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LANDCOM

PROPOSED DEVELOPMENT

DEFENCE LANDS, NORTH PENRITH

GROUNDWATER ASSESSMENT

REPORT NO 12609/3-AA 1 JUNE 2012

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Job No: 12609/3
Our Ref: 12609/3-AA

1 June 2012

Landcom
Level 2
330 Church Street
PARRAMATTA NSW 2150

Attention: Mr M Williams

Dear Sir

re: **Proposed Development**
Defence Lands, North Penrith
Groundwater Assessment

Please find herewith the groundwater assessment report for the above site.

The objectives of the assessment were to;

- Ascertain the contamination status of the groundwater.
- Determine the impact if any on the groundwater in the site due to potential off-site migration of any contaminants associated with the adjoining Mobil site.
- Determine the water quality and suitability for any beneficial use if groundwater is to be extracted for use in the future.

If you have any questions, please do not hesitate to contact the undersigned.

Yours faithfully
GEOTECHNIQUE PTY LTD

JOHN XU
Associate
BE, MEngSc, MIEAust

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EXECUTIVE SUMMARY

This executive summary presents a synopsis of a groundwater assessment in the vicinity of the Mobil site, as requested by Site Auditors Mr Graeme Nyland and Ms Melissa Porter, for the subject site known as Defence Lands, located between Coreen Avenue and Penrith Railway Station, North Penrith, as shown on Figure 1 (page 1 of the report).

The site comprises part of a parcel of land registered as Lot 11 in DP1159973 and Lot 1 in DP532379.

It is understood that the site is proposed for mixed land uses including standard residential (with accessible soil), commercial space, industrial land, parklands, community facility, sewerage pumping station and associated infrastructure.

The site is currently undergoing preparation for a Stage 1 development.

The objectives of the assessment were to;

- Ascertain the contamination status of the groundwater.
- Determine the impact if any on the groundwater in the site due to potential off-site migration of any contaminants associated with the adjoining Mobil site.
- Determine the water quality and suitability for any beneficial use if groundwater is to be extracted for use in future.

The subject site was part of the land used for Army Stores since 1942. Since the 1990s it has had minor uses, mainly by the army reserves and the site facilities have been progressively demolished concurrently with staged environmental investigations and remediation.

It was understood that environmental investigations were conducted in many stages over a long period, followed by remediation and detailed validation. The land, including the subject site, has been audited by the appointed Site Auditor Mr G Nyland.

In the Site Audit Statement dated 22 May 2009, Mr G Nyland concluded that the land, including the subject site, was suitable for residential with accessible soil (with minimum home grown produce, excluding poultry); residential with minimum opportunity for soil access (including units, day care centre, preschool, primary school and secondary school); park, recreational open space, playing field and commercial/industrial use; subject to implementation of additional works, as detailed in Section 8.0 of this report.

The Mobil site is located immediately to the north of the subject site. There is potential for off-site migration of contaminants associated with activities in the adjoining Mobil site.

This assessment is to address point 1 of the recommendations made by Mr G Nyland (refer to Section 8.0 of this report) and determine any impact on groundwater due to activities in the adjoining Mobil site and former activities in the site.

It was considered that the potential contaminants of concern associated with the Mobil site were petroleum hydrocarbons and heavy metals resulting from leakage / spill of petroleum products including lubricants, diesel and petrol in the depot and/or underground storage tanks (UST).

Based on the previous contamination assessments / validation in various stages the site was assessed predominantly to have localised metals, Total Petroleum Hydrocarbons (TPH), Polycyclic Aromatic Hydrocarbons (PAH) and asbestos contamination in the surface soil.

Three groundwater monitoring wells (GW1 to GW3) were installed on 6 and 7 March 2012 to depths ranging from 9 metres (m) to 12m below the existing ground surface (EGS). Locations of the wells are shown on Drawing No 12609/3-AA1.

There was no petroleum hydrocarbon staining, discoloration of the soil or odour during installation of the wells that would indicate the potential for contamination.

Reference should be made to Appendix A for details of the soil profile encountered during installation of the wells. In general, either low permeable silty clay or sandy clay was identified to depths ranging from about 1.8m to 2.5m below the EGS. The depths of groundwater in the 3 monitoring wells ranged from about 6.2m to 6.9m below the EGS. The soil between the silty clay / sandy clay and the groundwater table is a layer of permeable silty sand and gravelly sand with thickness of about 3.7m to 5.0m.

Based on previous investigations by other consultants it is understood that groundwater at the site appears to flow in a north to north-westerly direction.

Due to potential off-site migration of contaminants from the adjoining Mobil site and based on the soil contaminants of concern identified during previous assessments / validation within the site and for screening purposes, groundwater samples recovered from GW1 to GW3, duplicate sample D1 and split sample S1 were analysed for the following;

- Metals including arsenic (As), boron (B), beryllium (Be), cadmium (Cd), chromium (Cr), cobalt (Co), copper (Cu), lead (Pb), mercury (Hg), manganese (Mn), nickel (Ni) and zinc (Zn)
- TPH
- Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX)
- Oil and Grease
- PAH
- Total Phenols
- Total Cyanides
- Organochlorine Pesticides (OCP)
- Organophosphate Pesticides (OPP)
- Polychlorinated Biphenyls (PCB)
- Volatile Organic Compounds (VOC), which include BTEX, etc
- Semi Volatile Chlorinated Hydrocarbons (SVCH)
- Total Kjeldahl Nitrogen (TKN), ammonia (NH4-N), nitrite (NO2-N) and nitrate (NO3-N)
- Total Phosphorous (P)

- Soluble Fluoride (F)
- Total Dissolved Solids (TDS)
- pH
- Hardness

One trip spike sample (TS1) was analysed for BTEX and one trip blank sample (TB1) was analysed for VOC.

The test results are summarised in the attached Tables A to I. Reference should be made to Section 13.0 of this report for the assessment of the test results.

The available Trigger Values or Guideline Values presented in the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, published by the *Australian and New Zealand Environment and Conservation Council* and *Agriculture and Resource Management Council of Australia and New Zealand, 2000* (ANZECC & ARMCANZ Water Quality Guidelines 2000) are adopted for the assessment of any potential groundwater impact on Nepean River aquatic ecosystem and irrigation use.

The "Guidelines for Managing Risks in Recreation Water" 2008 published by the Australian Government National Health and Medical Research Council (NHMRC) is adopted for assessing water for recreational purposes.

The Trigger Values or Guideline Values are also known as Generic Groundwater Investigation Levels (GIL) in the *Guidelines for the Assessment and Management of Groundwater Contamination*, published by *Department of Environment and Conservation*, 2007 (DEC Groundwater Guidelines 2007).

There are no reliable GIL for Total Petroleum Hydrocarbons in ANZECC & ARMCANZ Water Quality Guidelines 2000; reference has therefore been made to Airports (Environment Protection) Regulations 1997 (compiled and prepared on 28 May 2004). The accepted limits (for fresh water) of 150 µg/L (C_6-C_9) and 600 µg/L (>C_9) detailed in that Regulation are considered applicable for the protection of fresh water.

The data quality objectives outlined in the report have been satisfied.

The findings of this groundwater assessment are summarised as follows;

- The depths of groundwater table in the three groundwater monitoring wells range from about 6.2m to 6.9 m below the EGS.
- In general, low permeable silty clay or sandy clay was identified to depths ranging from about 1.8m to 2.5m below the EGS. The soil between the silty clay/sandy clay and groundwater table is a layer of permeable silty sand and gravelly sand with thickness of about 3.7m to 5.0m.
- The Nepean River is situated approximately 1.5km to the west of the site; there are parks and public reserves and a showground located at distances ranging from about 500m to less than 1km from the site.
- The realistic environmental values (beneficial uses) of the groundwater would therefore be for the support of the fresh water aquatic ecosystem (Nepean River) and to a lesser extent for the irrigation and recreation (through extraction) for parks, public reserves or showground.

- In general, there is no indication of contamination of groundwater from the former site uses and activities associated with the adjoining Mobil site.
- The contaminants in the groundwater, in general, would not impact on the Nepean River.
- The groundwater would be suitable to be extracted for short-term (up to 20 years) irrigation and recreational purposes.

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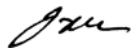

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1.0 INTRODUCTION

This report presents the results of a groundwater assessment in the vicinity of the Mobil site (refer to Drawing No 12609/3-AA1), as requested by Site Auditors Mr Graeme Nyland and Ms Melissa Porter for the subject site known as Defence Lands at North Penrith, as shown on Figure 1 below.

FIGURE 1

The objectives of the assessment were to;

- Ascertain the contamination status of the groundwater.
- Determine the impact if any on groundwater in the site due to potential off-site migration of any contaminants associated with the adjoining Mobil site.
- Determine the water quality and suitability for any beneficial use if groundwater is to be extracted for use in the future.

2.0 SCOPE OF WORK

In order to achieve the objectives of this assessment the following scope of work was conducted;

- Drilling three bores using a drilling rig.
- Screening soil samples for potential volatile organic compounds (VOC) using a photo-ionisation detector (PID).
- Installation of three groundwater monitoring wells.

- Development of the monitoring wells within one week of installation, using a pump.
- Measurement of standing groundwater levels prior to purging the wells.
- Determination of the presence or otherwise of non-aqueous phase liquids (NAPL) and measurement of thickness of any light and dense NAPL (LNAPL and DNAPL) using an oil/water interface meter prior to purging the wells.
- Measurement of groundwater parameters using water quality meters in conjunction with a flow-through cell, under a low-flow purging condition.
- Recovering groundwater samples using a low-flow bladder pump.
- Preparation of quality assurance (QA) and quality control (QC) samples.
- Forwarding the samples to National Association of Testing Authorities (NATA) accredited testing laboratories for chemical analysis, in accordance with chains of custody (COC).
- Assessment of the laboratory analytical results against the guidelines.
- Assessment of field and laboratory QA and QC.

3.0 SITE IDENTIFICATION & PROPOSED DEVELOPMENT

The installed groundwater monitoring wells are located along the northern boundary of the subject site, close to the adjoining Mobil site. The subject site known as the Defence Lands is located between Coreen Avenue and Penrith Railway Station, North Penrith, in the local government area of Penrith. The site is part of a parcel of land registered as Lot 11 in DP1159973 and Lot 1 in DP532379.

It is understood that the site is proposed for mixed land uses including standard residential (with accessible soil), commercial space, industrial land, parklands, community facility, sewerage pumping station and associated infrastructure.

The site is currently undergoing site preparation for a Stage 1 development.

4.0 BACKGROUND INFORMATION ON THE ADJOINING MOBIL SITE

The Mobil site located to the north of the subject site is the central Mobil lubricant distribution depot / warehouse for NSW, which started operation in June 2006 and stocks a full range of Mobil lubricants for automotive, industrial, marine and aviation application.

Nine (9) underground storage tanks (UST) (9 vent pipes were noted) were recently removed from the Mobile depot. Based on observation by Geotechnique the labels on the aboveground pipes indicate that the tanks were used for storage of Distillate (Diesel), Premium Unleaded and Super Petrol.

Other petroleum hydrocarbon products are currently stored in the Mobile depot.

5.0 GEOLOGY & HYDROGEOLOGY

Reference to the Penrith (1:100,000) Soil Landscape and Series Geological Maps indicates the following sub-surface conditions.

The western (mostly low-lying) portion of the site, which is closer to the Nepean River, is generally underlain by fluvial (alluvial) deposits. These deposits are known as;

- The Richmond Group (in accordance with the Landscape maps), which is Quaternary terrace of the Nepean River, generally relatively flat (slopes less than 1%) with local relief to 3 metres for splays and levees. Sub-surface soils in this landscape comprise clay, loam and sand. The landscape is susceptible to high erosion on terrace edges and minor localised flooding.
- The Cranebrook Formation (in accordance with the Geological maps) which comprises Quaternary fluvial deposits consisting of gravel, sand, silt and clay of variable proportions.

The eastern side of the site is probably underlain by the Luddenham Group overlying Bringelly Shale belonging to the Wianamatta Group of shales of Middle Triassic Age.

- The Luddenham Group is characterised by undulating to rolling low hills on Wianamatta Group shales, with local relief of 50m to 80m, ground surface slopes of 5% to 20%, narrow ridges, hillcrests and valleys. Sub-surface soils in this group are likely to be up to 1.5m deep and comprise high plasticity moderately reactive clays, which are locally impermeable and susceptible to high erosion hazards.
- Bringelly Shale comprises shale, carbonaceous claystone, laminite, fine to medium grained lithic sandstone, rare coal.

Reference should be made to the Engineering Logs in Appendix A for descriptions of the soils encountered during installation of groundwater monitoring wells for this assessment. Based on information from all wells, in general, low permeable silty clay or sandy clay was identified to depths ranging from about 1.8m to 2.5m below the EGS. The depths of groundwater in the three monitoring wells ranged from about 6.2m to 6.9m below the EGS.

The soil between the mentioned silty clay / sandy clay and the groundwater table is a layer of permeable silty sand and gravelly sand with thickness of about 3.7m to 5.0m.

Based on previous investigations by other consultants it is understood that groundwater at the site appears to flow in a north to north-westerly direction.

There is no waterbody such as a creek, river or wetland close to the site. The Nepean River is situated approximately 1.5 kilometres (km) to the west of the site. Obvious local depressions that might capture or divert stormwater run-off were not observed within the site.

A search was carried out on 14 March 2012 through the website of the Department of Natural Resources for any registered groundwater bore data within a radius of about 1km of the site. The search revealed four bores within this radius. The bores were intended for monitoring purposes. The information obtained is detailed in Appendix B, and summarised in the following table.

Bore	Date	Authorised/ Intended Purpose	AMG coordinates	Water Bearing Zone (m)	Standing Water Level (m)	Salinity (mg/L)
GW108041	12.04.2006	Monitoring Bore	$_{2}86.742_{E}$ & $_{62}63.735_{N}$	6.5-7.5	6.7	No Details
GW108042	22.04.2006	Monitoring Bore	$_{2}86.7592_{E}$ & $_{62}63.761_{N}$	No Details	6.4	No Details
GW108043	22.04.2006	Monitoring Bore	$_{2}86.836_{E}$ & $_{62}63.742_{N}$	7.0-9.0	6.8	No Details
GW108044	22.04.2006	Monitoring Bore	$_{2}86.812_{E}$ & $_{62}63.767_{N}$	8.2-9.5	6.6	No Details

6.0 MONITORING WELL INSTALLATION & DEVELOPMENT

Three groundwater monitoring wells (GW1 to GW3) were installed on 6 and 7 March 2012 to depths ranging from 9m to 12m below the EGS. Locations of the wells are shown on Drawing No 12609/3-AA1 as follows;

- GW1 located close to the western end of the Mobil depot.
- GW3 located close to the previous Mobil underground storage tanks /eastern end of the Mobile site.
- GW2 located between the eastern and western ends.

Terratest used a drilling rig equipped with push tube to penetrate through the layers of silty clay, sandy clay and silty sand, then with Tubex to penetrate through the layer of gravelly sand, remove the soils and install the monitoring wells under the supervision of Geotechnique Pty Ltd (Geotechnique).

Samples of different types of soils from various depths were recovered from each of the bores and placed in an airtight polyethylene bag, ensuring enough air space (headspace) above the sample was present to be screened in the field for VOC using a calibrated PID. The soil sample remained in the bag for approximately 15 minutes before being shaken (to thoroughly mix soil with the air in the headspace) and a PID reading was recorded. All the PID readings were equal to zero.

There was no petroleum hydrocarbon staining, discolouration of the soil or odour during installation of the wells that would indicate the potential for contamination.

Each monitoring well consisted of a standpipe of 50 millimetres (mm) internal diameter, Class 18 PVC casing and a 0.45mm machine slotted screen. The bottom of the standpipe was fitted with a push-on cap. The annulus was backfilled with clean sand and after that bentonite (seal material) and cement to prevent ingress of surface run-off. The top of the standpipe was fitted with a cap and a lockable monument. Construction details of the monitoring wells are shown on the borehole logs in Appendix A.

Within one week of installation of the monitoring well, our Environmental Engineer developed the wells by removing groundwater using a 12V electric pump (Super Twister) until the water was visibly clean.

Oily substances were not observed and there was no petroleum hydrocarbon odour in the groundwater during well development.

7.0 SAMPLING & ANALYSIS PLAN AND SAMPLING METHODOLOGY

Sampling and analysis were carried out to obtain an assessment of the following;

1. The contamination status, nature and location of any contaminant(s) in the groundwater.
2. The impact of groundwater on the site, if any, due to potential off-site migration of any contaminants associated with the adjoining Mobil site and former activities in the site.
3. The realistic environmental values (beneficial uses) of the groundwater.

Non-aqueous phase liquids (NAPL) were not detected in the wells by an oil/water interface meter prior to purging. A calibrated Water Quality Meter in conjunction with a low-flow bladder pump and a flow-through cell was used to measure field parameters including Temperature, Oxidation Reduction Potential (ORP), Dissolved Oxygen (DO), Turbidity, Conductivity and pH of the groundwater. Readings of field parameters during purging and the calibration sheets for the meters are detailed in Appendix C of this report.

After purging and reaching stable readings for ORP, DO, Turbidity, Conductivity and pH groundwater samples were collected using a low-flow bladder pump that would minimise disturbance of any VOC. One groundwater sample was recovered from each monitoring well (GW1 to GW3) on 21 March 2012.

Oily substances were not observed and there was no petroleum hydrocarbon odour in the groundwater during sampling.

The laboratory supplied vials, glass and plastic bottles were filled to zero headspace and sealed with air tight Teflon screw top lids. Duplicate samples and split samples were also prepared. The fully filled vials, glass and plastic bottles were labelled and placed in a chilled container.

The groundwater levels are summarised in the following table.

Groundwater Monitoring Well	**Reduced Level of Groundwater Monitoring Well AHD (m)**	**Standing Groundwater Level Below the Existing Ground Surface (m) 1st Reading: 6,7/03/2012 2nd Reading: 16/03/2012 3rd Reading: 21/03/2012**			**Standing Groundwater Water Reduced Level Reading on 21/03/2012 AHD (m)**	**Non-aqueous Phase Liquids (NAPL) Encountered (Yes / No)**
		1st	2nd	3rd		
GW1	26.12	6.5	5.99	6.15	19.97	No
GW2	26.68	7.5	6.54	6.77	19.91	No
GW3	26.77	7.4	6.72	6.85	19.92	No

At completion of field sampling the groundwater samples were transported in chilled containers under COC conditions to the primary laboratory SGS Environmental Services (SGS) and the secondary laboratory Envirolab Services Pty Ltd (Envirolab), both NATA accredited.

On receipt of the samples the laboratories returned the Sample Receipt Advice verifying the integrity of all samples received.

Filtration of samples for metal analysis through a 0.45 µm filter was carried out in the laboratories. No preservative was added to the plastic bottle supplied by the laboratories.

Due to potential off-site migration of contaminants from the adjoining Mobil site, based on the soil contaminants of concern identified during the previous assessments / validation within the site and for screening purposes, all the groundwater samples recovered from GW1 to GW3, duplicate sample D1 and split sample S1 were analysed for the following.

- Metals, including arsenic (As), boron (B), beryllium (Be), cadmium (Cd), chromium (Cr), cobalt (Co), copper (Cu), lead (Pb), mercury (Hg), manganese (Mn), nickel (Ni) and zinc (Zn)
- Total Petroleum Hydrocarbons (TPH)
- Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX)
- Oil and Grease
- Polycyclic Aromatic Hydrocarbons (PAH)
- Total Phenols
- Total Cyanides
- Organochlorine Pesticides (OCP)
- Organophosphate Pesticides (OPP)
- Polychlorinated Biphenyls (PCB)
- Volatile Organic Compounds (VOC), which include BTEX etc.
- Semi Volatile Chlorinated hydrocarbons (SVCH)
- Total Kjeldahl Nitrogen (TKN), ammonia (NH4-N), nitrite (NO2-N) and nitrate (NO3-N)
- Total Phosphorous (P)
- Soluble Fluoride (F)
- Total Dissolved Solids (TDS)
- pH
- Hardness

One trip spike sample (TS1) was analysed for BTEX and one trip blank sample (TB1) was analysed for VOC.

8.0 DATA QUALITY OBJECTIVES

The data qualitative objectives (DQO) were developed for this assessment in accordance with the NSW Department of Environment and Conservation (DEC) (2006), "*Guidelines for the NSW Site Auditor Scheme (2nd edition)*", as well as in accordance with the Australian Standard "*Guide to the Sampling and Investigation of Potentially Contaminated Soil Part 1: Non-volatile and semi-volatile compounds AS4482.1*" and "*Guide to the Sampling and Investigation of Potentially Contaminated Soil Part 2: Volatile substance AS4482.2*". The DQO process adopted is outlined below.

State the Problem

The subject site was part of the land used for Army Stores since 1942. Since the 1990s it has had minor uses, mainly by the army reserves, while the site facilities have been progressively demolished concurrently with staged environmental investigations and remediation.

It was understood that environmental investigations were conducted in many stages over a long period, followed by remediation and detailed validation. The land including the subject site has been audited by the appointed Site Auditor Mr G Nyland.

In the Site Audit Statement dated 22 May 2009, Mr G Nyland concluded that the land including the subject site was suitable for residential with accessible soil (with minimum home grown produce, excluding poultry); residential with minimum opportunity for soil access (including units, day care centre, preschool, primary school and secondary school); park, recreational open space, playing field and commercial/industrial use; subject to implementation of the following;

1. If groundwater is to be extracted for use in the future, further assessment of the water quality is required to verify that the groundwater is suitable for the purposes being considered.
2. Flaking paint on Thornton Hall which may contain lead should be considered when the fate of Thornton Hall is determined.
3. The stockpile of soil in the north-west should not be used on the surface of residential areas.

The Mobil site is located immediately to the north of the subject site. There is potential for off-site migration of contaminants associated with activities in the adjoining Mobil site.

This assessment is to address the abovementioned point 1 and determine any impact on groundwater due to activities in the adjoining Mobil site and former activities in the site.

It was considered that the potential contaminants of concern associated with the Mobil site were petroleum hydrocarbons and heavy metals, resulting from leakage / spill of petroleum products including lubricants, diesel and petrol in the depot and/or UST.

Based on the previous contamination assessments / validation in various stages the site was assessed predominantly to have localised metals, TPH, PAH and asbestos contamination in the surface soil.

The 'problems' to be addressed are whether contamination exists within the groundwater in an area close to the Mobil site and if so, to evaluate the likely human health and environmental risks associated with any contamination identified.

The following key professional personnel were involved in the assessment.

James Ngu	Senior Principal Environmental Engineer
John Xu	Associate
Lan Ye	Environmental Engineer

Identify the Decisions
The decisions to be made in completing the assessment are as follows;

- Is there any impact on groundwater in the site due to potential off-site migration of any contaminants associated with the adjoining Mobil site and former activities in the site?
- Is the groundwater likely to present a risk of harm to human health or the environment?
- What is the quality of groundwater within the site?
- What are the realistic environmental values (beneficial uses) of the groundwater?

Identify Inputs to the Decisions
The inputs into the decision process are as follows;

- Installation of three groundwater monitoring wells.
- Soil profile information obtained through the sampling phase.
- Groundwater sampling.
- Laboratory testing.
- Assessment of test results against assessment criteria.

Define the Study Boundaries
The study boundary for this assessment is an area in the subject site where the groundwater monitoring wells were located, adjacent to the Mobil site, as shown on Drawing No 12609/3-AA1 and summarised in Section 3.0 of this report.

Develop a Decision Rule
The information obtained through this assessment will be used to characterise the groundwater. The decision rule in characterising the groundwater will be as follows;

- The Trigger Values (TV) and Guideline Values (GV) presented in the "*Australian and New Zealand Guidelines for Fresh and Marine Water Quality*", published by the *Australian and New Zealand Environment and Conservation Council* and *Agriculture and Resource Management Council of Australia and New Zealand, 2000* (ANZECC & ARMCANZ Water Quality Guidelines 2000);
- The generic Groundwater Investigation Levels (GIL) described in the "*Guidelines for the Assessment and Management of Groundwater Contamination"*, published by *Department of Environment and Conservation*, 2007 (DEC Groundwater Guidelines 2007).
- There are no TV, GV or GIL for Total Petroleum Hydrocarbons; the accepted limits of 150 µg/L (C_6-C_9) and 600 µg/L (>C_9) detailed in *Airports (Environment Protection) Regulations 1997 (compiled and prepared on 28 May 2004)* are considered applicable for the protection of fresh water.

Laboratory test results will only be accepted and considered useable for this assessment under the following conditions;

- All laboratories used are accredited by NATA for the analyses undertaken.
- The differences between the reported concentrations of analytes in the field duplicate samples and the corresponding original samples are within accepted limits (refer to Section 9.4). However, the variation can be higher for organic analysis than for inorganics and for low concentrations of analytes.
- The differences between the reported concentrations of analytes in the inter-laboratory duplicate (split) samples and the corresponding original samples are within accepted limits (refer to Section 9.5). However, the variation can be higher for organic analysis than for inorganics and for low concentrations of analytes.
- The recovery of spike concentrations in the trip spike sample is sufficient (refer to Section 9.6) so as not to impact on the reported concentrations of the groundwater samples when the same recovery is applied (BTEX only).
- The recovery of concentrations in the trip blank sample is not significant (refer to Section 9.7) so as not to impact on the reported concentrations of the groundwater samples (VOC).
- The laboratories implement and meet appropriate QA/QC protocols and QA/QC results are satisfactory.

Specify Limits on Decision Errors
The limits on decision errors for this assessment are as follows;

- The analyte selection is based on the contaminants of concern associated with the adjoining Mobil site and the soil contaminants of concern identified during previous assessments / validation within the site. The possibility of any other potential contaminants that would be detected through field observation (through odours, staining, and colouring) during sampling might need to be included. The potential for contaminants other than those analysed is considered remote.
- The assessment criteria adopted from the guidelines stated in this report have risk probabilities already incorporated.
- The acceptable limits for field and inter-laboratory duplicate (split) comparisons are outlined in Sections 9.4 and 9.5 of this report.
- The acceptance limits for laboratory QA/QC parameters are based on the laboratory reported acceptance limits.

Optimise the Design for Obtaining Data
- The monitoring well locations and procedures for collection of samples were developed in accordance with the available guidelines and current industry practice.
- The analytical program was developed prior to undertaking the sampling. All potential contaminants have been covered.
- Only laboratories accredited by NATA for the analyses were used for this assessment. The laboratory performance is assessed through review of QA/QC samples such as blanks, spikes, duplicates and surrogates.

Data Quality Indicators
The performance of the assessment in achieving the DQO will be assessed through the application of Data Quality Indicators (DQI), defined as follows.

- **Precision**: A quantitative measure of the variability (or reproducibility) of data;
- **Accuracy**: A quantitative measure of the closeness of reported data to the "true" value;
- **Representativeness**: The confidence (expressed qualitatively) that data is representative of each media present on the site;
- **Completeness**: A measure of the amount of useable data from a data collection activity;
- **Comparability**: The confidence (expressed qualitatively) that data can be considered equivalent for each sampling and analytical event.

9.0 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

9.1 Sampling Personnel

An Environmental Engineer (Lan Ye) from Geotechnique supervised installation of the groundwater monitoring wells, measured the groundwater levels, developed the wells, purged the wells, measured the field parameters and recovered the samples.

Lan Ye has more than two years experience in installation of groundwater monitoring wells, development of wells, purging of groundwater and sampling.

9.2 Field Instrument Calibration

The PID, water quality meters and oil/water interface meter were calibrated prior to use in the field. A copy of the calibration sheets is presented in Appendix B.

9.3 Decontamination Procedures

A groundwater sample was collected at each sampling location using separate disposable sampling tubes connected to the pump. The pump and the interface probe were thoroughly washed in a solution of phosphate free detergent (Decon 90) then rinsed with distilled water twice prior to use in each well. In addition, the disposable bladder within the pump was replaced prior to use in each well.

9.4 Duplicate Sample

For field duplicate groundwater samples, two sets of laboratory supplied vials, glass and plastic bottles were filled to zero headspace and sealed with airtight Teflon screw top lids. One set of the fully filled vials, glass and plastic bottles were labelled as the original sample whilst the other set was labelled as the duplicate sample. Both the original sample and the duplicate samples were placed in a chilled container.

Duplicate samples were prepared on the basis of sample numbers recovered during the field work. The duplicate sample frequency was computed using the total number of samples analysed as part of this assessment. The duplicate frequency (33%) adopted complies with the NEPM, which recommends a duplicate frequency of at least 5%.

The duplicate samples test results are presented with the laboratory analytical report from SGS in Appendix D and summarised in Table Q1.

A comparison was made of the laboratory test results for the duplicate samples with the original samples and the Relative Percentage Differences (RPD) were computed in order to assess the accuracy of the laboratory test procedures. RPD within 50% are generally considered acceptable. However, this variation can be higher for organic analysis than for inorganics and for low concentrations of analytes.

As shown in Table Q1 the comparisons between the duplicates and corresponding original samples indicated generally acceptable RPD, with the exception of the RPD of TKN (63%), Nitrate (74%), Total Nitrogen (61%) and Total Phosphorus (88%), which were slightly above 50%, mainly due to the low concentrations of analytes.

The duplicate pair (Duplicate D1 & GW1) was found to have concentration of Total Phenols (40 µg/L) detected in the duplicate sample; however, the concentration of Total Phenols was less than the laboratory limit of reporting (LOR) in the corresponding original sample.

As such, the higher concentration was adopted for the assessment and included in Table C.

Based on the above the variations are not considered critical and overall the duplicate sample comparisons indicate that the laboratory test data provided by the primary laboratory are of adequate accuracy and reliability for this assessment.

9.5 Inter-laboratory Duplicate (Split) Sample

An inter-laboratory duplicate (split) sample provides a check on the analytical performance of the primary laboratory. The split sample was prepared on the basis of sample numbers recovered during the field work and the analyses undertaken by the primary laboratory.

The split sample was prepared in the same manner as the duplicate sample and forwarded to a secondary laboratory (Envirolab) for analysis.

The split sample frequency was computed using the total number of samples analysed as part of this assessment. The split sample frequency (33%) adopted complies with the NEPM, which recommends a frequency of 5%.

The laboratory certificate of analysis from Envirolab is included in Appendix D of this report. The results are also summarised in Table Q2.

Based on Schedule B (3) of the NEPM, the difference in the results between the split samples should generally be within 30% of the mean concentration determined by both laboratories, i.e., RPD should be within 30%. However, this variation can be higher for organic analysis than for inorganics and for low concentrations of analytes.

As shown in Table Q2 the comparisons between the split and corresponding original samples generally indicated acceptable RPD, with the exception of the RPD of Zn (100%), TKN (148%) and Total Nitrogen (34%), which were in excess of 30%.

The RPD of Zn was comparatively high, mainly due to the low concentrations of the analyte.

Although the RPD of Total Nitrogen was comparatively high, both the concentrations provided by the primary laboratory and secondary laboratory were less than the available Groundwater Investigation Levels (GIL).

Based on the above the variations are not considered critical and overall the split sample comparisons indicate that the test results provided by the primary laboratory can be relied upon for this assessment.

9.6 Trip Spike Sample

Trip spike samples are obtained from the laboratory on a regular basis, prior to conducting field sampling where volatile substances are suspected. The samples are held in the Penrith office of Geotechnique at less than 4 degrees Celsius for a period of no more than seven days. During field work the trip spike samples are kept in the chilled container with soil and water samples recovered from the site. The trip spike sample is then forwarded to the primary laboratory together with the soil and water samples recovered from the site.

The laboratory prepares the trip spike by adding a known amount of pure petrol standard to a clean sand or distilled water sample. The sample is mixed thoroughly to ensure a relatively homogenous distribution of the spike throughout the sample. When the sample is submitted for analysis the same procedure is adopted for testing as for the soil and water samples being analysed from the site.

The purpose of the trip spike is to detect any loss or potential loss of volatiles from the soil and water samples during field work, transportation, sample extraction or testing.

One trip spike sample (TS1) was forwarded to the primary analytical laboratory with the samples collected from the site and tested for BTEX. The test results for the trip spike sample, reported as a percentage recovery of the applied and known spike concentrations, are shown in Table Q3. The laboratory analytical report from SGS is included in Appendix D.

As indicated in Table Q3 the results show a generally good recovery of the spike concentrations. The results indicate that it is unlikely that BTEX if present within the groundwater samples recovered from the site volatilised significantly during field work or transportation.

Furthermore, virtually all BTEX results were less than laboratory LOR and there was no visible or olfactory indication of hydrocarbon contamination.

Based on the above it is considered that any loss of volatiles from the recovered samples that might have occurred would not affect the outcome / conclusions of this report.

9.7 Trip Blank Sample

A trip blank sample is used to determine whether contamination of the sample has occurred as a result of ambient exposures during transport. The trip blank sample typically comprises a clean sand or distilled water sample that does not contain volatiles. The trip blank sample is transported with the recovered field samples and analysed in the laboratory for volatiles.

One trip blank sample was forwarded to the primary analytical laboratory with the samples collected from the site and tested for VOC. The test results for the trip blank sample are shown in Table Q4. The laboratory analytical report from SGS is included in Appendix D.

As indicated in Table Q4 concentrations of the analytes were less than the LOR, indicating the there was no ambient exposures of VOC during transport to influence the assessment results.

Based on the above it is considered that any gain of volatiles from the recovered samples during transportation that might have occurred would not affect the outcome / conclusions of this report.

10.0 LABORATORY QUALITY ASSESSMENT AND QUALITY CONTROL

10.1 Laboratory Accreditation

Only laboratories accredited by NATA for chemical analyses were used for analysis of samples recovered as part of this assessment. The laboratory must also incorporate quality laboratory management systems to ensure that trained analysts using validated methods and suitably calibrated equipment produce reliable results.

In addition to the quality control samples the laboratory must also ensure that all analysts receive certification as to their competence in carrying out the analysis and participate in national and international proficiency studies. SGS and Envirolab, the two laboratories used for this assessment, are both accredited by NATA. The two laboratories also operate Quality Systems that are designed to comply with ISO/IEC 17025.

10.2 Sample Holding Times

The following table lists the allowable holding times of water, detailed in Standard Methods for the Examination of Water and Wastewater (APHA).

ANALYTE	HOLDING TIME
	Water
Metals *	6 months
Mercury	28 days
Boron	28 days
Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX)	7 days
Total Petroleum Hydrocarbons (TPH)	7 days
Polycyclic Aromatic Hydrocarbons (PAH)	7 days
Volatile Organic Compounds (VOC)	7 days
Semi-VOC	7 days
OCP, OPP & PCB	7 days
Total Phenols	21 days
Total Cyanides	14 days
Total Phosphorous, Ammonia, TKN, Nitrite, Nitrate & Total N (nutrient)	48 hours (28 days frozen)
Fluoride	28 days
Total Dissolved Solids (TDS)	7 days
Oil & Grease	28 days
pH	6 hours (indicative 24h)

Notes: * Metals include Arsenic (As), Beryllium (Be), Cadmium (Cd), Chromium (Cr), Cobalt (Co), Copper (Cu), Lead (Pb), Manganese (Mn), Nickel (Ni), Zinc (Zn), Calcium (Ca) and Magnesium (Mg)

The actual holding times of the two laboratories are shown in the following table. The samples for nutrient analysis were frozen by the laboratory prior to analysis. All analyses were generally conducted within the relevant holding times, except for VOC and Volatile Petroleum Hydrocarbons (C_6-C_9) (11 days) and TDS (14 days). The delay for analysis by SGS was due to negligence by the laboratory.

Laboratory	Report No	Sampling Date	Sample Receipt	Date Extracted (Analysed)	Holding Time
SGS	SE106556	21/03/2012	21/03/2012	22-03/03-04/2012 (22-10/03-04/2012)	1-13 days
SGS	PE066064 (part of SE106556)	21/03/2012	23/03/2012	28/03/2012 (10/04/2012)	7 days
Envirolab	70711	21/03/2012	21/03/2012	21-28/03/2012 (21-30/03/2012)	<1-7 days

10.3 Test Methods and Limits of Reporting (LOR)/ Practical Quantitation Limits (PQL)

The test methods and Limits of Reporting (LOR) / Practical Quantitation Limits (PQL) adopted by SGS and Envirolab are indicated with the analytical report / certificate of analysis in Appendix D.

The samples analysed for TPH (C_6–C_9) and VOC including BTEX were extracted by the purge and trap method recommended by the NSW EPA.

10.4 Method Blanks

Method blank samples are designed to monitor the introduction of incidental or accidental interferences into the analysis, which might result in a false increase in analyte concentration. The blank comprises reagents specific to each individual analytical method and is analysed in the same manner as the site sample. The reagents are carried through the preparation, extraction and digestion procedures and analysed at the beginning of every sample batch analysis, or at least 1 in 20 samples.

Method blank samples for water samples were analysed by the primary and secondary laboratories for Metals, TPH, BTEX, PAH, OCP, PCB, VOC, SVOC, Total Phenols, Total Cyanides, TKN, Nitrate, Nitrite, Ammonia, Total Phosphorous, Fluoride, TDS and Oil & Grease.

