



GROUNDWATER MONITORING REPORT

Coramba Coffs Harbour City Council

4/09/2015



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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**.

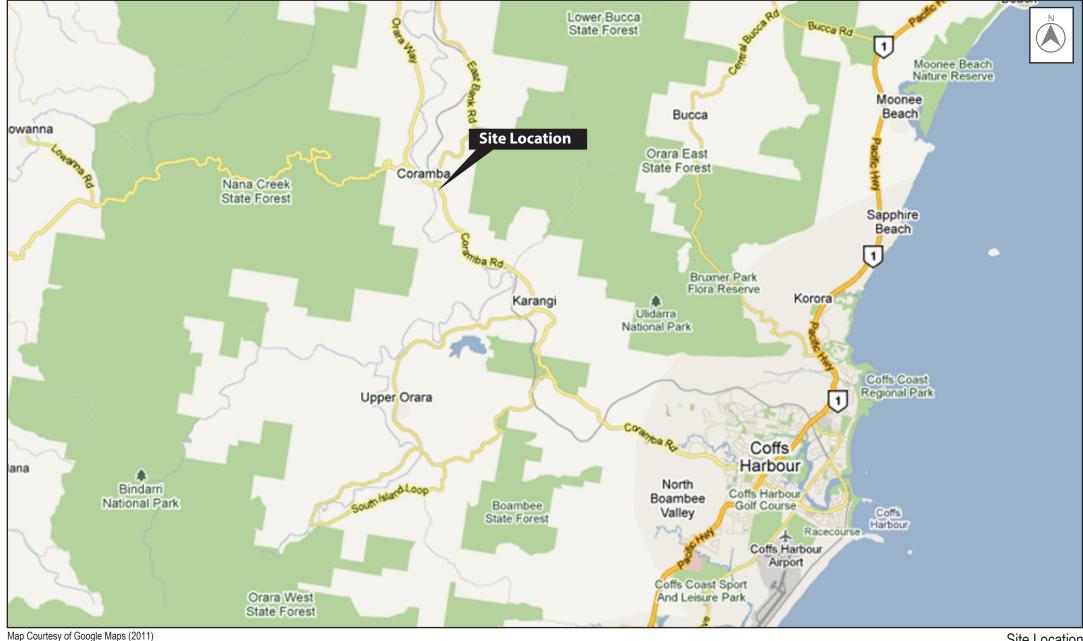
- The trial shut-down period for the system commenced on the 3 March 2015 and remains switched off. At the time of sampling for this GME, the system had been shut-down for approximately 3 months;
- With the exception of MW23, monitoring wells which reported concentrations of benzene above adopted site 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**

