Submersible Micro-purge Amazon Other: | | | | | | | | | | | | |
| Well Gauging and Purge Volume Calculations | | | | | | | | | | | | |
| Casing Dia | ameter | | 25m | nm 50i | mm 10 | 0mm 1 | 25mm | 150mm | 200mm | 250mm | 300mm | Volume of water in well / V |
| Conversio | | r | 0.9 | 8 1. | 96 7 | .85 | 31.4 | 49.1 | 70.7 | 125.7 | 196.3 | = Pr x r x h V = volume in litres |
| Total Well | Depth | (-) Water | level (=) | Water C | olumn | I | | | | uct (if pres | ent) | P = 3.14159 r = radius in cm |
| 6,85 | <u> </u> | (-) <u>65</u> | | | | | | | VD- | | | h = height of water column in cm |
| | | | | | | | | | | Vell Volume | | |
| | 1000 | guilt sector and a sector | | | | | | | | 2 | | |
| Water Quality Parameters | | | | | | | | | | | | |
| Beginning | | | | NS | | | | Ending | purge tim | | | |
| Litres | Time | рН | Temp C | Cond m8/cm | DO ppm | Redox mV | | | | С | omments | |
| 2 | | 5:77 | 209 | 222 | 0.23 | -117 | a | 20. | be | odou | | |
| 4 | | 5.76 | 209 | 230 | 0,18 | -721 | | | | | 2 | |
| 6 | | 5.76 | 20.9 | 234 | 0,66 | -124 | | | | | | |
| | | | | | | | | | | | | |
| | | 8 | | | | | | | | | | |
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| | | | | | | | Ded | carles | 1 fu | fine | (Lord | 60/ × 1/483/8) 1/ |
| | | | | | | | wel | 1, fe | of h | cop. | C | |
| | | | | | | | | t | | 1 | | |
| Stabilisa Criteri | | +/- 0.05 | +/- 10% | +/- 3% | +/- 10% | +/- 10% | Examp | le Comm | nents: cle slig | ar / slightly ght odour / | cloudy / tu odour / stre | ırbid / very turbid / no odour / ong odour |
| 1 | | | ell Volum | | | | 1 | | | | | dings not necessary if well is purged dry |
| 0 | | Actual am | iount of wa | ter prior to | | | | | | | | |
| | | | | | | Did field | paramete | rs stabilis | e? | N NA | Was the | e well dry purged? |
| | | | S. | | | | ield QC | Check | S | | | I A A |
| Was pre-c | leaning | sampling | equipmer | nt used fo | r these sa | mples? | | G | N | | \$X | 0 BHRRA |
| Was pre-cl | leaning | sampling | equipmer | nt properly | y protecte | d from co | ntaminati | ion? | N | | P | A AND I |
| Was docur | mentatio | on of equip | oment coi | nducted? | | | | Y | N N | A | ~ | |
| Were air b | oubbles | present in | vials at ti | me of col | lection? | | | Y | | A | | |
| Was samp | ole for m | etals field | filtered p | rior to pre | servation | s? | | C | N N | A | | TRY, BIEX & MWA. |
| Duplicate s | | | | | | | | R | N | Duplic | ate sample | e ID |
| iroundwater - well samp | npling data form | GPS | Coor | dina | tes (| UTM/N | IGA s | vsten | 1) | 1.11 | | 11/04 |

| | Job Information | | | | | | | | | | |
|-------------------------------------------------------------------------------------|------------------------------------------|----------|------------|------------|-------------|-------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|
| Date: | June 2 | 2015 | | | | Time: arrive depart | | | | | |
| Project Name: | Ground | wate | er Mo | nitor | ing | Project Number: 27055 | | | | | |
| Site Location: | Martin | St, | Cora | amba | NSW | Operator: AY | | | | | |
| Well ID: Mw | 7 | | | | | Weather: | | | | | |
| Equipment | | | | | | | | | | | |
| Water quality equi | pment descr | iption (| please cir | cle): TP | S90FLMV | Hanna HI9828 YSI | | | | | |
| Interface probe nu | umber (pleas | e circle | e): Dipp | er PRO | Herro | n IP Geotech IP | | | | | |
| Purging equipmen (please cirlce) | nt: Baile | er type | : P | lastic | Т | Teflon | | | | | |
| Pump type: Peristaltic Submersible Micro-purge Amazon Other: | | | | | | | | | | | |
| Well Gauging and Purge Volume Calculations | | | | | | | | | | | |
| Casing Diameter | | 25m | nm 50n | nm 100 |)mm 12 | 25mm 150mm 200mm 250mm 300mm Volume of water in well / V | | | | | |
| Conversion Factor (volume in factor L/m) | r | 0.9 | 8 1.9 | 96 7 | .85 3 | B1.4 49.1 70.7 125.7 196.3 Pr x r x h V = volume in litres | | | | | |
| Total Well Depth (| (-) Water lev | vel (=) | Water Co | olumn | | P = 3.14159 $P = 3.14159$ $r = radius in cm$ | | | | | |
| <u> </u> | (-)/ | | | | Conversi | m h = height of water column in cm | | | | | |
| Water Column (x) Conversion Factor (=) Litres per 1 Well Volume m (x) (=)L | | | | | | | | | | | |
| Water Quality Parameters | | | | | | | | | | | |
| Beginning purge ti | Beginning purge time: Ending purge time: | | | | | | | | | | |
| Litres Time | pH Ter | mp C | Cond | DO | Redox | Comments | | | | | |
| 2 | | ~ | mS/cm | ppm | mV | | | | | | |
| | 5.8519 | | 187.5 | | | Cleer. No odour. | | | | | |
| 9 | | | 188.0 | | | | | | | | |
| 8 | 5.82 19 | 1.6 | 189.1 | 0.82 | 104 | | | | | | |
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| | | | | | | | | | | | |
| Stabilisation Criteria | +/- 0.05 +/ | - 10% | +/- 3% | +/- 10% | +/- 10% | Example Comments: clear / slightly cloudy / turbid / very turbid / no odour / slight odour / odour / strong odour | | | | | |
| 8 | Total Well Actual amou | | | samolina | | *pH, temp, cond readings not necessary if well is purged dry | | | | | |
| | | | | | Did field r | parameters stabilise? (Y) N NA Was the well dry purged? Y (V) | | | | | |
| | | | | | | | | | | | |
| | | | | <u>.</u> | 0 | ield QC Checks | | | | | |
| Was pre-cleaning | | | | | A | | | | | | |
| Was pre-cleaning | | | | / protecte | a from col | | | | | | |
| Was documentatio | | | | oction? | | Y N NA | | | | | |
| Were air bubbles Was sample for m | | | | | 2 | Y N NA | | | | | |
| Duplicate sample | | leieu p | nor to pre | servation | 5 [| Y N NA Y N Duplicate sample ID | | | | | |
| Groundwater - well sampling data form | | Coor | rdinat | es (| IITM/N | IGA system): | | | | | |