All reported blank concentrations were below the LOR or PQL as detailed in the laboratory test results certificates from SGS and Envirolab respectively. The results complied with the acceptance criteria for each laboratory (must not be detected at the LOR/PQL).

The test results indicate that there was no interference to the analysis.

10.5 Laboratory Duplicate Samples

The laboratory prepares duplicate samples from the supplied samples (original samples) and/or laboratory spiked samples and carries out preparation and testing in the same manner as the original sample. The duplicate sample provides an indication of laboratory precision and reproducibility.

The laboratory prepared duplicates were analysed for the same range of analytes as the samples submitted from the site.

The comparisons between the laboratory duplicates and original samples have been reported on the laboratory test results certificates as RPD. The reported duplicate sample numbers and RPD ranges as well as acceptance criteria for both of the laboratories used are summarised below.

Laboratory	Batch	Item	Reported	Acceptance Criteria	Comments
SGS	SE106556	Duplicate numbers	2 duplicates out of 6 samples analysed (and 5 duplicates from process batch samples)	1 duplicate for every 10 samples analysed	Achieved
		RPD	0% to 198%	<MAD[1]	Within acceptable limits
Envirolab	70711	Duplicate numbers	1 duplicate out of 1 sample analysed	1 duplicate for every 10 samples analysed	Achieved
		RPD	ND[2] for Total Phenols (No data reported for the rest of analytes tested in batch)	<5xPQL: any RPD >5xPQL: 0-50% RPD	Within acceptable limits

Notes 1. MAD: Maximum Allowable Difference (SGS suggested RPD criteria for Lab Duplicates) = 100 x Statistical Detection Limit (SDL) / Mean + Limiting Repeatability (LR)
2. ND: Not determined due to both results of original sample and lab duplicate are less than PQL.

No duplicate sample was reported for SGS Report PE066064 (subcontracted report of SE106556) and no duplicate sample was reported for analytes other than Total Phenols for Envirolab. However, both laboratories claim to run one sample in batches of 10 samples. The results are generally not reported with the laboratory certificates provided to clients; however, claim to be within the laboratory acceptance criteria.

Based on the above the duplicate sample numbers and reported RPD for SGS and Envirolab were within the acceptance criteria adopted by the laboratories.

10.6 Laboratory Control Samples

A laboratory control sample is a sample of material with known concentrations of various analytes, such as a standard reference material or control matrix. The control sample is analysed with the sample batch and the recorded concentrations reported as a percentage recovery of the known or expected concentration. At least one control sample is included in each run to confirm calibration validity.

The reported percentage recoveries and acceptance criteria for both laboratories are presented below.

SGS

SE106556 All percentage recoveries reported: 84% to 105% for inorganics & metals and 104% to 121% for organics.

Acceptable limits: 80%-120% for inorganics & metals and 60%-140% for organics.

PE066064 All percentage recoveries reported: 82% to 94% for SVOC, 101% & 102% for TPH.

Acceptable limits: 50%-130% for SVOC and 60%-130% for TPH.

Envirolab

70711 All percentage recoveries reported: 85% to 113% for inorganics & metals, 66% to 138% for organics and 55% to 133% for SVOC.

Acceptable limits in general: 60%-140% for organics, 70% to 130% for inorganics/metals and 10% to 140% for SVOC.

The control samples data presented by the laboratories fall within the acceptance limits of the laboratories.

10.7 Matrix Spikes

The purpose of matrix spikes is to monitor the performance of the analytical methods used and to determine whether matrix interferences exist. Samples are spiked with identical concentrations of the target analyte before extraction or digestion. The results are reported as percentage recoveries of the known spike concentration.

The reported percentage recoveries and acceptance criteria for each of the laboratories used are presented below.

SGS (SE106556) Percentage recoveries reported for metals and Total Cyanide (75% to 104%).

Acceptable percentage recoveries in general between 60% and 130% for organics and 70% to 130% for metals/inorganics.

The matrix spike data presented by SGS fall within the laboratory acceptance criteria.

No matrix spike was reported for other analytes but claim to run one sample in batches of 20 samples. The results are generally not reported with the laboratory certificates provided to clients; however, claim to be within the laboratory acceptance criteria.

No matrix spike was reported for SGS report (PE066064) (subcontracted report of SE106556) and Envirolab (Report No. 70711), but claim to run one sample in batches of 20 samples. The results are generally not reported with the laboratory certificates provided to clients; however, claim to be within the laboratory acceptance criteria.

The matrix spikes data presented by SGS and Envirolab generally fall within the acceptance limits of the laboratory.

10.8 Surrogate Spikes

Surrogate spikes are used during analysis for organics to provide a means of checking that no gross errors have occurred at any stage of the procedure, leading to significant analyte losses. The surrogate spikes are added to each sample, blank, matrix spike, duplicate and control sample before the extraction stage. The percentage recovery of the known spike is recorded and reported on the laboratory certificates.

SGS (SE106556) Reported recovery percentages 90% to 123% for VOC.

Acceptance limits 40%-130% for VOC.

Within acceptable limits.

SGS (PE066064)	Reported recovery percentages 27% to 90% for SVOC.
	Acceptable limits 40%-130% for SVOC.
	Generally within acceptable limits, except 27% and 38% for SVOC surrogates in sample GW2 due to sample emulsifying during extraction.
Envirolab (70711)	Reported recovery percentage 28% to 133% (the lowest recovery for SVOC).
	Acceptance limits in general 60%-140% for organics and 10%-140% for SVOC.
	Within acceptable limits.

The surrogate spike data presented by the laboratories generally fall within the acceptance limits of the laboratories.

11.0 QA/QC DATA EVALUATION

All QA and QC details are presented in Sections 9.0 and 10.0 of this report.

The following table provides a list of the data quality indicators (DQI) for the **field procedures (sampling phase)** which have been achieved. Reference should be made to Section 9.0 of this report for details.

DATA QUALITY INDICATOR	ACHIEVEMENT
Completeness	Three monitoring wells were installed. On-site visual assessment of groundwater. Use of trained and qualified field staff. Preparation of monitoring well location plan. Engineering logs of monitoring wells in Appendix A. Preparation of chain of custody records. Appropriately calibrated PID, interface metre and water quality metre used.
Comparability	Using appropriate techniques for sample recovery. Using the same sampling and decontamination procedures for the field work. Experienced samplers used. Using appropriate sample storage and transportation methods for sampling.
Representativeness	Collection and analysis of samples was in accordance with the sampling and analysis plan. Analysis for all potential contaminants of concern on groundwater samples recovered from all the monitoring wells. Appropriate industry standard decontamination procedures adopted. Appropriate sample collection, preservation, storage and transportation were implemented.
Precision and Accuracy	Field duplicate sample numbers complying with NEPM. Inter-laboratory duplicate (split) numbers complying with NEPM.

The following table provides a list of the DQI for the **laboratory procedures (analytical phase)** which have been achieved. Reference should be made to Sections 10.0 of this report for details.

DATA QUALITY INDICATOR	ACHIEVEMENT
Completeness	Laboratory sample receipt information received confirming receipt of samples intact and appropriate chain of custody. Analysis for all potential contaminants of concern. NATA registered laboratory analytical report / certificate of analysis provided.
Comparability	Use of NATA registered laboratories. Test methods comparable between primary and secondary laboratories. Generally acceptable Relative Percentage Differences between original samples and field duplicates and inter-laboratory duplicate (split) samples, expected for organic and some metal analysis.
Representativeness	All samples analysed in accordance with chain of custody. Adequate trip spike, trip blank, duplicate and split sample numbers.
Precision and Accuracy	Acceptable RPD for duplicate comparison overall. Acceptable RPD for inter-laboratory duplicate (split) sample comparison overall. Acceptable recoveries of spike concentrations in trip spike sample. Acceptable concentrations in trip blank sample. Appropriate and validated laboratory test methods used. Adequate laboratory performance based on results of the blank, duplicate, laboratory control, matrix spike and surrogate samples.

As discussed in Section 9.0 the duplicate sample comparisons reported RPD exceeding the generally accepted limits for TKN, Nitrate, Total Nitrogen and Total Phosphorus, mainly due to the low concentrations of analytes. The results are therefore considered acceptable.

RPD for the split sample comparison were comparatively high for Zn, mainly due to the low concentrations of the analyte. Although the RPD of Total Nitrogen for the split sample comparison were comparatively high, both the concentrations provided by the primary laboratory and secondary laboratory were less than the available GIL. The results are therefore considered acceptable.

Based on the above it is considered that the quality assurance and quality control data quality indicators have been complied with, both in the field and in the laboratory. As such, it is concluded that the laboratory test data obtained is reliable and useable for this assessment.

12.0 ASSESSMENT CRITERIA

The available Trigger Values or Guideline Values presented in the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, published by the *Australian and New Zealand Environment and Conservation Council* and *Agriculture and Resource Management Council of Australia and New Zealand, 2000* (ANZECC & ARMCANZ Guidelines 2000) are considered applicable for assessment of any potential groundwater impact on the Nepean River aquatic ecosystem and irrigation use.

The "Guidelines for Managing Risks in Recreation Water" 2008 published by the Australian Government National Health and Medical Research Council (NHMRC) are adopted for assessing water for recreational purposes.

The Trigger Values or Guideline Values are also known as generic Groundwater Investigation Levels (GIL) in the Guidelines for the Assessment and Management of Groundwater Contamination, published by Department of Environment and Conservation, 2007 (DEC Groundwater Guidelines 2007).

There are no reliable GIL for Total Petroleum Hydrocarbons in ANZECC & ARMCANZ Guidelines 2000; reference has therefore been made to Airports (Environment Protection) Regulations 1997 (compiled and prepared on 28 May 2004). The accepted limits (for fresh water) of 150 µg/L (C6-C9) and 600 µg/L (>C9) detailed in that Regulations are considered applicable for the protection of fresh water.

The adopted assessment criteria are presented in the attached Tables A to I.

Aquatic Ecosystem

In order to determine any potential impact on the aquatic ecosystem of the Nepean River the available Trigger Values for fresh water aquatic system for the protection of 95% of species are adopted, as recommended by the DEC Groundwater Guidelines 2007.

Regarding protection of an aquatic ecosystem where the existing GIL for a particular contaminant is below the practical limit of reporting (PLR) /detection limit (DL), the DEC Groundwater Guidelines 2007 recommend the PLR/DL to be used instead of the existing GIL.

Irrigation

There are short-term (up to 20 years) and long-term (up to 100 years) GIL for irrigation water. The goal of these GIL is to maintain the productivity of irrigated agricultural land. The short-term GIL are less stringent than the long-term GIL.

There are no GIL for assessment of water for irrigating grass, plants and trees in parks, public reserves, golf course and showground. We are of the opinion that short-term GIL would be appropriate for this assessment as the requirement for productivity of grass, plants and trees within the parks, public reserves, golf course and showground is less stringent than for crops in agricultural land.

13.0 LABORATORY TEST RESULTS, ASSESSMENT & DISCUSSION

Reference may be made to Appendix D for the actual laboratory test results certificates from SGS. The test results are also presented in Tables A to I together with the assessment criteria adopted. A discussion of the test data is presented in the following sub-sections.

13.1 Metals

As summarised in Table A the concentrations of all Metals were below the relevant GIL or below the laboratory LOR for Be, Cr and Co.

13.2 TPH and BTEX

As shown in Table B the concentrations of TPH, BTEX and Oil & Grease were below the relevant GIL, the accepted limits of Airports (Environment Protection) Regulations or the laboratory LOR.

13.3 PAH, Total Phenols and Total Cyanides

As shown in Table C the concentrations of PAH and Total Cyanides were below the relevant GIL or below the laboratory LOR.

As indicated in Table C, with the exception of the concentration of Total Phenols in duplicate sample D1, the remaining concentrations of Total Phenols were below the GIL for fresh water aquatic ecosystems and below the laboratory LOR.

The concentration of Total Phenols (40 µg/L) was detected in duplicate sample D1; however, the original groundwater sample GW2 corresponding to duplicate sample D1 was below the laboratory LOR.

13.4 OCP and OPP

As shown in Tables D and E the concentrations of OCP and OPP were below the relevant GIL or below the laboratory LOR.

13.5 PCB

As indicated in Table F the concentrations of PCB were below the laboratory LOR.

The concentrations of PCB in split sample S1, corresponding to the original groundwater sample GW2, were below the relevant GIL or below the laboratory PQL.

13.6 VOC and SVCH

As shown in Table G (VOC) and Table H (SVCH) the concentrations of individual VOC and SVCH were below the relevant GIL or below the laboratory LOR.

13.7 TKN, AMMONIA, NITRITE, NITRATE, TOTAL N & P, F, TDS, pH and HARDNESS

As shown in Table I the concentrations of TKN, Nitrite, Total Nitrogen, Total Phosphorus, fluoride and pH were within the relevant GIL or below the laboratory LOR.

As presented in Table I, with the exception of the highlighted Ammonia concentration (0.56 mg/L), the remaining concentrations of Ammonia were within the relevant GIL (0.9 mg/L and 0.5 mg/L for fresh water aquatic ecosystems and recreational water respectively).

The Ammonia concentration (0.56 mg/L) in groundwater sample GW2 was marginally in excess of the GIL for water for recreation (0.5 mg/L); however, the concentration was within the GIL for fresh water aquatic ecosystems (0.9 mg/L). It was noted that the Ammonia concentration in split sample S1, corresponding to the original groundwater sample GW2, was less than the laboratory detection limit and well below the relevant GIL for fresh water aquatic ecosystems and recreational water. As such, it is our opinion that the marginal exceedence of the Aesthetic Value for recreational water in sample GW2 is not of concern.

As indicated in Table I the nitrate concentrations (ranging from 1.347 mg/L to 3.9 mg/L) were in excess of the GIL (0.7 mg/L) for fresh water aquatic ecosystems; however, the concentrations were within the GIL (50 mg/L) for water for recreation.

It is our opinion that the impact of nitrate concentrations on the aquatic ecosystems is not significant unless the groundwater is to be extracted and directly discharged.

The TDS concentrations ranged from 1,070 mg/L to 1,500 mg/L.

The values of Hardness ranged from 170 mg/L to 350 mg/L.

14.0 CONCLUSIONS AND RECOMMENDATIONS

The data quality objectives outlined in the report have been satisfied.

The findings of this groundwater assessment are summarised as follows;

- The depths of groundwater table in the three groundwater monitoring wells range from about 6.2m to 6.9 m below the EGS.
- In general, low permeable silty clay or sandy clay was identified to depths ranging from about 1.8m to 2.5m below the EGS. The soil between the silty clay/sandy clay and groundwater table is a layer of permeable silty sand and gravelly sand with thickness of about 3.7m to 5.0m.
- The Nepean River is situated approximately 1.5km to the west of the site; there are parks and public reserves and a showground located at distances ranging from about 500m to less than 1km from the site.
- The realistic environmental values (beneficial uses) of the groundwater would therefore be for the support of the fresh water aquatic ecosystem (Nepean River) and to a lesser extent for the irrigation and recreation (through extraction) for parks, public reserves or showground.
- In general, there is no indication of contamination of groundwater from the former site uses and activities associated with the adjoining Mobil site.
- The contaminants in the groundwater, in general, would not impact on the Nepean River.
- The groundwater would be suitable to be extracted for short-term (up to 20 years) irrigation and recreational purposes.

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LIST OF REFERENCES

- *Airports (Environment Protection) Regulations 1997 (compiled and prepared on 28 May 2004)*
- *Australian and New Zealand Guidelines for Fresh and Marine Water – Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) 2000*
- *Australian Standard "Guide to the Sampling and Investigation of Potentially Contaminated Soil Part 1: Non-volatile and semi-volatile compounds"*
- *Australian Standard "Guide to the Sampling and Investigation of Potentially Contaminated Soil Part 2: Volatile substances"*
- *Contaminated Sites: Guidelines for Assessing Service Station Sites – NSW Environment Protection Authority 1994*
- *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites – NSW Environment Protection Authority 1997/2000*
- *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd Edition) – Department of Environment and Conservation NSW 2006*
- *Geology of Penrith 1:100,000 Sheet (9030) – Geological Survey of New South Wales, Department of Minerals and Energy 1991*
- *Groundwater Sampling Guidelines – Environment Protection Authority State Government of Victoria*
- *Guidelines for Managing Risks in Recreational Water - Australian Government National Health and Medical Research Council (NHMRC) 2008*
- *Guidelines for the Assessment and Management of Groundwater Contamination*, published by *Department of Environment and Conservation*, 2007
- *Minimum Construction Requirements for Water Bores in Australia*
- *Soil Landscape of Penrith 1:100,000 Sheet (9030) – Soil Conservation Service of NSW 1989*
- *Standard Methods for the Examination of Water and Wastewater – American Public Health Association (APHA)*

DRAWING

Drawing No 12609/3-AA1 *Groundwater Monitoring Well Locations*

LEGEND

- Monitoring Well
- Site Boundary
- Stage 1 Boundary
- Bitumen
- Building
- Concrete slab

Aerial photograph obtained from nearmap.com

0 40 80 120 160 200m

Scale 1:4000

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NOTES

1. This drawing has been produced using a base plan provided by others, to which additional information e.g., test pits, borehole locations or notes have been added. Some or all of the information on this plan may not be relevant at the time of producing this drawing.
2. Site features are shown at approximate locations and are not to scale.

Landcom
North Penrith Defence Lands
Penrith

Groundwater Monitoring Well Locations

Drawing No: 12609/3-AA1
Job No: 12609/3
Drawn By: MH
Date: 12 March 2012
Checked By: JN

File Ref: 12609-3
Layers: 0, AA1

TABLES

TABLE Q1
DUPLICATE SAMPLE
(Ref No: 12609/3-AA)

ANALYTE	LIMIT OF REPORTING (SGS) µg/L	ORIGINAL SAMPLE GW1 µg/L	DUPLICATE SAMPLE D1 µg/L	RELATIVE PERCENTAGE DIFFERENCE %
METALS				
Arsenic	1	<1	<1	-
Boron	5	34	33	3
Beryllium	1	<1	<1	-
Cadmium	0.1	<0.1	<0.1	-
Chromium	1	<1	<1	-
Cobalt	1	1	<1	-
Copper	1	<1	<1	-
Lead	1	<1	<1	-
Mercury	0.1	<0.1	<0.1	-
Manganese	1	220	160	32
Nickel	1	7	5	33
Zinc	1	2	2	0
TOTAL PETROLEUM HYDROCARBONS				
C6 - C9	40	<40	<40	-
C10 - C14	40	<40	<40	-
C15 - C28	100	<100	<100	-
C29 - C40	200	<200	<200	-
BTEX				
Benzene	0.5	<0.5	<0.5	-
Toluene	0.5	<0.5	<0.5	-
Ethyl Benzene	0.5	<0.5	<0.5	-
Total Xylenes	1.5	<1.5	<1.5	-
POLYCYCLIC AROMATIC HYDROCARBONS				
Naphthalene	0.02	<0.02	<0.02	-
Anthracene	0.01	<0.01	<0.01	-
Phenanthrene	0.01	<0.01	<0.01	-
Fluoranthene	0.01	<0.01	<0.01	-
Benzo(a)Pyrene	0.005	<0.005	<0.005	-
PHENOLS & CYANIDES				
Total Phenols	10	<10	40	-
Total Cyanides	5	<5	<5	-

TABLE Q1
DUPLICATE SAMPLE
(Ref No: 12609/3-AA)

ANALYTE	LIMIT OF REPORTING (SGS) µg/L	ORIGINAL SAMPLE GW1 µg/L	DUPLICATE SAMPLE D1 µg/L	RELATIVE PERCENTAGE DIFFERENCE %
ORGANOCHLORINE PESTICIDES (OCP)				
LINDANE(gama-BHC)	0.05	<0.05	<0.05	-
HEPTACHLOR	0.02	<0.02	<0.02	-
HEPTACHLOR EPOXIDE	0.02	<0.02	<0.02	-
METHOXYCHLOR	0.1	<0.1	<0.1	-
ALDRIN	0.01	<0.01	<0.01	-
DIELDRIN	0.01	<0.01	<0.01	-
ENDRIN	0.02	<0.02	<0.02	-
ENDOSULFAN alpha	0.02	<0.02	<0.02	-
ENDOSULFAN beta	0.02	<0.02	<0.02	-
ENDOSULFAN SULFATE	0.02	<0.02	<0.02	-
DDE	0.01	<0.01	<0.01	-
DDT	0.01	<0.01	<0.01	-
CHLORDANE	0.02	<0.02	<0.02	-
ORGANOPHOSPHORUS PESTICIDES (OP)				
Azinphos-Methyl (Guthion)	0.05	<0.05	<0.05	-
Bromophos Ethyl	0.05	<0.05	<0.05	-
Carbophenothion	0.1	<0.1	<0.1	-
Chlorfenvinphos-cis	0.5	<0.5	<0.5	-
Chlorfenvinphos-trans	0.1	<0.1	<0.1	-
Chloropyrifos	0.01	<0.01	<0.01	-
Diazinon (Dimpylate)	0.01	<0.01	<0.01	-
Dichlorvos	0.5	<0.5	<0.5	
Dimethoate	0.15	<0.15	<0.15	-
Ethion	0.05	<0.05	<0.05	-
Ethoprophos	0.1	<0.1	<0.1	-
Fenitrothion	0.2	<0.2	<0.2	-
Malathion (Maldison)	0.05	<0.05	<0.05	-
Mevinphos	0.1	<0.1	<0.1	-
Parathion Ethyl (Parathion)	0.01	<0.01	<0.01	-
Parathion Methyl	0.1	<0.1	<0.1	-
Pirimiphos-Ethyl	0.1	<0.1	<0.1	-
Pirimiphos-Methyl	0.1	<0.1	<0.1	-
Profenofos	0.1	<0.1	<0.1	-
Tetrachlorvinphos	0.1	<0.1	<0.1	-
POLYCHLORINATED BIPHENYLS (PCB)				
Arochlor 1016	1	<1	<1	-
Arochlor 1221	1	<1	<1	-
Arochlor 1232	1	<1	<1	-
Arochlor 1242	1	<1	<1	-
Arochlor 1248	1	<1	<1	-
Arochlor 1254	1	<1	<1	-
Arochlor 1260	1	<1	<1	-
Arochlor 1262	1	<1	<1	-
Arochlor 1268	1	<1	<1	-
TKN	50	230	120	63
Nitrate	5	1100	2400	74
Nitrite	5	17	14	19
Total Nitrogen	50	1347	2534	61
Ammonia	10	30	20	40
Total Phosphorus	50	230	90	88
Flouride	20	<40	<40	-
Total Dissolved Solids	10000	1,380,000	1,440,000	4
pH	-	6.6	6.6	0
Oil & Grease	5000	<5000	<5000	-

TABLE Q1
DUPLICATE SAMPLE
(Ref No: 12609/3-AA)

ANALYTE	LIMIT OF REPORTING (SGS) µg/L	ORIGINAL SAMPLE GW1 µg/L	DUPLICATE SAMPLE D1 µg/L	RELATIVE PERCENTAGE DIFFERENCE %
VOC				
Dichlorodifluoromethane	5	<5	<5	-
Chloromethane	5	<5	<5	-
Vinyl Chloride	0.3	<0.3	<0.3	-
Bromomethane	10	<10	<10	-
Chloroethane	5	<5	<5	-
Trichlorofluoromethane	1	<1	<1	-
Acetone	10	<10	<10	-
1,1-Dichloroethene	0.5	<0.5	<0.5	-
Acrylonitrile	0.5	<0.5	<0.5	-
Methylene Chloride	5	<5	<5	-
Allyl Chloride	2	<2	<2	-
Carbon Disulphide	2	<2	<2	-
Trans-1,2-dichloroethene	0.5	<0.5	<0.5	-
Methyl-tert-butyl ether	0.5	<0.5	<0.5	-
1,1-dichloroethane	0.5	<0.5	<0.5	-
2-Butanone	10	<10	<10	-
Cis-1,2-dichloroethene	0.5	<0.5	<0.5	-
Bromochloromethane	0.5	<0.5	<0.5	-
Chloroform	0.5	<0.5	<0.5	-
2,2-dichloropropane	0.5	<0.5	<0.5	-
1,2-dichloroethane	0.5	<0.5	<0.5	-
1,1,1-trichloroethane	0.5	<0.5	<0.5	-
1,1-dichloropropene	0.5	<0.5	<0.5	-
Carbon tetrachloride	0.5	<0.5	<0.5	-
Dibromomethane	0.5	<0.5	<0.5	-
1,2-dichloropropane	0.5	<0.5	<0.5	-
Trichloroethene	0.5	<0.5	<0.5	-
2-Nitropropane	100	<100	<100	-
Bromodichloromethane	0.5	<0.5	<0.5	-
cis-1,3-dichloropropene	0.5	<0.5	<0.5	-
4-Methyl-2-Pentanone	5	<5	<5	-
trans-1,3-dichloropropene	0.5	<0.5	<0.5	-
1,1,2-trichloroethane	0.5	<0.5	<0.5	-
1,3-dichloropropane	0.5	<0.5	<0.5	-
2-Hexanone	5	<5	<5	-
Dibromochloromethane	0.5	<0.5	<0.5	-
1,2-dibromoethane	0.5	<0.5	<0.5	-
Tetrachloroethene	0.5	<0.5	<0.5	-
1,1,1,2-tetrachloroethane	0.5	<0.5	<0.5	-

TABLE Q1
DUPLICATE SAMPLE
(Ref No: 12609/3-AA)

ANALYTE	LIMIT OF REPORTING (SGS) µg/L	ORIGINAL SAMPLE GW1 µg/L	DUPLICATE SAMPLE D1 µg/L	RELATIVE PERCENTAGE DIFFERENCE %
VOC				
Chlorobenzene	0.5	<0.5	<0.5	-
Bromoform	0.5	<0.5	<0.5	-
Cis-1,4-dichloro-2-butene	1	<1	<1	-
Styrene	0.5	<0.5	<0.5	-
1,1,2,2-tetrachloroethane	0.5	<0.5	<0.5	-
1,2,3-trichloropropane	0.5	<0.5	<0.5	-
Trans-1,4-dichloro-2-butene	1	<1	<1	-
Isopropylbenzene	0.5	<0.5	<0.5	-
Bromobenzene	0.5	<0.5	<0.5	-
n-propyl benzene	0.5	<0.5	<0.5	-
2-chlorotoluene	0.5	<0.5	<0.5	-
4-chlorotoluene	0.5	<0.5	<0.5	-
1,3,5-trimethyl benzene	0.5	<0.5	<0.5	-
Tert-butyl benzene	0.5	<0.5	<0.5	-
1,2,4-trimethyl benzene	0.5	<0.5	<0.5	-
Sec-butyl benzene	0.5	<0.5	<0.5	-
1,3-dichlorobenzene	0.5	<0.5	<0.5	-
1,4-dichlorobenzene	0.3	<0.3	<0.3	-
p-Isopropyl toluene	0.5	<0.5	<0.5	-
1,2-dichlorobenzene	0.5	<0.5	<0.5	-
n-butyl benzene	0.5	<0.5	<0.5	-
1,2-dibromo-3-chloropropane	0.5	<0.5	<0.5	-
1,2,4-trichlorobenzene	0.5	<0.5	<0.5	-
Naphthalene	0.5	<0.5	<0.5	-
Hexachlorobutadiene	0.5	<0.5	<0.5	-
1,2,3-trichlorobenzene	0.5	<0.5	<0.5	-
Vinyl acetate	10	<10	<10	-
				-
SVCH				-
1/2-Chloronaphthalene	0.02	<0.02	<0.02	-
Hexachlorocyclopentadiene	0.5	<0.5	<0.5	-
Hexachloroethane	0.05	<0.05	<0.05	-
Hexachloroproprene	0.05	<0.05	<0.05	-
Pentachlorobenzene	0.05	<0.05	<0.05	-
Pentachloroethane	0.05	<0.05	<0.05	-
1,2,3,5 and 1,2,4,5-tetrachlorober	0.1	<0.1	<0.1	-
1,2,3,4-tetrachlorobenzene	0.05	<0.05	<0.05	-

TABLE Q2
SPLIT SAMPLE
(Ref No: 12609/3-AA)

ANALYTE	LIMIT OF REPORTING (SGS) µg/L	PRACTICAL QUANTITATION LIMIT (ENVIROLAB) µg/L	ORIGINAL SAMPLE GW2 (SGS) µg/L	SPLIT SAMPLE S1 (ENVIROLAB) µg/L	RELATIVE PERCENTAGE DIFFERENCE %
METALS					
Arsenic	1	1	<1	<1	-
Boron	5	5	40	47	16
Beryllium	1	0.5	<1	<0.5	-
Cadmium	0.1	0.1	<0.1	<0.1	-
Chromium	1	1	<1	<1	-
Cobalt	1	1	<1	<1	-
Copper	1	1	<1	<1	-
Lead	1	1	<1	<1	-
Mercury	0.1	0.05	<0.1	<0.05	-
Manganese	1	5	160	160	0
Nickel	1	1	4	3	29
Zinc	1	1	3	1	100
TOTAL PETROLEUM HYDROCARBONS					
C6 - C9	40	10	<40	<10	-
C10 - C14	40	50	<40	<50	-
C15 - C28	100	100	<100	<100	-
C29 - C40 ***C29 - C36 for Envirolab***	200	100	<200	<100	-
BTEX					
Benzene	0.5	1	<0.5	<1	-
Toluene	0.5	1	<0.5	<1	-
Ethyl Benzene	0.5	1	<0.5	<1	-
Total Xylenes	1.5	3	<1.5	<3	-
POLYCYCLIC AROMATIC HYDROCARBONS					
Naphthalene	0.02	0.01	<0.02	0.02	-
Anthracene	0.01	0.01	<0.01	<0.01	-
Phenanthrene	0.01	0.01	<0.01	<0.01	-
Fluoranthene	0.01	0.01	<0.01	<0.01	-
Benzo(a)Pyrene	0.005	0.01	<0.005	<0.01	-
PHENOLS & CYANIDES					
Total Phenols	10	10	<10	<10	-
Total Cyanides	5	4	<5	<4	-

TABLE Q2
SPLIT SAMPLE
(Ref No: 12609/3-AA)

ANALYTE	LIMIT OF REPORTING (SGS) µg/L	PRACTICAL QUANTITATION LIMIT (ENVIROLAB) µg/L	ORIGINAL SAMPLE GW2 (SGS) µg/L	SPLIT SAMPLE S1 (ENVIROLAB) µg/L	RELATIVE PERCENTAGE DIFFERENCE %
ORGANOCHLORINE PESTICIDES (OCP)					
LINDANE(gama-BHC)	0.05	0.001	<0.05	<0.001	-
HEPTACHLOR	0.02	0.001	<0.02	<0.001	-
HEPTACHLOR EPOXIDE	0.02	0.001	<0.02	<0.001	-
METHOXYCHLOR	0.1	0.001	<0.1	<0.001	-
ALDRIN	0.01	0.001	<0.01	<0.001	-
DIELDRIN	0.01	0.001	<0.01	<0.001	-
ENDRIN	0.02	0.001	<0.02	<0.001	-
ENDOSULFAN alpha	0.02	0.001	<0.02	<0.001	-
ENDOSULFAN beta	0.02	0.001	<0.02	<0.001	-
ENDOSULFAN SULFATE	0.02	0.001	<0.02	<0.001	-
DDE	0.01	0.001	<0.01	<0.001	-
DDT	0.01	0.001	<0.01	<0.001	-
CHLORDANE	0.02	0.002	<0.02	<0.002	-
ORGANOPHOSPHORUS PESTICIDES (OP)					
Azinphos-Methyl (Guthion)	0.05	0.01	<0.05	<0.01	-
Chloropyrifos	0.01	0.01	<0.01	<0.01	-
Diazinon (Dimpylate)	0.01	0.01	<0.01	<0.01	-
Dichlorvos	0.5	0.01	<0.5	<0.01	-
Dimethoate	0.15	0.01	<0.15	<0.01	-
Ethion	0.05	0.01	<0.05	<0.01	-
Fenitrothion	0.2	0.01	<0.2	<0.01	-
Malathion (Maldison)	0.05	0.01	<0.05	<0.01	-
Parathion Ethyl (Parathion)	0.1	0.01	<0.1	<0.01	-
Parathion Methyl	0.01	0.01	<0.01	<0.01	-
Pirimiphos-Ethyl	0.1	0.01	<0.1	<0.01	-
Pirimiphos-Methyl	0.1	0.01	<0.1	<0.01	-
POLYCHLORINATED BIPHENYLS (PCB)					
Arochlor 1016	1	0.01	<1	<0.01	-
Arochlor 1221	1	0.01	<1	<0.01	-
Arochlor 1232	1	0.01	<1	<0.01	-
Arochlor 1242	1	0.01	<1	<0.01	-
Arochlor 1248	1	0.01	<1	<0.01	-
Arochlor 1254	1	0.01	<1	<0.01	-
Arochlor 1260	1	0.01	<1	<0.01	-
TKN	50	100	120	800	148
Nitrate	5	5	3200	3900	20
Nitrite	5	5	6	<5	-
Total Nitrogen	50	100	3326	4700	34
Ammonia	10	5	560	<5	-
Total Phosphorus	50	50	<50	60	-
Flouride	20	100	<40	440	-
Total Dissolved Solids	10000	5000	1,420,000	1,500,000	5
pH	-	-	6.7	6.9	3
Oil & Grease	5000	5000	<5000	<5000	-

TABLE Q2
SPLIT SAMPLE
(Ref No: 12609/3-AA)

ANALYTE	LIMIT OF REPORTING (SGS) µg/L	PRACTICAL QUANTITATION LIMIT (ENVIROLAB) µg/L	ORIGINAL SAMPLE GW2 (SGS) µg/L	SPLIT SAMPLE S1 (ENVIROLAB) µg/L	RELATIVE PERCENTAGE DIFFERENCE %
VOC					
Dichlorodifluoromethane	5	10	<5	<10	-
Chloromethane	5	10	<5	<10	-
Vinyl Chloride	0.3	10	<0.3	<10	-
Bromomethane	10	10	<10	<10	-
Chloroethane	5	10	<5	<10	-
Trichlorofluoromethane	1	10	<1	<10	-
1,1-Dichloroethene	0.5	1	<0.5	<1	-
Trans-1,2-dichloroethene	0.5	1	<0.5	<1	-
1,1-dichloroethane	0.5	1	<0.5	<1	-
Cis-1,2-dichloroethene	0.5	1	<0.5	<1	-
Bromochloromethane	0.5	1	<0.5	<1	-
Chloroform	0.5	1	4.3	4	7
2,2-dichloropropane	0.5	1	<0.5	<1	-
1,2-dichloroethane	0.5	1	<0.5	<1	-
1,1,1-trichloroethane	0.5	1	<0.5	<1	-
1,1-dichloropropene	0.5	1	<0.5	<1	-
Carbon tetrachloride	0.5	1	<0.5	<1	-
Dibromomethane	0.5	1	<0.5	<1	-
1,2-dichloropropane	0.5	1	<0.5	<1	-
Trichloroethene	0.5	1	<0.5	<1	-
Bromodichloromethane	0.5	1	<0.5	<1	-
cis-1,3-dichloropropene	0.5	1	<0.5	<1	-
trans-1,3-dichloropropene	0.5	1	<0.5	<1	-
1,1,2-trichloroethane	0.5	1	<0.5	<1	-
1,3-dichloropropane	0.5	1	<0.5	<1	-
Dibromochloromethane	0.5	1	<0.5	<1	-
1,2-dibromoethane	0.5	1	<0.5	<1	-
Tetrachloroethene	0.5	1	<0.5	<1	-
1,1,1,2-tetrachloroethane	0.5	1	<0.5	<1	-

TABLE Q2
SPLIT SAMPLE
(Ref No: 12609/3-AA)

ANALYTE	LIMIT OF REPORTING (SGS) µg/L	PRACTICAL QUANTITATION LIMIT (ENVIROLAB) µg/L	ORIGINAL SAMPLE GW2 (SGS) µg/L	SPLIT SAMPLE S1 (ENVIROLAB) µg/L	RELATIVE PERCENTAGE DIFFERENCE %
VOC					
Chlorobenzene	0.5	1	<0.5	<1	-
Bromoform	0.5	1	<0.5	<1	-
Styrene	0.5	1	<0.5	<1	-
1,1,2,2-tetrachloroethane	0.5	1	<0.5	<1	-
1,2,3-trichloropropane	0.5	1	<0.5	<1	-
Isopropylbenzene	0.5	1	<0.5	<1	-
Bromobenzene	0.5	1	<0.5	<1	-
n-propyl benzene	0.5	1	<0.5	<1	-
2-chlorotoluene	0.5	1	<0.5	<1	-
4-chlorotoluene	0.5	1	<0.5	<1	-
1,3,5-trimethyl benzene	0.5	1	<0.5	<1	-
Tert-butyl benzene	0.5	1	<0.5	<1	-
1,2,4-trimethyl benzene	0.5	1	<0.5	<1	-
Sec-butyl benzene	0.5	1	<0.5	<1	-
1,3-dichlorobenzene	0.5	1	<0.5	<1	-
1,4-dichlorobenzene	0.3	1	<0.3	<1	-
1,2-dichlorobenzene	0.5	1	<0.5	<1	-
n-butyl benzene	0.5	1	<0.5	<1	-
1,2-dibromo-3-chloropropane	0.5	1	<0.5	<1	-
1,2,4-trichlorobenzene	0.5	1	<0.5	<1	-
Naphthalene	0.5	0.01	<0.5	0.02	-
Hexachlorobutadiene	0.5	1	<0.5	<1	-
1,2,3-trichlorobenzene	0.5	1	<0.5	<1	-
SVCH					
Hexachlorocyclopentadiene	0.5	10	<0.5	<10	-
Hexachloroethane	0.05	10	<0.05	<10	-
Hexachloroproprene	0.05	10	<0.05	<10	-
Pentachlorobenzene	0.05	10	<0.05	<10	-
Pentachloroethane	0.05	10	<0.05	<10	-