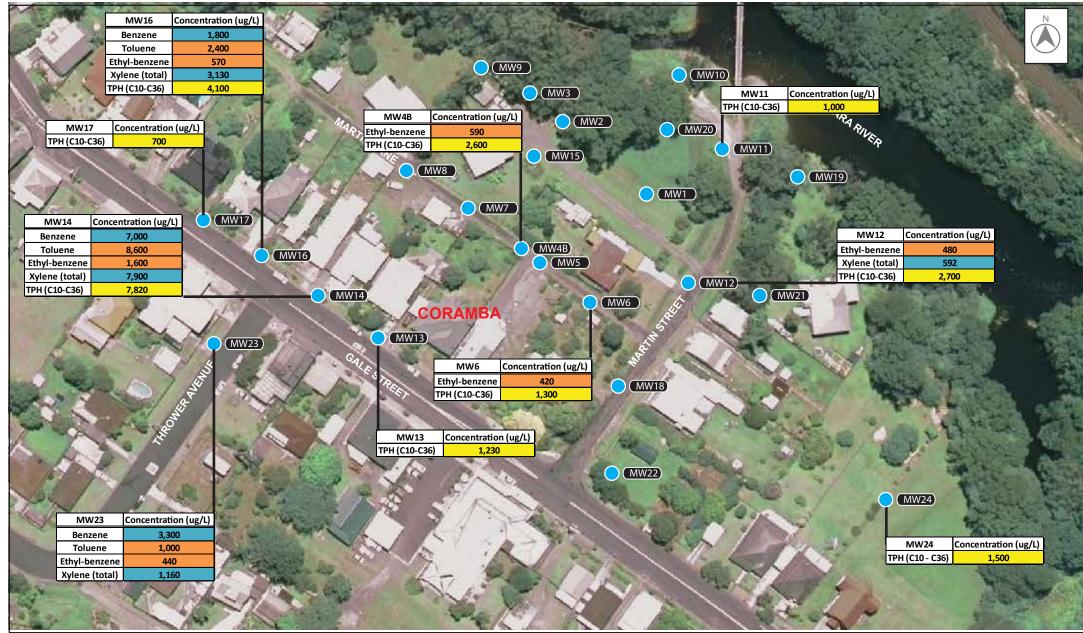


Monitoring Well Locations

Coramba, NSW FIGURE 2



KEY



 KEY
 Monitoring Well Location

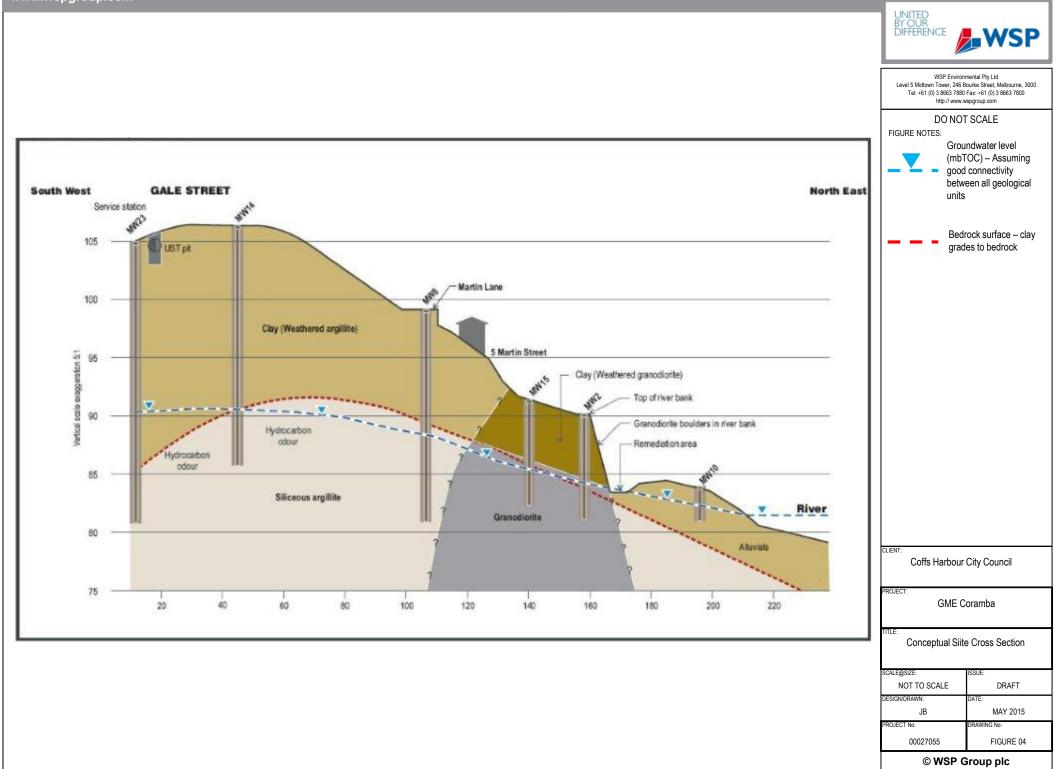
 Monitoring Well Location
 Analyte –

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

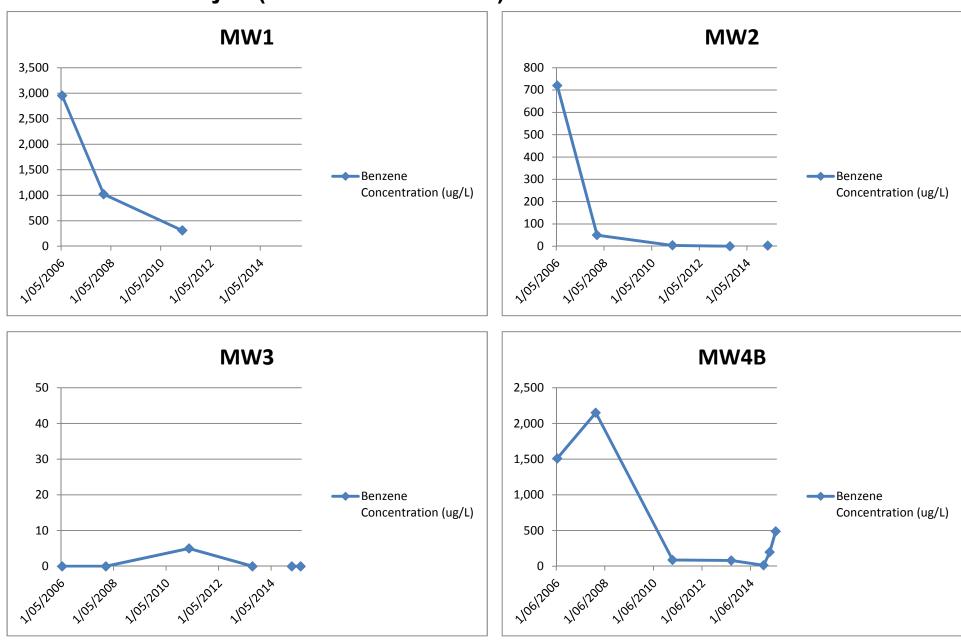
Field Duplicates (water) Filter: ALL		SDG Field_ID Sampled_Date-Time	ENVIROLAB 2015-06-12T00:00:00 