| | | | | | | | Job Informatic | on | | | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|--------------|--------------|----------------|------------|-------------|----------------|--------------|----------|----------------------------|------------------------------------------------------|--|
| Date: | И | June | 2015 | | | | Time: | arrive | | | depart | |
| Project | Name: | Grour | ndwat | er Mc | nitor | ring | Projec | t Number: | 2705 | 5 | 1 | |
| Site Loc | ation: | Marti | n St, | Cor | amba | NSW | Opera | Operator: AY | | | | |
| Well ID: | Mh | 18 | | | | | Weath | ner: | | | | |
| 1 | 3 | 1.200 | 1111 | 1 | | 1.1 | Equipment | | | | | |
| Water quality equipment description (please circle): TPS90FLMV Hanna HI9828 | | | | | | | | | | | | |
| Interface probe number (please circle): Dipper PRO Herron IP Geotech IP | | | | | | | | | | | | |
| Purging equipment: (please cirlce) Bailer type: Plastic Teflon Pump type: Peristaltic Submersible Micro-purge Amazon Other: | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| Well Gauging and Purge Volume Calculations | | | | | | | | | | | | |
| | Diameter |)r | 25m | | | | 25mm 150mm | 200mm | 250mm | 300mm | Volume of water in well / V = Pr x r x h | |
| (volume in | factor L/m) | | 0.9 | | | .85 | 31.4 49.1 | 70.7 | 125.7 | 196.3 | V = volume in litres P = 3.14159 | |
| | <u>57</u> m | (-) Water | 1evel (=) | Water C | olumn m | | De | pth to Prod | | ent) | r = radius in cm h = height of water column in cm | |
| $\underline{19.37} \text{ m} (-) \underbrace{4.57} \text{ m} (=) \underline{\qquad} \text{m}$ $\underline{W1} \text{ m}$ $h = \text{height of water column in cm}$ $Water Column (x) Conversion Factor (=) Litres per 1 Well Volume$ | | | | | | | | | | | | |
| m (x) (=)L | | | | | | | | | | | | |
| Water Quality Parameters | | | | | | | | | | | | |
| Beginnir | ginning purge time: Ending purge time: | | | | | | | | | | | |
| Litres | Time | pН | Temp C | Cond prS/cm | DO ppm | Redox mV | | | с | omments | | |
| 2 | | 5.47 | 20.6 | 24.9 | 0.40 | 151,7 | aler | . No | odse | s . | | |
| ч | | | | | 0.30 | | | | | | - | |
| 8 | | 5.46 | 20.5 | 191.8 | 0.28 | 153,3 | | | | 74 | | |
| | | | | * | | | | | | | | |
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| | | | | | | | D. las I | 1 | ۸. | | IL (R L) > / I | |
| | | | | | | | Dedicades | n fer | Brig | in a | rell (Bonder) officed | |
| Stabili Crit | | +/- 0.05 | +/- 10% | +/- 3% | +/- 10% | +/- 10% | Example Com | | | cloudy / tu odour / str | urbid / very turbid / no odour / ong odour | |
| K | ø | | ell Volum | 100 No. 100 | | | 1 | | *pH, tem | p, cond read | dings not necessary if well is purged dry | |
| | | Actual an | nount of wa | iter prior to | | | | 3 | | | | |
| Did field parameters stabilise? 👔 N NA Was the well dry purged? Y Ň | | | | | | | | | | | | |
| 1.821 | | | last! | | | F | ield QC Checl | ĸs | | | | |
| Was pre | -cleaning | sampling | equipme | nt used fo | r these sa | mples? | C | Y N | | | | |
| Was pre-cleaning sampling equipment properly protected from contamination? | | | | | | | | | | | | |
| Was documentation of equipment conducted? | | | | | | | | | | | | |
| Were air bubbles present in vials at time of collection? | | | | | | | | | | | | |
| Was sar | mple for n | netals field | l filtered p | rior to pre | servation | s? | | YNN | A | | | |
| and the second se | - | collected? | | | | | | YN | Duplic | ate sample | | |
| GPS Coordinates (UTM/MGA system): | | | | | | | | | | | | |

| Job Information | | | | | | | | | | | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------------|------------|---------------------|------------|-------------|-----------|-----------------------|-------------|---------------|--------------|-----------------------------------------------|--|
| Date: | 10 | June | 2015 | | | | - | Time: arrive depart | | | | | |
| Project N | lame: | Groun | dwat | er Mo | nitor | ring | F | Project Number: 27055 | | | | | |
| Site Loca | ation: | Marti | n St, | Cora | amba | NSW | (| Operator: AY | | | | | |
| Well ID: Mw9 | | | | | | | | | Weather: | | | | |
| Equipment | | | | | | | | | | | | | |
| Water quality equipment description (please circle): TPS90FLMV Hanna HI9828 | | | | | | | | | | | | | |
| Interface probe number (please circle): Dipper PRO Herron IP Geotech IP | | | | | | | | | | | | | |
| Purging equipment: Bailer type: Plastic Teflon (please cirlce) | | | | | | | | | | | | | |
| Pump type: Peristaltic Submersible Micro-purge Amazon Other: | | | | | | | | | | | | | |
| Well Gauging and Purge Volume Calculations | | | | | | | | | | | | | |
| Casing E | Diameter | | 25m | nm 50mm 100 | | 0mm 12 | 25mm 15 | 0mm | 200mm | 250mm | 300mm | Volume of water in well / V | |
| | Conversion Factor | | | 0.98 1.96 7 | | .85 3 | 31.4 4 | 9.1 | 70.7 | 125.7 | 196.3 | = Pr x r x h V = volume in litres | |
| Total We | II Depth | (-) Water | level (=) | Water Co | olumn | | | | | uct (if pres | ent) | P = 3.14159 r = radius in cm | |
| $m (-) 5 - 7^{\circ} m (=) $ m $h = height of water column in cm$ | | | | | | | | | | | | | |
| Water Column (x) Conversion Factor (=) Litres per 1 Well Volume m (x) (=) L | | | | | | | | | | | | | |
| Water Quality Parameters | | | | | | | | | | | | | |
| Beginnin | ig purge t | time: | | MY | | | E | Ending | purge tim | e: | | | |
| Litres | Time | рН | Temp C | Cond mS/cm | DO ppm | Redox mV | | Comments | | | | | |
| 2 | | 5,01 | 19.3 | 126.7 | 2.13 | 198 | Pale | Pale brown. Cloudy. | | | | | |
| 43 | | | | | 2.05 | | | | | | | | |
| 4 | | | | | 2.10 | | | | | | | | |
| | | | | | | | | | | | | | |
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| | és, e | | | | | | | | | | | | |
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| | | | | | | | | | | | | | |
| | | | | | | | Declica | red | subil | s in | vell | (Burded Ung 3/8) | |
| | | | | | | | YYYY | MA | XX A | | UM I | And a start 1 AP 1 37 | |
| Stabilis | ation | | | | | | MALST. | | <u>////</u> | | | CARLON WS 4000 | |
| Crite | | +/- 0.05 | +/- 10% | +/- 3% | +/- 10% | +/- 10% | Example | Comm | | ght odour / | | urbid / very turbid / no odour / ong odour | |
| 9 | | | ell Volum | ie ater prior to | sampling | | | | | *pH, tem | ip, cond rea | dings not necessary if well is purged dry | |
| Did field parameters stabilise? N NA Was the well dry purged? Y | | | | | | | | | | | | | |
| | | | | | | F | ield QC (| Check | S | | | | |
| Was pre | -cleaning | sampling | equipme | nt used fo | r these sa | amples? | | 6 | | | n telles and | PEN ROFY | |
| Was pre-cleaning sampling equipment used for these samples? N Was pre-cleaning sampling equipment properly protected from contamination? N | | | | | | | | | | | | | |
| Was documentation of equipment conducted? | | | | | | | | | | | | | |
| Were air bubbles present in vials at time of collection? | | | | | | | | | | | | | |
| Was san | nple for n | netals field | filtered p | rior to pre | eservation | s? | × 1 | Y | NN | à | | entre Carrie | |
| Duplicate | e sample | collected? | ? | | | | 1 | Y | N | Duplic | ate sample | e ID | |
| Groundwater - well s | sampling data forn | GPS | Сооз | dina | tes (| UTM/N | 1GA sy | ster | n): | 1 4. 1 49. | | 11/04 | |
| Job Information | | | | | | | | | | | | |
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| Date: () June 2015 Time: arrive depart | | | | | | | | | | | | |
| Project Name: Groundwater Monitoring Project Number: 27055 | | | | | | | | | | | | |
| Site Location: Martin St, Coramba NSW Operator: AY | | | | | | | | | | | | |
| Well ID: MUIO Weather: | | | | | | | | | | | | |
| Equipment | | | | | | | | | | | | |
| Water quality equipment description (please circle): TPS90FLMV Hanna HI9828 (YSI) | | | | | | | | | | | | |
| Interface probe number (please circle): Dipper PRO Herron IP Geotech IP | | | | | | | | | | | | |
| Purging equipment: Bailer type: Plastic Teflon (please cirlce) Pump type: Peristaltic Submersible Micro-purge Amazon Other: | | | | | | | | | | | | |
| Well Gauging and Purge Volume Calculations | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| Conversion Factor 0.98 1.96 7.85 31.4 49.1 70.7 125.7 196.3 = Pr x r x h | | | | | | | | | | | | |
| $\frac{(\text{volume in factor L/m})}{\text{Total Wall Depth () Water level (T) Water Column P = 3.14159}$ | | | | | | | | | | | | |
| Total Well Depth (-)Water level (=)Water ColumnDepth to Product (if present) $r = radius in cm$ m (-)m (=)mmh = height of water column in cm | | | | | | | | | | | | |
| Water Column (x) Conversion Factor (=) Litres per 1 Well Volume m (x) (=)L | | | | | | | | | | | | |
| Water Quality Parameters | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| Litres Time pH Temp C Cond DO Redox Comments | | | | | | | | | | | | |
| $\frac{1}{2} \frac{1}{2} \frac{1}$ | | | | | | | | | | | | |
| 2 0.62 15.4 82.4 0.65 -56 Dark brown, Tursid, No odow. 4 6.72 15.4 820 0.42-66 Become, day | | | | | | | | | | | | |
| 6 6.78 15.4 81.3 0.39 -75 | | | | | | | | | | | | |
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| | | | | | | | | | | | | |
| Pedicated tubing (3/8') inwell (fied to cop.) | | | | | | | | | | | | |
| Locked envirocap. | | | | | | | | | | | | |
| Well Localed in asphalt crea S of MW20, | | | | | | | | | | | | |
| Stabilisation Criteria +/- 0.05 +/- 10% +/- 3% +/- 10% +/- 10% Example Comments: clear / slightly cloudy / turbid / very turbid / no odour / slight odour / odour / odour / strong odour | | | | | | | | | | | | |
| 6 Total Well Volume *pH, temp, cond readings not necessary if well is purged dry Actual amount of water prior to sampling *pH, temp, cond readings not necessary if well is purged dry | | | | | | | | | | | | |
| Did field parameters stabilise? N NA Was the well dry purged? Y N | | | | | | | | | | | | |
| Field QC Checks | | | | | | | | | | | | |
| Was pre-cleaning sampling equipment used for these samples? | | | | | | | | | | | | |
| Was pre-cleaning sampling equipment properly protected from contamination? | | | | | | | | | | | | |
| Was documentation of equipment conducted? | | | | | | | | | | | | |
| Were air bubbles present in vials at time of collection? | | | | | | | | | | | | |
| Was sample for metals field filtered prior to preservations? | | | | | | | | | | | | |
| Duplicate sample collected? Y N Duplicate sample ID | | | | | | | | | | | | |