TABLE Q3
TRIP SPIKE SAMPLE
(Ref No: 12609/3-AA)

ANALYTE	TRIP SPIKE TS1
BTEX	
Benzene	100%
Toluene	100%
Ethyl Benzene	100%
Total Xylenes	100%

Note : results are reported as percentage recovery of known spike concentration

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TABLE Q4
VOLATILE ORGANIC COMPOUNDS (VOC) TEST RESULTS
TRIP BLANK SAMPLE
(Ref No: 12609/3-AA)

Analyte / Sample ID	VOC (µg/L)																					
	Dichlorodifluoromethane	Chloromethane	Vinyl Chloride	Bromomethane	Chloroethane	Trichlorofluoromethane	Acetone	1,1-Dichloroethene	Acrylonitrile	Methylene Chloride	Allyl Chloride	Carbon Disulphide	trans-1,2-Dichloroethene	Methyl-tert-butyl ether	1,1-Dichloroethane	2-Butanone	cis-1,2-Dichloroethene	Bromochloromethane	Chloroform	2,2-Dichloropropane	1,2-Dichloroethane	1,1,1-Trichloroethane
Trip Blank TB1	<5	<5	<0.3	<10	<5	<1	<10	<0.5	<0.5	<5	<2	<2	<0.5	<0.5	<0.5	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Limit of Reporting (LOR)	5	5	0.3	10	5	1	10	0.5	0.5	5	2	2	0.5	0.5	0.5	10	0.5	0.5	0.5	0.5	0.5	0.5

GEOTECHNIQUE
PTY LTD

TABLE Q4
VOLATILE ORGANIC COMPOUNDS (VOC) TEST RESULTS
TRIP BLANK SAMPLE
(Ref No: 12609/3-AA)

Analyte / Sample ID	VOC (µg/L)																						
	1,1-Dichloropropene	Carbon tetrachloride	Dibromomethane	1,2-Dichloropropane	Trichloroethene	2-Nitropropane	Bromodichloromethane	cis-1,3-Dichloropropene	4-Methyl-2-Pentanone	trans-1,3-Dichloropropene	1,1,2-Trichloroethane	1,3-Dichloropropane	2-Hexanone	Dibromochloromethane	1,2-Dibromoethane	Tetrachloroethene	1,1,1,2-Tetrachloroethane	Chlorobenzene	Bromoform	Cis-1,4-dichloro-2-butene	Styrene	1,1,2,2-Tetrachloroethane	1,2,3-Trichloropropane
Trip Blank TB1	<0.5	<0.5	<0.5	<0.5	<0.5	<100	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5
Limit of Reporting (LOR)	0.5	0.5	0.5	0.5	0.5	100	0.5	0.5	5	0.5	0.5	0.5	5	0.5	0.5	0.5	0.5	0.5	0.5	1	0.5	0.5	0.5

TABLE Q4
VOLATILE ORGANIC COMPOUNDS (VOC) TEST RESULTS
TRIP BLANK SAMPLE
(Ref No: 12609/3-AA)

Analyte / Sample ID	VOC (µg/L)																				
	Trans-1,4-dichloro-2-butene	Isopropylbenzene	Bromobenzene	n-Propylbenzene	2-Chlorotoluene	4-Chlorotoluene	1,3,5-Trimethylbenzene	tert-Butylbenzene	1,2,4-Trimethylbenzene	sec-Butylbenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	p-Isopropyl toluene	1,2-Dichlorobenzene	n-Butylbenzene	1,2-Dibromo-3-chloropropane	1,2,4-Trichlorobenzene	Naphthalene	Hexachlorobutadiene	1,2,3-Trichlorobenzene	Vinyl acetate
Trip Blank TB1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<10
Limit of Reporting (LOR)	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	10

TABLE A
METALS TEST RESULTS
GROUNDWATER SAMPLES
(Ref No: 12609/3-AA)

Analyte / Sample Location	METALS (µg/L)											
	ARSENIC (As) - Total	BORON (B)	BERYLLIUM (Be)	CADMIUM (Cd)	CHROMIUM (Cr) - Total	COBALT (Co)	COPPER (Cu)	LEAD (Pb)	MERCURY (Hg)	MANGANESE (Mn)	NICKEL (Ni)	ZINC (Zn)
GROUNDWATER SAMPLES												
GW1	<1	34	<1	<0.1	<1	1	<1	<1	<0.1	220	7	2
GW2	<1	40	<1	<0.1	<1	<1	<1	<1	<0.1	160	4	3
GW3	<1	32	<1	<0.1	<1	<1	<1	<1	<0.1	150	3	3
Limit of Reporting (LOR)	1	5	1	0.1	1	1	1	1	0.1	1	1	1
ANZ [a] Guidelines for Fresh and Marine Water Quality (2000)												
Aquatic Ecosystems- Trigger Values (TV)												
Fresh Water	24[b] 13[c]	370	ID	0.2	1 [f]	ID	1.4	3.4	0.6	1900	11	8
Irrigation Water (Trigger Values)												
STV	2000	<500-15000[d]	500	50	1000	100	5000	5000	2	10000	2000	5000
NHMRC [e] Guidelines for Managing Risks in Recreational Water (2008)												
Health Values	7	4000	g	2	50 '		2000	10	1	500	20	
Aesthetic Values												3000

Notes
a: ANZ = Australia and New Zealands
b: as As (III)
c: as As (V)
d: Adopted from Table 9.2.18, ANZ Guidelines for Fresh and Marine Water Quality, 2000, Volume 3, pp. 9.2-54
e: Australian Government National Health and Medical Research Council
f: as Cr (VI)
g: Insufficient data to set a guideline value based on health consideration.
ID: Insufficient data to derive a reliable trigger value
STV: Short Term Trigger Value (up to 20 years)

TABLE B

TOTAL RECOVERABLE HYDROCARBONS(TRH), TOTAL PETROLEUM HYDROCARBONS (TPH), BTEX AND OIL & GREASE TEST RESULTS
GROUNDWATER SAMPLES
(Ref No: 12609/3-AA)

Analyte / Sample Location	TRH/TPH (µg/L)					BTEX (µg/L)				OIL & GREASE (mg/L)
	C6-C9	C10-C14	C15-C28	C29-C40	C10-C40	BENZENE	TOLUENE	ETHYL BENZENE	TOTAL XYLENES	
GROUNDWATER SAMPLES										
GW1	<40	<40	<100	<200	<340	<0.5	<0.5	<0.5	<1.5	<5
GW2	<40	<40	<100	<200	<340	<0.5	<0.5	<0.5	<1.5	<5
GW3	<40	<40	<100	<200	<340	<0.5	<0.5	<0.5	<1.5	<5
Limit of Reporting (LOR)	40	40	100	200	-	0.5	0.5	0.5	1.5	5
ANZ [a] Guidelines for Fresh and Marine Water Quality (2000)										
Aquatic Ecosystems (Trigger Values)										
Fresh water						950	ID	ID	350[b] 200[c]	
Airports (Environment Protection) Regulations										
(compiled and prepared on 28 May 2004)	150		600[d]							
NHMRC [e] Guidelines for Managing Risks in Recreational Water (2008)										
Health Values						1	800	300	600	
Aesthetic Values							25	3	20	

Notes
a: ANZ = Australia and New Zealand
b: as o-Xylene
c: as p-Xylene
d: >C9
e: Australian Government National Health and Medical Research Council
ID: Insufficient data to derive a reliable trigger value

TABLE C
POLYCYCLIC AROMATIC HYDROCARBONS (PAH), PHENOLS AND CYANIDES TEST RESULTS
GROUNDWATER SAMPLES
(Ref No: 12609/3-AA)

Analyte / Sample Location	PAH (µg/L)					TOTAL PHENOLS (µg/L)	TOTAL CYANIDE (µg/L)
	NAPHTHALENE	ANTHRACENE	PHENANTHRENE	FLUORANTHENE	BENZO(a)PYRENE		
GROUNDWATER SAMPLES							
GW1	<0.02	<0.01	<0.01	<0.01	<0.005	<10	<5
Duplicate D1 = GW1	<0.02	<0.01	<0.01	<0.01	<0.005	40	<5
GW2	<0.02	<0.01	<0.01	<0.01	<0.005	<10	<5
GW3	<0.02	<0.01	<0.01	<0.01	<0.005	<10	<5
Limit of Reporting (LOR)	0.02	0.01	0.01	0.01	0.005	10	5
ANZ [a] Guidelines for Fresh and Marine Water Quality (2000) Aquatic Ecosystems (Trigger Values)							
Fresh	16	ID	ID	ID	ID	320	7
NHMRC [b] Guidelines for Managing Risks in Recreational Water (2008) Health Values					0.01		80

Notes
a: ANZ = Australia and New Zealands
b: Australian Government National Health and Medical Research Council
ID: Insufficient data to derive a reliable trigger value

TABLE D
ORGANOCHLORINE PESTICIDES (OCP) TEST RESULTS
GROUNDWATER SAMPLES
(Ref No: 12609/3-AA)

Analyte / Sampling Location	OCP (µg/L)												
	LINDANE(gama-BHC)	HEPTACHLOR	HEPTACHLOR EPOXIDE	METHOXYCHLOR	ALDRIN	DIELDRIN	ENDRIN	ENDOSULFAN alpha	ENDOSULFAN beta	ENDOSULFAN SULFATE	DDE	DDT	CHLORDANE
GROUNDWATER SAMPLES													
GW1	<0.05	<0.02	<0.02	<0.1	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02
GW2	<0.05	<0.02	<0.02	<0.1	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02
GW3	<0.05	<0.02	<0.02	<0.1	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02
Limit of Reporting (LOR)	0.05	0.02	0.02	0.1	0.01	0.01	0.02	0.02	0.02	0.02	0.01	0.01	0.02
ANZ [a] Guidelines for Fresh and Marine Water Quality (2000) Aquatic Ecosystems (Trigger Values) Fresh	0.2	0.09	0.09	ID	ID	ID	0.02	ID	ID		ID	0.01	0.08 [b]
NHMRC [f] Guidelines for Managing Risks in Recreational Water (2008) Health Values	10	0.3 [c]	0.3 [c]	300	0.3 [d]	0.3 [d]		30 [e]	30 [e]	30 [e]		20	1 [b]

Notes:
a: ANZ = Australia and New Zealands
b: Chlordane
c: Heptachlor and Heptachlor Epoxide
d: Aldrin / Dieldrin
e: Endosulfan
f: Australian Government National Health and Medical Research Council
ID: Insufficient data to derive a reliable trigger value

TABLE E
ORGANOPHOSPHORUS PESTICIDES (OPP) TEST RESULTS
GROUNDWATER SAMPLES
(Ref No: 12609/3-AA)

Analyte / Sampling Location	OPP (µg/L)																				
	AZINPHOS-METHYL (GUTHION)	BROMOPHOS ETHYL	CARBOPHENOTHION	CHLORFENVINPHOS-cis	CHLORFENVINPHOS-trans	CHLORPYRIFOS	DIAZINON (DIMPYLATE)	DICHLORVOS	DIMETHOATE	ETHION	ETHOPROPHOS	FENITROTHION	MALATHION (MALDISON)	METHIDATHION	MEVINPHOS	PARATHION ETHYL (PARATHION)	PARATHION METHYL	PIRIMIPHOS-ETHYL	PIRIMIPHOS-METHYL	PROFENOFOS	TETRACHLORVINPHOS
GROUNDWATER SAMPLES																					
GW1	<0.05	<0.05	<0.1	<0.5	<0.1	<0.01	<0.01	<0.5	<0.15	<0.05	<0.1	<0.2	<0.05	<0.05	<0.1	<0.01	<0.1	<0.1	<0.1	<0.1	<0.1
GW2	<0.05	<0.05	<0.1	<0.5	<0.1	<0.01	<0.01	<0.5	<0.15	<0.05	<0.1	<0.2	<0.05	<0.05	<0.1	<0.01	<0.1	<0.1	<0.1	<0.1	<0.1
GW3	<0.05	<0.05	<0.1	<0.5	<0.1	<0.01	<0.01	<0.5	<0.15	<0.05	<0.1	<0.2	<0.05	<0.05	<0.1	<0.01	<0.1	<0.1	<0.1	<0.1	<0.1
Limit of Reporting (LOR)	0.05	0.05	0.1	0.5	0.1	0.01	0.01	0.5	0.15	0.05	0.1	0.2	0.05	0.05	0.1	0.01	0.1	0.1	0.1	0.1	0.1
ANZ [a] Guidelines for Fresh and Marine Water Quality (2000)																					
Aquatic Ecosystems (Trigger Values)																					
Fresh	0.02					0.01	0.01		0.15			0.2	0.05			0.004					
NHMRC [b] Guidelines for Managing Risks in Recreational Water (2008)																					
Health Values	3	10	0.5	5 [c]	5 [c]	10	3	1	50	3	1	10	50	30	5	10	100	0.5	50	0.3	100

Notes:
a: ANZ = Australia and New Zealands
b: Australian Government National Health and Medical Research Council
c: Chlorfenvinphos

TABLE F

POLYCHLORINATED BIPHENYLS (PCB) TEST RESULTS

GROUNDWATER SAMPLES

(Ref No: 12609/3-AA)

Analyte / Sample Location	PCB (µg/L)								
	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	Arochlor 1262	Arochlor 1268
GROUNDWATER SAMPLES									
GW1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Duplicate D1 = GW1	<1	<1	<1	<1	<1	<1	<1	<1	<1
GW2	<1	<1	<1	<1	<1	<1	<1	<1	<1
Splite S1 = GW2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-
GW3	<1	<1	<1	<1	<1	<1	<1	<1	<1
Limit of Reporting (LOR)/Practical Quantitation Limit (PQL)	1/0.01	1/0.01	1/0.01	1/0.01	1/0.01	1/0.01	1/0.01	1	1
ANZ [a] Guidelines for Fresh and Marine Water Quality (2000) Aquatic Ecosystems (Trigger Values) Fresh	ID	ID	ID	0.6	ID	0.03	ID	ID	ID

Notes a : ANZ = Australia and New Zealands.

ID : Insufficient data to derive a reliable trigger value

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TABLE G
VOLATILE ORGANIC COMPOUNDS (VOC) EXCLUDING BTEX TEST RESULTS
GROUNDWATER SAMPLES
(Ref No: 12609/3-AA)

Analyte / Sample Location	VOC (µg/L)																					
	Dichlorodifluoromethane	Chloromethane	Vinyl Chloride	Bromomethane	Chloroethane	Trichlorofluoromethane	Acetone	1,1-Dichloroethene	Acrylonitrile	Methylene Chloride	Allyl Chloride	Carbon Disulphide	trans-1,2-Dichloroethene	Methyl-tert-butyl ether	1,1-Dichloroethane	2-Butanone	cis-1,2-Dichloroethene	Bromochloromethane	Chloroform	2,2-Dichloropropane	1,2-Dichloroethane	1,1,1-Trichloroethane
GW1	<5	<5	<0.3	<10	<5	<1	<10	<0.5	<0.5	<5	<2	<2	<0.5	<0.5	<0.5	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
GW2	<5	<5	<0.3	<10	<5	<1	<10	<0.5	<0.5	<5	<2	<2	<0.5	<0.5	<0.5	<10	<0.5	<0.5	4.3	<0.5	<0.5	<0.5
GW3	<5	<5	<0.3	<10	<5	<1	<10	<0.5	<0.5	<5	<2	<2	<0.5	<0.5	<0.5	<10	<0.5	<0.5	3.1	<0.5	<0.5	<0.5
Limit of Reporting (LOR)	5	5	0.3	10	5	1	10	0.5	0.5	5	0.5	0.5	0.5	2	0.5	10	0.5	0.5	0.5	0.5	0.5	0.5
ANZ[a] Guidelines for Fresh and Marine Water Quality (2000) Aquatic Ecosystems (Trigger Values) Fresh Water																			ID		ID	ID
NHMRC [b] Guidelines for Managing Risks in Recreational Water (2008) Health Values			0.3					30					60 [c]		d		60 [c]				3	d

Notes
a : ANZ = Australia and New Zealands
b : Australian Government National Health and Medical Research Council
c : 1,2-Dichloroethene
d : Insufficient data to set a guideline value based on health consideration.
ID : Insufficient data to derive a reliable trigger value

GEOTECHNIQUE
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TABLE G
VOLATILE ORGANIC COMPOUNDS (VOC) EXCLUDING BTEX TEST RESULTS
GROUNDWATER SAMPLES
(Ref No: 12609/3-AA)

Analyte / Sample Location	VOC (µg/L)																						
	1,1-Dichloropropene	Carbon tetrachloride	Dibromomethane	1,2-Dichloropropane	Trichloroethene	2-Nitropropane	Bromodichloromethane	cis-1,3-Dichloropropene	4-Methyl-2-Pentanone	trans-1,3-Dichloropropene	1,1,2-Trichloroethane	1,3-Dichloropropane	2-Hexanone	Dibromochloromethane	1,2-Dibromoethane	Tetrachloroethene	1,1,1,2-Tetrachloroethane	Chlorobenzene	Bromoform	Cis-1,4-dichloro-2-butene	Styrene	1,1,2,2-Tetrachloroethane	1,2,3-Trichloropropane
GW1	<0.5	<0.5	<0.5	<0.5	<0.5	<100	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5
GW2	<0.5	<0.5	<0.5	<0.5	<0.5	<100	1	<0.5	<5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5
GW3	<0.5	<0.5	<0.5	<0.5	<0.5	<100	0.8	<0.5	<5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5
Limit of Reporting (LOR)	0.5	0.5	0.5	0.5	0.5	100	0.5	0.5	5	0.5	0.5	0.5	5	0.5	0.5	0.5	0.5	0.5	0.5	1	0.5	0.5	0.5
ANZ[a] Guidelines for Fresh and Marine Water Quality (2000)																							
Aquatic Ecosystems (Trigger Values)																							
Fresh Water	ID	ID		ID							6500	ID										ID	
NHMRC [b] Guidelines for Managing Risks in Recreational Water (2008)																							
Health Values		3			c											50		300			30		
Aesthetic Values																					4		

Notes
a : ANZ = Australia and New Zealands
b : Australian Government National Health and Medical Research Council
c : Insufficient data to set a guideline value based on health consideration.
ID : Insufficient data to derive a reliable trigger value

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TABLE G
VOLATILE ORGANIC COMPOUNDS (VOC) EXCLUDING BTEX TEST RESULTS
GROUNDWATER SAMPLES
(Ref No: 12609/3-AA)

Analyte / Sample Location	VOC (µg/L)																				
	Trans-1,4-dichloro-2-butene	Isopropylbenzene	Bromobenzene	n-Propylbenzene	2-Chlorotoluene	4-Chlorotoluene	1,3,5-Trimethylbenzene	tert-Butylbenzene	1,2,4-Trimethylbenzene	sec-Butylbenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	p-Isopropyl toluene	1,2-Dichlorobenzene	n-Butylbenzene	1,2-Dibromo-3-chloropropane	1,2,4-Trichlorobenzene	Naphthalene	Hexachlorobutadiene	1,2,3-Trichlorobenzene	Vinyl acetate
GW1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<10
GW2	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<10
GW3	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<10
Limit of Reporting (LOR)	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.3	0.5	0.5	0.5	0.5	0.5	0.5	1	0.5	10
ANZ[a] Guidelines for Fresh and Marine Water Quality (2000) Aquatic Ecosystems (Trigger Values)																					
Fresh Water											260	60		160			170	16	ID	10	
NHMRC [b] Guidelines for Managing Risks in Recreational Water (2008)																					
Health Values											c	40		1500			30 [d]		0.7	30 [d]	
Aesthetic Values											20	0.3		1			5 [d]			5 [d]	

Notes
a : ANZ = Australia and New Zealands
b : Australian Government National Health and Medical Research Council
c : Insufficient data to set a guideline value based on health consideration.
d : Trichlorobenzenes (Total)
ID : Insufficient data to derive a reliable trigger value

TABLE H
SEMI VOLATILE CHLORINATED HYDROCARBONS (SVCH) TEST RESULTS
GROUNDWATER SAMPLES
(Ref No: 12609/3-AA)

Analyte / Sample Location	SVCH (µg/L)							
	1/2-Chloronaphthalene	Hexachlorocyclopentadiene	Hexachloroethane	Hexachloroproprene	Pentachlorobenzene	Pentachloroethane	1,2,3,5 and 1,2,4,5-tetrachlorobenzene	1,2,3,4-tetrachlorobenzene
GW1	<0.02	<0.5	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05
GW2	<0.02	<0.5	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05
GW3	<0.02	<0.5	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05
Limit of Reporting (LOR)	0.02	0.5	0.05	0.05	0.05	0.05	0.1	0.05
ANZ[a] Guidelines for Fresh and Marine Water Quality (2000) Aquatic Ecosystems (Trigger Values) Fresh Water	ID	ID	360		ID	ID	ID	ID

Notes
a : ANZ = Australia and New Zealands
ID : Insufficient data to derive a reliable trigger value

TABLE I

TKN, AMMONIA, NITRITE, NITRATE, TOTAL N, TOTAL P, SULFATE, TOTAL F, TDS, pH AND HARDNESS TEST RESULTS

GROUNDWATER SAMPLES

(Ref No: 12609/3-AA)

Analyte / Sample Location	TOTAL KJELDAHL NITROGEN (TKN) mg/L	AMMONIA mg/L	NITRITE (NO2-N) mg/L	NITRATE (NO3-N) mg/L	TOTAL Nitrogen (N) [b] mg/L	TOTAL PHOSPHORUS (P) mg/L	FLUORIDE (F) mg/L	TOTAL DISSOLVED SOLIDS (TDS) mg/L	pH	HARDNESS (as CaCO3) mg/L
GW1	0.23	0.03	0.017	1.1	1.347	0.23	<0.04	1380	6.6	350
Duplicate D1=GW1	0.12	0.02	0.014	2.4	2.434	0.09	<0.04	1440	6.6	-
GW2	0.12	0.56	0.006	3.2	3.326	<0.05	<0.04	1420	6.7	250
Splite S1=GW2	0.8	<0.005	<0.005	3.9	4.7	0.06	0.44	1500	6.9	-
GW3	0.08	0.26	0.01	1.7	1.79	0.05	<0.04	1070	6.6	170
Limit of Reporting (LOR)	0.05	0.01	0.005	0.005	0.05	0.05	0.02	10	-	0.2
ANZ [a] Guidelines for Fresh and Marine Water Quality (2000)										
Aquatic Ecosystems (Trigger Values)										
Fresh Water		0.9		0.7						
Irrigation Water (Trigger Values)										
STV					25-125	0.8-12	2			
NHMRC [c] Guidelines for Managing Risks in Recreational Water (2008)										
Health Values			3	50					6.5-8.5	
Aesthetic Values		0.5								

Notes : a : ANZ = Australia and New Zealands
b : Total N = TKN+Nitrite+Nitrate
c : Australian Government National Health and Medical Research Council
STV : Short Term Trigger Value (up to 20 years)

APPENDIX A

ENGINEERING LOGS – MONITORING WELLS

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engineering log - monitoring well

Client : Landcom
Project : Proposed Development
Location : North Penrith Defence Lands, Penrith

Job No. : 12609/3
Borehole No. : GW1
Date : 06/03/2012
Logged/Checked by: LY

drill rig : Ausroc 4000
R.L. surface : 26.12m **AHD**

groundwater 21/03/2012 : 6.15m (m)

groundwater	samples	PID Reading (ppm)	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	MONITORING WELL Graphic Log	Description
								Lockable Monument(0. 61m above ground level) and cap
			0			TOPSOIL; Silty Clay, medium to high plasticity, grey, trace of roots		Cement 0.0-0.2m
					CH	Silty CLAY, high plasticity, brown, trace of sand		Bentonite 0.2-1.2m
			1					Sand 1.2-12.0m
					CI-CH	Sandy CLAY, medium to high plasticity, brown		
			2					
					SF-SM	Silty SAND, fine to medium grained, brown		
			3					
			4		SM	Gravelly SAND, medium grained, brown and grey		Screen 4.5-12.0m
			5					
▼			6					Groundwater @ 6.15m
			7					
			8					

GEOTECHNIQUE
PTY LTD

engineering log - monitoring well

Client : Landcom
Project : Proposed Development
Location : North Penrith Defence Lands, Penrith

Job No. : 12609/3
Borehole No. : GW1
Date : 06/03/2012
Logged/Checked by: LY

drill rig : Ausroc 4000
R.L. surface : 26.12m **AHD**

groundwater 21/03/2012 : 6.15m (m)

groundwater	samples	PID Reading (ppm)	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	MONITORING WELL Graphic Log	 Description
			9					
			10					
			11					
			12			Monitoring Well No GW1 terminated at 12.0m		Target depth reached
			13					
			14					
			15					
			16					
			17					
			18					

GEOTECHNIQUE
PTY LTD

engineering log - monitoring well

Client : Landcom
Project : Proposed Development
Location : North Penrith Defence Lands, Penrith

Job No. : 12609/3
Borehole No. : GW2
Date : 07/03/2012
Logged/Checked by: LY

drill rig : Ausroc 4000
R.L. surface : 26.68m **AHD**

groundwater 21/03/2012 : 6.77m (m)

groundwater	samples	PID Reading (ppm)	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.
			0			TOPSOIL; Silty Clay, medium plasticity, grey, trace of roots
						FILL; Silty Clay, medium plasticity, grey, trace of gravels
					CH	Silty CLAY, high plasticity, brown, trace of sand
			1			
					CI-CH	Sandy CLAY, medium to high plasticity, brown
					SF-SM	Silty SAND, fine to medium grained, brown
			2			
			3			
					SM	Gravelly SAND, medium grained, brown and grey
			4			
			5			
			6			
▼			7			
			8			

MONITORING WELL

Graphic Log	Description
	Lockable Monument (0.56m above ground level) and cap
	Cement 0.0-0.2m
	Bentonite 0.2-1.2m
	Sand 1.2-9.0m
	Screen 5.0-9.0m
	Groundwater @ 6.77m

GEOTECHNIQUE
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engineering log - monitoring well

Client : Landcom
Project : Proposed Development
Location : North Penrith Defence Lands, Penrith

Job No. : 12609/3
Borehole No. : GW2
Date : 07/03/2012
Logged/Checked by: LY

drill rig : Ausroc 4000 **R.L. surface :** 26.68m **AHD**

groundwater 21/03/2012 : 6.77m (m)

groundwater	samples	PID Reading (ppm)	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	MONITORING WELL Graphic Log	 Description
			9			Monitoring Well No GW2 terminated at 9.0m		Target depth reached
			10					
			11					
			12					
			13					
			14					
			15					
			16					
			17					
			18					

GEOTECHNIQUE
PTY LTD

engineering log - monitoring well

Client : Landcom
Project : Proposed Development
Location : North Penrith Defence Lands, Penrith

Job No. : 12609/3
Borehole No. : GW3
Date : 07/03/2012
Logged/Checked by: LY

drill rig : Ausroc 4000
R.L. surface : 26.77 **AHD**

groundwater 21/03/2012 : 6.85m (m)

groundwater	samples	PID Reading (ppm)	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	MONITORING WELL Graphic Log	Description
								Lockable Monument (0.68m above ground level) and cap
			0			TOPSOIL; Silty Clay, medium plasticity, grey, trace of roots		Cement 0.0-0.2m
					CH	Silty CLAY, high plasticity, brown, trace of sand		Bentonite 0.2-1.2m
			1		CI-CH	Sandy CLAY, medium to high plasticity, brown		Sand 1.2-9.0
			2					
					SF-SM	Silty SAND, fine to medium grained, brown		
			3					
			4		SM	Gravelly SAND, medium grained, brown and grey		
			5					Screen 5.3-9.0m
			6					
▼			7					Groundwater @ 6.85m
			8					

GEOTECHNIQUE
PTY LTD

engineering log - monitoring well

Client : Landcom
Project : Proposed Development
Location : North Penrith Defence Lands, Penrith

Job No. : 12609/3
Borehole No. : GW3
Date : 07/03/2012
Logged/Checked by: LY

drill rig : Ausroc 4000
R.L. surface : 26.77 **AHD**

groundwater 21/03/2012 : 6.85m (m)

groundwater	samples	PID Reading (ppm)	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	MONITORING WELL Graphic Log	 Description
			9			Monitoring Well No GW3 terminated at 9.0m		Target depth reached
			10					
			11					
			12					
			13					
			14					
			15					
			16					
			17					
			18					

EXPLANATORY NOTES

Introduction
These notes have been provided to simplify the geotechnical report with regard to investigation procedures, classification methods and certain matters relating to the Discussion and Comments section. Not all notes are necessarily relevant to all reports.

Geotechnical reports are based on information gained from finite sub-surface probing, excavation, boring, sampling or other means of investigation, supplemented by experience and knowledge of local geology. For this reason they must be regarded as interpretative rather than factual documents, limited to some extent by the scope of information on which they rely.

Description and Classification Methods
The methods of description and classification of soils and rocks used in this report are based on AS1726 - 1993 "Geotechnical Site Investigations". In general, descriptions cover the following properties; strength or density, colour, structure, soil or rock type, and inclusions. Identification and classification of soil and rock involves, to a large extent, judgement within the acceptable level commonly adopted by current geotechnical practices.

Soil types are described according to the predominating particle size, qualified by the grading or other particles present (e.g. sandy clay) on the following basis:

Soil Classification	Particle Size
Clay	Less than 0.002mm
Silt	0.002 to 0.06mm
Sand	0.06 to 2.00mm
Gravel	2.00mm to 60.00mm

Cohesive soils are classified on the basis of strength, either by laboratory testing or engineering examination. The strength terms are defined as follows:

Classification	Undrained Shear Strength kPa
Very Soft	Less than 12
Soft	12 – 25
Firm	25 – 50
Stiff	50 – 100
Very Stiff	100 – 200
Hard	Greater than 200

Non-cohesive soils are classified on the basis of relative density, generally from the results of standard penetration tests (SPT) or Dutch cone penetrometer tests (CPT), as below:

Relative Density	SPT 'N' Value (blows/300mm)	CPT Cone Value (q_c-MPQ)
Very Loose	Less than 5	Less than 2
Loose	5 – 10	2 – 5
Medium Dense	10 – 30	5 – 15
Dense	30 – 50	15 – 25
Very Dense	>50	>25

Rock types are classified by their geological names, together with descriptive terms on degrees of weathering, strength, defects and other minor components. Where relevant, further information regarding rock classification is given on the following sheet.

Sampling
Sampling is carried out during drilling to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on plasticity, grain size, colour, type, moisture content, inclusions and depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin walled sample tube (normally known as U_{50}) into the soil and withdrawing a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils. Details of the type and method of sampling are given in the report.

Field Investigation Methods
The following is a brief summary of investigation methods currently carried out by this Company and comments on their use and application.

Hand Auger Drilling
The borehole is advanced by manually operated equipment. The diameter of the borehole ranges from 50mm to 100mm. Penetration depth of hand augered boreholes may be limited by premature refusal on a variety of materials, such as hard clay, gravels or ironstone.

Test Pits
These are excavated with a tractor-mounted backhoe or a tracked excavator, allowing close examination of the insitu soils if it is safe to descend into the pit. The depth of penetration is limited to about 3.0m for a backhoe and up to 6.0m for an excavator. A potential disadvantage is the disturbance caused by the excavation.

Care must be taken if construction is to be carried out near, or within the test pit locations, to either adequately recompact the backfill during construction, or to design the structure to accommodate the poorly compacted backfill.

Large Diameter Auger (e.g. Pengo)
The hole is advanced by a rotating plate or short spiral auger, generally 300mm or larger in diameter. The cuttings are returned to the surface at intervals (generally of not more than 0.5m) and are disturbed, but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers and is usually supplemented by occasional undisturbed tube sampling.

Continuous Spiral Flight Augers
The hole is advanced by using 90mm-115mm diameter continuous spiral flight augers, which are withdrawn at intervals to allow sampling or insitu testing. This is a relatively economical means of drilling in clays and in sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are very disturbed and may be highly mixed with soil of other stratum.

Information from the drilling (as distinct from specific sampling by SPT or undisturbed samples) is of relatively lower reliability due to remoulding, mixing or softening of samples by groundwater, resulting in uncertainties of the original sample depth.

The spiral augers are usually advanced by using a V-bit through the soil profile to refusal, followed by Tungsten Carbide (TC) bit, to penetrate into bedrock. The quality and continuity of the bedrock may be assessed by examination of recovered rock fragments and through observation of the drilling penetration resistance.

Non-core Rotary Drilling (Wash Boring)
The hole is advanced by a rotary bit, with water being pumped down the drill rod and returned up the annulus carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the feel and rate of penetration.

Rotary Mud Stabilised Drilling
This is similar to rotary drilling, but uses drilling mud as a circulating fluid, which may consist of a range of products from bentonite to polymers such as Revert or Biogel. The mud tends to mask the cuttings and reliable identification is again only possible from separate intact sampling (e.g. SPT and U_{50}) samples).

Continuous Core Drilling
A continuous core sample is obtained using a diamond tipped core barrel. Providing full core recovery is achieved (which is not always possible in very low strength rocks and granular soils), this technique provides a very reliable (but relatively expensive) method of investigation. In rocks, an NMLC triple tube core barrel, which gives a core of about 50mm diameter, is usually used with water flush.

Portable Proline Drilling
This is manually operated equipment and is only used in sites which require bedrock core sampling and there is restricted site access to truck mounted drill rigs. The boreholes are usually advanced initially using a tricone roller bit and water circulation to penetrate the upper soil profile. In some instances, a hand auger may be used to penetrate the soil profile. Subsequent drilling into bedrock involves the use of NMLC triple tube equipment, using water as a lubricant.

Standard Penetration Tests
Standard penetration tests are used mainly in non-cohesive soils, but occasionally also in cohesive soils, as a means of determining density or strength and of obtaining a relatively undisturbed sample. The test procedure is described in AS1289 6.3.1.

The test is carried out in a borehole by driving a 50mm diameter split sample tube under the impact of a 63kg hammer with a free fall of 769mm. It is normal for the tube to be driven in three successive 150mm increments and the 'N' value is taken as the number of blows for the last 300mm. In dense sands, very hard clays or weak rock, the full 450mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form:

- In a case where full penetration is obtained with successive blow counts for each 150mm of, say 4, 6 and 7 blows as;

  N = 13
  4,6,7

- In a case where the test is discontinued short of full penetration, say after 15 blows for the first 150mm and 30 blows for the next 40mm as;

  15, 30/40mm

The results of the tests can be related empirically to the engineering properties of the soil. Occasionally the test method is used to obtain samples in 50mm diameter thin walled sample tubes in clays. In these circumstances, the test results are shown on the bore logs in brackets.

Cone Penetrometer Testing and Interpretation
Cone penetrometer testing (sometimes referred to as Dutch Cone-CPT) described in this report, has been carried out using an electrical friction cone penetrometer and the test is described in AS1289 6.5.1.

In the test, a 35mm diameter rod with cone tipped end is pushed continuously into the soil, the reaction being provided by a specially designed truck or rig, which is fitted with a hydraulic ram system. Measurements are made of the end bearing resistance on the cone and the friction resistance on a separate 130mm long sleeve, immediately behind the cone. Transducers in the tip of the assembly are connected by electrical wires passing through the centre of the push rods to an amplifier and recorder unit mounted on the control truck.

As penetration occurs (at a rate of approximately 20mm per second) the information is output on continuous chart recorders. The plotted results given in this report have been traced from the original records. The information provided on the charts comprises:

- Cone resistance - the actual end bearing force divided by the cross sectional area of the cone, expressed in MPa *
- Sleeve friction - the frictional force on the sleeve divided by the surface area, expressed in kPa

The ratios of the sleeve resistance to cone resistance will vary with the type of soil encountered, with higher relative friction in clays than in sands. Friction ratios of 1% to 2% are commonly encountered in sands and very soft clays, rising to 4% to 10% in stiff clays.

In sands, the relationship between cone resistance and SPT value is commonly in the range:

$$q_c \text{ (MPa)} = (0.4 \text{ to } 0.6)\ N \text{ (blows per 300mm)}$$

In clays, the relationship between undrained shear strength and cone resistance is commonly in the range:

$$q_c=(12 \text{ to } 18)C_u$$

Interpretation of CPT values can also be made to allow estimate of modulus or compressibility values, to allow calculation of foundation settlements. Inferred stratification, as shown on the attached report, is assessed from the cone and friction traces, from experience and information from nearby boreholes etc.