MW4B 10/06/2015	ENVIROLAB 2015-06-12T00:00:00 DUP1 10/06/2015	RPD
Chem_Group	ChemNamUnits	EQL			Т
BTEX	Benzene µg/L	1	490.0	480.0	2
	Toluene μg/L	1	88.0	84.0	5
	Ethylbenzeµg/L	1	590.0	580.0	2
	Xylene (o) 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.

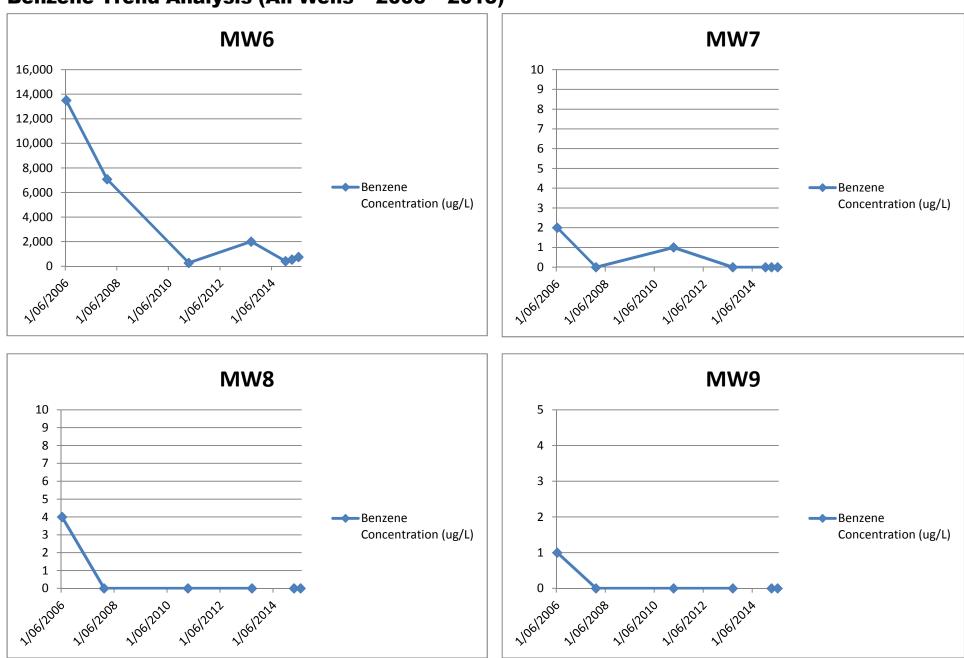
**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 100 (0-5 x EQL); 75 (5-10 x EQL); 30 (> 10 x EQL))