GPS Coordinates (UTM/MGA system):

| Date: June 2015 Time: arrive depart | | | | | | | | | | | | |
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| | | | | | | | | | | | | |
| Project Name: Groundwater Monitoring Project Number: 27055 | | | | | | | | | | | | |
| Site Location: Martin St, Coramba NSW Operator: AY | | | | | | | | | | | | |
| Well ID: Mwill Weather: | | | | | | | | | | | | |
| Equipment | | | | | | | | | | | | |
| Water quality equipment description (please circle): TPS90FLMV Hanna HI9828 | | | | | | | | | | | | |
| Interface probe number (please circle): Dipper PRO Herron IP Geotech IP | | | | | | | | | | | | |
| Purging equipment: Bailer type: Plastic Teflon (please cirlce) Pump type: Peristaltic Submersible Micro-purge Amazon Other: | | | | | | | | | | | | |
| Well Gauging and Purge Volume Calculations | | | | | | | | | | | | |
| Casing Diameter 25mm 50mm 100mm 125mm 150mm 200mm 250mm 300mm Volume of water in well / V | | | | | | | | | | | | |
| Conversion Factor 0.98 1.96 7.85 31.4 49.1 70.7 125.7 196.3 V = volume in litres | | | | | | | | | | | | |
| (volume in factor L/m) Clock Note Not Note Note < | | | | | | | | | | | | |
| $\underline{m} (-) \underline{2.79} m (=) \underline{m} m $ | | | | | | | | | | | | |
| Water Column (x) Conversion Factor (=) Litres per 1 Well Volume m (x) (=)L | | | | | | | | | | | | |
| Water Quality Parameters | | | | | | | | | | | | |
| Beginning purge time: Ending purge time: | | | | | | | | | | | | |
| Litres Time pH Temp C Cond DO Redox Comments | | | | | | | | | | | | |
| 2 6.48 20.4 338 0.42 -143 Clear. Hydrocardon odow. | | | | | | | | | | | | |
| 4 6.48 20.5 339 0.37 -127 | | | | | | | | | | | | |
| 6 6.49 20.5339 0.33-122 | | | | | | | | | | | | |
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| | | | | | | | | | | | | |
| Stabilisation Criteria +/- 0.05 +/- 10% +/- 10% +/- 10% Example Comments: clear / slightly cloudy / turbid / very turbid / no odour / slight odour / odour / strong odour | | | | | | | | | | | | |
| Total Well Volume *pH, temp, cond readings not necessary if well is purged | | | | | | | | | | | | |
| Actual amount of water prior to sampling | | | | | | | | | | | | |
| Did field parameters stabilise? YNNA Was the well dry purged? YN | | | | | | | | | | | | |
| Field QC Checks | | | | | | | | | | | | |
| Was pre-cleaning sampling equipment used for these samples? | | | | | | | | | | | | |
| Was pre-cleaning sampling equipment properly protected from contamination? | | | | | | | | | | | | |
| Was documentation of equipment conducted? | | | | | | | | | | | | |
| Were air bubbles present in vials at time of collection? | | | | | | | | | | | | |
| Was sample for metals field filtered prior to preservations? | | | | | | | | | | | | |
| Duplicate sample collected? Y Duplicate sample ID Groundwater-well sampling data form.cdr GPS Coordinates (UTM/MGA_system) : | | | | | | | | | | | | |

and and the

| | | | V | | | Job Informatio | n | | | |
|-------------------------------------|------------------------|-------------------------|-------------|-----------------------------------------------------------------------------------------------------------------|-----------|-------------------------|-------------|----------|------------------|-----------------------------------------------------------------------------------------------------------------|
| Date: \O | June | 2015 | | | | Time: | arrive | | | depart |
| Project Name: | Ground | | er Mo | nitor | ing | Projec | t Number: | 2705 | 5 | |
| Site Location: | Martir | st, | Cora | amba | NSW | Opera | tor: AY | | entre de se stre | |
| Well ID: MW | 12 | | | | | Weath | ier: | | | |
| | | | | | 7 | Equipment | | 100 m | | |
| Water quality equ | uipment des | cription (| olease cir | cle): TP: | S90FLM\ | | 19828 (| YSI |) | |
| Interface probe n | umber (plea | ise circle |): Dipp | er PRO | Herro | n IP Geote | ch IP | | , | |
| Purging equipme (please cirlce) | | iler type: Imp type: | | Plastic Peristaltic | | Teflon Submersible (| Micro-pu | rge | Amazon | Other: |
| | | | | Well Ga | uging a | nd Purge Volu | me Calcu | lations | | |
| Casing Diameter | | 25mi | m 50r | nm 100 | 0mm 12 | 25mm 150mm | 200mm | 250mm | 300mm | Volume of water in well / V |
| Conversion Factor | or | 0.98 | 3 1.9 | 96 7 | .85 | 31.4 49.1 | 70.7 | 125.7 | 196.3 | = Pr x r x h V = volume in litres |
| Total Well Depth | (-) Water le | evel (=) | Water Co | olumn | | De | pth to Prod | | ent) | P = 3.14159 r = radius in cm |
| <u>6.60</u> m | (-) <u>~~</u> | | | | ~ · · | - | ND. | | | h = height of water column in cm |
| | | v | | | | on Factor (=) Li (=) | | | | |
| | | | | | | r Quality Para | | | | |
| Beginning purge | time: | | | | Wate | | g purge tim | e. | | |
| Litres Time | T T | emp C | Cond | DO | Redox | | g purge un | | omments | n an ann an Anna an Ann |
| | | | mS/cm | ppm | mV | | | | | |
| 2 | 6.47 | | | 0.98 | -132 | | . Hyde | read | en ce | odor. |
| 4 | | | | 20,77 | | | | | | |
| N | 6.44 | 21.5 | 352 | 9 0.69 | -138 | | | | | |
| | | | 2 | | | | | | | |
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| | | | | | | | | | | |
| Stabilisation Criteria | +/- 0.05 | +/- 10% | +/- 3% | +/- 10% | +/- 10% | Example Com | | | | urbid / very turbid / no odour / ong odour |
| 6 | Total We Actual amo | | | sampling | | | | *pH, ten | np, cond rea | dings not necessary if well is purged dry |
| | Actual ant | | | | Did field | parameters stabi | ise? Y | N NA | Was the | e well dry purged? Y |
| See. | eresti jag T | | | 101 - 101 - 101 - 101 - 101 - 101 - 101 - 101 - 101 - 101 - 101 - 101 - 101 - 101 - 101 - 101 - 101 - 101 - 101 | - | Field QC Chec | ks | | | |
| Was pre-cleaning | g sampling e | quipmen | it used fo | r these sa | | | Ŷ N | | | |
| Was pre-cleaning | | | | | | ontamination? | Y) N | | | |
| Was documentat | | | | | | t | N N | A | | |
| Were air bubbles | s present in v | vials at ti | me of col | lection? | | ., | Y N N | A | | |
| Was sample for | metals field | filtered p | rior to pre | eservation | s? | - | YNN | À | | |
| Duplicate sample | e collected? | 3 | | | | - | YN | Duplic | cate sampl | e ID |
| Groundwater - well sampling data fo | rm.cdr GPS | Coor | dina | tes (| UTM/N | MGA syste | em): | | | 11/0 |