This information is presented for general guidance, but must be regarded as being to some extent interpretive. The test method provides a continuous profile of engineering properties and where precise information or soil classification is required, direct drilling and sampling may be preferable.

Portable Dynamic Cone Penetrometer (DCP)
Portable Dynamic Cone Penetrometer tests are carried out by driving a rod into the ground with a falling weight hammer and measuring the blows per successive 100mm increment of penetration.

There are two similar tests, Cone Penetrometer (commonly known as Scala Penetrometer) AS1289 6.3.2 and the Perth Sand Penetrometer AS1289 6.3.3. Scala Penetrometer is commonly adopted by this company and consists of a 16mm rod with a 20mm diameter cone end, driven with a 9kg hammer, dropping 510mm (AS1289 Test P3.2).

Laboratory Testing
Laboratory testing is carried out in accordance with Australian Standard 1289 "Methods of Testing Soil for Engineering Purposes". Details of the test procedures are given on the individual report forms.

Engineering Logs
The engineering logs presented herein are an engineering and/or geological interpretation of the sub-surface conditions and their reliability will depend to some extent on frequency of sampling and the method of drilling. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, however, this is not always practicable or possible to justify economically. As it is, the boreholes represent only a small sample of the total sub-surface profile. Interpretation of the information and its application to design and construction should take into account the spacing of boreholes, frequency of sampling and the possibility of other than 'straight line' variations between the boreholes.

Groundwater
Where groundwater levels are measured in boreholes, there are several potential problems:

- in low permeability soils groundwater, although present, may enter the hole slowly or perhaps not at all during the investigation period
- a localised perched water table may lead to an erroneous indication of the true water table
- water table levels will vary from time to time due to the seasons or recent weather changes. They may not be the same at the time of construction as indicated in the report
- the use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must be washed out of the hole if water observations are to be made

More reliable measurements can be achieved by installing standpipes that are read at intervals over several days, or weeks for low permeability soils. Piezometers sealed in a particular stratum may be advisable in low permeability soils, or where there may be interference from a perched water table or surface water.

Engineering Reports
Engineering reports are prepared by qualified personnel and are based on the information obtained and on current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, perhaps a three-storey building, the information and interpretation may not be relevant if the design proposal is changed, say to a twenty-storey building. If this occurs, the Company will be pleased to review the report and sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of sub-surface conditions, discussions of geotechnical aspects and recommendations or suggestions for design and construction. However, the Company cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on bore spacing and sampling frequency.
- Changes in policy or interpretation of policy by statutory authorities.
- The actions of contractors responding to commercial pressures.

If these occur, the Company will be pleased to assist with investigation or advice to resolve the matter.

Site Anomalies
In the event that conditions encountered on-site during construction appear to vary from those that were expected from the information contained in the report, the Company requests immediate notification. Most problems are much more easily resolved when conditions are exposed rather than at some later stage, well after the event.

Reproduction of Information for Contractual Purposes
Attention is drawn to the document "Guidelines for the Provision of Geotechnical Information in Tender Documents", published by the Institute of Engineers Australia. Where information obtained from this Investigation is provided for tendering purposes; it is recommended that all information, including the written report and discussion, be made available.

In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. The Company would be pleased to assist in this regard and/or make additional copies of the report available for contract purposes, at a nominal charge.

Site Inspection
The Company will always be pleased to provide engineering inspection services for geotechnical aspects of work to which this report is related. This could range from a site visit to confirm that the conditions exposed are as expected, to full time engineering presence on site.

Review of Design
Where major civil or structural developments are proposed, or where only a limited investigation has been completed, or where the geotechnical conditions are complex, it is prudent to have the design reviewed by a Senior Geotechnical Engineer.

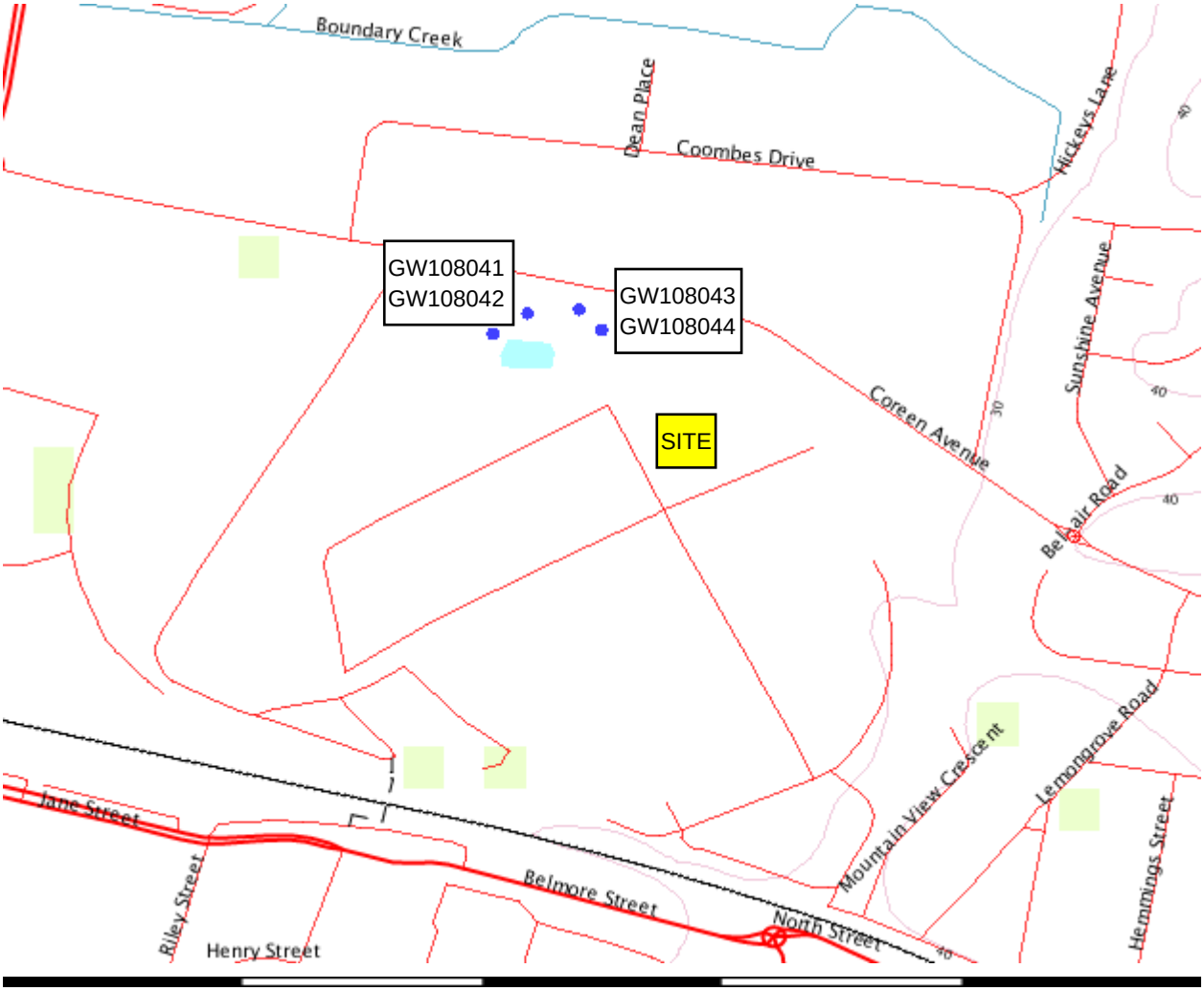
APPENDIX B

REGIONAL GROUNDWATER MAP & BORE DATA

12609/3 Groundwater Map

Map created with NSW Natural Resource Atlas - http://www.nratlas.nsw.gov.au

Wednesday, March 14, 2012



0 1 Km

Legend

Symbol	Layer	Custodian
	Cities and large towns renderImage: Cannot build image from features	
Cowra	Populated places renderImage: Cannot build image from features	
	Towns	
	Groundwater Bores	
	Catchment Management Authority boundaries	
	Major rivers	
Primary/arterial road Motorway/freeway Railway Runway Contour Background	Topographic base map	

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Wednesday, March 14, 2012

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW108041

Works Details (top)

GROUNDWATER NUMBER	GW108041
LIC-NUM	10BL600263
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	
CONSTRUCTION-METHOD	
OWNER-TYPE	
COMMENCE-DATE	
COMPLETION-DATE	2006-04-12
FINAL-DEPTH (metres)	7.50
DRILLED-DEPTH (metres)	7.50
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	MOBIL
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	6.70
SALINITY	
YIELD	

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6263735.00
EASTING	286724.00
LATITUDE	33 44' 42"
LONGITUDE	150 41' 51"
GS-MAP	
AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

COUNTY	CUMBERLAND
PARISH	MULGOA
PORTION-LOT-DP	81 810416

Licensed (top)

COUNTY	CUMBERLAND
PARISH	MULGOA
PORTION-LOT-DP	81 810416

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	7.50	100			Auger
1	1	Casing	PVC Class 18	0.00	4.50	50	42		
1	1	Opening	Slots	4.50	7.50	50			PVC Class 18; Sawn
1		Annulus	(Unknown)	0.00	0.00				Graded; GS: 4-7.5mm

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
6.50	7.50	1.00		6.70					

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	0.20	0.20	CONCRETE		
0.20	0.40	0.20	CLAY L/BROWN		
0.40	3.30	2.90	CLAY BECOMING ORANGE,BROWN		
3.30	7.50	4.20	GRAVEL,BROWN,WELL GRADED		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Wednesday, March 14, 2012

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW108042

Works Details (top)

GROUNDWATER NUMBER	GW108042
LIC-NUM	10BL600263
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	
CONSTRUCTION-METHOD	
OWNER-TYPE	
COMMENCE-DATE	
COMPLETION-DATE	2006-04-22
FINAL-DEPTH (metres)	8.00
DRILLED-DEPTH (metres)	8.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	MOBIL
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	6.40
SALINITY	
YIELD	

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6263761.00
EASTING	286759.00
LATITUDE	33 44' 41"
LONGITUDE	150 41' 53"
GS-MAP	
AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

COUNTY	CUMBERLAND
PARISH	MULGOA
PORTION-LOT-DP	81 810416

Licensed (top)

COUNTY	CUMBERLAND
PARISH	MULGOA
PORTION-LOT-DP	81 810416

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	8.00	100			Auger
1	1	Casing	PVC Class 18	0.00	5.00	50	42		
1	1	Opening	Slots	5.00	8.00	50			PVC Class 18; Sawn
1		Annulus	(Unknown)	4.00	8.00				Graded

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	0.20	0.20	CONCRETE		
0.20	0.30	0.10	FILL,CLAY,GREY/BROWN		
0.30	2.50	2.20	CLAY,RED/BROWN		
2.50	7.50	5.00	GRAVELS,WELL GRADED		
7.50	8.00	0.50	COARSE GRAINED SAND BANDS		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Wednesday, March 14, 2012

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW108043

Works Details (top)

GROUNDWATER NUMBER	GW108043
LIC-NUM	10BL600263
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	
CONSTRUCTION-METHOD	
OWNER-TYPE	
COMMENCE-DATE	
COMPLETION-DATE	2006-04-22
FINAL-DEPTH (metres)	9.00
DRILLED-DEPTH (metres)	9.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	MOBIL
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	6.80
SALINITY	
YIELD	

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6263742.00
EASTING	286836.00
LATITUDE	33 44' 42"
LONGITUDE	150 41' 56"
GS-MAP	
AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

COUNTY	CUMBERLAND
PARISH	MULGOA
PORTION-LOT-DP	81 810416

Licensed (top)

COUNTY	CUMBERLAND
PARISH	MULGOA
PORTION-LOT-DP	81 810416

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	9.00	100			Auger
1	1	Casing	PVC Class 18	0.00	6.00	50	42		
1	1	Opening	Slots	6.00	9.00	50			PVC Class 18; Sawn
1		Annulus	(Unknown)	5.00	9.00				Graded

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
7.00	9.00	2.00		6.80					

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	4.80	4.80	CLAYEY SAND		
4.80	5.40	0.60	SAND,BROWN, LOOSE,DDRY		
5.40	9.00	3.60	GRAVEL		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Wednesday, March 14, 2012

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW108044

Works Details (top)

GROUNDWATER NUMBER	GW108044
LIC-NUM	10BL600263
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	
CONSTRUCTION-METHOD	
OWNER-TYPE	
COMMENCE-DATE	
COMPLETION-DATE	2006-04-22
FINAL-DEPTH (metres)	9.50
DRILLED-DEPTH (metres)	9.50
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	MOBIL
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	6.60
SALINITY	
YIELD	

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6263767.00
EASTING	286812.00
LATITUDE	33 44' 41"
LONGITUDE	150 41' 55"
GS-MAP	
AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

COUNTY	CUMBERLAND
PARISH	MULGOA
PORTION-LOT-DP	81 810416

Licensed (top)

COUNTY	CUMBERLAND
PARISH	MULGOA
PORTION-LOT-DP	81 810416

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	9.50	100			Auger
1	1	Casing	PVC Class 18	0.00	6.50	50	42		
1	1	Opening	Slots	6.50	9.50	50			PVC Class 18; Sawn
1		Annulus	(Unknown)	6.00	9.50				Graded

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
8.20	9.50	1.30		6.60					

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	0.20	0.20	CONCRETE		
0.20	0.30	0.10	FILL,CLAY,GREY		
0.30	6.40	6.10	SILTY CLAYEY SAND,ORANGE,BROWN		
6.40	9.50	3.10	GRAVELS,WET,MODERATE		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Wednesday, March 14, 2012

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW108041

Works Details (top)

GROUNDWATER NUMBER	GW108041
LIC-NUM	10BL600263
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	
CONSTRUCTION-METHOD	
OWNER-TYPE	
COMMENCE-DATE	
COMPLETION-DATE	2006-04-12
FINAL-DEPTH (metres)	7.50
DRILLED-DEPTH (metres)	7.50
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	MOBIL
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	6.70
SALINITY	
YIELD	

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6263735.00
EASTING	286724.00
LATITUDE	33 44' 42"
LONGITUDE	150 41' 51"
GS-MAP	
AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

COUNTY	CUMBERLAND
PARISH	MULGOA
PORTION-LOT-DP	81 810416

Licensed (top)

COUNTY	CUMBERLAND
PARISH	MULGOA
PORTION-LOT-DP	81 810416

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	7.50	100			Auger
1	1	Casing	PVC Class 18	0.00	4.50	50	42		
1	1	Opening	Slots	4.50	7.50	50			PVC Class 18; Sawn
1		Annulus	(Unknown)	0.00	0.00				Graded; GS: 4-7.5mm

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
6.50	7.50	1.00		6.70					

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	0.20	0.20	CONCRETE		
0.20	0.40	0.20	CLAY L/BROWN		
0.40	3.30	2.90	CLAY BECOMING ORANGE,BROWN		
3.30	7.50	4.20	GRAVEL,BROWN,WELL GRADED		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Wednesday, March 14, 2012

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW108042

Works Details (top)

GROUNDWATER NUMBER	GW108042
LIC-NUM	10BL600263
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	
CONSTRUCTION-METHOD	
OWNER-TYPE	
COMMENCE-DATE	
COMPLETION-DATE	2006-04-22
FINAL-DEPTH (metres)	8.00
DRILLED-DEPTH (metres)	8.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	MOBIL
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	6.40
SALINITY	
YIELD	

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6263761.00
EASTING	286759.00
LATITUDE	33 44' 41"
LONGITUDE	150 41' 53"
GS-MAP	
AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

COUNTY	CUMBERLAND
PARISH	MULGOA
PORTION-LOT-DP	81 810416

Licensed (top)

COUNTY	CUMBERLAND
PARISH	MULGOA
PORTION-LOT-DP	81 810416

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	8.00	100			Auger
1	1	Casing	PVC Class 18	0.00	5.00	50	42		
1	1	Opening	Slots	5.00	8.00	50			PVC Class 18; Sawn
1		Annulus	(Unknown)	4.00	8.00				Graded

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	0.20	0.20	CONCRETE		
0.20	0.30	0.10	FILL,CLAY,GREY/BROWN		
0.30	2.50	2.20	CLAY,RED/BROWN		
2.50	7.50	5.00	GRAVELS,WELL GRADED		
7.50	8.00	0.50	COARSE GRAINED SAND BANDS		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Wednesday, March 14, 2012

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW108043

Works Details (top)

GROUNDWATER NUMBER	GW108043
LIC-NUM	10BL600263
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	
CONSTRUCTION-METHOD	
OWNER-TYPE	
COMMENCE-DATE	
COMPLETION-DATE	2006-04-22
FINAL-DEPTH (metres)	9.00
DRILLED-DEPTH (metres)	9.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	MOBIL
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	6.80
SALINITY	
YIELD	

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6263742.00
EASTING	286836.00
LATITUDE	33 44' 42"
LONGITUDE	150 41' 56"
GS-MAP	
AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

COUNTY	CUMBERLAND
PARISH	MULGOA
PORTION-LOT-DP	81 810416

Licensed (top)

COUNTY	CUMBERLAND
PARISH	MULGOA
PORTION-LOT-DP	81 810416

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	9.00	100			Auger
1	1	Casing	PVC Class 18	0.00	6.00	50	42		
1	1	Opening	Slots	6.00	9.00	50			PVC Class 18; Sawn
1		Annulus	(Unknown)	5.00	9.00				Graded

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
7.00	9.00	2.00		6.80					

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	4.80	4.80	CLAYEY SAND		
4.80	5.40	0.60	SAND,BROWN, LOOSE,DDRY		
5.40	9.00	3.60	GRAVEL		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Wednesday, March 14, 2012

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW108044

Works Details (top)

GROUNDWATER NUMBER	GW108044
LIC-NUM	10BL600263
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	
CONSTRUCTION-METHOD	
OWNER-TYPE	
COMMENCE-DATE	
COMPLETION-DATE	2006-04-22
FINAL-DEPTH (metres)	9.50
DRILLED-DEPTH (metres)	9.50
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	MOBIL
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	6.60
SALINITY	
YIELD	

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6263767.00
EASTING	286812.00
LATITUDE	33 44' 41"
LONGITUDE	150 41' 55"
GS-MAP	
AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

COUNTY	CUMBERLAND
PARISH	MULGOA
PORTION-LOT-DP	81 810416

Licensed (top)

COUNTY	CUMBERLAND
PARISH	MULGOA
PORTION-LOT-DP	81 810416

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	9.50	100			Auger
1	1	Casing	PVC Class 18	0.00	6.50	50	42		
1	1	Opening	Slots	6.50	9.50	50			PVC Class 18; Sawn
1		Annulus	(Unknown)	6.00	9.50				Graded

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
8.20	9.50	1.30		6.60					

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	0.20	0.20	CONCRETE		
0.20	0.30	0.10	FILL,CLAY,GREY		
0.30	6.40	6.10	SILTY CLAYEY SAND,ORANGE,BROWN		
6.40	9.50	3.10	GRAVELS,WET,MODERATE		

APPENDIX C

MEASUREMENT OF GROUNDWATER PARAMETERS & CALIBRATION SHEETS

GEOTECHNIQUE
PTY LTD

Measurement of Groundwater Parameters

MONITORING WELL: GW1

Date: 21/03/2012

Meter Type / Model(s): TPS90 FL Water Quality Meter

DURING PURGING

Reading Time	Temperature °C	Oxidation Reduction Potential (ORP) mV	Dissolved Oxygen ppm	Turbidity NTU	Conductivity ms/cm	pH
14:10	20.2	61	6.76	38.1	2.53	6.72
14:15	20.1	62	6.76	38.3	2.54	6.72
14:20	20.1	62	6.78	37.9	2.54	6.71
The three consecutive readings are within		± 10mV	± 10%	± 10%	± 3%	± 0.05

INTERFACE PROBE SOLINST 122 (Prior to Purging)

☐ Oil detected ☒ Oil not detected

GEOTECHNIQUE
PTY LTD

Measurement of Groundwater Parameters

MONITORING WELL: GW2

Date: 21/03/2012

Meter Type / Model(s): TPS90 FL Water Quality Meter

DURING PURGING

Reading Time	Temperature °C	Oxidation Reduction Potential (ORP) mV	Dissolved Oxygen ppm	Turbidity NTU	Conductivity ms/cm	pH
13:06	20.0	72	4.91	88.3	2.49	6.81
13:11	19.7	67	4.96	89.2	2.51	6.78
13:16	19.8	67	4.97	89.5	2.51	6.77
The three consecutive readings are within		± 10mV	± 10%	± 10%	± 3%	± 0.05

INTERFACE PROBE SOLINST 122 (Prior to Purging)

☐ Oil detected ☒ Oil not detected

GEOTECHNIQUE
PTY LTD

Measurement of Groundwater Parameters

MONITORING WELL: GW3

Date: 21/03/2012

Meter Type / Model(s): TPS90 FL Water Quality Meter

DURING PURGING

Reading Time	Temperature °C	Oxidation Reduction Potential (ORP) MV	Dissolved Oxygen ppm	Turbidity NTU	Conductivity ms/cm	pH
12:00	19.7	95	7.47	90.2	1.94	6.49
12:05	19.7	93	7.50	91.5	1.95	6.49
12:10	19.6	90	7.51	93.3	1.94	6.52
The three consecutive readings are within		± 10mV	± 10%	± 10%	± 3%	± 0.05

INTERFACE PROBE SOLINST 122 (Prior to Purging)

☐ Oil detected ☒ Oil not detect

GEOTECHNIQUE
PTY LTD

PID CALIBRATION

CLIENT	Landcom	JOB NO	12609/3
PROJECT	Proposed Development	DATE	05/03/2012
ADDRESS	North Penrith Defence Land, North Penrith	CHECKED BY	JX
PID MODEL	**PID MODEL: PGM – 7600 MINIRAE 2000**	CALIBRATED BY	LY
SERIAL NO	**SERIAL NO: 110 – 005380**		

This performance of this PID has been checked and calibrated as follows:

☒ **Charged***

☒ **Calibrate** **0.0ppm** **Reading:** 0 **ppm**

100ppm **Isobutylene** **Reading:** 99 **ppm**

Gas Bottle Number 31 **Lot No** 934758

Signed & Approved Date: 05/03/2012

Note: * Should be between 5.V and 6.2V

ThermoFisher SCIENTIFIC

The world leader in serving science

RENTALS

Equipment Report – Solinst Model 122 Interface Meter

This Meter has been performance checked / calibrated* as follows:

Cleaned/Tested	**Pass?**
Probe	☑
Tape/Reel	☑

9.1

☐ Performance Test & Battery Voltage Check (9.1 v) 8.0v minimum

Date: 14.3.2012 Checked by: TONY

Signed: TONY

Please check that the following items are received and that all items are cleaned and decontaminated before return. A minimum $20 cleaning / service / repair charge may be applied to any unclean or damaged items. Items not returned will be billed for at the full replacement cost.

Sent	Received	Returned	Item
☑	☐	☐	Operations check OK
☑	☐	☐	Plastic Box / Bag
☑	☐	☐	Spare 9V Battery Qty 2
☒	☐	☐	Probe Cleaning Brush
☑	☐	☐	Decon
☑	☐	☐	Instruction leaflet
☑	☐	☐	Tape Guide
☐	☐	☐	

Processors Signature/ Initials

Quote Reference	29050	Condition on return
Customer Ref	282771	
Equipment ID	80 Meter SOL122305I	
Equipment serial no.		
Return Date	/ /	
Return Time		

ThermoFisher SCIENTIFIC

The world leader
In serving science

RENTALS

Equipment Report - TPS 90FLMV Water Quality Meter

This Water Quality Meter has been performance checked / calibrated* as follows:

pH	☐ pH 6.88	☑ pH 7.00	☑ pH 4.00	☐ pH 10.00	☐ pH
Conductivity	☑ 0.0mS/cm	☑ 2.76mS/cm	☐12.88mS/cm	☐ 58.6mS/cm	☐ mS/cm
TDS	☑ 0.0 ppk	☑ 36 ppk	☐ ppk		
Dissolved Oxygen	☑ 0.00ppm in Sodium Sulphite			☑ 100% Saturation in Air	
Redox (ORP)**	☑ Electrode operability test 234 mV +/- 10%. Actual: 226 mV				
☑ Electrodes cleaned/checked		☑ Charged 8.0 v (min 7.2V)		☑ Temperature	
Turbidity	0.0 NTU☑	90NTU☐	360NTU☑	_____NTU☐	

* Calibration solution traceability information is available upon request.
** This meter uses an Ag/AgCl ORP electrode. To convert readings to SHE (Standard Hydrogen Electrode), add 199mV to the mV reading. For further information, refer to www.enviroequip.com/quipnotes/ORP.htm.

Date: 20/03/2012 Checked by: MILENKO

Signed: _____

Please check that the following items are received and that all items are cleaned and decontaminated before return. A minimum $20 cleaning / service / repair charge may be applied to any unclean or damaged items. Items not returned will be billed for at the full replacement cost.

Sent	Received	Returned	Item
☑	☐	☐	90FLMV Unit. Ops check / Battery Voltage @ 8.0
☑	☐	☐	pH sensor 5m
☑	☐	☐	Conductivity / TDS / Temperature k=10 sensor 5m
☑	☐	☐	Dissolved Oxygen YSI5739 sensor 5m
☑	☐	☐	Redox (ORP) sensor 5m
☑	☐	☐	Battery charger: 240V AC to 12V DC 200mA
☑	☐	☐	Instruction Manual
☑	☐	☐	Quick Guide
☐	☐	☐	Syringe with storage solution for pH & ORP sensors
☐	☐	☐	Turbidity 5m
☑	☐	☐	Carry Case

Processors Signature/ Initials MS

Quote Reference	29050	Condition on return
Customer Ref		
Equipment ID	90FLT SD	
Equipment serial no.	U4340	
Return Date	/ /	
Return Time		

ThermoFisher SCIENTIFIC

Equipment Report – Micropurge Kit (MP15)

This system has been performance checked as follows:

Sample Pro Pump		
☑ Components Cleaned / checked	☑ Ops check	
☑ MP15 Controller	☑ Included in kit	☐ Not included in kit
☑ Components Cleaned / checked	☑ Ops check	
☑ Battery check – On/Off	☑ Flow response	

Date: 20 · 3 · 2012 Checked by: TONY

Signed: Tony

Please check that the following items are received and that all items are cleaned and decontaminated before return. A minimum $20 cleaning / service / repair charge may be applied to any unclean or damaged items. Items not returned will be billed for at the full replacement cost.

Sent	Received	Returned	Item
☐	☐	☐	MP15 Control & Power Pack
☐	☐	☐	CO2 cylinder (installed in MP15 backpack)
☐	☐	☐	2 Stage gas regulator
☐	☐	☐	Spanner or shifter
☐	☐	☐	Quick Start Guide
☐	☐	☐	MP15 Users Guide + Pump operating instructions
☐	☐	☐	Sample Pro Stainless Steel Pump ID: 05P6P5K
☐	☐	☐	Bladder
☐	☐	☐	Flow cell ID: EFC500SN
☐	☐	☐	Stainless Steel Hanger Cable 120 m
☐	☐	☐	Spare CO2 Cylinders, quantity: 1
☐	☐	☐	Gas Cylinder CO2 - D Size ID:
☐	☐	☐	Maintenance kit (O rings, fittings, SS check ball, collett & screen if applicable)

Processors Signature/ Initials

EE Quote Reference	29050	Condition on return
Customer Ref	282771	
Equipment ID	GMP15SE	
Equipment serial no.		
Return Date	/ /	
Return Time		

APPENDIX D

ANALYTICAL REPORT (SGS ENVIRONMENTAL SERVICES)
AND
CERTIFICATE OF ANALYSIS (ENVIROLAB SERVICES PTY LTD)

ANALYTICAL REPORT

CLIENT DETAILS		LABORATORY DETAILS	
Contact	James Ngu	Manager	Huong Crawford
Client	Geotechnique	Laboratory	SGS Alexandria Environmental
Address	P.O. Box 880 PENRITH NSW 2751	Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	02 4722 2700	Telephone	+61 2 8594 0400
Facsimile	02 4722 6161	Facsimile	+61 2 8594 0499
Email	james.ngu@geotech.com.au	Email	au.environmental.sydney@sgs.com
Project	**12609-3 - North Penrith- Waters**	SGS Reference	SE106556 R0
Order Number	(Not specified)	Report Number	0000023984
Samples	6	Date Reported	11 Apr 2012
		Date Received	21 Mar 2012

COMMENTS

The document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025. NATA accredited laboratory 2562(4354).

VOC 8270 List (Low Levels) including (PAHs (0.01µg/L), OCP (LOR 0.01-0.05µg/L) OPP (LOR 0.01-0.2µg/L) and PCB Congeners (LOR 0.004-0.01µg/L)):-subcontracted to SGS Perth Environmental, 10 Reid Rd Newburn WA, NATA Accreditation Number 2562, Site Number 898.

SIGNATORIES

Dong Liang
Inorganics Metals Team Leader

Huong Crawford
Laboratory Manager

Ly Kim Ha
Organics Supervisor

Snezana Kostoska
Inorganics Chemist

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name	SE106556.001 Water 21 Mar 2012 GW1	SE106556.002 Water 21 Mar 2012 GW2	SE106556.003 Water 21 Mar 2012 GW3	SE106556.004 Water 21 Mar 2012 Duplicate D1	SE106556.005 Water 21 Mar 2012 Tripspike TS1
VOCs in Water Method: AN433/AN434								
Fumigants								
2,2-dichloropropane	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	-
1,2-dichloropropane	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	-
cis-1,3-dichloropropene	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	-
trans-1,3-dichloropropene	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	-
1,2-dibromoethane (EDB)	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	-
Halogenated Aliphatics								
Dichlorodifluoromethane (CFC-12)	µg/L	5		<5	<5	<5	<5	-
Chloromethane	µg/L	5		<5	<5	<5	<5	-
Vinyl chloride (Chloroethene)	µg/L	0.3		<0.3	<0.3	<0.3	<0.3	-
Bromomethane	µg/L	10		<10	<10	<10	<10	-
Chloroethane	µg/L	5		<5	<5	<5	<5	-
Trichlorofluoromethane	µg/L	1		<1	<1	<1	<1	-
Iodomethane	µg/L	5		<5	<5	<5	<5	-
1,1-dichloroethene	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	-
Dichloromethane (Methylene chloride)	µg/L	5		<5	<5	<5	<5	-
Allyl chloride	µg/L	2		<2	<2	<2	<2	-
trans-1,2-dichloroethene	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	-
1,1-dichloroethane	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	-
cis-1,2-dichloroethene	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	-
Bromochloromethane	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	-
1,2-dichloroethane	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	-
1,1,1-trichloroethane	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	-
1,1-dichloropropene	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	-
Carbon tetrachloride	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	-
Dibromomethane	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	-
Trichloroethene (Trichloroethylene,TCE)	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	-
1,1,2-trichloroethane	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	-
1,3-dichloropropane	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	-
Tetrachloroethene (Perchloroethylene,PCE)	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	-
1,1,1,2-tetrachloroethane	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	-
cis-1,4-dichloro-2-butene	µg/L	1		<1	<1	<1	<1	-
1,1,2,2-tetrachloroethane	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	-
1,2,3-trichloropropane	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	-
trans-1,4-dichloro-2-butene	µg/L	1		<1	<1	<1	<1	-
1,2-dibromo-3-chloropropane	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	-
Hexachlorobutadiene	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	-
Halogenated Aromatics								
Chlorobenzene	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	-
Bromobenzene	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	-
2-chlorotoluene	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	-
4-chlorotoluene	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	-
1,3-dichlorobenzene	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	-
1,4-dichlorobenzene	µg/L	0.3		<0.3	<0.3	<0.3	<0.3	-
1,2-dichlorobenzene	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	-
1,2,4-trichlorobenzene	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	-
1,2,3-trichlorobenzene	µg/L	0.5		<0.5	<0.5	<0.5	<0.5	-

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name SE106556.001 Water 21 Mar 2012 GW1	SE106556.002 Water 21 Mar 2012 GW2	SE106556.003 Water 21 Mar 2012 GW3	SE106556.004 Water 21 Mar 2012 Duplicate D1	SE106556.005 Water 21 Mar 2012 Tripspike TS1
VOCs in Water Method: AN433/AN434 (continued)							
Monocyclic Aromatic Hydrocarbons							
Benzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	[105%]
Toluene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	[105%]
Ethylbenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	[103%]
m/p-xylene	µg/L	1	<1	<1	<1	<1	[103%]
o-xylene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	[104%]
Styrene (Vinyl benzene)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	-
Isopropylbenzene (Cumene)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	-
n-propylbenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	-
1,3,5-trimethylbenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	-
tert-butylbenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	-
1,2,4-trimethylbenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	-
sec-butylbenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	-
p-isopropyltoluene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	-
n-butylbenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	-
Nitrogenous Compounds							
Acrylonitrile	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	-
2-nitropropane	µg/L	100	<100	<100	<100	<100	-
Oxygenated Compounds							
MtBE (Methyl-tert-butyl ether)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	-
Acetone (2-propanone)	µg/L	10	<10	<10	<10	<10	-
Vinyl acetate	µg/L	10	<10	<10	<10	<10	-
MEK (2-butanone)	µg/L	10	<10	<10	<10	<10	-
MIBK (4-methyl-2-pentanone)	µg/L	5	<5	<5	<5	<5	-
2-hexanone (MBK)	µg/L	5	<5	<5	<5	<5	-
Polycyclic VOCs							
Naphthalene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	-
Sulphonated Compounds							
Carbon disulfide	µg/L	2	<2	<2	<2	<2	-
Surrogates							
Dibromofluoromethane (Surrogate)	%	-	**121**	**123**	**123**	**123**	**106**
d4-1,2-dichloroethane (Surrogate)	%	-	**110**	**113**	**112**	**110**	**106**
d8-toluene (Surrogate)	%	-	**94**	**98**	**95**	**95**	**100**
Bromofluorobenzene (Surrogate)	%	-	**113**	**108**	**111**	**112**	**99**
Totals							
Total Xylenes	µg/L	1.5	<1.5	<1.5	<1.5	<1.5	-
Total BTEX	µg/L	3	<3	<3	<3	<3	-
Total VOC	µg/L	10	-	-	-	-	-
Trihalomethanes							
Chloroform (THM)	µg/L	0.5	<0.5	**4.3**	**3.1**	<0.5	-
Bromodichloromethane (THM)	µg/L	0.5	<0.5	**1.0**	**0.8**	<0.5	-
Dibromochloromethane (THM)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	-
Bromoform (THM)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	-

Parameter	Units	LOR	Sample Number: SE106556.001 Sample Matrix: Water Sample Date: 21 Mar 2012 Sample Name: GW1	SE106556.002 Water 21 Mar 2012 GW2	SE106556.003 Water 21 Mar 2012 GW3	SE106556.004 Water 21 Mar 2012 Duplicate D1	SE106556.005 Water 21 Mar 2012 Tripspike TS1
Volatile Petroleum Hydrocarbons in Water Method: AN433/AN434							
TRH C6-C9	µg/L	40	<40	<40	<40	<40	-
Surrogates							
Trifluorotoluene (Surrogate)	%	-	**100**	**99**	**99**	**100**	-
Dibromofluoromethane (Surrogate)	%	-	-	-	-	-	-
d4-1,2-dichloroethane (Surrogate)	%	-	-	-	-	-	-
d8-toluene (Surrogate)	%	-	-	-	-	-	-
Bromofluorobenzene (Surrogate)	%	-	-	-	-	-	-
Total Phenolics in Water Method: AN289							
Total Phenols	mg/L	0.01	<0.01	<0.01	<0.01	**0.04**	-
Total Cyanide in water by Discrete Analyser (Aquakem) Method: AN077/AN287							
Total Cyanide	mg/L	0.005	<0.005	<0.005	<0.005	<0.005	-
TKN Kjeldahl Digestion by Discrete Analyser Method: AN281/AN292							
Total Kjeldahl Nitrogen	mg/L	0.05	**0.23**	**0.12**	**0.08**	**0.12**	-
Total Nitrogen (calc)	mg/L	0.05	-	-	-	-	-
Nitrite in Water Method: AN277/WC250.312							
Nitrite Nitrogen, NO_2 as N	mg/L	0.005	**0.017**	**0.006**	**0.010**	**0.014**	-
Anions by Ion Chromatography in Water Method: AN245							
Nitrate Nitrogen, NO3-N	mg/L	0.005	**1.1**	**3.2**	**1.7**	**2.4**	-
Fluoride	mg/L	0.02	<0.04↑	<0.04↑	<0.04↑	<0.04↑	-
Ammonia Nitrogen by Discrete Analyser (Aquakem) Method: AN291							
Ammonia Nitrogen, NH_3 as N	mg/L	0.01	**0.03**	**0.56**	**0.26**	**0.02**	-
Total Phosphorus by Kjeldahl Digestion DA in Water Method: AN279/AN293							
Total Phosphorus (Kjeldahl Digestion)	mg/L	0.05	**0.23**	<0.05	**0.05**	**0.09**	-
Total Dissolved Solids (TDS) in water Method: AN113							
Total Dissolved Solids Dried at 180°C	mg/L	10	**1380**	**1420**	**1070**	**1440**	-
pH in water Method: AN101							
pH	pH Units	-	**6.6**	**6.7**	**6.6**	**6.6**	-
Oil and Grease in Water Method: AN185							
Oil and Grease	mg/L	5	<5	<5	<5	<5	-