***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

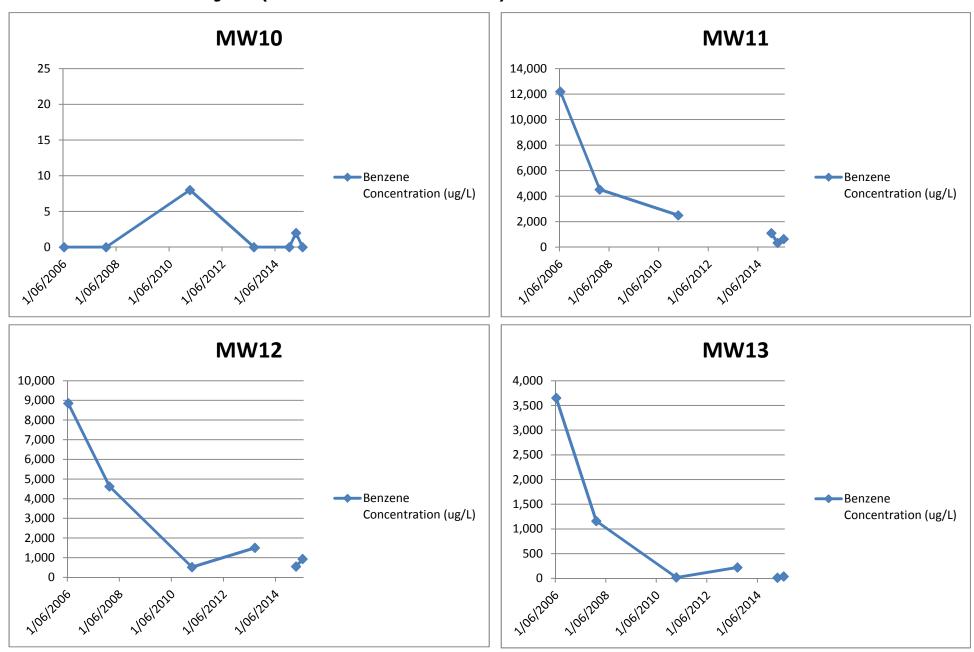
Appendix C – Benzene and TRH Trend Analysis



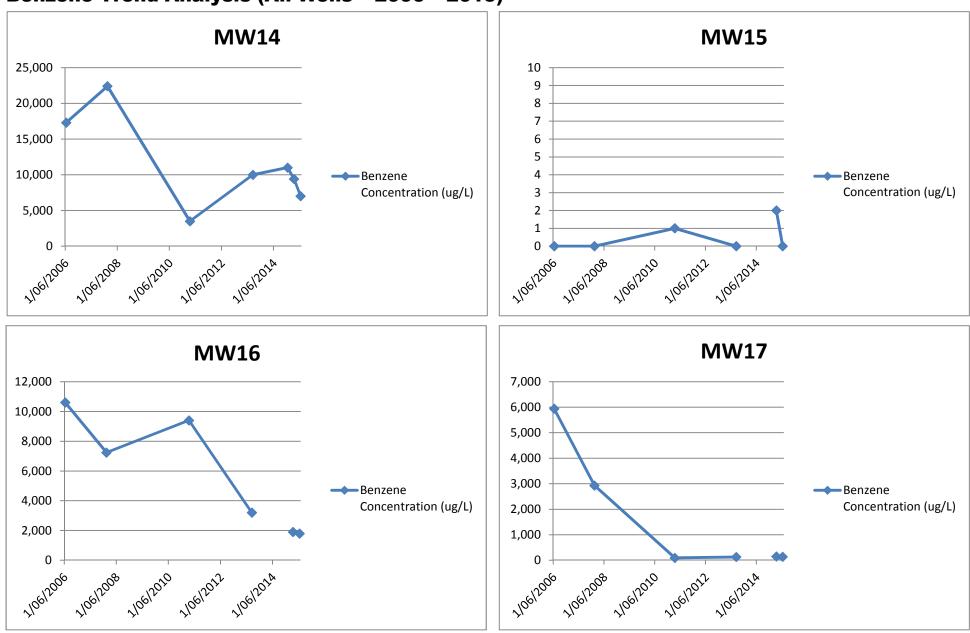
Benzene Trend Analysis (All Wells – 2006 – 2015)