| Job Information | | | | | | | | | | | | |
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| Date: 1 June 2015 Time: arrive depart | | | | | | | | | | | | |
| Project Name: Groundwater Monitoring Project Number: 27055 | | | | | | | | | | | | |
| Site Location: Martin St, Coramba NSW Operator: AY | | | | | | | | | | | | |
| Well ID: MW 13 Weather: | | | | | | | | | | | | |
| Equipment | | | | | | | | | | | | |
| Water quality equipment description (please circle): TPS90FLMV Hanna HI9828 | | | | | | | | | | | | |
| Interface probe number (please circle): Dipper PRO Herron IP Geotech IP | | | | | | | | | | | | |
| Purging equipment: Bailer type: Plastic Teflon (please cirlce) Pump type: Peristaltic Submersible Micro-purge Amazon Other: | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| Well Gauging and Purge Volume Calculations | | | | | | | | | | | | |
| Casing Diameter 25mm 50mm 100mm 125mm 150mm 200mm 250mm 300mm Volume of water in well / V | | | | | | | | | | | | |
| Conversion Factor 0.98 1.96 7.85 31.4 49.1 70.7 125.7 196.3 V = volume in litres (volume in factor L/m) P = 3.14159 P = 3.14159 P = 3.14159 P = 3.14159 | | | | | | | | | | | | |
| Total Well Depth (-)Water level (=)Water ColumnDepth to Product (if present) $r = radius in cm$ 19.40m (-)13.22m (=)m $h = height of water column in c$ | | | | | | | | | | | | |
| Water Column (x) Conversion Factor (=) Litres per 1 Well Volume | | | | | | | | | | | | |
| m (x) (=)L | | | | | | | | | | | | |
| Water Quality Parameters | | | | | | | | | | | | |
| Beginning purge time: | | | | | | | | | | | | |
| Litres Time pH Temp C Cond DO Redox Comments | | | | | | | | | | | | |
| 2 5.6120.6 335.0 0.78 -79 Clear. He adow | | | | | | | | | | | | |
| M STORE OF STORE OF STORE OF STORE | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | |
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| Dedicated fubine in well. | | | | | | | | | | | | |
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| Stabilisation Criteria +/- 0.05 +/- 10% +/- 10% +/- 10% Example Comments: clear / slightly cloudy / turbid / very turbid / no odour / slight odour / odour / odour / strong odour | | | | | | | | | | | | |
| Total Well Volume Actual amount of water prior to sampling *pH, temp, cond readings not necessary if well is purged of | | | | | | | | | | | | |
| Did field parameters stabilise N NA Was the well dry purged? | | | | | | | | | | | | |
| Field QC Checks | | | | | | | | | | | | |
| Was pre-cleaning sampling equipment used for these samples? | | | | | | | | | | | | |
| Was pre-cleaning sampling equipment properly protected from contamination? | | | | | | | | | | | | |
| Was documentation of equipment conducted? | | | | | | | | | | | | |
| Were air bubbles present in vials at time of collection? | | | | | | | | | | | | |
| Was sample for metals field filtered prior to preservations? Y N NA | | | | | | | | | | | | |
| Duplicate sample collected? | | | | | | | | | | | | |
| oundwater-weil sampling data form.cdr GPS Coordinates (UTM/MGA system): | | | | | | | | | | | | |

| | | | 147.955 | alter | 12.00 | | Job Information |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-------------|-------------|---------------------|------------------|-------------------------------------------------------------------------------------------------------------------|
| Date: | 11 | June | e 201 | 5 | ti di finansi takan | Ratio Print | Time: arrive depart |
| Project | Name: | Grou | ndwat | er Mo | onito | ring | Gopart |
| Site Lo | cation: | 1 | in St | | | | Operator: AY |
| Well ID | mul | ч | 19 | | 8 | | Weather: |
| | S. 1. 27 | | | 19 18 7 10 | | | Equipment |
| Water o | uality equ | uipment d | escription | (please o | ircle): T | PS90FLN | |
| | | | lease circ | | | | rron IP Geotech IP |
| Purging | equipme | | Bailer typ | | Plastic | | Teflon |
| (please | cirlce) | | Pump typ | e: | Peristalt | ic | Submersible Micro-purge Amazon Other: |
| | | | | | Well G | auging | and Purge Volume Calculations |
| Casing | Diameter | <u>i desta su para s</u> | 25r | mm 50 | | | 105 |
| Convers | sion Facto | | 0.9 | | | 7.85 | = Prxrxh |
| Total W | ell Depth | (-) Wate | r level (= |) Water C | olumn | | P = 3.14159 |
| 17.3 | ;0 _m | (-) | m (= |) | m | | r = radius in cm h = height of water column in cm |
| | | | | Water Co | | | rsion Factor (=) Litres per 1 Well Volume (=)L |
| | | | | 1.20 | 1.1.1.1 | | ter Quality Parameters |
| Beginnii | ng purge | time: | | | 3104,323 | Watt | Ending purge time: |
| Litres | Time | pН | Temp C | Cond | DO ppm | Redox mV | |
| 1 | | 6.63 | 20.2 | | | 0.000 | 1 Cloudy. It adon. |
| 3 | | | 20.7 | | | | |
| 6 | | | 20.7 | | | | |
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| | | | | | | | Dedicated future in well. |
| | | | | | - | - | |
| Stabilis Crite | | +/- 0.05 | +/- 10% | +/- 3% | +/- 10% | +/- 10% | Example Comments: clear / slightly cloudy / turbid / very turbid / no odour / slight odour / odour / strong odour |
| 6 | | | ell Volum | | sampling | | *pH, temp, cond readings not necessary if well is purged dry |
| | | | | | | Did field | |
| and a second second | | | | - | | Dia liela | parameters stabilise? N NA Was the well dry purged? Y |
| <u></u> | and the second | | Valler | | | 100 C 1 C 1 A 24 | Field QC Checks |
| | | | equipmer | | | | () N MA |
| | | | | | v protecte | d from co | ontamination? N |
| | | | pment cor | | 5 | | N NA |
| | | | vials at ti | | | | Y N NA |
| | | etals field | filtered p | rior to pre | servation | s? | Y N NA |
| oundwater - well sa | and the second se | and the second second second | | dinei | | | Y N Duplicate sample ID |
| | | GLD | coor | urnat | les (| U.I.W\N | MGA system): |