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name	SE106556.001 Water 21 Mar 2012 GW1	SE106556.002 Water 21 Mar 2012 GW2	SE106556.003 Water 21 Mar 2012 GW3	SE106556.004 Water 21 Mar 2012 Duplicate D1	SE106556.005 Water 21 Mar 2012 Tripspike TS1
Trace Metals (Dissolved) in Water by ICPMS Method: AN318								
Arsenic, As	µg/L	1		<1	<1	<1	<1	-
Beryllium, Be	µg/L	1		<1	<1	<1	<1	-
Boron, B	µg/L	5		**34**	**40**	**32**	**33**	-
Cadmium, Cd	µg/L	0.1		<0.1	<0.1	<0.1	<0.1	-
Chromium, Cr	µg/L	1		<1	<1	<1	<1	-
Cobalt, Co	µg/L	1		**1**	<1	<1	<1	-
Copper, Cu	µg/L	1		<1	<1	<1	<1	-
Lead, Pb	µg/L	1		<1	<1	<1	<1	-
Manganese, Mn	µg/L	1		**220**	**160**	**150**	**160**	-
Nickel, Ni	µg/L	1		**7**	**4**	**3**	**5**	-
Zinc, Zn	µg/L	1		**2**	**3**	**3**	**2**	-
Metals in Water (Dissolved) by ICPOES Method: AN320/AN321								
Calcium, Ca	mg/L	0.1		**51**	**31**	**20**	-	-
Magnesium, Mg	mg/L	0.1		**55**	**42**	**29**	-	-
Total Hardness by Calculation	mg CaCO3/L	0.2		**350**	**250**	**170**	-	-
Mercury (dissolved) in Water Method: AN311/AN312								
Mercury	mg/L	0.0001		<0.0001	<0.0001	<0.0001	<0.0001	-

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name	SE106556.006 Water 21 Mar 2012 Trip Blank TB1
VOCs in Water Method: AN433/AN434				
Fumigants				
2,2-dichloropropane	µg/L	0.5		<0.5
1,2-dichloropropane	µg/L	0.5		<0.5
cis-1,3-dichloropropene	µg/L	0.5		<0.5
trans-1,3-dichloropropene	µg/L	0.5		<0.5
1,2-dibromoethane (EDB)	µg/L	0.5		<0.5
Halogenated Aliphatics				
Dichlorodifluoromethane (CFC-12)	µg/L	5		<5
Chloromethane	µg/L	5		<5
Vinyl chloride (Chloroethene)	µg/L	0.3		<0.3
Bromomethane	µg/L	10		<10
Chloroethane	µg/L	5		<5
Trichlorofluoromethane	µg/L	1		<1
Iodomethane	µg/L	5		<5
1,1-dichloroethene	µg/L	0.5		<0.5
Dichloromethane (Methylene chloride)	µg/L	5		<5
Allyl chloride	µg/L	2		<2
trans-1,2-dichloroethene	µg/L	0.5		<0.5
1,1-dichloroethane	µg/L	0.5		<0.5
cis-1,2-dichloroethene	µg/L	0.5		<0.5
Bromochloromethane	µg/L	0.5		<0.5
1,2-dichloroethane	µg/L	0.5		<0.5
1,1,1-trichloroethane	µg/L	0.5		<0.5
1,1-dichloropropene	µg/L	0.5		<0.5
Carbon tetrachloride	µg/L	0.5		<0.5
Dibromomethane	µg/L	0.5		<0.5
Trichloroethene (Trichloroethylene,TCE)	µg/L	0.5		<0.5
1,1,2-trichloroethane	µg/L	0.5		<0.5
1,3-dichloropropane	µg/L	0.5		<0.5
Tetrachloroethene (Perchloroethylene,PCE)	µg/L	0.5		<0.5

Parameter	Units	LOR	Sample Number SE106556.006 Sample Matrix Water Sample Date 21 Mar 2012 Sample Name Trip Blank TB1
VOCs in Water Method: AN433/AN434 (continued)			
1,1,1,2-tetrachloroethane	µg/L	0.5	<0.5
cis-1,4-dichloro-2-butene	µg/L	1	<1
1,1,2,2-tetrachloroethane	µg/L	0.5	<0.5
1,2,3-trichloropropane	µg/L	0.5	<0.5
trans-1,4-dichloro-2-butene	µg/L	1	<1
1,2-dibromo-3-chloropropane	µg/L	0.5	<0.5
Hexachlorobutadiene	µg/L	0.5	<0.5
Halogenated Aromatics			
Chlorobenzene	µg/L	0.5	<0.5
Bromobenzene	µg/L	0.5	<0.5
2-chlorotoluene	µg/L	0.5	<0.5
4-chlorotoluene	µg/L	0.5	<0.5
1,3-dichlorobenzene	µg/L	0.5	<0.5
1,4-dichlorobenzene	µg/L	0.3	<0.3
1,2-dichlorobenzene	µg/L	0.5	<0.5
1,2,4-trichlorobenzene	µg/L	0.5	<0.5
1,2,3-trichlorobenzene	µg/L	0.5	<0.5
Monocyclic Aromatic Hydrocarbons			
Benzene	µg/L	0.5	<0.5
Toluene	µg/L	0.5	<0.5
Ethylbenzene	µg/L	0.5	<0.5
m/p-xylene	µg/L	1	<1
o-xylene	µg/L	0.5	<0.5
Styrene (Vinyl benzene)	µg/L	0.5	<0.5
Isopropylbenzene (Cumene)	µg/L	0.5	<0.5
n-propylbenzene	µg/L	0.5	<0.5
1,3,5-trimethylbenzene	µg/L	0.5	<0.5
tert-butylbenzene	µg/L	0.5	<0.5
1,2,4-trimethylbenzene	µg/L	0.5	<0.5
sec-butylbenzene	µg/L	0.5	<0.5
p-isopropyltoluene	µg/L	0.5	<0.5
n-butylbenzene	µg/L	0.5	<0.5

Parameter	Units	LOR	Sample Number SE106556.006 Sample Matrix Water Sample Date 21 Mar 2012 Sample Name Trip Blank TB1
VOCs in Water Method: AN433/AN434 (continued)			
Nitrogenous Compounds			
Acrylonitrile	µg/L	0.5	<0.5
2-nitropropane	µg/L	100	<100
Oxygenated Compounds			
MtBE (Methyl-tert-butyl ether)	µg/L	0.5	<0.5
Acetone (2-propanone)	µg/L	10	<10
Vinyl acetate	µg/L	10	<10
MEK (2-butanone)	µg/L	10	<10
MIBK (4-methyl-2-pentanone)	µg/L	5	<5
2-hexanone (MBK)	µg/L	5	<5
Polycyclic VOCs			
Naphthalene	µg/L	0.5	<0.5
Sulphonated Compounds			
Carbon disulfide	µg/L	2	<2
Surrogates			
Dibromofluoromethane (Surrogate)	%	-	**109**
d4-1,2-dichloroethane (Surrogate)	%	-	**105**
d8-toluene (Surrogate)	%	-	**100**
Bromofluorobenzene (Surrogate)	%	-	**90**
Totals			
Total Xylenes	µg/L	1.5	<1.5
Total BTEX	µg/L	3	<3
Total VOC	µg/L	10	-
Trihalomethanes			
Chloroform (THM)	µg/L	0.5	<0.5
Bromodichloromethane (THM)	µg/L	0.5	<0.5
Dibromochloromethane (THM)	µg/L	0.5	<0.5
Bromoform (THM)	µg/L	0.5	<0.5
Volatile Petroleum Hydrocarbons in Water Method: AN433/AN434			
TRH C6-C9	µg/L	40	-
Surrogates			
Trifluorotoluene (Surrogate)	%	-	-
Dibromofluoromethane (Surrogate)	%	-	-
d4-1,2-dichloroethane (Surrogate)	%	-	-
d8-toluene (Surrogate)	%	-	-
Bromofluorobenzene (Surrogate)	%	-	-
Total Phenolics in Water Method: AN289			
Total Phenols	mg/L	0.01	-

Parameter	Units	LOR	
Sample Number			SE106556.006
Sample Matrix			Water
Sample Date			21 Mar 2012
Sample Name			Trip Blank TB1
Total Cyanide in water by Discrete Analyser (Aquakem) Method: AN077/AN287			
Total Cyanide	mg/L	0.005	-
TKN Kjeldahl Digestion by Discrete Analyser Method: AN281/AN292			
Total Kjeldahl Nitrogen	mg/L	0.05	-
Total Nitrogen (calc)	mg/L	0.05	-
Nitrite in Water Method: AN277/WC250.312			
Nitrite Nitrogen, NO_2 as N	mg/L	0.005	-
Anions by Ion Chromatography in Water Method: AN245			
Nitrate Nitrogen, NO3-N	mg/L	0.005	-
Fluoride	mg/L	0.02	-
Ammonia Nitrogen by Discrete Analyser (Aquakem) Method: AN291			
Ammonia Nitrogen, NH_3 as N	mg/L	0.01	-
Total Phosphorus by Kjeldahl Digestion DA in Water Method: AN279/AN293			
Total Phosphorus (Kjeldahl Digestion)	mg/L	0.05	-
Total Dissolved Solids (TDS) in water Method: AN113			
Total Dissolved Solids Dried at 180°C	mg/L	10	-
pH in water Method: AN101			
pH	pH Units	-	-
Oil and Grease in Water Method: AN185			
Oil and Grease	mg/L	5	-
Trace Metals (Dissolved) in Water by ICPMS Method: AN318			
Arsenic, As	µg/L	1	-
Beryllium, Be	µg/L	1	-
Boron, B	µg/L	5	-
Cadmium, Cd	µg/L	0.1	-
Chromium, Cr	µg/L	1	-
Cobalt, Co	µg/L	1	-
Copper, Cu	µg/L	1	-
Lead, Pb	µg/L	1	-
Manganese, Mn	µg/L	1	-
Nickel, Ni	µg/L	1	-
Zinc, Zn	µg/L	1	-
Metals in Water (Dissolved) by ICPOES Method: AN320/AN321			
Calcium, Ca	mg/L	0.1	-
Magnesium, Mg	mg/L	0.1	-
Total Hardness by Calculation	mg CaCO3/L	0.2	-

Parameter	Units	LOR	Sample Number SE106556.006 Sample Matrix Water Sample Date 21 Mar 2012 Sample Name Trip Blank TB1
Mercury (dissolved) in Water Method: AN311/AN312			
Mercury	mg/L	0.0001	-

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula: *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Ammonia Nitrogen by Discrete Analyser (Aquakem) Method: ME-(AU)-[ENV]AN291

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Ammonia Nitrogen, NH_3 as N	LB016588	mg/L	0.01	<0.01	0%	97%

Anions by Ion Chromatography in Water Method: ME-(AU)-[ENV]AN245

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Nitrate Nitrogen, NO3-N	LB016593	mg/L	0.005	<0.005	4%	96%
Fluoride	LB016593	mg/L	0.02	<0.02		98%

Mercury (dissolved) in Water Method: ME-(AU)-[ENV]AN311/AN312

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Mercury	LB016615	mg/L	0.0001	<0.0001	0 - 198%	105%	104%

Metals in Water (Dissolved) by ICPOES Method: ME-(AU)-[ENV]AN320/AN321

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery	MS %Recovery
Calcium, Ca	LB017250	mg/L	0.1	<0.1	95%	104%
Magnesium, Mg	LB017250	mg/L	0.1	<0.1	96%	104%
Total Hardness by Calculation	LB017250	mg CaCO3/L	0.2	<0.2		

Nitrite in Water Method: ME-(AU)-[ENV]AN277/WC250.312

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Nitrite Nitrogen, NO_2 as N	LB016591	mg/L	0.005	<0.005	0 - 2%	NA

Oil and Grease in Water Method: ME-(AU)-[ENV]AN185

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
Oil and Grease	LB016649	mg/L	5	<5	92%

pH in water Method: ME-(AU)-[ENV]AN101

Parameter	QC Reference	Units	LOR	LCS %Recovery
pH	LB016600	pH Units	-	NA

TKN Kjeldahl Digestion by Discrete Analyser Method: ME-(AU)-[ENV]AN281/AN292

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MSD %RPD
Total Kjeldahl Nitrogen	LB016597	mg/L	0.05	<0.05	2%	102%	NA

Total Cyanide in water by Discrete Analyser (Aquakem) Method: ME-(AU)-[ENV]AN077/AN287

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Cyanide	LB016589	mg/L	0.005	<0.005	0%	98%	96%

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula: *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Total Dissolved Solids (TDS) in water Method: ME-(AU)-[ENV]AN113

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
Total Dissolved Solids Dried at 180°C	LB016598	mg/L	10	<10	NA

Total Phenolics in Water Method: ME-(AU)-[ENV]AN289

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MSD %RPD
Total Phenols	LB016595	mg/L	0.01	<0.01	0%	86%	NA

Total Phosphorus by Kjeldahl Digestion DA in Water Method: ME-(AU)-[ENV]AN279/AN293

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MSD %RPD
Total Phosphorus (Kjeldahl Digestion)	LB016639	mg/L	0.05	<0.05	0%	NA	NA

Trace Metals (Dissolved) in Water by ICPMS Method: ME-(AU)-[ENV]AN318

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Arsenic, As	LB017491	µg/L	1	<1	0%	95%	96%
Beryllium, Be	LB017491	µg/L	1	<1	0%	97%	82%
Boron, B	LB017491	µg/L	5	<5		91%	75%
Cadmium, Cd	LB017491	µg/L	0.1	<0.1	0%	94%	90%
Chromium, Cr	LB017491	µg/L	1	<1	0%	101%	92%
Cobalt, Co	LB017491	µg/L	1	<1	0%	100%	85%
Copper, Cu	LB017491	µg/L	1	<1	0%	99%	87%
Lead, Pb	LB017491	µg/L	1	<1	0%	84%	92%
Manganese, Mn	LB017491	µg/L	1	<1	0%	101%	90%
Nickel, Ni	LB017491	µg/L	1	<1	0%	101%	91%
Zinc, Zn	LB017491	µg/L	1	<1	1 - 3%	99%	90%

VOCs in Water Method: ME-(AU)-[ENV]AN433/AN434

Fumigants

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
2,2-dichloropropane	LB017376	µg/L	0.5	<0.5	0%	NA
1,2-dichloropropane	LB017376	µg/L	0.5	<0.5	0%	NA
cis-1,3-dichloropropene	LB017376	µg/L	0.5	<0.5	0%	NA
trans-1,3-dichloropropene	LB017376	µg/L	0.5	<0.5	0%	NA
1,2-dibromoethane (EDB)	LB017376	µg/L	0.5	<0.5	0%	NA

Halogenated Aliphatics

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Dichlorodifluoromethane (CFC-12)	LB017376	µg/L	5	<5	0%	NA
Chloromethane	LB017376	µg/L	5	<5	0%	NA
Vinyl chloride (Chloroethene)	LB017376	µg/L	0.3	<0.3	0%	NA
Bromomethane	LB017376	µg/L	10	<10	0%	NA
Chloroethane	LB017376	µg/L	5	<5	0%	NA
Trichlorofluoromethane	LB017376	µg/L	1	<1	0%	NA
Iodomethane	LB017376	µg/L	5	<5	0%	NA
1,1-dichloroethene	LB017376	µg/L	0.5	<0.5	0%	119%
Dichloromethane (Methylene chloride)	LB017376	µg/L	5	<5	0%	NA
Allyl chloride	LB017376	µg/L	2	<2	0%	NA
trans-1,2-dichloroethene	LB017376	µg/L	0.5	<0.5	0%	NA
1,1-dichloroethane	LB017376	µg/L	0.5	<0.5	0%	NA
cis-1,2-dichloroethene	LB017376	µg/L	0.5	<0.5	0%	NA
Bromochloromethane	LB017376	µg/L	0.5	<0.5	0%	NA
1,2-dichloroethane	LB017376	µg/L	0.5	<0.5	0%	108%
1,1,1-trichloroethane	LB017376	µg/L	0.5	<0.5	0%	NA
1,1-dichloropropene	LB017376	µg/L	0.5	<0.5	0%	NA

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula: *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

VOCs in Water **Method: ME-(AU)-[ENV]AN433/AN434 (continued)**

				MB	DUP %RPD	LCS %Recovery
Carbon tetrachloride	LB017376	µg/L	0.5	<0.5	0%	NA
Dibromomethane	LB017376	µg/L	0.5	<0.5	0%	NA
Trichloroethene (Trichloroethylene,TCE)	LB017376	µg/L	0.5	<0.5	0%	113%
1,1,2-trichloroethane	LB017376	µg/L	0.5	<0.5	0%	NA
1,3-dichloropropane	LB017376	µg/L	0.5	<0.5	0%	NA
Tetrachloroethene (Perchloroethylene,PCE)	LB017376	µg/L	0.5	<0.5	0%	NA
1,1,1,2-tetrachloroethane	LB017376	µg/L	0.5	<0.5	0%	NA
cis-1,4-dichloro-2-butene	LB017376	µg/L	1	<1	0%	NA
1,1,2,2-tetrachloroethane	LB017376	µg/L	0.5	<0.5	0%	NA
1,2,3-trichloropropane	LB017376	µg/L	0.5	<0.5	0%	NA
trans-1,4-dichloro-2-butene	LB017376	µg/L	1	<1	0%	NA
1,2-dibromo-3-chloropropane	LB017376	µg/L	0.5	<0.5	0%	NA
Hexachlorobutadiene	LB017376	µg/L	0.5	<0.5	0%	NA

Halogenated Aromatics

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Chlorobenzene	LB017376	µg/L	0.5	<0.5	0%	112%
Bromobenzene	LB017376	µg/L	0.5	<0.5	0%	NA
2-chlorotoluene	LB017376	µg/L	0.5	<0.5	0%	NA
4-chlorotoluene	LB017376	µg/L	0.5	<0.5	0%	NA
1,3-dichlorobenzene	LB017376	µg/L	0.5	<0.5	0%	NA
1,4-dichlorobenzene	LB017376	µg/L	0.3	<0.3	0%	NA
1,2-dichlorobenzene	LB017376	µg/L	0.5	<0.5	0%	NA
1,2,4-trichlorobenzene	LB017376	µg/L	0.5	<0.5	0%	NA
1,2,3-trichlorobenzene	LB017376	µg/L	0.5	<0.5	0%	NA

Monocyclic Aromatic Hydrocarbons

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Benzene	LB017376	µg/L	0.5	<0.5	0%	119%
Toluene	LB017376	µg/L	0.5	<0.5	0%	110%
Ethylbenzene	LB017376	µg/L	0.5	<0.5	0%	121%
m/p-xylene	LB017376	µg/L	1	<1	0%	116%
o-xylene	LB017376	µg/L	0.5	<0.5	0%	109%
Styrene (Vinyl benzene)	LB017376	µg/L	0.5	<0.5	0%	NA
Isopropylbenzene (Cumene)	LB017376	µg/L	0.5	<0.5	0%	NA
n-propylbenzene	LB017376	µg/L	0.5	<0.5	0%	NA
1,3,5-trimethylbenzene	LB017376	µg/L	0.5	<0.5	0%	NA
tert-butylbenzene	LB017376	µg/L	0.5	<0.5	0%	NA
1,2,4-trimethylbenzene	LB017376	µg/L	0.5	<0.5	0%	NA
sec-butylbenzene	LB017376	µg/L	0.5	<0.5	0%	NA
p-isopropyltoluene	LB017376	µg/L	0.5	<0.5	0%	NA
n-butylbenzene	LB017376	µg/L	0.5	<0.5	0%	NA

Nitrogenous Compounds

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Acrylonitrile	LB017376	µg/L	0.5	<0.5	0%	NA

Oxygenated Compounds

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
MtBE (Methyl-tert-butyl ether)	LB017376	µg/L	0.5	<0.5	0%	NA
Acetone (2-propanone)	LB017376	µg/L	10	<10	0%	NA
Vinyl acetate	LB017376	µg/L	10	<10	0%	NA
MEK (2-butanone)	LB017376	µg/L	10	<10	0%	NA
MIBK (4-methyl-2-pentanone)	LB017376	µg/L	5	<5	0%	NA
2-hexanone (MBK)	LB017376	µg/L	5	<5	0%	NA

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula: *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

VOCs in Water **Method: ME-(AU)-[ENV]AN433/AN434 (continued)**

Polycyclic VOCs

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Naphthalene	LB017376	µg/L	0.5	<0.5	0%	NA

Sulphonated Compounds

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Carbon disulfide	LB017376	µg/L	2	<2	0%	NA

Surrogates

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Dibromofluoromethane (Surrogate)	LB017376	%	-	113%	0%	94%
d4-1,2-dichloroethane (Surrogate)	LB017376	%	-	107%	2%	90%
d8-toluene (Surrogate)	LB017376	%	-	96%	3%	98%
Bromofluorobenzene (Surrogate)	LB017376	%	-	113%	1%	95%

Trihalomethanes

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Chloroform (THM)	LB017376	µg/L	0.5	<0.5	0%	107%
Bromodichloromethane (THM)	LB017376	µg/L	0.5	<0.5	0%	NA
Dibromochloromethane (THM)	LB017376	µg/L	0.5	<0.5	0%	NA
Bromoform (THM)	LB017376	µg/L	0.5	<0.5	0%	NA

Volatile Petroleum Hydrocarbons in Water **Method: ME-(AU)-[ENV]AN433/AN434**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
TRH C6-C9	LB017376	µg/L	40	<40	0%	104%

Surrogates

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Trifluorotoluene (Surrogate)	LB017376	%	-	100%	0%	91%

METHOD SUMMARY

METHOD	METHODOLOGY SUMMARY
AN020	Unpreserved water sample is filtered through a 0.45µm membrane filter and acidified with nitric acid similar to APHA3030B.
AN077	Hydrogen cyanide is liberated from an acidified sample by distillation and purging with air. The hydrogen cyanide gas is then collected by passing it through a sodium hydroxide scrubbing solution. The scrubbing solution will then be analysed for cyanide by the appropriate method.
AN083	Separatory funnels are used for aqueous samples and extracted by transferring an appropriate volume (mass) of liquid into a separatory funnel and adding 3 serial aliquots of dichloromethane. Samples receive a single extraction at pH 7 to recover base / neutral analytes and two extractions at pH < 2 to recover acidic analytes. QC samples are prepared by spiking organic free water with target analytes and extracting as per samples.
AN101	pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode (glass plus reference electrode) and is calibrated against 3 buffers purchased commercially. For soils, an extract with water is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
AN113	Total Dissolved Solids: A well-mixed filtered sample of known volume is evaporated to dryness at 180°C and the residue weighed. Approximate methods for correlating chemical analysis with dissolved solids are available. Reference APHA 2540 C.
AN185	Gravimetric Oil & Grease and Hydrocarbons: A known volume of sample is extracted using an organic solvent and the solvent layer with dissolved oils and greases is transferred to a pre-weighed beaker. The solvent is evaporated over low heating and the beaker reweighed. The concentration of oil and grease is determined by the increase in mass of the collection beaker per volume of sample extracted. O&G is suitable for lubricating oils and other high boiling point products but is not suitable for volatiles. Reference APHA 5520 B. Internal Reference AN185
AN245	Anions by Ion Chromatography: A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO2, NO3 and SO4 are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B
AN277/WC250.312	Nitrite ions, when reacted with a reagent containing sulphanilamide and N-(1-naphthyl)-ethylenediamine dihydrochloride produce a highly coloured azo dye that is measured photometrically at 540nm.
AN279/AN293	The sample is digested with Sulphuric acid, K2SO4 and CuSO4. All forms of phosphorus are converted into orthophosphate. The digest is cooled and placed on the discrete analyser for colorimetric analysis.
AN281	An unfiltered water or soil sample is first digested in a block digestor with sulphuric acid, K2SO4 and CuSO4. The ammonia produced following digestion is then measured colourimetrically using the Aquakem 250 Discrete Analyser. A portion of the digested sample is buffered to an alkaline pH, and interfering cations are complexed. The ammonia then reacts with salicylate and hypochlorite to give a blue colour whose absorbance is measured at 660nm and compared with calibration standards. This is proportional to the concentration of Total Kjeldahl Nitrogen in the original sample.
AN287	A buffered distillate or water sample is treated with chloramine/barbituric acid reagents and the intensity of the colour developed is proportional to the cyanide concentration by Aquakem DA.
AN289	Analysis of Total Phenols in Soil Sediment and Water: Steam distillable phenols react with 4-aminoantipyrine at pH 7.9±0.1 in the presence of potassium ferricyanide to form a coloured antipyrine dye analysed by Discrete Analyser. Reference APHA 5530 B/D.

METHOD SUMMARY

METHOD	METHODOLOGY SUMMARY
AN311/AN312	Mercury by Cold Vapour AAS in Waters: Mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500.
AN318	Determination of elements at trace level in waters by ICP-MS technique, in accordance with USEPA 6020A.
AN320/AN321	Metals by ICP-OES: Samples are preserved with 10% nitric acid for a wide range of metals and some non-metals. This solution is measured by Inductively Coupled Plasma. Solutions are aspirated into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components.
AN320/AN321	Photomultipliers or CCDs are used to measure the light intensity at specific wavelengths. This intensity is directly proportional to concentration. Corrections are required to compensate for spectral overlap between elements. Reference APHA 3120 B.
AN433/AN434	VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC`s are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.

FOOTNOTES

IS	Insufficient sample for analysis.
LNR	Sample listed, but not received.
*	This analysis is not covered by the scope of accreditation.
^	Performed by outside laboratory.
LOR	Limit of Reporting
↑↓	Raised or Lowered Limit of Reporting
QFH	QC result is above the upper tolerance
QFL	QC result is below the lower tolerance
-	The sample was not analysed for this analyte
NVL	Not Validated

Samples analysed as received.
Solid samples expressed on a dry weight basis.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: http://www.au.sgs.com/sgs-mp-au-env-qu-022-qa-qc-plan-en-11.pdf

ANALYTICAL REPORT

CLIENT DETAILS		LABORATORY DETAILS	
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Project	**126093 North Penrith SE106556**	SGS Reference	PE066064 R1
Order Number	(Not specified)	Report Number	0000039712
Samples	4	Date Reported	09 May 2012
		Date Received	23 Mar 2012

COMMENTS

The document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025. NATA accredited laboratory 2562(898/20210).

SVOC surrogate recovery for sample "GW2 SE106556-2" was low due to the sample emulsifying during extraction.

TRH surrogate recoveries were not reported as samples were extracted for low level SVOC analysis.

This report cancels and supersedes the report PE066064. dated 11/5/2012 issued by SGS Environmental Services due to additional analysis added.

SIGNATORIES

Dale Lang
Senior Organics Chemist

Pamela Adams
Organic Team Leader

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name	PE066064.001 Water 21 Mar 2012 GW1 SE106556-1	PE066064.002 Water 21 Mar 2012 GW2 SE106556-2	PE066064.003 Water 21 Mar 2012 GW3 SE106556-3	PE066064.004 Water 21 Mar 2012 Duplicate D1 SE106556-4
Low Level Full 8270 SVOC in Water **Method: AN420**							
PAHs							
Acenaphthene	µg/L	0.01		<0.01	<0.01	<0.01	<0.01
Acenaphthylene	µg/L	0.01		<0.01	<0.01	<0.01	<0.01
Anthracene	µg/L	0.01		<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	µg/L	0.01		<0.01	<0.01	<0.01	<0.01
Benzo(b&k)fluoranthene	µg/L	0.02		<0.02	<0.02	<0.02	<0.02
Benzo(bluoranthene	µg/L	0.01		<0.01	<0.01	<0.01	<0.01
Benzo(k)fluoranthene	µg/L	0.01		<0.01	<0.01	<0.01	<0.01
Benzo(ghi)perylene	µg/L	0.01		<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	µg/L	0.005		<0.005	<0.005	<0.005	<0.005
Chrysene	µg/L	0.01		<0.01	<0.01	<0.01	<0.01
Dibenzo(ah)anthracene	µg/L	0.01		<0.01	<0.01	<0.01	<0.01
Fluoranthene	µg/L	0.01		<0.01	<0.01	<0.01	<0.01
Fluorene	µg/L	0.01		<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-cd)pyrene	µg/L	0.01		<0.01	<0.01	<0.01	<0.01
1-methylnaphthalene	µg/L	0.01		<0.01	<0.01	<0.01	<0.01
2-methylnaphthalene	µg/L	0.01		<0.01	<0.01	<0.01	<0.01
Naphthalene	µg/L	0.02		<0.02	<0.02	<0.02	<0.02
Phenanthrene	µg/L	0.01		<0.01	<0.01	<0.01	<0.01
Pyrene	µg/L	0.01		<0.01	<0.01	<0.01	<0.01
2-acetylamino fluorene	µg/L	0.05		<0.05	<0.05	<0.05	<0.05
7,12-dimethyl-benz(a)anthracene	µg/L	0.01		<0.01	<0.01	<0.01	<0.01
3-methylcholanthrene	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
OCs							
Aldrin	µg/L	0.01		<0.01	<0.01	<0.01	<0.01
Alpha-BHC	µg/L	0.05		<0.05	<0.05	<0.05	<0.05
Beta-BHC	µg/L	0.05		<0.05	<0.05	<0.05	<0.05
Delta-BHC	µg/L	0.05		<0.05	<0.05	<0.05	<0.05
Gamma-BHC (Lindane)	µg/L	0.05		<0.05	<0.05	<0.05	<0.05
p,p-DDD	µg/L	0.01		<0.01	<0.01	<0.01	<0.01
p,p-DDE	µg/L	0.01		<0.01	<0.01	<0.01	<0.01
p,p-DDT	µg/L	0.01		<0.01	<0.01	<0.01	<0.01
Dieldrin	µg/L	0.01		<0.01	<0.01	<0.01	<0.01
Alpha-endosulfan	µg/L	0.02		<0.02	<0.02	<0.02	<0.02
Beta-endosulfan	µg/L	0.02		<0.02	<0.02	<0.02	<0.02
Endosulfan sulphate	µg/L	0.02		<0.02	<0.02	<0.02	<0.02
Endrin	µg/L	0.02		<0.02	<0.02	<0.02	<0.02
Heptachlor	µg/L	0.02		<0.02	<0.02	<0.02	<0.02
Heptachlor epoxide	µg/L	0.02		<0.02	<0.02	<0.02	<0.02
Isodrin	µg/L	0.01		<0.01	<0.01	<0.01	<0.01
Methoxychlor	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
Mirex	µg/L	0.01		<0.01	<0.01	<0.01	<0.01
Alpha-chlordane	µg/L	0.01		<0.01	<0.01	<0.01	<0.01
Gamma-chlordane	µg/L	0.01		<0.01	<0.01	<0.01	<0.01
Endrin ketone	µg/L	0.05		<0.05	<0.05	<0.05	<0.05
OPs							
Azinphos-methyl (Guthion)	µg/L	0.05		<0.05	<0.05	<0.05	<0.05
Bromophos ethyl	µg/L	0.05		<0.05	<0.05	<0.05	<0.05
Carbophenothion	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
Chlorfenvinphos-cis (Chlofenvinphos-cis)	µg/L	0.5		<0.5	<0.5	<0.5	<0.5
Chlorfenvinphos-trans (Chlofenvinphos-trans)	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
Chlorpyrifos (Chlorpyrifos Ethyl)	µg/L	0.01		<0.01	<0.01	<0.01	<0.01
Chlorpyrifos-methyl	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
Co-Ral (Coumaphos)	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
Diazinon (Dimpylate)	µg/L	0.01		<0.01	<0.01	<0.01	<0.01
Dichlorvos	µg/L	0.5		<0.5	<0.5	<0.5	<0.5
Demeton-S-methyl	µg/L	0.1		<0.1	<0.1	<0.1	<0.1

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name	PE066064.001 Water 21 Mar 2012 GW1 SE106556-1	PE066064.002 Water 21 Mar 2012 GW2 SE106556-2	PE066064.003 Water 21 Mar 2012 GW3 SE106556-3	PE066064.004 Water 21 Mar 2012 Duplicate D1 SE106556-4
Low Level Full 8270 SVOC in Water Method: AN420 (continued)							
Dimethoate	µg/L	0.15		<0.15	<0.15	<0.15	<0.15
Disulfoton (Di-syston)	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
EPN*	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
Ethion	µg/L	0.05		<0.05	<0.05	<0.05	<0.05
Ethoprophos (Ethoprop or Prophos)	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
Famphur (Famophos)	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
Fenamiphos (Phenamiphos)	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
Fenchlorophos (Ronnel)	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
Fenitrothion	µg/L	0.2		<0.2	<0.2	<0.2	<0.2
Fenthion	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
Malathion (Maldison)	µg/L	0.05		<0.05	<0.05	<0.05	<0.05
Methidathion	µg/L	0.05		<0.05	<0.05	<0.05	<0.05
Mevinphos-cis/trans	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
o,o,o-triethyl phosphorothioate	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
Parathion ethyl (Parathion)	µg/L	0.01		<0.01	<0.01	<0.01	<0.01
Parathion methyl	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
Phorate	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
Pirimiphos-ethyl	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
Pirimiphos-methyl	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
Profenofos	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
Prothiophos (Tokuthion)*	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
Sulfotepp	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
Tetrachlorvinphos (Stirophos)*	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
PCB UPAC(7) Congeners							
Arochlor 1221	µg/L	1		<1	<1	<1	<1
Arochlor 1232	µg/L	1		<1	<1	<1	<1
Arochlor 1242	µg/L	1		<1	<1	<1	<1
Arochlor 1248	µg/L	1		<1	<1	<1	<1
Arochlor 1254	µg/L	1		<1	<1	<1	<1
Arochlor 1260	µg/L	1		<1	<1	<1	<1
Arochlor 1262	µg/L	1		<1	<1	<1	<1
Arochlor 1016	µg/L	1		<1	<1	<1	<1
Arochlor 1268	µg/L	1		<1	<1	<1	<1
SVCH (Cl Benzenes, Hydrocarbons & VOCs)							
1/2-Chloronaphthalene	µg/L	0.02		<0.02	<0.02	<0.02	<0.02
Hexachlorobenzene	µg/L	0.01		<0.01	<0.01	<0.01	<0.01
1,2-dichlorobenzene	µg/L	0.05		<0.05	<0.05	<0.05	<0.05
1,3-dichlorobenzene	µg/L	0.05		<0.05	<0.05	<0.05	<0.05
1,4-dichlorobenzene	µg/L	0.05		<0.05	<0.05	<0.05	<0.05
Hexachlorobutadiene	µg/L	0.05		<0.05	<0.05	<0.05	<0.05
Hexachlorocyclopentadiene	µg/L	0.5		<0.5	<0.5	<0.5	<0.5
Hexachloroethane	µg/L	0.05		<0.05	<0.05	<0.05	<0.05
Hexachloroproprene	µg/L	0.05		<0.05	<0.05	<0.05	<0.05
Pentachlorobenzene	µg/L	0.05		<0.05	<0.05	<0.05	<0.05
Pentachloroethane	µg/L	0.05		<0.05	<0.05	<0.05	<0.05
1,2,3,5 and 1,2,4,5-tetrachlorobenzene	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
1,2,3,4-tetrachlorobenzene	µg/L	0.05		<0.05	<0.05	<0.05	<0.05
1,2,4-trichlorobenzene	µg/L	0.01		<0.01	<0.01	<0.01	<0.01
Phthalates							
Bis(2-ethylhexyl)phthalate	µg/L	50		<50	<50	<50	<50
Bis(2-ethylhexyl)adipate	µg/L	5		<5	<5	<5	<5
Butyl benzyl phthalate	µg/L	5		<5	<5	<5	<5
Di-n-butyl phthalate	µg/L	10		<10	<10	<10	<10
Diethyl phthalate	µg/L	5		<5	<5	<5	<5
Dimethyl phthalate	µg/L	5		<5	<5	<5	<5
Dioctyl phthalate	µg/L	5		<5	<5	<5	<5