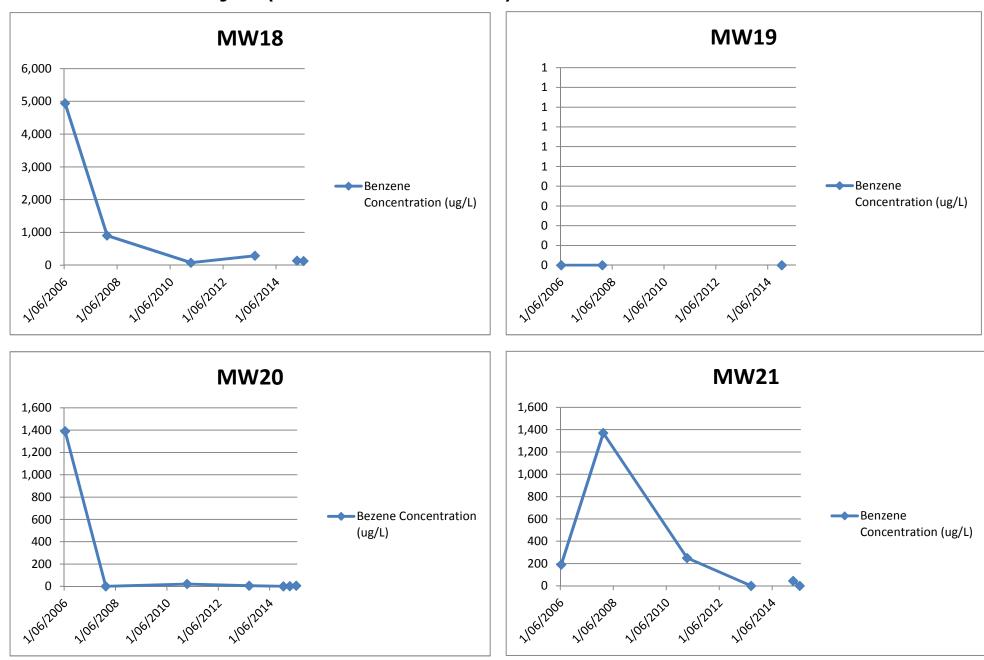
Benzene Trend Analysis (All Wells – 2006 – 2015)



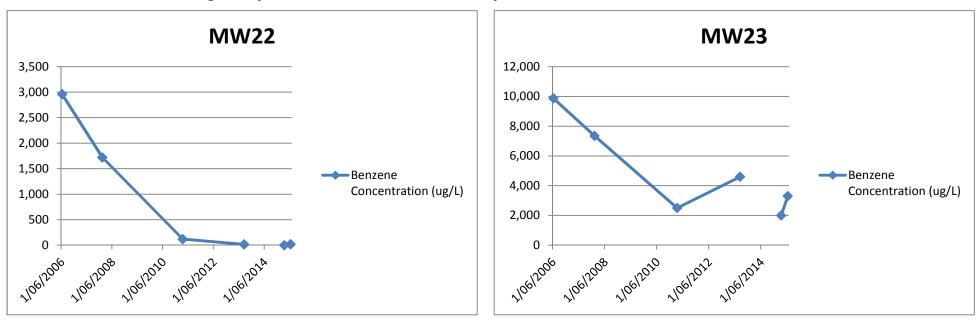
Benzene Trend Analysis (All Wells – 2006 – 2015)



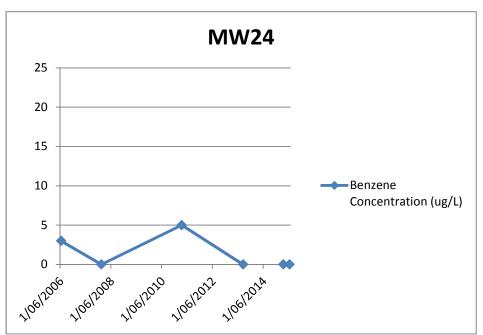
Benzene Trend Analysis (All Wells – 2006 – 2015)