| Job Information | | | | | | | | | | | | |
|-----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|------------------------|-----------------------|------------|------------------------------------------------------------------------------------------------------------------|--------------------|----------|-----------------------------------------|------------------------------|------------------------------------------------------|--|--|
| Date: 10 | June 2 | 2015 | | | - | Time: | arrive | | | depart | | |
| Project Name | Ground | lwater | Monito | ring | F | Project N | lumber: | 2705 | 5 | | | |
| Site Location: | Martin | St, C | oramba | NSW | | Operator | : AY | | | | | |
| Well ID: nw | 015 | | | | 1 | Weather: | | | | | | |
| | Equipment | | | | | | | | | | | |
| Water quality | equipment desc | ription (pleas | se circle): TF | S90FLMV | ' Ha | nna HI98 | 328 | YSÍ | | | | |
| Interface prob | e number (pleas | se circle): | Dipper PRO |) Herro | n IP C | Geotech | IP | | | | | |
| Purging equip (please cirlce | One of | iler type: mp type: | Plastic Peristalti | | Teflon Submersib | le 🏻 | licro-pu | rge | Amazon | Other: | | |
| 1 | | and the second | Wall G | | nd Purge | Volum | o Calcu | lations | | | | |
| Casing Diam | tor | 25mm | | | | | 200mm | 250mm | 300mm | Volume of water in well / V | | |
| Casing Diame Conversion F | | 25mm 0.98 | | | | 19.1 | 70.7 | 125.7 | 196.3 | = Pr x r x h | | |
| (volume in factor L | | | | .00 . | 51.4 4 | | | uct (if pres | | V = volume in litres P = 3.14159 | | |
| | | | | | | | | | ent) | r = radius in cm h = height of water column in cm | | |
| Water Column (x) Conversion Factor (=) Litres per 1 Well Volume | | | | | | | | | | | | |
| m (x) (=)LWater Quality Parameters | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| Beginning purge time: NS Ending purge time: Litres Time pH Temp C Cond DO Redox | | | | | | | | | | | | |
| mS/cm ppm mV | | | | | | | | | | | | |
| 2 | 2 5.54 17.8 208 1.97 146 Brown. Tubid. No odor. | | | | | | | | | | | |
| Ч | 5.531 | | | 130 | | | | | | | | |
| 6 | 5.52 | 17.9 19 | 3 1.21 | 132 | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | × | | | | | | | | |
| | | | | | | | | | 22 | | | |
| | | | | | | 5 | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| Stabilisatio Criteria | n +/- 0.05 + | -/- 10% +/- | 3% +/- 10% | +/- 10% | Example | e Comme | | | / cloudy / tu odour / str | urbid / very turbid / no odour / | | |
| / | Total Wel | l Volume | 1 | | | | SIL | | | dings not necessary if well is purged dry | | |
| 6 | | | ior to sampling | ÷ | | | | | | | | |
| 1 | Ø ₂₋ | 1 | * | Did field | parameters | stabilise | ? | N NA | Was the | e well dry purged? Y | | |
| | A Contraction | | ALC: M | F F | ield QC | Checks | | 8 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - | | | | |
| Was pre-clea | ning sampling e | quipment us | ed for these s | amples? | 4 | \bigtriangledown | N | | | TPW, BTEX, MUA | | |
| Was pre-clea | ning sampling e | quipment pro | operly protecte | ed from co | ntaminatior | n? 🕅 | N | _ | | 11.10.1 | | |
| Was docume | ntation of equipr | ment conduc | ted? | | | Y | N N | A | | | | |
| Were air bub | oles present in v | vials at time o | of collection? | | | Y | NN. | A | | | | |
| Was sample | or metals field fi | iltered prior t | o preservatior | ns? | | Y | N | | 2 | | | |
| Duplicate sar | ple collected? | | | | and the second | Y | N | Duplic | cate sampl | | | |
| Groundwater - well sampling | lata form.cdr | Coordi | nates | ITTM /N | ACA SU | stom | 1. | 1 A. F. | 1 | 11/04 | | |

| | | | | | | | Job In | formatio | n | 2 ⁶ 20 | | |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------|------------------------|----------------|---------------|-------------|---------------------------------|----------|---------------|----------|-------------------|------------|-----------------------------------------------|
| Date: - | 1(| June | 2015 | 5 | | | | Time: | arrive | | | depart |
| Project N | lame: | Grour | ndwat | er Mo | onito | ring | | Projec | Number: | 2705 | 5 | S. |
| Site Loca | ition: | Marti | n St | , Cor | amba | NSW | | Operat | or: AY | | | |
| Well ID: | Well ID: MUL6 Weather: | | | | | | | | | | | |
| 11 | | | | -2 | | | Equ | ipment | . / | | | |
| Water qu | ality equ | ipment de | scription | (please o | circle): TI | S90FLN | 1V | Hanna H | 9828 | YSI | | |
| Interface | probe n | umber (ple | ease circl | e): Dip | per PRO | Heri | on IP | Geotec | h IP | | | |
| Purging e (please c | | nt: E | Bailer type | e: | Plastic | | Teflon | | | _ | | |
| (picase c | Pump type: Peristaltic Submersible Mcro-purge Amazon Other: | | | | | | | | | | | |
| | | 9.0 | | 1 | Well G | auging | and Pu | rge Volu | me Calcu | lations | | |
| Casing D | iameter | | 25r | nm 50 |)mm 1(| 0mm | 125mm | 150mm | 200mm | 250mm | 300mm | Volume of water in well / V |
| Conversio | | or | 0.9 | 98 1 | .96 | 7.85 | 31.4 | 49.1 | 70.7 | 125.7 | 196.3 | <pre>= Pr x r x h V = volume in litres</pre> |
| Total Wel | I Depth | (-) Water | level (=) | Water C | Column | | | Dep | | uct (if pres | ent) | P = 3.14159 r = radius in cm |
| 10.0 | $\frac{19.00}{19.00} \text{ m (-) } \frac{19.90}{19.00} \text{ m (=) } \text{ m } \text{ h = height of water column in cm}$ | | | | | | | | | | | |
| | Water Column (x) Conversion Factor (=) Litres per 1 Well Volume m (x) (=) L | | | | | | | | | | | |
| Water Quality Parameters | | | | | | | | | | | | |
| Beginning | Beginning purge time: Ending purge time: | | | | | | | | | | | |
| Litres | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | |
| 4 | | 6.43 | 20,3 | 298.1 | 0.28 | -14 | | | | | | |
| 6 | | 6.42 | 20.4 | 303.2 | 0.21 | -154 | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | _ | | | | | | | |
| | | | | | | | | . 0 | | | | |
| | | | | | | | Deel | carbod | tes | ng in | well | |
| | | | | | | | | | | | | |
| Stabilis Crite | | +/- 0.05 | +/- 10% | +/- 3% | +/- 10% | +/- 10% | Exam | ple Comr | | | | urbid / very turbid / no odour / ong odour |
| 1 | | | ell Volum | | - | | | | | | | dings not necessary if well is purged dry |
| | > | Actual an | nount of wa | ater prior to | o sampling | Did field | paramet | ters stabilis | se? (P) | N NA | Was the | e well dry purged? Y |
| ing and provide | | | National de la | | | | | | | | | |
| Mag and | alacaia | oomalia | | | | | Field Q | C Check | 4 | 255 | | |
| Was pre- | | | | | | | | C | | | | |
| | | sampling on of equi | | | | su irom C | ontamina | | | | | |
| | | present in | | | | | | | | | | |
| | | netals field | | | | is? | | | | - | | |
| | | collected | | | 2001 10101 | | | | | | ate sample | a ID |
| Groundwater - well sa | | | | rdina | tes | / [] [] [] [] [] | MGA | syster | | Dupilo | ato sample | 11/04 |
| | | | | , | | | | 1000 | | a ³ 3 | | |

4

| | Job Information | | | | | | | | | | | |
|---------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------|---------------|-------------|-------------|-----------------------------------------------------------------------------------------------------|--|--|--|--|--|
| Date: | 11 | June | 2015 | 8 | | | Time: arrive depart | | | | | |
| Project N | Name: | Groun | ndwate | er Mo | nitor | ing | Project Number: 27055 | | | | | |
| Site Loca | ation: | Marti | n St, | Cora | amba (| NSW | Operator: AY | | | | | |
| Well ID: | MW | マ | | | | | Weather: | | | | | |
| | Equipment | | | | | | | | | | | |
| Water qu | uality equ | ipment de | scription (| please ci | cle): TR | S90FLMV | / Hanna HI9828 YSI | | | | | |
| Interface | e probe n | umber (ple | ease circle | e): Dipp | er PRO | Herro | n IP Geotech IP | | | | | |
| | Purging equipment: (please cirlce) Bailer type: Plastic Teflon Pump type: Peristaltic Submersible Micro-purge Amazon Other: | | | | | | | | | | | |
| Well Gauging and Purge Volume Calculations | | | | | | | | | | | | |
| Casing [| Diameter | 2 | 25m | m 50r | - | | 25mm 150mm 200mm 250mm 300mm Volume of water in well / V | | | | | |
| | ion Facto | or | 0.9 | 8 1.9 | 96 7 | .85 3 | 31.4 49.1 70.7 125.7 196.3 V = volume in litres | | | | | |
| Total We | ell Depth | (-) Water | level (=) | Water Co | olumn | | Depth to Product (if present) $P = 3.14159$ r = radius in cm | | | | | |
| <u>17-1</u> m (-) <u>15-1</u> m (=) m → h = height of water column in cm | | | | | | | | | | | | |
| Water Column (x) Conversion Factor (=) Litres per 1 Well Volume m (x) (=) L | | | | | | | | | | | | |
| Water Quality Parameters | | | | | | | | | | | | |
| Beginning purge time: Ending purge time: | | | | | | | | | | | | |
| Litres | Time | рН | Temp C | Cond mS/cm | DO ppm | Redox mV | Comments | | | | | |
| 1 | | | | | | | | | | | | |
| 2 | | 6.34 | 19.9 | 257.1 | 0.25 | -148 | | | | | | |
| ч | | 6.34 | 20.0 | 258.3 | 0,25 | +151 | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | ×. | | | | | | | | |
| | | 1 | | | | | | | | | | |
| | | | | | | | | | | | | |
| | - | | | | | | Docheasted tubing (Landed 1/433/8) in | | | | | |
| | | | | | | | well (fied to cop). | | | | | |
| | sation | +/- 0.05 | +/- 10% | +/- 3% | +/- 10% | +/- 10% | Example Comments: clear / slightly cloudy / turbid / very turbid / no odour / | | | | | |
| Crit | eria | | ell Volum | | | | slight odour / odour / strong odour *pH, temp, cond readings not necessary if well is purged dry | | | | | |
| | 7 | | | ater prior to | sampling | | | | | | | |
| | | | | | | Did field p | parameters stabilise? | | | | | |
| | | 10 | | | | F | Field QC Checks | | | | | |
| Was pre | e-cleaning | sampling | equipme | nt used fo | or these sa | amples? | N N | | | | | |
| Was pre | e-cleaning | g sampling | equipme | nt properl | y protecte | d from co | ontamination? Y N | | | | | |
| Was doo | cumentat | ion of equ | ipment co | nducted? | | | Y N | | | | | |
| Were ai | r bubbles | present ir | n vials at t | ime of co | lection? | | Y 🔊 NA | | | | | |
| Was sar | mple for r | netals field | d filtered p | prior to pre | eservation | s? | Y N RA | | | | | |
| Duplicat | e sample | e collected | ? | | | | Y N Duplicate sample ID | | | | | |
| Groundwater - well | sampling data for | m.cdr GPS | COO | rdina | tes (| UTM/N | MGA system): | | | | | |