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name PE066064.001 Water 21 Mar 2012 GW1 SE106556-1	PE066064.002 Water 21 Mar 2012 GW2 SE106556-2	PE066064.003 Water 21 Mar 2012 GW3 SE106556-3	PE066064.004 Water 21 Mar 2012 Duplicate D1 SE106556-4
Low Level Full 8270 SVOC in Water Method: AN420 (continued)						
Carbamates						
Carbofuran	µg/L	0.05	<0.05	<0.05	<0.05	<0.05
Carbaryl	µg/L	0.05	<0.05	<0.05	<0.05	<0.05
Herbicides (normal)						
Trifluralin	µg/L	0.05	<0.05	<0.05	<0.05	<0.05
Nitrosamines						
N-nitroso-di-n-butylamine (NDBA)	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
N-nitroso-diethylamine (NDEA)	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
N-nitroso-di-n-propylamine (NDPA)	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
N-nitroso-morpholine (NMOR)	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
N-nitroso-piperidine (NPIP)	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
N-nitroso-pyrrolidine (NPYR)	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
4-amino biphenyl	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Nitroaromatics and Ketones						
Acetophenone	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
1,3-dinitrobenzene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
2,4-dinitrotoluene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
2,6-dinitrotoluene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Isophorone	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Nitrobenzene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
p-(dimethylamino) azobenzene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Phenacetin	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Pentachloronitrobenzene (quintozene)	µg/L	0.01	<0.01	<0.01	<0.01	<0.01
Anilines and Amines						
Aniline	µg/L	5	<5	<5	<5	<5
4-chloroaniline	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
2-nitroaniline	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
3-nitroaniline	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
4-nitroaniline	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
Diphenylamine	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
o-Toluidine	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
5-nitro-o-toluidine	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
1-naphthylamine	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
2-naphthylamine	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
Haloethers						
Bis(2-chloroethoxy) methane	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Bis(2-chloroethyl) ether	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Bis(2-chloroisopropyl) ether	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
4-chlorophenyl phenyl ether	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
4-bromophenyl phenyl ether	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Other SVOCs						
Methyl methanesulfonate	µg/L	0.2	<0.2	<0.2	<0.2	<0.2
Ethyl methanesulfonate	µg/L	0.2	<0.2	<0.2	<0.2	<0.2
Dibenzofuran	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
Benzyl alcohol	µg/L	0.2	<0.2	<0.2	<0.2	<0.2
Safrole	µg/L	0.2	<0.2	<0.2	<0.2	<0.2
Isosafrole Isomer 1	µg/L	0.2	<0.2	<0.2	<0.2	<0.2
Isosafrole Isomer 2	µg/L	0.2	<0.2	<0.2	<0.2	<0.2
1,4-naphthoquinone	µg/L	0.2	<0.2	<0.2	<0.2	<0.2
Thionazin	µg/L	0.2	<0.2	<0.2	<0.2	<0.2
Speciated Routine Phenols						

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name	PE066064.001 Water 21 Mar 2012 GW1 SE106556-1	PE066064.002 Water 21 Mar 2012 GW2 SE106556-2	PE066064.003 Water 21 Mar 2012 GW3 SE106556-3	PE066064.004 Water 21 Mar 2012 Duplicate D1 SE106556-4
Low Level Full 8270 SVOC in Water Method: AN420 (continued)							
3/4-methyl phenol (m/p-cresol)	µg/L	0.4		<0.4	<0.4	<0.4	<0.4
2-methyl phenol (o-cresol)	µg/L	0.2		<0.2	<0.2	<0.2	<0.2
2,6-dichlorophenol	µg/L	0.05		<0.05	<0.05	<0.05	<0.05
2,3,4,6 and 2,3,5,6-tetrachlorophenol	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
2,4,5-trichlorophenol	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
4-chloro-3-methylphenol	µg/L	0.2		<0.2	<0.2	<0.2	<0.2
2-chlorophenol	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
2,4-dichlorophenol	µg/L	0.05		<0.05	<0.05	<0.05	<0.05
2,4-dimethyl phenol	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
2-nitrophenol	µg/L	0.2		<0.2	<0.2	<0.2	<0.2
Phenol	µg/L	0.2		<0.2	<0.2	<0.2	<0.2
2,4,6-trichlorophenol	µg/L	0.05		<0.05	<0.05	<0.05	<0.05
Pentachlorophenol	µg/L	0.01		<0.01	<0.01	<0.01	<0.01
4-nitrophenol	µg/L	0.05		<0.05	<0.05	<0.05	<0.05
Surrogates							
d5-phenol (Surrogate)	%	-		-	-	-	-
d5-nitrobenzene (Surrogate)	%	-		-	-	-	-
2-fluorobiphenyl (Surrogate)	%	-		-	-	-	-
2,4,6-Tribromophenol (Surrogate)	%	-		**75**	**27**	**76**	**82**
d14-p-terphenyl (Surrogate)	%	-		**85**	**38**	**76**	**90**
TRH (Total Recoverable Hydrocarbons) in Water Method: AN403							
TRH C10-C14	µg/L	40		<40	<40	<40	<40
TRH C15-C28	µg/L	100		<100	<100	<100	<100
TRH C29-C40	µg/L	200		<200	<200	<200	<200
Surrogates							
TRH (Surrogate)	%	-		-	-	-	-

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula: *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Low Level Full 8270 SVOC in Water **Method: ME-(AU)-[ENV]AN420**

PAHs

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
Acenaphthene	LB038268	µg/L	0.01	<0.01	
Acenaphthylene	LB038268	µg/L	0.01	<0.01	
Anthracene	LB038268	µg/L	0.01	<0.01	
Benzo(a)anthracene	LB038268	µg/L	0.01	<0.01	NA
Benzo(b&k)fluoranthene	LB038268	µg/L	0.02	<0.02	
Benzo(bluoranthene	LB038268	µg/L	0.01	<0.01	
Benzo(k)fluoranthene	LB038268	µg/L	0.01	<0.01	
Benzo(ghi)perylene	LB038268	µg/L	0.01	<0.01	
Benzo(a)pyrene	LB038268	µg/L	0.005	<0.005	NA
Chrysene	LB038268	µg/L	0.01	<0.01	
Dibenzo(ah)anthracene	LB038268	µg/L	0.01	<0.01	
Fluoranthene	LB038268	µg/L	0.01	<0.01	
Fluorene	LB038268	µg/L	0.01	<0.01	NA
Indeno(1,2,3-cd)pyrene	LB038268	µg/L	0.01	<0.01	
1-methylnaphthalene	LB038268	µg/L	0.01	<0.01	
2-methylnaphthalene	LB038268	µg/L	0.01	<0.01	
Naphthalene	LB038268	µg/L	0.02	<0.02	NA
Phenanthrene	LB038268	µg/L	0.01	<0.01	NA
Pyrene	LB038268	µg/L	0.01	<0.01	NA
2-acetylamino fluorene	LB038268	µg/L	0.05	<0.05	
7,12-dimethyl-benz(a)anthracene	LB038268	µg/L	0.01	<0.01	
3-methylcholanthrene	LB038268	µg/L	0.1	<0.1	

OCs

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
Aldrin	LB038268	µg/L	0.01	<0.01	NA
Alpha-BHC	LB038268	µg/L	0.05	<0.05	
Beta-BHC	LB038268	µg/L	0.05	<0.05	
Delta-BHC	LB038268	µg/L	0.05	<0.05	
Gamma-BHC (Lindane)	LB038268	µg/L	0.05	<0.05	NA
p,p-DDD	LB038268	µg/L	0.01	<0.01	
p,p-DDE	LB038268	µg/L	0.01	<0.01	
p,p-DDT	LB038268	µg/L	0.01	<0.01	
Dieldrin	LB038268	µg/L	0.01	<0.01	NA
Alpha-endosulfan	LB038268	µg/L	0.02	<0.02	
Beta-endosulfan	LB038268	µg/L	0.02	<0.02	
Endosulfan sulphate	LB038268	µg/L	0.02	<0.02	
Endrin	LB038268	µg/L	0.02	<0.02	NA
Heptachlor	LB038268	µg/L	0.02	<0.02	NA
Heptachlor epoxide	LB038268	µg/L	0.02	<0.02	
Isodrin	LB038268	µg/L	0.01	<0.01	NA
Methoxychlor	LB038268	µg/L	0.1	<0.1	
Mirex	LB038268	µg/L	0.01	<0.01	NA
Alpha-chlordane	LB038268	µg/L	0.01	<0.01	
Gamma-chlordane	LB038268	µg/L	0.01	<0.01	NA
Endrin ketone	LB038268	µg/L	0.05	<0.05	

OPs

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
Azinphos-methyl (Guthion)	LB038268	µg/L	0.05	<0.05	
Bromophos ethyl	LB038268	µg/L	0.05	<0.05	
Carbophenothion	LB038268	µg/L	0.1	<0.1	
Chlorfenvinphos-cis (Chlofenvinphos-cis)	LB038268	µg/L	0.5	<0.5	
Chlorfenvinphos-trans (Chlofenvinphos-trans)	LB038268	µg/L	0.1	<0.1	

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula: *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Low Level Full 8270 SVOC in Water **Method: ME-(AU)-[ENV]AN420 (continued)**

				MB	LCS %Recovery
Chlorpyrifos (Chlorpyrifos Ethyl)	LB038268	µg/L	0.01	<0.01	NA
Chlorpyrifos-methyl	LB038268	µg/L	0.1	<0.1	
Co-Ral (Coumaphos)	LB038268	µg/L	0.1	<0.1	
Diazinon (Dimpylate)	LB038268	µg/L	0.01	<0.01	NA
Dichlorvos	LB038268	µg/L	0.5	<0.5	
Demeton-S-methyl	LB038268	µg/L	0.1	<0.1	
Dimethoate	LB038268	µg/L	0.15	<0.15	
Disulfoton (Di-syston)	LB038268	µg/L	0.1	<0.1	
EPN*	LB038268	µg/L	0.1	<0.1	
Ethion	LB038268	µg/L	0.05	<0.05	
Ethoprophos (Ethoprop or Prophos)	LB038268	µg/L	0.1	<0.1	
Famphur (Famophos)	LB038268	µg/L	0.1	<0.1	
Fenamiphos (Phenamiphos)	LB038268	µg/L	0.1	<0.1	
Fenchlorophos (Ronnel)	LB038268	µg/L	0.1	<0.1	
Fenitrothion	LB038268	µg/L	0.2	<0.2	
Fenthion	LB038268	µg/L	0.1	<0.1	
Malathion (Maldison)	LB038268	µg/L	0.05	<0.05	
Methidathion	LB038268	µg/L	0.05	<0.05	NA
Mevinphos-cis/trans	LB038268	µg/L	0.1	<0.1	
o,o,o-triethyl phosphorothioate	LB038268	µg/L	0.1	<0.1	
Parathion ethyl (Parathion)	LB038268	µg/L	0.01	<0.01	NA
Parathion methyl	LB038268	µg/L	0.1	<0.1	
Phorate	LB038268	µg/L	0.1	<0.1	
Pirimiphos-ethyl	LB038268	µg/L	0.1	<0.1	NA
Pirimiphos-methyl	LB038268	µg/L	0.1	<0.1	
Profenofos	LB038268	µg/L	0.1	<0.1	
Prothiophos (Tokuthion)*	LB038268	µg/L	0.1	<0.1	
Sulfotepp	LB038268	µg/L	0.1	<0.1	
Tetrachlorvinphos (Stirophos)*	LB038268	µg/L	0.1	<0.1	82%

PCB UPAC(7) Congeners

Parameter	QC Reference	Units	LOR	MB
Arochlor 1221	LB040898	µg/L	1	<1
Arochlor 1232	LB040898	µg/L	1	<1
Arochlor 1242	LB040898	µg/L	1	<1
Arochlor 1248	LB040898	µg/L	1	<1
Arochlor 1254	LB040898	µg/L	1	<1
Arochlor 1260	LB040898	µg/L	1	<1
Arochlor 1262	LB040898	µg/L	1	<1
Arochlor 1016	LB040898	µg/L	1	<1
Arochlor 1268	LB040898	µg/L	1	<1

SVCH (Cl Benzenes, Hydrocarbons & VOCs)

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
1/2-Chloronaphthalene	LB038268	µg/L	0.02	<0.02	
Hexachlorobenzene	LB038268	µg/L	0.01	<0.01	NA
1,2-dichlorobenzene	LB038268	µg/L	0.05	<0.05	NA
1,3-dichlorobenzene	LB038268	µg/L	0.05	<0.05	NA
1,4-dichlorobenzene	LB038268	µg/L	0.05	<0.05	NA
Hexachlorobutadiene	LB038268	µg/L	0.05	<0.05	NA
Hexachlorocyclopentadiene	LB038268	µg/L	0.5	<0.5	
Hexachloroethane	LB038268	µg/L	0.05	<0.05	NA
Hexachloroproprene	LB038268	µg/L	0.05	<0.05	
Pentachlorobenzene	LB038268	µg/L	0.05	<0.05	
Pentachloroethane	LB038268	µg/L	0.05	<0.05	

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula: *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Low Level Full 8270 SVOC in Water **Method: ME-(AU)-[ENV]AN420 (continued)**

				MB	LCS %Recovery
1,2,3,5 and 1,2,4,5-tetrachlorobenzene	LB038268	µg/L	0.1	<0.1	
1,2,3,4-tetrachlorobenzene	LB038268	µg/L	0.05	<0.05	
1,2,4-trichlorobenzene	LB038268	µg/L	0.01	<0.01	NA

Phthalates

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
Bis(2-ethylhexyl)phthalate	LB038268	µg/L	50	<50	NA
Bis(2-ethylhexyl)adipate	LB038268	µg/L	5	<5	
Butyl benzyl phthalate	LB038268	µg/L	5	<5	NA
Di-n-butyl phthalate	LB038268	µg/L	10	<10	NA
Diethyl phthalate	LB038268	µg/L	5	<5	NA
Dimethyl phthalate	LB038268	µg/L	5	<5	NA
Dioctyl phthalate	LB038268	µg/L	5	<5	

Carbamates

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
Carbofuran	LB038268	µg/L	0.05	<0.05	NA
Carbaryl	LB038268	µg/L	0.05	<0.05	

Herbicides (normal)

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
Trifluralin	LB038268	µg/L	0.05	<0.05	84%

Nitrosamines

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
N-nitroso-di-n-butylamine (NDBA)	LB038268	µg/L	0.1	<0.1	
N-nitroso-diethylamine (NDEA)	LB038268	µg/L	0.1	<0.1	
N-nitroso-di-n-propylamine (NDPA)	LB038268	µg/L	0.1	<0.1	94%
N-nitroso-morpholine (NMOR)	LB038268	µg/L	0.1	<0.1	
N-nitroso-piperidine (NPIP)	LB038268	µg/L	0.1	<0.1	
N-nitroso-pyrrolidine (NPYR)	LB038268	µg/L	0.1	<0.1	
4-amino biphenyl	LB038268	µg/L	0.1	<0.1	

Nitroaromatics and Ketones

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
Acetophenone	LB038268	µg/L	0.1	<0.1	
1,3-dinitrobenzene	LB038268	µg/L	0.1	<0.1	
2,4-dinitrotoluene	LB038268	µg/L	0.1	<0.1	NA
2,6-dinitrotoluene	LB038268	µg/L	0.1	<0.1	NA
Isophorone	LB038268	µg/L	0.1	<0.1	NA
Nitrobenzene	LB038268	µg/L	0.1	<0.1	NA
p-(dimethylamino) azobenzene	LB038268	µg/L	0.1	<0.1	
Phenacetin	LB038268	µg/L	0.1	<0.1	
Pentachloronitrobenzene (quintozene)	LB038268	µg/L	0.01	<0.01	

Anilines and Amines

Parameter	QC Reference	Units	LOR	MB
Aniline	LB038268	µg/L	5	<5
4-chloroaniline	LB038268	µg/L	0.5	<0.5
2-nitroaniline	LB038268	µg/L	0.5	<0.5
3-nitroaniline	LB038268	µg/L	0.5	<0.5
4-nitroaniline	LB038268	µg/L	0.5	<0.5
Diphenylamine	LB038268	µg/L	0.1	<0.1

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula: *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Low Level Full 8270 SVOC in Water Method: ME-(AU)-[ENV]AN420 (continued)

				MB
o-Toluidine	LB038268	µg/L	0.5	<0.5
5-nitro-o-toluidine	LB038268	µg/L	0.5	<0.5
1-naphthylamine	LB038268	µg/L	0.5	<0.5
2-naphthylamine	LB038268	µg/L	0.5	<0.5

Haloethers

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
Bis(2-chloroethoxy) methane	LB038268	µg/L	0.1	<0.1	NA
Bis(2-chloroethyl) ether	LB038268	µg/L	0.1	<0.1	NA
Bis(2-chloroisopropyl) ether	LB038268	µg/L	0.1	<0.1	NA
4-chlorophenyl phenyl ether	LB038268	µg/L	0.1	<0.1	NA
4-bromophenyl phenyl ether	LB038268	µg/L	0.1	<0.1	NA

Other SVOCs

Parameter	QC Reference	Units	LOR	MB
Methyl methanesulfonate	LB038268	µg/L	0.2	<0.2
Ethyl methanesulfonate	LB038268	µg/L	0.2	<0.2
Dibenzofuran	LB038268	µg/L	0.5	<0.5
Benzyl alcohol	LB038268	µg/L	0.2	<0.2
Safrole	LB038268	µg/L	0.2	<0.2
Isosafrole Isomer 1	LB038268	µg/L	0.2	<0.2
Isosafrole Isomer 2	LB038268	µg/L	0.2	<0.2
1,4-naphthoquinone	LB038268	µg/L	0.2	<0.2
Thionazin	LB038268	µg/L	0.2	<0.2

Speciated Routine Phenols

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
3/4-methyl phenol (m/p-cresol)	LB038268	µg/L	0.4	<0.4	
2-methyl phenol (o-cresol)	LB038268	µg/L	0.2	<0.2	NA
2,6-dichlorophenol	LB038268	µg/L	0.05	<0.05	
2,3,4,6 and 2,3,5,6-tetrachlorophenol	LB038268	µg/L	0.1	<0.1	
2,4,5-trichlorophenol	LB038268	µg/L	0.1	<0.1	
4-chloro-3-methylphenol	LB038268	µg/L	0.2	<0.2	
2-chlorophenol	LB038268	µg/L	0.1	<0.1	
2,4-dichlorophenol	LB038268	µg/L	0.05	<0.05	NA
2,4-dimethyl phenol	LB038268	µg/L	0.1	<0.1	
2-nitrophenol	LB038268	µg/L	0.2	<0.2	
Phenol	LB038268	µg/L	0.2	<0.2	NA
2,4,6-trichlorophenol	LB038268	µg/L	0.05	<0.05	
Pentachlorophenol	LB038268	µg/L	0.01	<0.01	NA
4-nitrophenol	LB038268	µg/L	0.05	<0.05	

Surrogates

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
2,4,6-Tribromophenol (Surrogate)	LB038268	%	-	64%	92%
d14-p-terphenyl (Surrogate)	LB038268	%	-	77%	83%

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula: *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

TRH (Total Recoverable Hydrocarbons) in Water **Method: ME-(AU)-[ENV]AN403**

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
TRH C10-C14	LB038268	µg/L	40	<40	102%
TRH C15-C28	LB038268	µg/L	100	<100	101%
TRH C29-C40	LB038268	µg/L	200	<200	NA

METHOD SUMMARY

METHOD	METHODOLOGY SUMMARY
AN083	Separatory funnels are used for aqueous samples and extracted by transferring an appropriate volume (mass) of liquid into a separatory funnel and adding 3 serial aliquots of dichloromethane. Samples receive a single extraction at pH 7 to recover base / neutral analytes and two extractions at pH < 2 to recover acidic analytes. QC samples are prepared by spiking organic free water with target analytes and extracting as per samples.
AN403	Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36.
AN403	Additionally, the volatile C6-C9 fraction may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Petroleum Hydrocarbons (TPH) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with diffential polarity of the elluent solvents.
AN403	The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependant on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.
AN420	SVOC Compounds: Semi-Volatile Organic Compounds (SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols (etc) in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).

FOOTNOTES

IS	Insufficient sample for analysis.
LNR	Sample listed, but not received.
*	This analysis is not covered by the scope of accreditation.
^	Performed by outside laboratory.
LOR	Limit of Reporting
↑↓	Raised or Lowered Limit of Reporting
QFH	QC result is above the upper tolerance
QFL	QC result is below the lower tolerance
-	The sample was not analysed for this analyte
NVL	Not Validated

Samples analysed as received.
Solid samples expressed on a dry weight basis.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: http://www.au.sgs.com/sgs-mp-au-env-qu-022-qa-qc-plan-en-11.pdf

STATEMENT OF QA/QC PERFORMANCE

SE106556 R0

CLIENT DETAILS

Contact	James Ngu
Client	Geotechnique
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Telephone	02 4722 2700
Facsimile	02 4722 6161
Email	james.ngu@geotech.com.au
Project	**12609-3 - North Penrith- Waters**
Order Number	(Not specified)
Samples	6

LABORATORY DETAILS

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SGS Reference	SE106556 R0
Report Number	0000023985
Date Reported	11 Apr 2012

COMMENTS

All the laboratory data for each environmental matrix was compared to SGS Environmental Services' stated Data Quality Objectives (DQO). Comments arising from the comparison were made and are reported below.

The data relating to sampling was taken from the Chain of Custody document and was supplied by the Client.
This QA/QC Statement must be read in conjunction with the referenced Analytical Report.
The Statement and the Analytical Report must not be reproduced except in full.

All Data Quality Objectives were met with the exception of the following:

Extraction Date	VOCs in Water	6 items
	Volatile Petroleum Hydrocarbons in Water	6 items
Analysis Date	Total Dissolved Solids (TDS) in water	4 items

SAMPLE SUMMARY

Sample counts by matrix	6 Waters	Type of documentation received	COC
Date documentation received	21/03/2012@4:38pr	Samples received in good order	Yes
Samples received without headspace	Yes	Sample temperature upon receipt	20.0°C
Sample container provider	SGS	Turnaround time requested	Standard
Samples received in correct containers	**No**	Sufficient sample for analysis	Yes
Sample cooling method	None	Samples clearly labelled	Yes
Complete documentation received	Yes		

HOLDING TIME SUMMARY

SE106556 R0

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

Ammonia Nitrogen by Discrete Analyser (Aquakem)

Method: ME-(AU)-[ENV]AN291

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW1	SE106556.001	LB016588	21 Mar 2012	21 Mar 2012	18 Apr 2012	22 Mar 2012	18 Apr 2012	22 Mar 2012
GW2	SE106556.002	LB016588	21 Mar 2012	21 Mar 2012	18 Apr 2012	22 Mar 2012	18 Apr 2012	22 Mar 2012
GW3	SE106556.003	LB016588	21 Mar 2012	21 Mar 2012	18 Apr 2012	22 Mar 2012	18 Apr 2012	22 Mar 2012
Duplicate D1	SE106556.004	LB016588	21 Mar 2012	21 Mar 2012	18 Apr 2012	22 Mar 2012	18 Apr 2012	22 Mar 2012

Anions by Ion Chromatography in Water

Method: ME-(AU)-[ENV]AN245

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW1	SE106556.001	LB016593	21 Mar 2012	21 Mar 2012	18 Apr 2012	22 Mar 2012	18 Apr 2012	26 Mar 2012
GW2	SE106556.002	LB016593	21 Mar 2012	21 Mar 2012	18 Apr 2012	22 Mar 2012	18 Apr 2012	26 Mar 2012
GW3	SE106556.003	LB016593	21 Mar 2012	21 Mar 2012	18 Apr 2012	22 Mar 2012	18 Apr 2012	26 Mar 2012
Duplicate D1	SE106556.004	LB016593	21 Mar 2012	21 Mar 2012	18 Apr 2012	22 Mar 2012	18 Apr 2012	26 Mar 2012

Mercury (dissolved) in Water

Method: ME-(AU)-[ENV]AN311/AN312

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW1	SE106556.001	LB016615	21 Mar 2012	21 Mar 2012	18 Apr 2012	22 Mar 2012	18 Apr 2012	23 Mar 2012
GW2	SE106556.002	LB016615	21 Mar 2012	21 Mar 2012	18 Apr 2012	22 Mar 2012	18 Apr 2012	23 Mar 2012
GW3	SE106556.003	LB016615	21 Mar 2012	21 Mar 2012	18 Apr 2012	22 Mar 2012	18 Apr 2012	23 Mar 2012
Duplicate D1	SE106556.004	LB016615	21 Mar 2012	21 Mar 2012	18 Apr 2012	22 Mar 2012	18 Apr 2012	23 Mar 2012

Metals in Water (Dissolved) by ICPOES

Method: ME-(AU)-[ENV]AN320/AN321

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW1	SE106556.001	LB017250	21 Mar 2012	21 Mar 2012	17 Sep 2012	30 Mar 2012	17 Sep 2012	02 Apr 2012
GW2	SE106556.002	LB017250	21 Mar 2012	21 Mar 2012	17 Sep 2012	30 Mar 2012	17 Sep 2012	02 Apr 2012
GW3	SE106556.003	LB017250	21 Mar 2012	21 Mar 2012	17 Sep 2012	30 Mar 2012	17 Sep 2012	02 Apr 2012

Nitrite in Water

Method: ME-(AU)-[ENV]AN277/WC250.312

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW1	SE106556.001	LB016591	21 Mar 2012	21 Mar 2012	23 Mar 2012	22 Mar 2012	23 Mar 2012	22 Mar 2012
GW2	SE106556.002	LB016591	21 Mar 2012	21 Mar 2012	23 Mar 2012	22 Mar 2012	23 Mar 2012	22 Mar 2012
GW3	SE106556.003	LB016591	21 Mar 2012	21 Mar 2012	23 Mar 2012	22 Mar 2012	23 Mar 2012	22 Mar 2012
Duplicate D1	SE106556.004	LB016591	21 Mar 2012	21 Mar 2012	23 Mar 2012	22 Mar 2012	23 Mar 2012	22 Mar 2012

Oil and Grease in Water

Method: ME-(AU)-[ENV]AN185

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW1	SE106556.001	LB016649	21 Mar 2012	21 Mar 2012	18 Apr 2012	22 Mar 2012	18 Apr 2012	27 Mar 2012
GW2	SE106556.002	LB016649	21 Mar 2012	21 Mar 2012	18 Apr 2012	22 Mar 2012	18 Apr 2012	27 Mar 2012
GW3	SE106556.003	LB016649	21 Mar 2012	21 Mar 2012	18 Apr 2012	22 Mar 2012	18 Apr 2012	27 Mar 2012
Duplicate D1	SE106556.004	LB016649	21 Mar 2012	21 Mar 2012	18 Apr 2012	22 Mar 2012	18 Apr 2012	27 Mar 2012

pH in water

Method: ME-(AU)-[ENV]AN101

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW1	SE106556.001	LB016600	21 Mar 2012	21 Mar 2012	22 Mar 2012	22 Mar 2012	22 Mar 2012	22 Mar 2012
GW2	SE106556.002	LB016600	21 Mar 2012	21 Mar 2012	22 Mar 2012	22 Mar 2012	22 Mar 2012	22 Mar 2012
GW3	SE106556.003	LB016600	21 Mar 2012	21 Mar 2012	22 Mar 2012	22 Mar 2012	22 Mar 2012	22 Mar 2012
Duplicate D1	SE106556.004	LB016600	21 Mar 2012	21 Mar 2012	22 Mar 2012	22 Mar 2012	22 Mar 2012	22 Mar 2012

TKN Kjeldahl Digestion by Discrete Analyser

Method: ME-(AU)-[ENV]AN281/AN292

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW1	SE106556.001	LB016597	21 Mar 2012	21 Mar 2012	18 Apr 2012	22 Mar 2012	18 Apr 2012	22 Mar 2012
GW2	SE106556.002	LB016597	21 Mar 2012	21 Mar 2012	18 Apr 2012	22 Mar 2012	18 Apr 2012	22 Mar 2012
GW3	SE106556.003	LB016597	21 Mar 2012	21 Mar 2012	18 Apr 2012	22 Mar 2012	18 Apr 2012	22 Mar 2012
Duplicate D1	SE106556.004	LB016597	21 Mar 2012	21 Mar 2012	18 Apr 2012	22 Mar 2012	18 Apr 2012	22 Mar 2012

Total Cyanide in water by Discrete Analyser (Aquakem)

Method: ME-(AU)-[ENV]AN077/AN287

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW1	SE106556.001	LB016589	21 Mar 2012	21 Mar 2012	04 Apr 2012	22 Mar 2012	04 Apr 2012	22 Mar 2012
GW2	SE106556.002	LB016589	21 Mar 2012	21 Mar 2012	04 Apr 2012	22 Mar 2012	04 Apr 2012	22 Mar 2012
GW3	SE106556.003	LB016589	21 Mar 2012	21 Mar 2012	04 Apr 2012	22 Mar 2012	04 Apr 2012	22 Mar 2012
Duplicate D1	SE106556.004	LB016589	21 Mar 2012	21 Mar 2012	04 Apr 2012	22 Mar 2012	04 Apr 2012	22 Mar 2012

Total Dissolved Solids (TDS) in water

Method: ME-(AU)-[ENV]AN113

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW1	SE106556.001	LB016598	21 Mar 2012	21 Mar 2012	28 Mar 2012	22 Mar 2012	28 Mar 2012	04 Apr 2012†
GW2	SE106556.002	LB016598	21 Mar 2012	21 Mar 2012	28 Mar 2012	22 Mar 2012	28 Mar 2012	04 Apr 2012†

HOLDING TIME SUMMARY

SE106556 R0

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

Total Dissolved Solids (TDS) in water (continued)

Method: ME-(AU)-[ENV]AN113

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW3	SE106556.003	LB016598	21 Mar 2012	21 Mar 2012	28 Mar 2012	22 Mar 2012	28 Mar 2012	04 Apr 2012†
Duplicate D1	SE106556.004	LB016598	21 Mar 2012	21 Mar 2012	28 Mar 2012	22 Mar 2012	28 Mar 2012	04 Apr 2012†

Total Phenolics in Water

Method: ME-(AU)-[ENV]AN289

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW1	SE106556.001	LB016595	21 Mar 2012	21 Mar 2012	18 Apr 2012	22 Mar 2012	18 Apr 2012	22 Mar 2012
GW2	SE106556.002	LB016595	21 Mar 2012	21 Mar 2012	18 Apr 2012	22 Mar 2012	18 Apr 2012	22 Mar 2012
GW3	SE106556.003	LB016595	21 Mar 2012	21 Mar 2012	18 Apr 2012	22 Mar 2012	18 Apr 2012	22 Mar 2012
Duplicate D1	SE106556.004	LB016595	21 Mar 2012	21 Mar 2012	18 Apr 2012	22 Mar 2012	18 Apr 2012	22 Mar 2012

Total Phosphorus by Kjeldahl Digestion DA in Water

Method: ME-(AU)-[ENV]AN279/AN293

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW1	SE106556.001	LB016639	21 Mar 2012	21 Mar 2012	18 Apr 2012	22 Mar 2012	18 Apr 2012	22 Mar 2012
GW2	SE106556.002	LB016639	21 Mar 2012	21 Mar 2012	18 Apr 2012	22 Mar 2012	18 Apr 2012	22 Mar 2012
GW3	SE106556.003	LB016639	21 Mar 2012	21 Mar 2012	18 Apr 2012	22 Mar 2012	18 Apr 2012	22 Mar 2012
Duplicate D1	SE106556.004	LB016639	21 Mar 2012	21 Mar 2012	18 Apr 2012	22 Mar 2012	18 Apr 2012	22 Mar 2012

Trace Metals (Dissolved) in Water by ICPMS

Method: ME-(AU)-[ENV]AN318

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW1	SE106556.001	LB017491	21 Mar 2012	21 Mar 2012	17 Sep 2012	03 Apr 2012	17 Sep 2012	04 Apr 2012
GW2	SE106556.002	LB017491	21 Mar 2012	21 Mar 2012	17 Sep 2012	03 Apr 2012	17 Sep 2012	04 Apr 2012
GW3	SE106556.003	LB017491	21 Mar 2012	21 Mar 2012	17 Sep 2012	03 Apr 2012	17 Sep 2012	04 Apr 2012
Duplicate D1	SE106556.004	LB017491	21 Mar 2012	21 Mar 2012	17 Sep 2012	03 Apr 2012	17 Sep 2012	04 Apr 2012

VOCs in Water

Method: ME-(AU)-[ENV]AN433/AN434

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW1	SE106556.001	LB017376	21 Mar 2012	21 Mar 2012	28 Mar 2012	01 Apr 2012†	11 May 2012	02 Apr 2012
GW2	SE106556.002	LB017376	21 Mar 2012	21 Mar 2012	28 Mar 2012	01 Apr 2012†	11 May 2012	02 Apr 2012
GW3	SE106556.003	LB017376	21 Mar 2012	21 Mar 2012	28 Mar 2012	01 Apr 2012†	11 May 2012	02 Apr 2012
Duplicate D1	SE106556.004	LB017376	21 Mar 2012	21 Mar 2012	28 Mar 2012	01 Apr 2012†	11 May 2012	02 Apr 2012
Tripspike TS1	SE106556.005	LB017376	21 Mar 2012	21 Mar 2012	28 Mar 2012	01 Apr 2012†	11 May 2012	02 Apr 2012
Trip Blank TB1	SE106556.006	LB017376	21 Mar 2012	21 Mar 2012	28 Mar 2012	01 Apr 2012†	11 May 2012	02 Apr 2012

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433/AN434

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW1	SE106556.001	LB017376	21 Mar 2012	21 Mar 2012	28 Mar 2012	01 Apr 2012†	11 May 2012	02 Apr 2012
GW2	SE106556.002	LB017376	21 Mar 2012	21 Mar 2012	28 Mar 2012	01 Apr 2012†	11 May 2012	02 Apr 2012
GW3	SE106556.003	LB017376	21 Mar 2012	21 Mar 2012	28 Mar 2012	01 Apr 2012†	11 May 2012	02 Apr 2012
Duplicate D1	SE106556.004	LB017376	21 Mar 2012	21 Mar 2012	28 Mar 2012	01 Apr 2012†	11 May 2012	02 Apr 2012
Tripspike TS1	SE106556.005	LB017376	21 Mar 2012	21 Mar 2012	28 Mar 2012	01 Apr 2012†	11 May 2012	02 Apr 2012
Trip Blank TB1	SE106556.006	LB017376	21 Mar 2012	21 Mar 2012	28 Mar 2012	01 Apr 2012†	11 May 2012	02 Apr 2012

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

VOCs in Water

Method: ME-(AU)-[ENV]AN433/AN434

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	GW1	SE106556.001	%	60 - 130%	113
	GW2	SE106556.002	%	60 - 130%	108
	GW3	SE106556.003	%	60 - 130%	111
	Duplicate D1	SE106556.004	%	60 - 130%	112
	Tripspike TS1	SE106556.005	%	60 - 130%	99
	Trip Blank TB1	SE106556.006	%	60 - 130%	90
d4-1,2-dichloroethane (Surrogate)	GW1	SE106556.001	%	40 - 130%	110
	GW2	SE106556.002	%	40 - 130%	113
	GW3	SE106556.003	%	40 - 130%	112
	Duplicate D1	SE106556.004	%	40 - 130%	110
	Tripspike TS1	SE106556.005	%	40 - 130%	106
	Trip Blank TB1	SE106556.006	%	40 - 130%	105
d8-toluene (Surrogate)	GW1	SE106556.001	%	60 - 130%	94
	GW2	SE106556.002	%	60 - 130%	98
	GW3	SE106556.003	%	60 - 130%	95
	Duplicate D1	SE106556.004	%	60 - 130%	95
	Tripspike TS1	SE106556.005	%	60 - 130%	100
	Trip Blank TB1	SE106556.006	%	60 - 130%	100
Dibromofluoromethane (Surrogate)	GW1	SE106556.001	%	60 - 130%	121
	GW2	SE106556.002	%	60 - 130%	123
	GW3	SE106556.003	%	60 - 130%	123
	Duplicate D1	SE106556.004	%	60 - 130%	123
	Tripspike TS1	SE106556.005	%	60 - 130%	106
	Trip Blank TB1	SE106556.006	%	60 - 130%	109

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433/AN434

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Trifluorotoluene (Surrogate)	GW1	SE106556.001	%	40 - 130%	100
	GW2	SE106556.002	%	40 - 130%	99
	GW3	SE106556.003	%	40 - 130%	99
	Duplicate D1	SE106556.004	%	40 - 130%	100

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Mercury (dissolved) in Water

Method: ME-(AU)-[ENV]AN311/AN312

Sample Number	Parameter	Units	LOR	Result
LB016615.001	Mercury	mg/L	0.0001	<0.0001

Metals in Water (Dissolved) by ICPOES

Method: ME-(AU)-[ENV]AN320/AN321

Sample Number	Parameter	Units	LOR	Result
LB017250.001	Calcium, Ca	mg/L	0.1	<0.1
	Magnesium, Mg	mg/L	0.1	<0.1

Oil and Grease in Water

Method: ME-(AU)-[ENV]AN185

Sample Number	Parameter	Units	LOR	Result
LB016649.001	Oil and Grease	mg/L	5	<5

TKN Kjeldahl Digestion by Discrete Analyser

Method: ME-(AU)-[ENV]AN281/AN292

Sample Number	Parameter	Units	LOR	Result
LB016597.001	Total Kjeldahl Nitrogen	mg/L	0.05	<0.05

Total Dissolved Solids (TDS) in water

Method: ME-(AU)-[ENV]AN113

Sample Number	Parameter	Units	LOR	Result
LB016598.001	Total Dissolved Solids Dried at 180°C	mg/L	10	<10