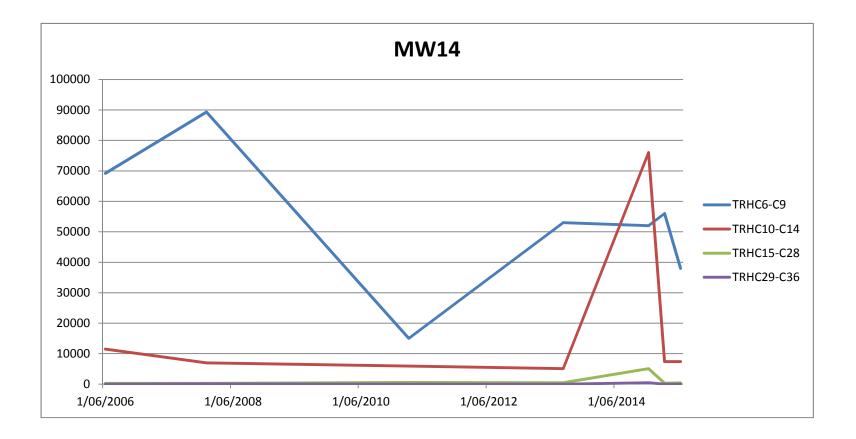
Benzene Trend Analysis (All Wells – 2006 – 2015)



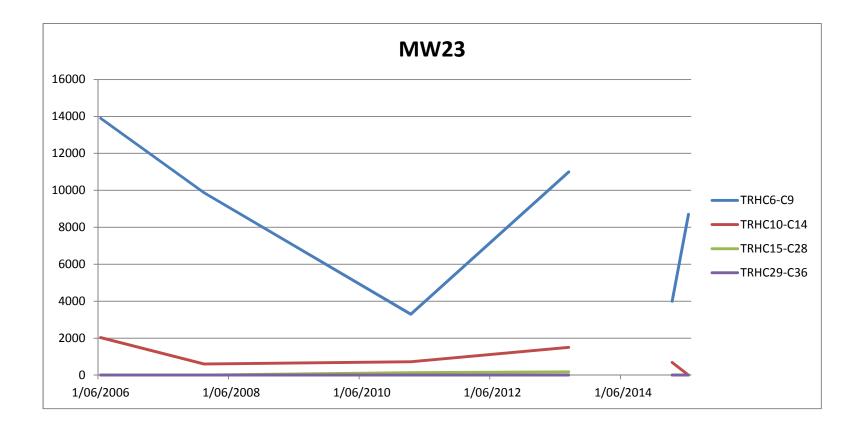
Benzene Trend Analysis (All Wells – 2006 – 2015)



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)
\searrow

			·	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

 NATA accreditation number 2901. This document shall not be reproduced except in full.

 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

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		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:
Chefit	Nelelence.

		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
+ Delive dry 1 1		
+ Delive drun to shed. A broundwet sampling.		
a woundwet sampling.		
Description of	Works and People Met	
	•	
· .		
Sami	pling Details	1004.00
Sompling Conducted		1 mary
Mahim	20, MWII, MW&9, MW3, MU2, ML	NS, MWN
Kiatrix: S W O MWB, MWB COC Form Submitted: Y N NA MWB	mous mos, in	
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	
moste to beate our & min 19		
d reporting form.cdr		



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											
& Circudwate Scoply											
Description	n of	Woi	rks and People Met			_					
						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					
			- Se								
Field reporting form.cdr	10000					11/04					

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:
1				mS/	cm pp	neu	
1							De
	2		-				
			1				
abilisat	ion						
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
		Actual am	ount of wate	r prior to	sampling		- ing oddul
					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
		moline	and the second	and a second	Sile 2025	Fie	ield QC Checks
pre-clea	nina sa		quipment u	sed for	these san		
pre-clea	ning sa						YN
	ing sai	inpling ec	upment n	roport	protected	from conta	aminationa
documen	itation c	of equipm	luipment p	roperly p	protected	from conta	tamination? Y N
documen air bubbl	itation cles pres	of equipm sent in via	luipment p ent conduc	roperly p cted?	protected	from conta	tamination? Y N Y N NA
documen air bubbl ample fo	itation c les pres	of equipm sent in via sfield filte	luipment p ent conduc	roperly p cted?	protected	from conta	
air bubbl	itation c les pres r metal ple colle	of equipm sent in via sfield filte	luipment p	roperly p cted?	protected	from conta	Y N NA

	(0	June	2015	41464	J. C.	000 11	formation			A AND AND AND AND AND
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
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	6									and the second
							2		12.	
						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					
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.					
	-										
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										
		-										
							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						
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		
				*								
											· · · · · · · · · · · · · · · · · · ·	
			•								3	
							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								
	és, e												
											8		
							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												
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												
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												
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												
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							
					2					
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												
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												
Dedicated fubine in well.												
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				
							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											
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										
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	
/												
						-						
							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	

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							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