2

| Job Information | | | | | | | | | | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|
| Date: 1\ June 2015 Time: arrive depart | Time: arrive depart | | | | | | | | | | |
| Project Name: Groundwater Monitoring Project Number: 27055 | | | | | | | | | | | |
| Site Location: Martin St, Coramba NSW Operator: AY | 38 | | | | | | | | | | |
| Well ID: MW18 Weather: | | | | | | | | | | | |
| Equipment | | | | | | | | | | | |
| Water quality equipment description (please circle): TPS90FLMV Hanna HI9828 YSI | | | | | | | | | | | |
| Interface probe number (please circle): Dipper PRO Herron IP Geotech IP | | | | | | | | | | | |
| Purging equipment: Bailer type: Plastic Teflon (please cirlce) | | | | | | | | | | | |
| Pump type: Peristaltic Submersible Micro-purge Amazon | Other: | | | | | | | | | | |
| Well Gauging and Purge Volume Calculations | | | | | | | | | | | |
| | me of water in well / V | | | | | | | | | | |
| (volume in factor) 0.98 1.96 7.85 31.4 49.1 70.7 125.7 196.3 V = v | x r x h volume in litres | | | | | | | | | | |
| Total Well Depth (-) Water level (=) Water Column Depth to Product (if present) r = ra | 3.14159 adius in cm | | | | | | | | | | |
| | neight of water column in cm | | | | | | | | | | |
| Water Column (x) Conversion Factor (=) Litres per 1 Well Volume m (x) (=) L | | | | | | | | | | | |
| Water Quality Parameters | | | | | | | | | | | |
| Beginning purge time: | | | | | | | | | | | |
| Litres Time pH Temp C Cond DO Redox Comments | | | | | | | | | | | |
| mrS/cm ppm mV HC | | | | | | | | | | | |
| 2 6.19 21.4 26.7 0.48 - 705 Clar. Ho odour. | | | | | | | | | | | |
| 4 6.28 21.3266.00.42 -73 | | | | | | | | | | | |
| 6 6.28 21.3 268, 1 0.28 - 74 | | | | | | | | | | | |
| | | | | | | | | | | | |
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| | | | | | | | | | | | |
| Stabilisation Criteria +/- 0.05 +/- 10% +/- 3% +/- 10% +/- 10% Example Comments: clear / slightly cloudy / turbid / slight odour / odour / strong od | | | | | | | | | | | |
| 6 Total Well Volume *pH, temp, cond readings not Actual amount of water prior to sampling | ot necessary if well is purged dry | | | | | | | | | | |
| Did field parameters stabilise? N NA Was the well d | Iry purged? Y | | | | | | | | | | |
| Field QC Checks | | | | | | | | | | | |
| Was pre-cleaning sampling equipment used for these samples? | and the second | | | | | | | | | | |
| Was pre-cleaning sampling equipment properly protected from contamination? | | | | | | | | | | | |
| Was documentation of equipment conducted? | | | | | | | | | | | |
| Were air bubbles present in vials at time of collection? | 2 | | | | | | | | | | |
| Was sample for metals field filtered prior to preservations? Y N NA | | | | | | | | | | | |
| Duplicate sample collected? Y N Duplicate sample ID | | | | | | | | | | | |
| Groundwater - weit sampling data form.cdr GPS Coordinates (UTM/MGA system): | 11/04 | | | | | | | | | | |

| Job Information | | | | | | | | | | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|--|--|--|--|--|--|--|--|--|--|
| Date:CompositionTime:arrivedepart | | | | | | | | | | | |
| Project Name: Groundwater Monitoring Project Number: 27055 | | | | | | | | | | | |
| Site Location: Martin St, Coramba NSW Operator: AY | | | | | | | | | | | |
| Well ID: MW20 Weather: | | | | | | | | | | | |
| Equipment | | | | | | | | | | | |
| Water quality equipment description (please circle): TPS90FLMV Hanna HI9828 | | | | | | | | | | | |
| Interface probe number (please circle): Dipper PRO Herron IP Geotech IP | а. | | | | | | | | | | |
| Purging equipment: Bailer type: Plastic Teflon (please cirlce) Pump type: Peristaltic Submersible Micro-purge Amazon Other: | | | | | | | | | | | |
| | | | | | | | | | | | |
| Well Gauging and Purge Volume Calculations | S. Area | | | | | | | | | | |
| Casing Diameter 25mm 50mm 100mm 125mm 150mm 200mm 250mm 300mm Conversion Factor Image: Conversion Factor | / V | | | | | | | | | | |
| Conversion Factor (volume in factor L/m) 0.98 1.96 7.85 31.4 49.1 70.7 125.7 196.3 V = volume in litres P = 3.14159 | | | | | | | | | | | |
| Total Well Depth (-) Water level (=) Water ColumnDepth to Product (if present) $r = radius in cm$ m (-) $3 \sqrt{5}$ m (=)m m $h = height of water column$ | n in cm | | | | | | | | | | |
| m (-) <u>→ → → m</u> (=)m m <u>→ → → m</u> h = height of water column in cm Water Column (x) Conversion Factor (=) Litres per 1 Well Volume | | | | | | | | | | | |
| m (x) (=)L | | | | | | | | | | | |
| Water Quality Parameters | | | | | | | | | | | |
| Beginning purge time: Ending purge time: | | | | | | | | | | | |
| Litres Time pH Temp C Cond DO Redox Comments | | | | | | | | | | | |
| 2 5.64 19.5 122.10.43 -15 Cleer. No odow. | | | | | | | | | | | |
| 4 5.61 19.8 122.7 0.39 -34 | | | | | | | | | | | |
| 6 5.61 19.8 12.7 0.37 - 36 | | | | | | | | | | | |
| | 1 | | | | | | | | | | |
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| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Stickys well. | | | | | | | | | | | |
| Redicated tubing (3/8) in well (tied to cap | | | | | | | | | | | |
| Stabilisation Criteria +/- 0.05 +/- 10% +/- 10% +/- 10% Example Comments: clear / slightly cloudy / turbid / very turbid / no odour slight odour / odour / strong odour | • / | | | | | | | | | | |
| 6 Total Well Volume *pH, temp, cond readings not necessary if well is put Actual amount of water prior to sampling | rged dry | | | | | | | | | | |
| Did field parameters stabilise? | 7 | | | | | | | | | | |
| | 4 | | | | | | | | | | |
| Field QC Checks | No. la tra | | | | | | | | | | |
| Was pre-cleaning sampling equipment used for these samples? | | | | | | | | | | | |
| Was pre-cleaning sampling equipment properly protected from contamination? | | | | | | | | | | | |
| Was documentation of equipment conducted? | | | | | | | | | | | |
| Were air bubbles present in vials at time of collection? | | | | | | | | | | | |
| Was sample for metals field filtered prior to preservations? Y N NA Duplicate comple collected? Y N NA | | | | | | | | | | | |
| Duplicate sample collected? Y N Duplicate sample ID Groundwater - well sampling data form.cdr GPS Coordinates (UTM/MGA system): | 11/04 | | | | | | | | | | |