Trace Metals (Dissolved) in Water by ICPMS

Method: ME-(AU)-[ENV]AN318

Sample Number	Parameter	Units	LOR	Result
LB017491.001	Arsenic, As	µg/L	1	<1
	Beryllium, Be	µg/L	1	<1
	Boron, B	µg/L	5	<5
	Cadmium, Cd	µg/L	0.1	<0.1
	Chromium, Cr	µg/L	1	<1
	Cobalt, Co	µg/L	1	<1
	Copper, Cu	µg/L	1	<1
	Lead, Pb	µg/L	1	<1
	Manganese, Mn	µg/L	1	<1
	Nickel, Ni	µg/L	1	<1
	Zinc, Zn	µg/L	1	<1

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433/AN434

Sample Number		Parameter	Units	LOR	Result
LB017376.001		TRH C6-C9	µg/L	40	<40
	Surrogates	Trifluorotoluene (Surrogate)	%	-	100

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Ammonia Nitrogen by Discrete Analyser (Aquakem)

Method: ME-(AU)-[ENV]AN291

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE106550.001	LB016588.004	Ammonia Nitrogen, NH_3 as N	mg/L	0.01	<0.01	<0.01	200	0

Anions by Ion Chromatography in Water

Method: ME-(AU)-[ENV]AN245

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE106550.001	LB016593.004	Nitrate Nitrogen, NO3-N	mg/L	0.005	0.38	0.40	16	4

Mercury (dissolved) in Water

Method: ME-(AU)-[ENV]AN311/AN312

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE106524.002	LB016615.014	Mercury	µg/L	0.0001	<0.0001	<0.0001	200	198
SE106556.004	LB016615.022	Mercury	µg/L	0.0001	<0.0001	<0.0001	200	0

Nitrite in Water

Method: ME-(AU)-[ENV]AN277/WC250.312

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE106550.001	LB016591.004	Nitrite Nitrogen, NO_2 as N	mg/L	0.005	<0.005	<0.005	200	0
SE106556.001	LB016591.009	Nitrite Nitrogen, NO_2 as N	mg/L	0.005	0.017	0.018	43	2

TKN Kjeldahl Digestion by Discrete Analyser

Method: ME-(AU)-[ENV]AN281/AN292

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE106424.001	LB016597.004	Total Kjeldahl Nitrogen	mg/L	0.05	72	71	15	2

Total Cyanide in water by Discrete Analyser (Aquakem)

Method: ME-(AU)-[ENV]AN077/AN287

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE106556.001	LB016589.004	Total Cyanide	mg/L	0.005	<0.005	<0.005	200	0

Total Phenolics in Water

Method: ME-(AU)-[ENV]AN289

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE106556.001	LB016595.004	Total Phenols	mg/L	0.01	<0.01	<0.01	200	0

Total Phosphorus by Kjeldahl Digestion DA in Water

Method: ME-(AU)-[ENV]AN279/AN293

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE106424.001	LB016639.004	Total Phosphorus (Kjeldahl Digestion)	mg/L	0.05	8.4	8.4	16	0

Trace Metals (Dissolved) in Water by ICPMS

Method: ME-(AU)-[ENV]AN318

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE106672.017	LB017491.014	Arsenic, As	µg/L	1	<1	<1	200	0
		Beryllium, Be	µg/L	1	<1	<1	200	0
		Cadmium, Cd	µg/L	0.1	<0.1	<0.1	200	0
		Cobalt, Co	µg/L	1	<1	<1	200	0
		Copper, Cu	µg/L	1	<1	<1	200	0
		Lead, Pb	µg/L	1	<1	<1	200	0
		Manganese, Mn	µg/L	1	<1	<1	200	0
		Nickel, Ni	µg/L	1	<1	<1	200	0
		Zinc, Zn	µg/L	1	6	6	32	3
SE106794.013	LB017491.024	Arsenic, As	µg/L	1	<1	<1	200	0
		Cadmium, Cd	µg/L	0.1	<0.1	<0.1	200	0
		Chromium, Cr	µg/L	1	<1	<1	200	0
		Copper, Cu	µg/L	1	<1	<1	200	0
		Lead, Pb	µg/L	1	<1	<1	200	0

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Trace Metals (Dissolved) in Water by ICPMS (continued)

Method: ME-(AU)-[ENV]AN318

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE106794.013	LB017491.024	Nickel, Ni	µg/L	1	<1	<1	200	0
		Zinc, Zn	µg/L	1	82	83	16	1

VOCs in Water

Method: ME-(AU)-[ENV]AN433/AN434

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE106556.001	LB017376.004	Fumigants	2,2-dichloropropane	µg/L	0.5	<0.5	<0.5	200	0
			1,2-dichloropropane	µg/L	0.5	<0.5	<0.5	200	0
			cis-1,3-dichloropropene	µg/L	0.5	<0.5	<0.5	200	0
			trans-1,3-dichloropropene	µg/L	0.5	<0.5	<0.5	200	0
			1,2-dibromoethane (EDB)	µg/L	0.5	<0.5	<0.5	200	0
		Halogenated	Dichlorodifluoromethane (CFC-12)	µg/L	5	<5	<5	200	0
		Aliphatics	Chloromethane	µg/L	5	<5	<5	200	0
			Vinyl chloride (Chloroethene)	µg/L	0.3	<0.3	<0.3	200	0
			Bromomethane	µg/L	10	<10	<10	200	0
			Chloroethane	µg/L	5	<5	<5	200	0
			Trichlorofluoromethane	µg/L	1	<1	<1	200	0
			Iodomethane	µg/L	5	<5	<5	200	0
			1,1-dichloroethene	µg/L	0.5	<0.5	<0.5	200	0
			Dichloromethane (Methylene chloride)	µg/L	5	<5	<5	200	0
			Allyl chloride	µg/L	2	<2	<2	200	0
			trans-1,2-dichloroethene	µg/L	0.5	<0.5	<0.5	200	0
			1,1-dichloroethane	µg/L	0.5	<0.5	<0.5	200	0
			cis-1,2-dichloroethene	µg/L	0.5	<0.5	<0.5	200	0
			Bromochloromethane	µg/L	0.5	<0.5	<0.5	200	0
			1,2-dichloroethane	µg/L	0.5	<0.5	<0.5	200	0
			1,1,1-trichloroethane	µg/L	0.5	<0.5	<0.5	200	0
			1,1-dichloropropene	µg/L	0.5	<0.5	<0.5	200	0
			Carbon tetrachloride	µg/L	0.5	<0.5	<0.5	200	0
			Dibromomethane	µg/L	0.5	<0.5	<0.5	200	0
			Trichloroethene (Trichloroethylene,TCE)	µg/L	0.5	<0.5	<0.5	200	0
			1,1,2-trichloroethane	µg/L	0.5	<0.5	<0.5	200	0
			1,3-dichloropropane	µg/L	0.5	<0.5	<0.5	200	0
			Tetrachloroethene (Perchloroethylene,PCE)	µg/L	0.5	<0.5	<0.5	200	0
			1,1,1,2-tetrachloroethane	µg/L	0.5	<0.5	<0.5	200	0
			cis-1,4-dichloro-2-butene	µg/L	1	<1	<1	200	0
			1,1,2,2-tetrachloroethane	µg/L	0.5	<0.5	<0.5	200	0
			1,2,3-trichloropropane	µg/L	0.5	<0.5	<0.5	200	0
			trans-1,4-dichloro-2-butene	µg/L	1	<1	<1	200	0
			1,2-dibromo-3-chloropropane	µg/L	0.5	<0.5	<0.5	200	0
			Hexachlorobutadiene	µg/L	0.5	<0.5	<0.5	200	0
		Halogenated	Chlorobenzene	µg/L	0.5	<0.5	<0.5	200	0
		Aromatics	Bromobenzene	µg/L	0.5	<0.5	<0.5	200	0
			2-chlorotoluene	µg/L	0.5	<0.5	<0.5	200	0
			4-chlorotoluene	µg/L	0.5	<0.5	<0.5	200	0
			1,3-dichlorobenzene	µg/L	0.5	<0.5	<0.5	200	0
			1,4-dichlorobenzene	µg/L	0.3	<0.3	<0.3	200	0
			1,2-dichlorobenzene	µg/L	0.5	<0.5	<0.5	200	0
			1,2,4-trichlorobenzene	µg/L	0.5	<0.5	<0.5	200	0
			1,2,3-trichlorobenzene	µg/L	0.5	<0.5	<0.5	200	0
		Monocyclic	Benzene	µg/L	0.5	<0.5	<0.5	200	0
		Aromatic	Toluene	µg/L	0.5	<0.5	<0.5	200	0
			Ethylbenzene	µg/L	0.5	<0.5	<0.5	200	0
			m/p-xylene	µg/L	1	<1	<1	200	0
			o-xylene	µg/L	0.5	<0.5	<0.5	200	0
			Styrene (Vinyl benzene)	µg/L	0.5	<0.5	<0.5	200	0
			Isopropylbenzene (Cumene)	µg/L	0.5	<0.5	<0.5	200	0
			n-propylbenzene	µg/L	0.5	<0.5	<0.5	200	0
			1,3,5-trimethylbenzene	µg/L	0.5	<0.5	<0.5	200	0
			tert-butylbenzene	µg/L	0.5	<0.5	<0.5	200	0
			1,2,4-trimethylbenzene	µg/L	0.5	<0.5	<0.5	200	0
			sec-butylbenzene	µg/L	0.5	<0.5	<0.5	200	0

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

VOCs in Water (continued)

Method: ME-(AU)-[ENV]AN433/AN434

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE106556.001	LB017376.004	Monocyclic	p-isopropyltoluene	µg/L	0.5	<0.5	<0.5	200	0
		Aromatic	n-butylbenzene	µg/L	0.5	<0.5	<0.5	200	0
		Nitrogenous	Acrylonitrile	µg/L	0.5	<0.5	<0.5	200	0
		Oxygenated	MtBE (Methyl-tert-butyl ether)	µg/L	0.5	<0.5	<0.5	200	0
		Compounds	Acetone (2-propanone)	µg/L	10	<10	<10	200	0
			Vinyl acetate	µg/L	10	<10	<10	200	0
			MEK (2-butanone)	µg/L	10	<10	<10	200	0
			MIBK (4-methyl-2-pentanone)	µg/L	5	<5	<5	200	0
			2-hexanone (MBK)	µg/L	5	<5	<5	200	0
		Polycyclic	Naphthalene	µg/L	0.5	<0.5	<0.5	200	0
		Sulphonated	Carbon disulfide	µg/L	2	<2	<2	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	121.0	121.0	30	0
			d4-1,2-dichloroethane (Surrogate)	µg/L	-	110.0	112.0	30	2
			d8-toluene (Surrogate)	µg/L	-	94.0	97.0	30	3
			Bromofluorobenzene (Surrogate)	µg/L	-	113.0	112.0	30	1
		Trihalomethan	Chloroform (THM)	µg/L	0.5	<0.5	<0.5	200	0
		es	Bromodichloromethane (THM)	µg/L	0.5	<0.5	<0.5	200	0
			Dibromochloromethane (THM)	µg/L	0.5	<0.5	<0.5	200	0
			Bromoform (THM)	µg/L	0.5	<0.5	<0.5	200	0

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433/AN434

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE106556.001	LB017376.004		TRH C6-C9	µg/L	40	<40	<40	200	0
		Surrogates	Trifluorotoluene (Surrogate)	%	-	100.0	100.0	30	0

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Ammonia Nitrogen by Discrete Analyser (Aquakem)

Method: ME-(AU)-[ENV]AN291

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB016588.002	Ammonia Nitrogen, NH_3 as N	mg/L	0.01	2.4	2.5	80 - 120	97

Anions by Ion Chromatography in Water

Method: ME-(AU)-[ENV]AN245

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB016593.002	Nitrate Nitrogen, NO3-N	mg/L	0.005	1.9	2	80 - 120	96
	Fluoride	mg/L	0.02	2.0	2	80 - 120	98

Mercury (dissolved) in Water

Method: ME-(AU)-[ENV]AN311/AN312

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB016615.002	Mercury	mg/L	0.0001	0.0084	0.008	80 - 120	105

Metals in Water (Dissolved) by ICPOES

Method: ME-(AU)-[ENV]AN320/AN321

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB017250.002	Calcium, Ca	mg/L	0.1	1.9	2	80 - 120	95
	Magnesium, Mg	mg/L	0.1	1.9	2	80 - 120	96

Oil and Grease in Water

Method: ME-(AU)-[ENV]AN185

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB016649.002	Oil and Grease	mg/L	5	92	100	80 - 120	92

TKN Kjeldahl Digestion by Discrete Analyser

Method: ME-(AU)-[ENV]AN281/AN292

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB016597.002	Total Kjeldahl Nitrogen	mg/L	0.05	2.5	2.5	80 - 120	102

Total Cyanide in water by Discrete Analyser (Aquakem)

Method: ME-(AU)-[ENV]AN077/AN287

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB016589.002	Total Cyanide	mg/L	0.005	0.025	0.025	80 - 120	98

Total Phenolics in Water

Method: ME-(AU)-[ENV]AN289

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB016595.002	Total Phenols	mg/L	0.01	0.22	0.25	80 - 120	86

Trace Metals (Dissolved) in Water by ICPMS

Method: ME-(AU)-[ENV]AN318

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB017491.002	Arsenic, As	µg/L	1	19	20	80 - 120	95
	Beryllium, Be	µg/L	1	19	20	80 - 120	97
	Boron, B	µg/L	5	18	20	80 - 120	91
	Cadmium, Cd	µg/L	0.1	19	20	80 - 120	94
	Chromium, Cr	µg/L	1	20	20	80 - 120	101
	Cobalt, Co	µg/L	1	20	20	80 - 120	100
	Copper, Cu	µg/L	1	20	20	80 - 120	99
	Lead, Pb	µg/L	1	17	20	80 - 120	84
	Manganese, Mn	µg/L	1	20	20	80 - 120	101
	Nickel, Ni	µg/L	1	20	20	80 - 120	101
	Zinc, Zn	µg/L	1	20	20	80 - 120	99

VOCs in Water

Method: ME-(AU)-[ENV]AN433/AN434

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB017376.002	Halogenated	1,1-dichloroethene	µg/L	0.5	54	45.45	60 - 140	119
	Aliphatics	1,2-dichloroethane	µg/L	0.5	49	45.45	60 - 140	108
		Trichloroethene (Trichloroethylene,TCE)	µg/L	0.5	51	45.45	60 - 140	113

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

VOCs in Water (continued)

Method: ME-(AU)-[ENV]AN433/AN434

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB017376.002	Halogenated	Chlorobenzene	µg/L	0.5	51	45.45	60 - 140	112
	Monocyclic	Benzene	µg/L	0.5	54	45.45	60 - 140	119
	Aromatic	Toluene	µg/L	0.5	50	45.45	60 - 140	110
		Ethylbenzene	µg/L	0.5	55	45.45	60 - 140	121
		m/p-xylene	µg/L	1	110	90.9	60 - 140	116
		o-xylene	µg/L	0.5	50	45.45	60 - 140	109
	Trihalomethan	Chloroform (THM)	µg/L	0.5	49	45.45	60 - 140	107

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433/AN434

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB017376.002	TRH C6-C9	µg/L	40	860	827	60 - 140	104

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub -sample during the sample preparation stage. The original sample's result is subtracted from the sub -sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Mercury (dissolved) in Water

Method: ME-(AU)-[ENV]AN311/AN312

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE106523.001	LB016615.004	Mercury	mg/L	0.0001	0.0083	<0.0001	0.008	104

Metals in Water (Dissolved) by ICPOES

Method: ME-(AU)-[ENV]AN320/AN321

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE106556.001	LB017250.004	Calcium, Ca	mg/L	0.1	110	51	52	104
		Magnesium, Mg	mg/L	0.1	110	55	52	104

Total Cyanide in water by Discrete Analyser (Aquakem)

Method: ME-(AU)-[ENV]AN077/AN287

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE106556.004	LB016589.008	Total Cyanide	mg/L	0.005	0.026	<0.005	0.025	96

Trace Metals (Dissolved) in Water by ICPMS

Method: ME-(AU)-[ENV]AN318

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE106556.001	LB017491.004	Arsenic, As	µg/L	1	19	<1	20	96
		Beryllium, Be	µg/L	1	16	<1	20	82
		Boron, B	µg/L	5	49	34	20	75
		Cadmium, Cd	µg/L	0.1	18	<0.1	20	90
		Chromium, Cr	µg/L	1	19	<1	20	92
		Cobalt, Co	µg/L	1	18	1	20	85
		Copper, Cu	µg/L	1	18	<1	20	87
		Lead, Pb	µg/L	1	18	<1	20	92
		Manganese, Mn	µg/L	1	240	220	20	90
		Nickel, Ni	µg/L	1	26	7	20	91
		Zinc, Zn	µg/L	1	20	2	20	90

MATRIX SPIKE DUPLICATES

SE106556 R0

Matrix spike duplicates are calculated as Relative Percent Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The original result is the analyte concentration of the matrix spike. The Duplicate result is the analyte concentration of the matrix spike duplicate.

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

TKN Kjeldahl Digestion by Discrete Analyser

Method: ME-(AU)-[ENV]AN281/AN292

QC Sample	Sample Number	Parameter	Units	LOR	Duplicate
SE106424.002	LB016597.006	Total Kjeldahl Nitrogen	mg/L	0.05	41

Total Phenolics in Water

Method: ME-(AU)-[ENV]AN289

QC Sample	Sample Number	Parameter	Units	LOR	Duplicate
SE106556.002	LB016595.006	Total Phenols	mg/L	0.01	0.21

Total Phosphorus by Kjeldahl Digestion DA in Water

Method: ME-(AU)-[ENV]AN279/AN293

QC Sample	Sample Number	Parameter	Units	LOR	Duplicate
SE106424.002	LB016639.006	Total Phosphorus (Kjeldahl Digestion)	mg/L	0.05	26

Samples analysed as received.

Solid samples expressed on a dry weight basis.

QC criteria are subject to internal review according to the SGS QA/QC plan and may be provided on request or alternatively can be found here:
http://www.au.sgs.com/sgs-mp-au-env-qu-022-qa-qc-plan-en-11.pdf

*	Non-accredited analysis.
-	Sample not analysed for this analyte.
^	Analysis performed by external laboratory.

IS	Insufficient sample for analysis.
LNR	Sample listed, but not received.
LOR	Limit of reporting.
QFH	QC result is above the upper tolerance.
QFL	QC result is below the lower tolerance.

①	At least 2 of 3 surrogates are within acceptance criteria.
②	RPD failed acceptance criteria due to sample heterogeneity.
③	Results less than 5 times LOR preclude acceptance criteria for RPD.
④	Recovery failed acceptance criteria due to matrix interference.
⑤	Recovery failed acceptance criteria due to the presence of significant concentration of analyte (i.e. the concentration of analyte exceeds the spike level).
⑥	LOR was raised due to sample matrix interference.
⑦	LOR was raised due to dilution of significantly high concentration of analyte in sample.
⑧	Reanalysis of sample in duplicate confirmed sample heterogeneity and inconsistency of results.
⑨	Recovery failed acceptance criteria due to sample heterogeneity.
†	Refer to Analytical Report comments for further information.

STATEMENT OF QA/QC PERFORMANCE

PE066064 R0

CLIENT DETAILS

Contact	Edward Ibrahim
Client	SGS- Environmental Services
Address	PO Box 6432 Bourke Rd Business Centre Alexandria NSW 2015
Telephone	02 8594 0400
Facsimile	02 8594 0499
Email	edward.ibrahim@sgs.com
Project	**126093 North Penrith SE106556**
Order Number	(Not specified)
Samples	4

LABORATORY DETAILS

Manager	Said Hirad
Laboratory	SGS Newburn Environmental
Address	10 Reid Rd Newburn WA 6105
Telephone	(08) 9373 3500
Facsimile	(08) 9373 3556
Email	au.environmental.perth@sgs.com
SGS Reference	PE066064 R0
Report Number	0000037951
Date Reported	11 Apr 2012

COMMENTS

All the laboratory data for each environmental matrix was compared to SGS Environmental Services' stated Data Quality Objectives (DQO). Comments arising from the comparison were made and are reported below.

The data relating to sampling was taken from the Chain of Custody document and was supplied by the Client.
This QA/QC Statement must be read in conjunction with the referenced Analytical Report.
The Statement and the Analytical Report must not be reproduced except in full.

All Data Quality Objectives were met with the exception of the following:

Surrogate	Low Level Full 8270 SVOC in Water	2 items

SAMPLE SUMMARY

Sample counts by matrix	4 Water	Type of documentation received	COC
Date documentation received	23/3/2012	Samples received in good order	Yes
Samples received without headspace	Yes	Sample temperature upon receipt	14°C
Sample container provider	SGS	Turnaround time requested	Standard
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	Ice Bricks	Samples clearly labelled	Yes
Complete documentation received	Yes	Number of eskies/boxes received	2

HOLDING TIME SUMMARY

PE066064 R0

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

Low Level Full 8270 SVOC in Water — Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW1 SE106556-1	PE066064.001	LB038268	21 Mar 2012	23 Mar 2012	28 Mar 2012	28 Mar 2012	07 May 2012	10 Apr 2012
GW2 SE106556-2	PE066064.002	LB038268	21 Mar 2012	23 Mar 2012	28 Mar 2012	28 Mar 2012	07 May 2012	10 Apr 2012
GW3 SE106556-3	PE066064.003	LB038268	21 Mar 2012	23 Mar 2012	28 Mar 2012	28 Mar 2012	07 May 2012	10 Apr 2012
Duplicate D1 SE106556-4	PE066064.004	LB038268	21 Mar 2012	23 Mar 2012	28 Mar 2012	28 Mar 2012	07 May 2012	10 Apr 2012

TRH (Total Recoverable Hydrocarbons) in Water — Method: ME-(AU)-[ENV]AN403

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW1 SE106556-1	PE066064.001	LB038268	21 Mar 2012	23 Mar 2012	28 Mar 2012	28 Mar 2012	07 May 2012	10 Apr 2012
GW2 SE106556-2	PE066064.002	LB038268	21 Mar 2012	23 Mar 2012	28 Mar 2012	28 Mar 2012	07 May 2012	10 Apr 2012
GW3 SE106556-3	PE066064.003	LB038268	21 Mar 2012	23 Mar 2012	28 Mar 2012	28 Mar 2012	07 May 2012	10 Apr 2012
Duplicate D1 SE106556-4	PE066064.004	LB038268	21 Mar 2012	23 Mar 2012	28 Mar 2012	28 Mar 2012	07 May 2012	10 Apr 2012

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Low Level Full 8270 SVOC in Water — **Method: ME-(AU)-[ENV]AN420**

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2,4,6-Tribromophenol (Surrogate)	GW1 SE106556-1	PE066064.001	%	40 - 130%	75
	GW2 SE106556-2	PE066064.002	%	40 - 130%	27 ⓑ
	GW3 SE106556-3	PE066064.003	%	40 - 130%	76
	Duplicate D1 SE106556-4	PE066064.004	%	40 - 130%	82
d14-p-terphenyl (Surrogate)	GW1 SE106556-1	PE066064.001	%	40 - 130%	85
	GW2 SE106556-2	PE066064.002	%	40 - 130%	38 †
	GW3 SE106556-3	PE066064.003	%	40 - 130%	76
	Duplicate D1 SE106556-4	PE066064.004	%	40 - 130%	90

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

TRH (Total Recoverable Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN403

Sample Number	Parameter	Units	LOR	Result
LB038268.001	TRH C10-C14	µg/L	40	<40
	TRH C15-C28	µg/L	100	<100

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

No duplicates were required for this job.

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Low Level Full 8270 SVOC in Water

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB038268.002	03-OPs	Tetrachlorvinphos (Stirophos)*	µg/L	0.1	0.1	0.125	50 - 130	82
	08-Herbicides	Trifluralin	µg/L	0.05	0.11	0.125	50 - 130	84
	09-Nitrosamine	N-nitroso-di-n-propylamine (NDPA)	µg/L	0.1	0.1	0.125	50 - 130	94

TRH (Total Recoverable Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN403

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB038268.002	TRH C10-C14	µg/L	40	510	500	60 - 130	102
	TRH C15-C28	µg/L	100	510	500	60 - 130	101

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub -sample during the sample preparation stage. The original sample's result is subtracted from the sub -sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

No matrix spikes were required for this job.

MATRIX SPIKE DUPLICATES

PE066064 R0

Matrix spike duplicates are calculated as Relative Percent Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The original result is the analyte concentration of the matrix spike. The Duplicate result is the analyte concentration of the matrix spike duplicate.

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

QC criteria are subject to internal review according to the SGS QA/QC plan and may be provided on request or alternatively can be found here:
http://www.au.sgs.com/sgs-mp-au-env-qu-022-qa-qc-plan-en-11.pdf

*	Non-accredited analysis.
-	Sample not analysed for this analyte.
^	Analysis performed by external laboratory.

IS	Insufficient sample for analysis.
LNR	Sample listed, but not received.
LOR	Limit of reporting.
QFH	QC result is above the upper tolerance.
QFL	QC result is below the lower tolerance.

①	At least 2 of 3 surrogates are within acceptance criteria.
②	RPD failed acceptance criteria due to sample heterogeneity.
③	Results less than 5 times LOR preclude acceptance criteria for RPD.
④	Recovery failed acceptance criteria due to matrix interference.
⑤	Recovery failed acceptance criteria due to the presence of significant concentration of analyte (i.e. the concentration of analyte exceeds the spike level).
⑥	LOR was raised due to sample matrix interference.
⑦	LOR was raised due to dilution of significantly high concentration of analyte in sample.
⑧	Reanalysis of sample in duplicate confirmed sample heterogeneity and inconsistency of results.
⑨	Low surrogate recovery due to the sample emulsifying during extraction.
†	Refer to Analytical Report comments for further information.

COC 21/3/2012 @ 4:38pm

SGS
Received 21/3/2012
By Angela
Time 3:40
Samples intact Yes ○ ○
Temperature 20°C
W006-W008

SE106556

G EOTECHNIQUE PTY LTD

Laboratory Test Request / Chain of Custody Record

Note: Groundwater samples must be analysed at low LOR as per ANZECC 2000 Water Guidelines.

Lemko Place
PENRITH NSW 2750

P O Box 880
PENRITH NSW 2751

Tel: (02) 4722 2700
Fax: (02) 4722 6161
email: info@geotech.com.au

TO: SGS ENVIRONMENTAL SERVICES
UNIT 16
33 MADDOX STREET
ALEXANDRIA NSW 2015

PH: 02 8594 0400 **FAX:** 02 8594 0499

ATTN: MS ANGELA MAMALICOS

Sampling By: LY **Job No:** 12609/3

Project:

Project Manager: JN **Location:** North Penrith

Results required by: Normal TAT

	Sampling details			Sample type												
	Location	Depth (m)	Date	Time	Soil	Water	Metals (Low LOR) As, B, Be, Cd, Cr, Co, Cu, Pb, Hg, Mn, Ni & Zn	TRH* & BTEX (Low LOR)	PAH (Low LOR)	VOC (Low LOR)	Semi-VOC (Low LOR)	OCP, OPP & PCB (Low LOR)	TOTAL PHENOLS (Low LOR)	TOTAL CYANIDES (Low LOR)	BTEX (Low LOR)	Hardness	KEEP SAMPLE
1	GW1	-	21/03/2012	-		WG/WP/Vial	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	YES
2	GW2	-	21/03/2012	-		WG/WP/Vial	✓	✓	✓	✓	✓	✓	✓	✓		✓	YES
3	GW3	-	21/03/2012	-		WG/WP/Vial	✓	✓	✓	✓	✓	✓	✓	✓		✓	YES
4	Duplicate D1	-	21/03/2012	-		WG/WP/Vial	✓	✓	✓	✓	✓	✓	✓	✓			YES
5	Tripspike TS1	-	-	-		Vial									✓		YES
6	Trip Blank TB1	-	21/03/2012							✓							YES

Relinquished by			Received by		
Name	Signature	Date	Name	Signature	Date
JAMES NGU	jn	21/03/2012	Angela	Angela	21/3/2012 @ 3:40pm

Legend:

WG	Water sample, glass bottle	USG	Undisturbed soil sample (glass jar)	DSP	Disturbed soil sample (small plastic bag)	* Purge & Trap	@ mole H^+/tonne
WP	Water sample, plastic bottle	DSG	Disturbed soil sample (glass jar)	✓	Test required	# Geotechnique Screen	

G EOTECHNIQUE PTY LTD

Laboratory Test Request / Chain of Custody Record

Note: Groundwater samples must be analysed at low LOR as per ANZECC 2000 Water Guidelines.

Lemko Place
PENRITH NSW 2750

P O Box 880
PENRITH NSW 2751

Tel: (02) 4722 2700
Fax: (02) 4722 6161
email: info@geotech.com.au

TO: SGS ENVIRONMENTAL SERVICES
UNIT 16
33 MADDOX STREET
ALEXANDRIA NSW 2015

PH: 02 8594 0400 **FAX:** 02 8594 0499
ATTN: MS ANGELA MAMALICOS

Sampling By: LY **Job No:** 12609/3
Project:
Project Manager: JN **Location:** North Penrith

Results required by: Normal TAT

	Sampling details				Sample type											
	Location	Depth (m)	Date	Time	Soil	Water	TKN, Nitrite Nitrate & Total N (Low LOR)	Ammonia (Low LOR)	Total Phosphorous (Low LOR)	Soluble Fluoride (Low LOR)	Total Dissolved Solids (TDS)	pH	OIL & GREASE (Low LOR)			KEEP SAMPLE
1	GW1	-	21/03/2012	-		WG/WP/Vial	✓	✓	✓	✓	✓	✓	✓			YES
2	GW2	-	21/03/2012	-		WG/WP/Vial	✓	✓	✓	✓	✓	✓	✓			YES
3	GW3	-	21/03/2012	-		WG/WP/Vial	✓	✓	✓	✓	✓	✓	✓			YES
4	Duplicate D1	-	21/03/2012	-		WG/WP/Vial	✓	✓	✓	✓	✓	✓	✓			YES

Relinquished by			Received by		
Name	Signature	Date	Name	Signature	Date
JAMES NGU	jn	21/03/2012	Angela	Angela	21/3/2012 @ 3:40pm

Legend:

WG	Water sample, glass bottle	USG	Undisturbed soil sample (glass jar)	DSP	Disturbed soil sample (small plastic bag)	* Purge & Trap	@ mole H^+/tonne
WP	Water sample, plastic bottle	DSG	Disturbed soil sample (glass jar)	✓	Test required	# Geotechnique Screen	

SAMPLE RECEIPT ADVICE

SE106556

CLIENT DETAILS

Contact	James Ngu
Client	Geotechnique
Address	P.O. Box 880 PENRITH NSW 2751
Telephone	02 4722 2700
Facsimile	02 4722 6161
Email	james.ngu@geotech.com.au
Project	**12609-3 - North Penrith- Waters**
Order Number	(Not specified)
Samples	6

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
Samples Received	Wed 21/3/2012
Report Due	Wed 4/4/2012
SGS Reference	**SE106556**

SUBMISSION DETAILS

This is to confirm that 6 samples were received on Wednesday 21/3/2012. Results are expected to be ready by Wednesday 4/4/2012. Please quote SGS reference SE106556 when making enquiries. Refer below for details relating to sample integrity upon receipt.

Sample counts by matrix	6 Waters	Type of documentation received	COC
Date documentation received	21/03/2012@4:38pm	Samples received in good order	Yes
Samples received without headspace	Yes	Sample temperature upon receipt	20.0°C
Sample container provider	SGS	Turnaround time requested	Standard
Samples received in correct containers	**No**	Sufficient sample for analysis	Yes
Sample cooling method	None	Samples clearly labelled	Yes
Complete documentation received	Yes		

Samples will be held for one month for water samples and two months for soil samples from date of report, unless otherwise instructed.

COMMENTS

Samples received at SGS on 21/03/2012@3:40pm.

Full SVOC 8270 List (Low Levels) including (PAHs (0.01µg/L), OCP (LOR 0.01-0.05µg/L) OPP (LOR 0.01-0.2µg/L) and PCB Congeners (LOR 0.004-0.01µg/L)):-subcontracted to SGS Perth Environmental, 10 Reid Rd Newburn WA, NATA Accreditation Number 2562, Site Number 898, PCB Aurochlors will be reported if PCB Congeners are positive.

TRH C10-C40 = with Fractions LOR = (C10-C14)<40µg/L, (C15-C28)<100µg/L, (C29-C40) <200µg/L:--subcontracted to SGS Perth Environmental, 10 Reid Rd Newburn WA, NATA Accreditation Number 2562, Site Number 898,

Trip Blank TB1-Incorrect container supplied. A subsample will be taken at laboratory from the 1L Plastic Unpreserved supplied by client. Requirement is sample to be collected in glass without headspace.

SAMPLE RECEIPT ADVICE

SE106556

CLIENT DETAILS

Client	Geotechnique	Project	12609-3 - North Penrith- Waters

SUMMARY OF ANALYSIS

No.	Sample ID	Ammonia Nitrogen by Discrete Analyser	Anions by Ion Chromatography in Water	Low Level Full 8270 SVOC in Water	Nitrite in Water	TKN Kjeldahl Digestion by Discrete Analyser	Total Cyanide in water by Discrete Analyser	Total Phenolics in Water	TRH (Total Recoverable Hydrocarbons) in Water	VOCs in Water	Volatile Petroleum Hydrocarbons in Water
001	GW1	1	2	165	1	2	1	1	4	79	6
002	GW2	1	2	165	1	2	1	1	4	79	6
003	GW3	1	2	165	1	2	1	1	4	79	6
004	Duplicate D1	1	2	165	1	2	1	1	4	79	6
005	Tripspike TS1	-	-	-	-	-	-	-	-	8	-
006	Trip Blank TB1	-	-	-	-	-	-	-	-	79	-

CONTINUED OVERLEAF

The above table represents SGS Environmental Services' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details.
Testing as per this table shall commence immediately unless the client intervenes with a correction.

SAMPLE RECEIPT ADVICE

SE106556

CLIENT DETAILS

Client	Geotechnique	Project	12609-3 - North Penrith- Waters

SUMMARY OF ANALYSIS

No.	Sample ID	Mercury (dissolved) in Water	Metals in Water (Dissolved) by ICPOES	Oil and Grease in Water	pH in water	Total Dissolved Solids (TDS) in water	Total Phosphorus by Kjeldahl Digestion DA in	Trace Metals (Dissolved) in Water by ICPMS
001	GW1	1	3	1	1	1	1	11
002	GW2	1	3	1	1	1	1	11
003	GW3	1	3	1	1	1	1	11
004	Duplicate D1	1	-	1	1	1	1	11

The above table represents SGS Environmental Services' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details.
Testing as per this table shall commence immediately unless the client intervenes with a correction.