| | | | | | | | Job Ir | oformatio | on | | | |
|--------------------|--------------------|-----------|---------------|---------------|-----------|------------|-----------------|--------------|---------------------------|-------------------------------|-----------------------------|----------------------------------------------|
| Date: | 11 | June | e 201 | 5 | | \leq | 8. 1 | Time: | arrive | | | depart |
| Project | Name: | Grou | undwat | er M | onit | oring | J | Projec | ct Number: | 2705 | 55 | * |
| Site Loo | | | in St | , Coi | camb | a NSW | | Opera | ntor: AY | 7 | | |
| Well ID | mwa | 21 | | | | | | Weath | ner: | | | |
| | | | | | | | Equ | uipment | | | | |
| Water q | quality eq | uipment c | descriptior | (please | circle): | TPS90FL | A DE CONTRACTOR | Hanna H | 19828 | YSI | | |
| Interfac | e probe i | number (p | lease circ | le): Dip | per PR | O He | erron IP | Geote | ch IP | | | |
| Purging (please | | ent: | Bailer typ | e: | Plastic | | Teflon | | | | | |
| (picase | cirice) | | Pump typ | e: (| Perista | ltic | Subme | rsible | Micro-pu | urge | Amazon | Other: |
| | | 4 | Q | 1. 19 | Well | Gauging | and Pu | rge Volu | me Calcı | lations | | |
| Casing | Diameter | | 25 | mm 50 | | 100mm | 125mm | 150mm | 200mm | 250mm | 300mm | Volume of water in well / V |
| | sion Fact | | 0. | 98 1 | .96 | 7.85 | 31.4 | 49.1 | 70.7 | 125.7 | 196.3 | = $\Pr x r x h$ V = volume in litres |
| Total We | ell Depth | (-) Wate | er level (= |) Water C | Column | | | Dep | oth to Prod | | | P = 3.14159 r = radius in cm |
| 6.3 | . <mark>0</mark> m | (-) 5 - 7 | <u>2</u> m (= | | | | | 0 | ND | _ m | | h = height of water column in cm |
| | | | | Water C | | | | | res per 1 V | | | |
| | | | | | | | | | | | L | |
| De site i | sets here | | | | 4.412 | Wa | ter Qual | ity Paran | the second states and the | | | |
| | ng purge | 1 | | MS | | | | Ending | purge time | e: | | |
| Litres | Time | pH | Temp C | Cond mS/cm | DO ppm | | - 1421 | | | С | omments | |
| 2 | | 5.77 | 19.9 | 139.0 | 0.8 | 118 | U | can 1 | Vo o | dou | - | |
| 4 | | 5.27 | 199 | 138.5 | 0.6 | 0 105 | | | | | | |
| 6 | | 5.46 | 19.9 | 134.6 | 0.5 | 1019 | 4 | | | | | - |
| | | | | в | | | | | | | 2 | |
| / | | | | | | | | | | | | |
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| | | | | | | | Loc | heat | eur | Deap | - | |
| Ctabili | | | | | | | | | | · · · · | | |
| Stabilis Crite | | +/- 0.05 | +/- 10% | +/- 3% | +/- 109 | //- 109 | % Exam | ple Comn | nents: clea slig | ar / slightly ht odour / d | cloudy / tu odour / stro | rbid / very turbid / no odour / ong odour |
| 6 | (| | ell Volum | | oomelin | | | | | *pH, temp | o, cond read | ings not necessary if well is purged dry |
| 1 | | | nount of wa | iter prior to | sampling | | | | | | | |
| | | | | | | Did field | a paramete | ers stabilis | ie? | N NA | Was the | well dry purged? |
| | | | | | • | | A STATISTICS | C Check | S | | | |
| Was pre- | cleaning | sampling | equipmer | nt used fo | r these | samples? | | 6 | N | | | |
| | | | equipmer | | y protec | ted from o | contamina | tion? |) N | _ | | |
| | | | pment cor | | | | | R | N NA | | | |
| | | | n vials at ti | | | | | Y | | | | |
| | | | filtered p | rior to pre | servatio | ins? | | Y | N NA | | | |
| Duplicate | | collected | | | | | | Y | | Duplica | te sample | ID . |
| i, | | GPS | Coor | dinat | ces | (UTM/ | MGA s | system | n): | | n fa | 11/04 |

| | | | | | | | Job li | nformatio | on | | D. | | |
|------------------------------|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------------|---------------------|----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------------|-------------------------------------|--------------|---------------------------------------------------------------------------------------------|--|
| Date: | M | | ne 201 | | | | | Time: | arrive | | | depart | |
| Project Na | | | | | Monit | | | Project Number: 27055 | | | | | |
| Site Locat | an a | Mart | in S | t, Co | oramba | a NSW | | Opera | tor: A) | ζ | | | |
| Well ID: 1 | 162 | 2 | | | | | · | Weath | er: | | | 2 | |
| and the second | | | | | | | | uipment | | 6 | Ne Gran and | | |
| Water qua | | | | | e circle): | TPS90FL | MV | Hanna H | 19828 | YSI |) | | |
| Interface p | robe nu | imber (| please cir | cle): | ipper PRC | He | rron IP | Geoteo | h IP | | | | |
| Purging eq (please cirl | | it: | Bailer ty Pump ty | • | Plastic Peristal | tic | Teflon Subme | | Micro-pu | Irge | Amazon | Other: | |
| | | 1 | See St | - Lines: | Well (| Gauging | and Pu | rge Volu | me Calci | | | | |
| Casing Dia | meter | | 25 | 5mm § | | | 125mm | 150mm | 200mm | 250mm | 300mm | | |
| Conversion | | | 0 | .98 | 1.96 | 7.85 | 31.4 | 49.1 | 70.7 | 125.7 | 196.3 | Volume of water in well / V = Pr x r x h | |
| | 0epth (- m (- | -) Wate -) <u>9.</u> , | er level(= 72_m(= | =) | m Column (x |) Conver | sion Fact | | es per 1 W | uct (if prese _ m /ell Volume | ent) | V = volume in litres P = 3.14159 r = radius in cm h = height of water column in cm | |
| | | 1. | Star Star | | | the second s | STREET, STREET | ty Param | | | 1 September | | |
| Beginning p | urge tir | ne: | P | | | | | | purge time |) : | | | |
| Litres T | ime | рН | Temp C | Cond mS/cm | | Redox | : | 1 | | | omments | | |
| 2 | 6 | .27 | 10.9 | | 1 ppm | mV | | 1 | 110 | | 1.4.5 | | |
| 4 | | .27 | Nº 1 | | 00,80 | | | les. | ØC | - od | ow. | | |
| 8 | | 5.27 | 19.9 | | 0.67 | | | | N., | | | | |
| | | - | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | 1 | | | | |
| Stabilisatio Criteria | n +/ | - 0.05 | +/- 10% | +/- 3% | +/- 10% | +/- 10% | Examp | le Comme | nts: clear | / slightly c | loudy / turk | oid / very turbid / no odour / | |
| 8 | TA | otal We | ell Volum | e ter prior to | sampling | | | 5 | sign | t odour / od | dour / stron | ig odour gs not necessary if well is purged dry | |
| | | | | | | Did field p | arameter | s stabilise | ? (Y)N | | | vell dry purged? Y N | |
| | ************************************** | | | | | F | ield QC | Checks | | r produky s | | | |
| as pre-clear as pre-clear | | | | | | mples? | and a second | Ø | N ^a N | | | | |
| as documer ere air bubb | | | | | ection? | | | E S | N NA | | | | |
| as sample fo | | | | | | 2 | | Y | N NA | ¥ 3 | | | |
| plicate sam | | | | or to pres | auons | | | Y | N NA | | | | |
| ater - well sampling da | | State of the local division in the local div | Coor | | | JTM/M | | Y | N | Duplicate | sample ID |) | |

| | | | | | J | ob Information | i de la compañía | | | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|---------------|------------------------|-----------------------------------------------|---------------------------|-----------------------|---------------|-------------|--------------------------------------|--|
| Date: 🚺 June 2015 | | | | | | | arrive | | | depart | |
| Project Name | e: Grour | ndwate | er Mo | nitor | ing | Project | Project Number: 27055 | | | | |
| Site Location | n: Marti | n St, | Cora | amba | NSW | Operate | or: AY | | | | |
| Well ID: M | W23 | | | | | Weathe | r: | | | | |
| | | | | | | Equipment | | | | | |
| Water quality | y equipment de | scription (| please cir | rcle): TP | S90FLMV | Hanna HI | 9828 | YSI | | | |
| Interface pro | be number (ple | ease circle |): Dipp | er PRO | Herror | n IP Geotec | ו IP | | | | |
| Purging equi (please cirlce | e) | Bailer type Pump type | | Plastic Peristaltic | | eflon Submersible | Micro-pu | irge | Amazon | Other: | |
| | | 1.2.2.1.1 | | Well Ga | uging a | nd Purge Volur | ne Calcu | lations | | | |
| Casing Diam | neter | 25m | m 50r | nm 100 | 0mm 12 | 5mm 150mm | 200mm | 250mm | 300mm | Volume of water in well / V | |
| Conversion I | | 0.9 | 8 1.9 | 96 7 | .85 3 | 31.4 49.1 | 70.7 | 125.7 | 196.3 | = Pr x r x h V = volume in litres | |
| Total Well De | epth (-) Water | level (=) | Water Co | olumn | 1 | Dep | th to Prod | uct (if pres | ent) | P = 3.14159 r = radius in cm | |
| 17.91 | _m (-) <u>12.6</u> | | 12 | | | | NV () | _ m | | h = height of water column in cm | |
| | | | | | | on Factor (=) Litr (=) | | | e L | | |
| Water Quality Parameters | | | | | | | | | | | |
| Beginning pu | inning purge time: Ending purge time: | | | | | | | | | | |
| Litres Ti | me pH | Temp C | Cond mS/cm | DO ppm | Redox mV | | | с | omments | | |
| 2 | 6.65 | 20.5 | 3513 | 1.12 | -89 | Brown. | Turk | d. He | odou | 5. | |
| 4 | 6.66 | 20.5 | 351.2 | 0.29 | -91 | | | | | | |
| 6 | 6-68 | 20.5 | 353.1 | 0.23 | -92 | | | | | P | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Stabilisati Criteria | +/- 0 05 | +/- 10% | +/- 3% | +/- 10% | +/- 10% | Example Comr | | | | urbid / very turbid / no odour / | |
| 6 | Criteria Provident P | | | | | | | | | | |
| 0 | Actual a | mount of wa | ter prior to | | Did field p | parameters stabili | se? | N NA | Was the | e well dry purged? | |
| | State of the | | na poste e p | ga anala | | ield QC Check | • | | | | |
| Was pro clos | aning sampling | Aquinmo | at used fo | r these or | a dina si | | N N | Provide Stand | | | |
| 10.0 | aning sampling | | | | - | ntamination? | | | | TPU, BTBS | |
| 115 | entation of equ | | | 50 57 | | 4 | | IA | | | |
| | | | | | | | | IA | | | |
| Were air bubbles present in vials at time of collection? Y N NA Was sample for metals field filtered prior to preservations? Y N NA | | | | | | | | | | | |
| | imple collected | | nor to pre | | | - | | | cate sample | e ID | |
| Groundwater - well sampling | | | dina | tes (| UTM/N | IGA system | | | | 11/04 | |

le

| | | | | | | | Job Inform | nation | an a | 1997 - M. | | |
|---------------------------------------|--------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---------------------|-------------------------|-----------------------|--------------------------|------------------------------------------|------------------------------|------------------------------------------------------|--|
| Date: 1(June 2015 | | | | | | | Г | Time: arrive depart | | | | |
| Project Name: Groundwater Monitoring | | | | | | | | Project Number: 27055 | | | | |
| Site Location: Martin St, Coramba NSW | | | | | | | | Operator: 7 | Y | S | | |
| Well ID | MW | 24 | | | | | V | Veather: | | | | |
| | | | 14015 | | | | Equipm | ent | - | | | |
| Water c | uality eq | uipment d | lescriptior |) (please | circle): T | PS90FLN | //V Han | na HI9828 | (YSI) | | | |
| Interfac | e probe r | number (p | lease circ | le). Dip | per PRO | Her | ron IP G | eotech IP | | | | |
| Purging (please | equipme cirlce) | | Bailer typ Pump typ | | Plastic Peristal | tic | Teflon Submersible | e Micro- | purge | Amazon | Other: | |
| | d all a | 1968 S. | | | Well G | auging | and Purge | Volume Cal | culations | | | |
| Casing | Diameter | | 25 | mm 50 | | | 125mm 150 | the second second second | Contraction of the loss | 300mm | Volume of water in well / V | |
| | factor L/m) | or | 0. | 98 1 | .96 | 7.85 | 31.4 49 | | 125.7 | 196.3 | = $Pr x r x h$ V = volume in litres | |
| Total We | ell Depth | (-) Wate | r level (= |) Water (| Column | | | Depth to Pro | | | P = 3.14159 | |
| - 6 : | <u>1 L</u> m | (-) _6! | <u>44</u> m (= |) | m | | | ND | m | | r = radius in cm h = height of water column in cm | |
| | | | | Water Co | olumn (x) |) Convers | sion Factor(= |) Litres per 1 | Well Volum | e | | |
| 7 | | | | | III (X | No. of Concession, name | (= | | | L | 17 | |
| Pagingi | | | | the start | | Wate | er Quality P | arameters | | | | |
| Litres | ng purge | 1 | T | us | | | | nding purge ti | me: | | | |
| Littes | Time | рН | Temp C | Cond mS/cm | DO ppm | Redox mV | | | C | omments | | |
| 2 | | 6.57 | 20.8 | 219.8 | 1.58 | 39 | Clou | dr. N | o adi | 1W | | |
| 4 | | | 20-8 | | | | | <u> </u> | 0 004 | , | | |
| 8 | | 6.41 | 20.8 | 220.5 | 0.32 | 37 | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | |
| | | | | | | | S | | | | | |
| | | | | | | | Dright | 1 film | lat | down | well prive to with | |
| | | | | EN. | | | (no H | Fonke m | Julie ? | to a rad | | |
| | | | | 19.82 | | | New set | t delicat | ed fuge | ~ lif | Finnel (fiel to con) | |
| Stabilis Crite | | +/- 0.05 | +/- 10% | +/- 3% | +/- 10% | +/- 10% | Example C | omments: cl sl | ear / slightly ight odour / o | cloudy / tur odour / stro | rbid / very turbid / no odour / | |
| 4 | 6 | | ell Volum nount of wa | | sampling | | 41 | 1 | | | ings not necessary if well is purged dry | |
| | | | × 16 | | | Did field | parameters sta | abilise? | N NA | Was the | well dry purged? Y | |
| | and the second | 1.10 | | and the second | | - | A CONTRACTOR | | | was the | wen dry purged? | |
| Was pre- | cleaning | sampling | oquinmor | | | | Field QC Ch | | | | | |
| | | | | | | | | N N | | | | |
| | | on of equip | | | / protecte | d from co | ntamination? | | | | | |
| | | | | | | | | MNN | A | | k. i | |
| | | present in | | | | 0 | | YNN | - | | (N) | |
| | | etals field | | ior to pres | servations | s? | | YNN | | | | |
| undwater - well sar | | :dr | and the second se | 11 | | | | YN | Duplica | te sample | ID | |
| | | GPS | Coor | dınat | es (| UTM/M | IGA syst | cem): | | | 11/04 | |

| Instrument | YSI Quatro Pro Plus |
|------------|---------------------|
| Serial No. | 11C100753 |



1300 137 067

Item Test Pass Comments Battery Charge Condition ~ Fuses √ Capacity √ Switch/keypad Operation √ Display Intensity ~ Operation \checkmark (segments) **Grill Filter** Condition 1 Seal ~ PCB Condition ~ Connectors \checkmark Condition 1 Sensor 1. pH 2. mV 1 3.Specific ~ conductance 4. D.O 1 5. Temp 1 Alarms Beeper Settings Software Version Data logger Operation Download Operation Other tests:

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

| Sensor | Serial no | Standard Solutions | Certified | Solution Bottle Number | Instrument Reading |
|----------------|-----------|--------------------|-----------|---------------------------|--------------------|
| 1. pH 7.00 | | pH 7.00 | | LE1048 | pH 7.01 |
| 2. pH 4.00 | | pH 4.00 | | MD1859 | pH 3.98 |
| 3. pH 10.00 | | pH 10.00 | | MH1685 | pH 9.90 |
| 3. mV | | 231.8mV | | MC2156/MG1081 | 234.0mV |
| 4. EC | | 2.76 mS | | LK2419 | 2.76mS |
| 5. D.O | | / Oppm | | 2810 | 0.00ppm |
| 6. Temp | | / 21.5°C | | MultiTherm | 21.1°C |
| Calibrated by: | m | ~_ | _Joanna V | Vong | |

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Calibration date:

2/06/2015

Next calibration due:

2/07/2015



WSP Environment & Energy 41 McLaren Street North Sydney NSW 2060