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 70711

Client:
Geotechnique Pty Ltd
PO Box 880
Penrith
NSW 2751

Attention: James Ngu

Sample log in details:

Your Reference:	**12609/3, North Penrith**		
No. of samples:	1 water		
Date samples received / completed instructions received	21/03/12	/	21/03/12

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:	30/03/12	/	24/04/12
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:

Nancy Zhang
Chemist

Rhian Morgan
Reporting Supervisor

Nick Sarlamis
Inorganics Supervisor

Jeremy Faircloth
Chemist

VOCs in water Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	70711-1 S1 21/03/2012 water
Date extracted	-	23/03/2012
Date analysed	-	23/03/2012
Dichlorodifluoromethane	µg/L	<10
Chloromethane	µg/L	<10
Vinyl Chloride	µg/L	<10
Bromomethane	µg/L	<10
Chloroethane	µg/L	<10
Trichlorofluoromethane	µg/L	<10
1,1-Dichloroethene	µg/L	<1
Trans-1,2-dichloroethene	µg/L	<1
1,1-dichloroethane	µg/L	<1
Cis-1,2-dichloroethene	µg/L	<1
Bromochloromethane	µg/L	<1
Chloroform	µg/L	4
2,2-dichloropropane	µg/L	<1
1,2-dichloroethane	µg/L	<1
1,1,1-trichloroethane	µg/L	<1
1,1-dichloropropene	µg/L	<1
Cyclohexane	µg/L	<1
Carbon tetrachloride	µg/L	<1
Benzene	µg/L	<1
Dibromomethane	µg/L	<1
1,2-dichloropropane	µg/L	<1
Trichloroethene	µg/L	<1
Bromodichloromethane	µg/L	<1
trans-1,3-dichloropropene	µg/L	<1
cis-1,3-dichloropropene	µg/L	<1
1,1,2-trichloroethane	µg/L	<1
Toluene	µg/L	<1
1,3-dichloropropane	µg/L	<1
Dibromochloromethane	µg/L	<1
1,2-dibromoethane	µg/L	<1
Tetrachloroethene	µg/L	<1
1,1,1,2-tetrachloroethane	µg/L	<1
Chlorobenzene	µg/L	<1
Ethylbenzene	µg/L	<1
Bromoform	µg/L	<1
m+p-xylene	µg/L	<2
Styrene	µg/L	<1
1,1,2,2-tetrachloroethane	µg/L	<1
o-xylene	µg/L	<1
1,2,3-trichloropropane	µg/L	<1

VOCs in water Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ---------- 	70711-1 S1 21/03/2012 water
Isopropylbenzene	µg/L	<1
Bromobenzene	µg/L	<1
n-propyl benzene	µg/L	<1
2-chlorotoluene	µg/L	<1
4-chlorotoluene	µg/L	<1
1,3,5-trimethyl benzene	µg/L	<1
Tert-butyl benzene	µg/L	<1
1,2,4-trimethyl benzene	µg/L	<1
1,3-dichlorobenzene	µg/L	<1
Sec-butyl benzene	µg/L	<1
1,4-dichlorobenzene	µg/L	<1
4-isopropyl toluene	µg/L	<1
1,2-dichlorobenzene	µg/L	<1
n-butyl benzene	µg/L	<1
1,2-dibromo-3-chloropropane	µg/L	<1
1,2,4-trichlorobenzene	µg/L	<1
Hexachlorobutadiene	µg/L	<1
1,2,3-trichlorobenzene	µg/L	<1
Surrogate Dibromofluoromethane	%	110
Surrogate toluene-d8	%	97
Surrogate 4-BFB	%	87

vTRH & BTEX in Water		
Our Reference:	UNITS	70711-1
Your Reference	----------	S1
Date Sampled	----------	21/03/2012
Type of sample		water
Date extracted	-	23/03/2012
Date analysed	-	23/03/2012
TRHC$_6$ - C$_9$	µg/L	<10
Benzene	µg/L	<1
Toluene	µg/L	<1
Ethylbenzene	µg/L	<1
m+p-xylene	µg/L	<2
o-xylene	µg/L	<1
Surrogate Dibromofluoromethane	%	110
Surrogate toluene-d8	%	97
Surrogate 4-BFB	%	87

sTRH in Water (C10-C36)		
Our Reference:	UNITS	70711-1
Your Reference	----------	S1
Date Sampled	----------	21/03/2012
Type of sample		water
Date extracted	-	28/03/2012
Date analysed	-	29/03/2012
$TRHC_{10}$ - C_{14}	µg/L	<50
$TRHC_{15}$ - C_{28}	µg/L	<100
$TRHC_{29}$ - C_{36}	µg/L	<100
Surrogate o-Terphenyl	%	78

PAHs in Water - Trace Level		
Our Reference:	UNITS	70711-1
Your Reference	----------	S1
Date Sampled	----------	21/03/2012
Type of sample		water
Date extracted	-	28/03/2012
Date analysed	-	30/03/2012
Naphthalene	µg/L	0.02
Acenaphthylene	µg/L	<0.01
Acenaphthene	µg/L	<0.01
Fluorene	µg/L	<0.01
Phenanthrene	µg/L	<0.01
Anthracene	µg/L	<0.01
Fluoranthene	µg/L	<0.01
Pyrene	µg/L	<0.01
Benzo(a)anthracene	µg/L	<0.01
Chrysene	µg/L	<0.01
Benzo(b+k)fluoranthene	µg/L	<0.02
Benzo(a)pyrene	µg/L	<0.01
Dibenzo(a,h)anthracene	µg/L	<0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01
Benzo(g,h,i)perylene	µg/L	<0.01
Surrogate p-Terphenyl-d_{14}	%	99

SVOC's in water		
Our Reference:	UNITS	70711-1
Your Reference	----------	S1
Date Sampled	----------	21/03/2012
Type of sample		water
Date extracted	-	28/03/2012
Date analysed	-	29/03/2012
Phenol	µg/L	<10
Bis (2-chloroethyl) ether	µg/L	<10
2-Chlorophenol	µg/L	<10
1,3-Dichlorobenzene	µg/L	<10
1,4-Dichlorobenzene	µg/L	<10
2-Methylphenol	µg/L	<10
1,2-Dichlorobenzene	µg/L	<10
bis-(2-Chloroisopropyl) ether	µg/L	<10
3/4-Methylphenol	µg/L	<20
N-nitrosodi-n-propylamine	µg/L	<10
Hexachloroethane	µg/L	<10
Nitrobenzene	µg/L	<10
Isophorone	µg/L	<10
2,4-Dimethylphenol	µg/L	<10
2-Nitrophenol	µg/L	<10
bis (2-Chloroethoxy) methane	µg/L	<10
2,4-Dichlorophenol	µg/L	<10
1,2,4-Trichlorobenzene	µg/L	<10
Naphthalene	µg/L	<10
4-Chloroaniline	µg/L	<10
Hexachlorobutadiene	µg/L	<10
2-Methylnaphthalene	µg/L	<10
Hexachlorocyclopentadiene	µg/L	<10
2,4,6-Trichlorophenol	µg/L	<10
2,4,5-Trichlorophenol	µg/L	<10
2-Chloronaphthalene	µg/L	<10
2-Nitroaniline	µg/L	<10
Dimethyl phthalate	µg/L	<10
2,6-Dinitrotoluene	µg/L	<10
Acenaphthylene	µg/L	<10
3-Nitroaniline	µg/L	<10
Acenaphthene	µg/L	<10
2,4-Dinitrophenol	µg/L	<100
4-Nitrophenol	µg/L	<100
Dibenzofuran	µg/L	<10
Diethylphthalate	µg/L	<10
4-Chlorophenylphenylether	µg/L	<10
4-Nitroaniline	µg/L	<10
Fluorene	µg/L	<10
2-methyl-4,6-dinitrophenol	µg/L	<100
Azobenzene	µg/L	<10

SVOC's in water		
Our Reference:	UNITS	70711-1
Your Reference	----------	S1
Date Sampled	----------	21/03/2012
Type of sample		water
4-Bromophenylphenylether	µg/L	<10
Hexachlorobenzene	µg/L	<10
Pentachlorophenol	µg/L	<100
Phenanthrene	µg/L	<10
Anthracene	µg/L	<10
Carbazole	µg/L	<10
Di-n-butylphthalate	µg/L	<10
Fluoranthene	µg/L	<10
Pyrene	µg/L	<10
Butylbenzylphthalate	µg/L	<10
Bis(2-ethylhexyl) phthalate	µg/L	<10
Benzo(a)anthracene	µg/L	<10
Chrysene	µg/L	<10
Di-n-octylphthalate	µg/L	<10
Benzo(b)fluoranthene	µg/L	<10
Benzo(k)fluoranthene	µg/L	<10
Benzo(a)pyrene	µg/L	<10
Indeno(1,2,3-c,d)pyrene	µg/L	<10
Dibenzo(a,h)anthracene	µg/L	<10
Benzo(g,h,i)perylene	µg/L	<10
Ethylmethanesulfonate	µg/L	<10
Aniline	µg/L	<10
Pentachloroethane	µg/L	<10
Benzyl alcohol	µg/L	<10
Acetophenone	µg/L	<10
N-nitrosomorpholine	µg/L	<10
N-nitrosopiperidine	µg/L	<10
2,6-Dichlorophenol	µg/L	<10
Hexachloropropene-1	µg/L	<10
N-nitroso-n-butylamine	µg/L	<10
Safrole	µg/L	<10
1,2,4,5-Tetrachlorobenzene	µg/L	<10
Trans-iso-safrole	µg/L	<10
1,3-Dinitrobenzene	µg/L	<10
Pentachlorobenzene	µg/L	<10
1-Naphthylamine	µg/L	<10
2,3,4,6-Tetrachlorophenol	µg/L	<10
2-Naphthylamine	µg/L	<10
5-Nitro-o-toluidine	µg/L	<10
Diphenylamine	µg/L	<10
Phenacetin	µg/L	<10
Pentachloronitrobenzene	µg/L	<10
Dinoseb	µg/L	<10

SVOC's in water Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	70711-1 S1 21/03/2012 water
Methapyrilene	µg/L	<10
p-Dimethylaminoazobenzene	µg/L	<10
2-Acetylaminofluorene	µg/L	<10
7,12-Dimethylbenz(a)anthracene	µg/L	<10
3-Methylcholanthrene	µg/L	<10
a-BHC	µg/L	<10
b-BHC	µg/L	<10
g-BHC	µg/L	<10
d-BHC	µg/L	<10
Heptachlor	µg/L	<10
Aldrin	µg/L	<10
Heptachlor Epoxide	µg/L	<10
g-Chlordane	µg/L	<10
a-Chlordane	µg/L	<10
Endosulfan I	µg/L	<10
p,p'-DDE	µg/L	<10
Dieldrin	µg/L	<10
Endrin	µg/L	<10
p,p'-DDD	µg/L	<10
Endosulfan II	µg/L	<10
Endrin Aldehyde	µg/L	<10
p,p'-DDT	µg/L	<10
Endosulfan Sulphate	µg/L	<10
Surrogate 2-fluorophenol	%	28
Surrogate Phenol-d_6	%	38
Surrogate Nitrobenzene-d_5	%	60
Surrogate 2-fluorobiphenyl	%	65
Surrogate 2,4,6-Tribromophenol	%	90
Surrogate p-Terphenyl-d_{14}	%	83

OCP in water - trace level		
Our Reference:	UNITS	70711-1
Your Reference	----------	S1
Date Sampled	----------	21/03/2012
Type of sample		water
Date extracted	-	23/03/2012
Date analysed	-	26/03/2012
HCB	µg/L	<0.001
Heptachlor	µg/L	<0.001
Heptachlor Epoxide	µg/L	<0.001
Aldrin	µg/L	<0.001
gamma-BHC (Lindane)	µg/L	<0.001
alpha-BHC	µg/L	<0.001
beta-BHC	µg/L	<0.001
delta-BHC	µg/L	<0.001
trans-Chlordane	µg/L	<0.001
cis-Chlordane	µg/L	<0.001
Oxychlordane	µg/L	<0.001
Dieldrin	µg/L	<0.001
p,p-DDE	µg/L	<0.001
p,p-DDD	µg/L	<0.001
p,p-DDT	µg/L	<0.001
Endrin	µg/L	<0.001
Endrin Aldehyde	µg/L	<0.001
Endrin Ketone	µg/L	<0.001
alpha-Endosulfan	µg/L	<0.001
beta-Endosulfan	µg/L	<0.001
Endosulfan Sulfate	µg/L	<0.001
Methoxychlor	µg/L	<0.001
Surrogate OC Recovery	%	91

OP Pesticides -Trace Level		
Our Reference:	UNITS	70711-1
Your Reference	----------	S1
Date Sampled	----------	21/03/2012
Type of sample		water
Date extracted	-	23/03/2012
Date analysed	-	26/03/2012
Demeton-S-methyl	µg/L	<0.01
Dichlorvos	µg/L	<0.01
Diazinon	µg/L	<0.01
Dimethoate	µg/L	<0.01
Chlorpyrifos	µg/L	<0.01
Chlorpyrifos methyl	µg/L	<0.01
Malathion	µg/L	<0.01
Fenthion	µg/L	<0.01
Azinphos Ethyl	µg/L	<0.01
Azinphos Methyl	µg/L	<0.01
Chlorfenvinphos (E)	µg/L	<0.01
Chlorfenvinphos (Z)	µg/L	<0.01
Ethion	µg/L	<0.01
Fenitrothion	µg/L	<0.01
Parathion (Ethyl)	µg/L	<0.01
Parathion (Methyl)	µg/L	<0.01
Primiphos Ethyl	µg/L	<0.01
Primiphos Methyl	µg/L	<0.01
Surrogate OP Recovery - TPP	%	92

PCB in water - trace level		
Our Reference:	UNITS	70711-1
Your Reference	----------	S1
Date Sampled	----------	21/03/2012
Type of sample		water
Date extracted	-	23/03/2012
Date analysed	-	26/03/2012
Aroclor 1016	µg/L	<0.01
Aroclor 1221	µg/L	<0.01
Aroclor 1232	µg/L	<0.01
Aroclor 1242	µg/L	<0.01
Aroclor 1248	µg/L	<0.01
Aroclor 1254	µg/L	<0.01
Aroclor 1260	µg/L	<0.01
Total PCB's (as above)	µg/L	<0.01

Total Phenolics in Water		
Our Reference:	UNITS	70711-1
Your Reference	----------	S1
Date Sampled	----------	21/03/2012
Type of sample		water
Date extracted	-	27/03/2012
Date analysed	-	27/03/2012
Total Phenolics (as Phenol)	mg/L	<0.01

HM in water - dissolved		
Our Reference:	UNITS	70711-1
Your Reference	----------	S1
Date Sampled	----------	21/03/2012
Type of sample		water
Date prepared	-	26/03/2012
Date analysed	-	26/03/2012
Arsenic-Dissolved	µg/L	<1
Boron-Dissolved	µg/L	47
Beryllium-Dissolved	µg/L	<0.5
Cadmium-Dissolved	µg/L	<0.1
Chromium-Dissolved	µg/L	<1
Cobalt-Dissolved	µg/L	<1
Copper-Dissolved	µg/L	<1
Lead-Dissolved	µg/L	<1
Mercury-Dissolved	µg/L	<0.05
Manganese-Dissolved	µg/L	160
Nickel-Dissolved	µg/L	3
Zinc-Dissolved	µg/L	1

Metals in Waters - Acid extractable		
Our Reference:	UNITS	70711-1
Your Reference	----------	S1
Date Sampled	----------	21/03/2012
Type of sample		water
Date prepared	-	26/03/2012
Date analysed	-	28/03/2012
Phosphorus - Total	mg/L	0.06

Miscellaneous Inorganics		
Our Reference:	UNITS	70711-1
Your Reference	----------	S1
Date Sampled	----------	21/03/2012
Type of sample		water
Date prepared	-	21/03/2012
Date analysed	-	21/03/2012
Total Cyanide	mg/L	<0.004
TKN in water	mg/L	0.8
Nitrate as N in water	mg/L	3.9
Nitrite as N in water	mg/L	<0.005
Total Nitrogen in water	mg/L	4.7
Ammonia as N in water	mg/L	<0.005
Fluoride, F	mg/L	0.44
Total Dissolved Solids (grav)	mg/L	1,500
pH	pH Units	6.9
Oil & Grease (LLE)	mg/L	<5

Method ID	Methodology Summary
Org-013	Water samples are analysed directly by purge and trap GC-MS.
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.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID.
Org-012 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
Ext-020	Analysis subcontracted to Australian Government - National Measurement Institute. NATA Accreditation No: 198
Inorg-030	Total Phenolics - determined colorimetrically following disitillation, based upon APHA 21st ED 5530 D.
Metals-022 ICP-MS	Determination of various metals by ICP-MS.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Inorg-013	Cyanide - total determined colourimetrically after distillation, based on APHA 21st ED, 4500-CN_C,E. Free cyanide determined colourimetrically after filtration.
Inorg-062	TKN - determined colourimetrically based on APHA 21st ED 4500 Norg.
Inorg-055	Nitrate - determined colourimetrically based on EPA353.2 and APHA 21st ED NO3- F. Soils are analysed following a water extraction.
Inorg-055	Nitrite - determined colourimetrically based on EPA353.2 and APHA 21st ED NO2- B. Soils are analysed following a water extraction.
Inorg-055/062	Total Nitrogen - Calculation sum of TKN and oxidised Nitrogen.
Inorg-057	Ammonia - determined colourimetrically based on EPA350.1 and APHA 21st ED 4500-NH3 F, Soils are analysed following a KCl extraction.
Inorg-026	Fluoride determined by ion selective electrode (ISE) in accordance with APHA 21st ED, 4500-F-C.
Inorg-018	Total Dissolved Solids - determined gravimetrically in accordance with APHA 21st ED, 2540-C.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA 21st ED, 4500-H+.
Inorg-003	Oil & Grease - determine gravimetrically following extraction with Hexane, in accordance with APHA 21st ED, 5220-B.

QUALITY CONTROL VOCs in water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			19/03/2012	[NT]	[NT]	LCS-W1	19/03/2012
Date analysed	-			19/03/2012	[NT]	[NT]	LCS-W1	19/03/2012
Dichlorodifluoromethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NR]	[NR]
Chloromethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NR]	[NR]
Vinyl Chloride	µg/L	10	Org-013	<10	[NT]	[NT]	[NR]	[NR]
Bromomethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NR]	[NR]
Chloroethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NR]	[NR]
Trichlorofluoromethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NR]	[NR]
1,1-Dichloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Trans-1,2-dichloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,1-dichloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	101%
Cis-1,2-dichloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Bromochloromethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Chloroform	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	95%
2,2-dichloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2-dichloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	90%
1,1,1-trichloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	95%
1,1-dichloropropene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Cyclohexane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Carbon tetrachloride	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Dibromomethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2-dichloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Trichloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	104%
Bromodichloromethane	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	97%
trans-1,3-dichloropropene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
cis-1,3-dichloropropene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,1,2-trichloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Toluene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,3-dichloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Dibromochloromethane	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	98%
1,2-dibromoethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Tetrachloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	90%
1,1,1,2-tetrachloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Chlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Ethylbenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Bromoform	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
m+p-xylene	µg/L	2	Org-013	<2	[NT]	[NT]	[NR]	[NR]
Styrene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,1,2,2-tetrachloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
o-xylene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL VOCs in water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
1,2,3-trichloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Isopropylbenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Bromobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
n-propyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
2-chlorotoluene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
4-chlorotoluene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,3,5-trimethyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Tert-butyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2,4-trimethyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,3-dichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Sec-butyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,4-dichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
4-isopropyl toluene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2-dichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
n-butyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2-dibromo-3-chloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2,4-trichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Hexachlorobutadiene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2,3-trichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Surrogate Dibromofluoromethane	%		Org-013	99	[NT]	[NT]	LCS-W1	97%
Surrogate toluene-d8	%		Org-013	95	[NT]	[NT]	LCS-W1	98%
Surrogate 4-BFB	%		Org-013	88	[NT]	[NT]	LCS-W1	99%

QUALITY CONTROL vTRH & BTEX in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			19/03/2012	[NT]	[NT]	LCS-W1	19/03/2012
Date analysed	-			19/03/2012	[NT]	[NT]	LCS-W1	19/03/2012
TRHC$_6$ - C$_9$	µg/L	10	Org-016	<10	[NT]	[NT]	LCS-W1	90%
Benzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	84%
Toluene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	85%
Ethylbenzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	91%
m+p-xylene	µg/L	2	Org-016	<2	[NT]	[NT]	LCS-W1	95%
o-xylene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	93%
Surrogate Dibromofluoromethane	%		Org-016	99	[NT]	[NT]	LCS-W1	99%
Surrogate toluene-d8	%		Org-016	95	[NT]	[NT]	LCS-W1	96%
Surrogate 4-BFB	%		Org-016	88	[NT]	[NT]	LCS-W1	99%

QUALITY CONTROL sTRH in Water (C10-C36)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			28/03/2012	[NT]	[NT]	LCS-W2	28/03/2012
Date analysed	-			29/03/2012	[NT]	[NT]	LCS-W2	29/03/2012
TRHC$_{10}$ - C$_{14}$	µg/L	50	Org-003	<50	[NT]	[NT]	LCS-W2	66%
TRHC$_{15}$ - C$_{28}$	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W2	89%
TRHC$_{29}$ - C$_{36}$	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W2	79%
Surrogate o-Terphenyl	%		Org-003	78	[NT]	[NT]	LCS-W2	121%

QUALITY CONTROL PAHs in Water - Trace Level	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			28/03/2012	[NT]	[NT]	LCS-W1	28/03/2012
Date analysed	-			30/03/2012	[NT]	[NT]	LCS-W1	30/03/2012
Naphthalene	µg/L	0.01	Org-012 subset	<0.01	[NT]	[NT]	LCS-W1	78%
Acenaphthylene	µg/L	0.01	Org-012 subset	<0.01	[NT]	[NT]	[NR]	[NR]
Acenaphthene	µg/L	0.01	Org-012 subset	<0.01	[NT]	[NT]	[NR]	[NR]
Fluorene	µg/L	0.01	Org-012 subset	<0.01	[NT]	[NT]	LCS-W1	113%
Phenanthrene	µg/L	0.01	Org-012 subset	<0.01	[NT]	[NT]	LCS-W1	92%
Anthracene	µg/L	0.01	Org-012 subset	<0.01	[NT]	[NT]	[NR]	[NR]
Fluoranthene	µg/L	0.01	Org-012 subset	<0.01	[NT]	[NT]	LCS-W1	86%
Pyrene	µg/L	0.01	Org-012 subset	<0.01	[NT]	[NT]	LCS-W1	93%

QUALITY CONTROL PAHs in Water - Trace Level	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Benzo(a)anthracene	µg/L	0.01	Org-012 subset	<0.01	[NT]	[NT]	[NR]	[NR]
Chrysene	µg/L	0.01	Org-012 subset	<0.01	[NT]	[NT]	LCS-W1	90%
Benzo(b+k)fluoranthene	µg/L	0.02	Org-012 subset	<0.02	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	µg/L	0.01	Org-012 subset	<0.01	[NT]	[NT]	LCS-W1	92%
Dibenzo(a,h)anthracene	µg/L	0.01	Org-012 subset	<0.01	[NT]	[NT]	[NR]	[NR]
Indeno(1,2,3-c,d)pyrene	µg/L	0.01	Org-012 subset	<0.01	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	µg/L	0.01	Org-012 subset	<0.01	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%		Org-012 subset	90	[NT]	[NT]	LCS-W1	116%

QUALITY CONTROL SVOC's in water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			28/03/2012	[NT]	[NT]	LCS-W1	28/03/2012
Date analysed	-			29/03/2012	[NT]	[NT]	LCS-W1	29/03/2012
Phenol	µg/L	10	Org-012	<10	[NT]	[NT]	LCS-W1	57%
Bis (2-chloroethyl) ether	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
2-Chlorophenol	µg/L	10	Org-012	<10	[NT]	[NT]	LCS-W1	108%
1,3-Dichlorobenzene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
1,4-Dichlorobenzene	µg/L	10	Org-012	<10	[NT]	[NT]	LCS-W1	99%
2-Methylphenol	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
1,2-Dichlorobenzene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
bis-(2-Chloroisopropyl) ether	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
3/4-Methylphenol	µg/L	20	Org-012	<20	[NT]	[NT]	[NR]	[NR]
N-nitrosodi-n-propylamine	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Hexachloroethane	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Nitrobenzene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Isophorone	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
2,4-Dimethylphenol	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
2-Nitrophenol	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
bis (2-Chloroethoxy) methane	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
2,4-Dichlorophenol	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
1,2,4-Trichlorobenzene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Naphthalene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
4-Chloroaniline	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Hexachlorobutadiene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
2-Methylnaphthalene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL SVOC's in water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Hexachlorocyclopentadiene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
2,4,6-Trichlorophenol	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
2,4,5-Trichlorophenol	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
2-Chloronaphthalene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
2-Nitroaniline	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Dimethyl phthalate	µg/L	10	Org-012	<10	[NT]	[NT]	LCS-W1	132%
2,6-Dinitrotoluene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Acenaphthylene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
3-Nitroaniline	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Acenaphthene	µg/L	10	Org-012	<10	[NT]	[NT]	LCS-W1	110%
2,4-Dinitrophenol	µg/L	100	Org-012	<100	[NT]	[NT]	[NR]	[NR]
4-Nitrophenol	µg/L	100	Org-012	<100	[NT]	[NT]	LCS-W1	115%
Dibenzofuran	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Diethylphthalate	µg/L	10	Org-012	<10	[NT]	[NT]	LCS-W1	123%
4-Chlorophenylphenylether	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
4-Nitroaniline	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Fluorene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
2-methyl-4,6-dinitrophenol	µg/L	100	Org-012	<100	[NT]	[NT]	[NR]	[NR]
Azobenzene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
4-Bromophenylphenylether	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Hexachlorobenzene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Pentachlorophenol	µg/L	100	Org-012	<100	[NT]	[NT]	[NR]	[NR]
Phenanthrene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Anthracene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Carbazole	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Di-n-butylphthalate	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Fluoranthene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Pyrene	µg/L	10	Org-012	<10	[NT]	[NT]	LCS-W1	111%
Butylbenzylphthalate	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Bis(2-ethylhexyl) phthalate	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Benzo(a)anthracene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Chrysene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Di-n-octylphthalate	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Benzo(b)fluoranthene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Benzo(k)fluoranthene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Indeno(1,2,3-c,d)pyrene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Ethylmethanesulfonate	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Aniline	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Pentachloroethane	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL SVOC's in water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Benzyl alcohol	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Acetophenone	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
N-nitrosomorpholine	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
N-nitrosopiperidine	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
2,6-Dichlorophenol	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Hexachloropropene-1	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
N-nitroso-n-butylamine	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Safrole	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
1,2,4,5-Tetrachlorobenzene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Trans-iso-safrole	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
1,3-Dinitrobenzene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Pentachlorobenzene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
1-Naphthylamine	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
2,3,4,6-Tetrachlorophenol	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
2-Naphthylamine	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
5-Nitro-o-toluidine	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Diphenylamine	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Phenacetin	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Pentachloronitrobenzene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Dinoseb	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Methapyrilene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
p-Dimethylaminoazobenzene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
2-Acetylaminofluorene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
7,12-Dimethylbenz(a) anthracene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
3-Methylcholanthrene	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
a-BHC	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
b-BHC	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
g-BHC	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
d-BHC	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Heptachlor	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Aldrin	µg/L	10	Org-012	<10	[NT]	[NT]	LCS-W1	100%
Heptachlor Epoxide	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
g-Chlordane	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
a-Chlordane	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Endosulfan I	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
p,p'-DDE	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Dieldrin	µg/L	10	Org-012	<10	[NT]	[NT]	LCS-W1	105%
Endrin	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
p,p'-DDD	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Endosulfan II	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Endrin Aldehyde	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
p,p'-DDT	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL SVOC's in water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Endosulfan Sulphate	µg/L	10	Org-012	<10	[NT]	[NT]	[NR]	[NR]
Surrogate 2-fluorophenol	%		Org-012	66	[NT]	[NT]	LCS-W1	67%
Surrogate Phenol-d_6	%		Org-012	50	[NT]	[NT]	LCS-W1	55%
Surrogate Nitrobenzene-d_5	%		Org-012	100	[NT]	[NT]	LCS-W1	107%
Surrogate 2-fluorobiphenyl	%		Org-012	87	[NT]	[NT]	LCS-W1	105%
Surrogate 2,4,6-Tribromophenol	%		Org-012	128	[NT]	[NT]	LCS-W1	133%
Surrogate p-Terphenyl-d_{14}	%		Org-012	108	[NT]	[NT]	LCS-W1	116%
QUALITY CONTROL OCP in water - trace level	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			23/03/2012	[NT]	[NT]	LCS-W1	23/03/2012
Date analysed	-			26/03/2012	[NT]	[NT]	LCS-W1	26/03/2012
HCB	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	[NR]	[NR]
Heptachlor	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	LCS-W1	99%
Heptachlor Epoxide	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	[NR]	[NR]
Aldrin	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	LCS-W1	138%
gamma-BHC (Lindane)	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	LCS-W1	89%
alpha-BHC	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	[NR]	[NR]
beta-BHC	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	[NR]	[NR]
delta-BHC	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	[NR]	[NR]
trans-Chlordane	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	[NR]	[NR]
cis-Chlordane	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	[NR]	[NR]
Oxychlordane	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	[NR]	[NR]
Dieldrin	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	LCS-W1	99%
p,p-DDE	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	[NR]	[NR]
p,p-DDD	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	[NR]	[NR]
p,p-DDT	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	LCS-W1	88%
Endrin	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	LCS-W1	86%
Endrin Aldehyde	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	[NR]	[NR]
Endrin Ketone	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	[NR]	[NR]
alpha-Endosulfan	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	[NR]	[NR]
beta-Endosulfan	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	[NR]	[NR]
Endosulfan Sulfate	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	[NR]	[NR]
Methoxychlor	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	[NR]	[NR]
Surrogate OC Recovery	%		Ext-020	[NT]	[NT]	[NT]	LCS-W1	97%

QUALITY CONTROL OP Pesticides - Trace Level	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			23/03/2012	[NT]	[NT]	LCS-W1	23/03/2012
Date analysed	-			26/03/2012	[NT]	[NT]	LCS-W1	26/03/2012
Demeton-S-methyl	µg/L	0.010	Ext-020	<0.01	[NT]	[NT]	[NR]	[NR]
Dichlorvos	µg/L	0.010	Ext-020	<0.01	[NT]	[NT]	[NR]	[NR]
Diazinon	µg/L	0.010	Ext-020	<0.01	[NT]	[NT]	LCS-W1	102%
Dimethoate	µg/L	0.010	Ext-020	<0.01	[NT]	[NT]	[NR]	[NR]
Chlorpyrifos	µg/L	0.010	Ext-020	<0.01	[NT]	[NT]	LCS-W1	97%
Chlorpyrifos methyl	µg/L	0.010	Ext-020	<0.01	[NT]	[NT]	[NR]	[NR]
Malathion	µg/L	0.010	Ext-020	<0.01	[NT]	[NT]	[NR]	[NR]
Fenthion	µg/L	0.010	Ext-020	<0.01	[NT]	[NT]	[NR]	[NR]
Azinphos Ethyl	µg/L	0.010	Ext-020	<0.01	[NT]	[NT]	[NR]	[NR]
Azinphos Methyl	µg/L	0.010	Ext-020	<0.01	[NT]	[NT]	[NR]	[NR]
Chlorfenvinphos (E)	µg/L	0.010	Ext-020	<0.01	[NT]	[NT]	[NR]	[NR]
Chlorfenvinphos (Z)	µg/L	0.010	Ext-020	<0.01	[NT]	[NT]	[NR]	[NR]
Ethion	µg/L	0.010	Ext-020	<0.01	[NT]	[NT]	LCS-W1	107%
Fenitrothion	µg/L	0.010	Ext-020	<0.01	[NT]	[NT]	[NR]	[NR]
Parathion (Ethyl)	µg/L	0.010	Ext-020	<0.01	[NT]	[NT]	LCS-W1	100%
Parathion (Methyl)	µg/L	0.010	Ext-020	<0.01	[NT]	[NT]	[NR]	[NR]
Primiphos Ethyl	µg/L	0.010	Ext-020	<0.01	[NT]	[NT]	[NR]	[NR]
Primiphos Methyl	µg/L	0.010	Ext-020	<0.01	[NT]	[NT]	[NR]	[NR]
Surrogate OP Recovery - TPP	%		Ext-020	[NT]	[NT]	[NT]	LCS-W1	100%

QUALITY CONTROL PCB in water - trace level	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			23/03/2012	[NT]	[NT]	LCS-W1	23/03/2012
Date analysed	-			26/03/2012	[NT]	[NT]	LCS-W1	26/03/2012
Aroclor 1016	µg/L	0.01	Ext-020	<0.01	[NT]	[NT]	[NR]	[NR]
Aroclor 1221	µg/L	0.01	Ext-020	<0.01	[NT]	[NT]	[NR]	[NR]
Aroclor 1232	µg/L	0.01	Ext-020	<0.01	[NT]	[NT]	[NR]	[NR]
Aroclor 1242	µg/L	0.01	Ext-020	<0.01	[NT]	[NT]	[NR]	[NR]
Aroclor 1248	µg/L	0.01	Ext-020	<0.01	[NT]	[NT]	[NR]	[NR]
Aroclor 1254	µg/L	0.01	Ext-020	<0.01	[NT]	[NT]	[NR]	[NR]
Aroclor 1260	µg/L	0.01	Ext-020	<0.01	[NT]	[NT]	[NR]	[NR]
Total PCB's (as above)	µg/L	0.010	Ext-020	<0.01	[NT]	[NT]	LCS-W1	103%
QUALITY CONTROL Total Phenolics in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			27/03/2012	70711-1	27/03/2012 || 27/03/2012	LCS-W1	27/03/2012
Date analysed	-			27/03/2012	70711-1	27/03/2012 || 27/03/2012	LCS-W1	27/03/2012
Total Phenolics (as Phenol)	mg/L	0.01	Inorg-030	<0.01	70711-1	<0.01 || <0.01	LCS-W1	101%
QUALITY CONTROL HM in water - dissolved	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			26/03/2012	[NT]	[NT]	LCS-W1	26/03/2012
Date analysed	-			26/03/2012	[NT]	[NT]	LCS-W1	26/03/2012
Arsenic-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	98%
Boron-Dissolved	µg/L	5	Metals-022 ICP-MS	<5	[NT]	[NT]	LCS-W1	113%
Beryllium-Dissolved	µg/L	0.5	Metals-022 ICP-MS	<0.5	[NT]	[NT]	LCS-W1	112%
Cadmium-Dissolved	µg/L	0.1	Metals-022 ICP-MS	<0.1	[NT]	[NT]	LCS-W1	102%
Chromium-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	108%
Cobalt-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	104%
Copper-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	102%
Lead-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	107%
Mercury-Dissolved	µg/L	0.05	Metals-021 CV-AAS	<0.05	[NT]	[NT]	LCS-W1	104%
Manganese-Dissolved	µg/L	5	Metals-022 ICP-MS	<5	[NT]	[NT]	LCS-W1	107%
Nickel-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	103%

QUALITY CONTROL HM in water - dissolved	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Zinc-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	108%
QUALITY CONTROL Metals in Waters - Acid extractable	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			26/03/2012	[NT]	[NT]	LCS-W1	26/03/2012
Date analysed	-			28/03/2012	[NT]	[NT]	LCS-W1	28/03/2012
Phosphorus - Total	mg/L	0.05	Metals-020 ICP-AES	<0.05	[NT]	[NT]	LCS-W1	87%
QUALITY CONTROL Miscellaneous Inorganics	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			21/03/2012	[NT]	[NT]	LCS-W1	21/03/2012
Date analysed	-			21/03/2012	[NT]	[NT]	LCS-W1	21/03/2012
Total Cyanide	mg/L	0.004	Inorg-013	<0.004	[NT]	[NT]	LCS-W1	93%
TKN in water	mg/L	0.1	Inorg-062	<0.1	[NT]	[NT]	LCS-W1	101%
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	[NT]	[NT]	LCS-W1	104%
Nitrite as N in water	mg/L	0.005	Inorg-055	<0.005	[NT]	[NT]	LCS-W1	100%
Total Nitrogen in water	mg/L	0.1	Inorg-055/062	<0.1	[NT]	[NT]	LCS-W1	101%
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	[NT]	[NT]	LCS-W1	105%
Fluoride, F	mg/L	0.1	Inorg-026	<0.1	[NT]	[NT]	LCS-W1	98%
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	[NT]	[NT]	LCS-W1	102%
pH	pH Units		Inorg-001	[NT]	[NT]	[NT]	LCS-W1	101%
Oil & Grease (LLE)	mg/L	5	Inorg-003	<5	[NT]	[NT]	LCS-W1	85%

Report Comments:

Asbestos ID was analysed by Approved Identifier:	Not applicable for this job
Asbestos ID was authorised by Approved Signatory:	Not applicable for this job

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

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 batched of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

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 RECEIPT ADVICE

Client:

Geotechnique Pty Ltd
PO Box 880
Penrith NSW 2751

ph: 02 4722 2700
Fax: 02 4722 6161

Attention: James Ngu

Sample log in details:

Your reference:	**12609/3, North Penrith**
Envirolab Reference:	**70711**
Date received:	21/03/12
Date results expected to be reported:	**30/03/12**

Samples received in appropriate condition for analysis:	YES
No. of samples provided	1 water
Turnaround time requested:	Standard
Temperature on receipt	Cool
Cooling Method:	Ice

Comments:

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

Contact details:

Please direct any queries to Aileen Hie or Jacinta Hurst
ph: 02 9910 6200 fax: 02 9910 6201
email: ahie@envirolabservices.com.au or jhurst@envirolabservices.com.au

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 8200

Job No: 70711

Date Received: 21/3/12
Time Received: 16:15
Received by: PT
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

G EOTECHNIQUE PTY LTD

Laboratory Test Request / Chain of Custody Record

Note: Groundwater samples must be analysed at low LOR as per ANZECC 2000 Water Guidelines.

Lemko Place
PENRITH NSW 2750

P O Box 880
PENRITH NSW 2751

Tel: (02) 4722 2700
Fax: (02) 4722 6161
email: info@geotech.com.au

TO: ENVIROLAB SERVICES PTY LD
12 ASHLEY STREET
CHATSWOOD NSW 2067

PH: 02 9910 6200 FAX: 02 9910 6201

ATTN: TANIA NOTARAS

Sampling By: LY
Job No: 12609/3
Project:
Project Manager: JN
Location: North Penrith

Results required by: Normal TAT

Sampling details				Sample type												
Location	Depth (m)	Date	Time	Soil	Water	Metals (Low LOR) As, B, Be, Cd, Cr, Co, Cu, Pb, Hg, Mn, Ni & Zn	TRH* & BTEX (Low LOR)	PAH (Low LOR)	VOC (Low LOR)	Semi-VOC (Low LOR)	OCP, OPP & PCB (Low LOR)	TOTAL PHENOLS (Low LOR)	TOTAL CYANIDES (Low LOR)			KEEP SAMPLE
S1	-	21/03/2012	-		WG/WP/Vial	✓	✓	✓	✓	✓	✓	✓	✓			YES

Relinquished by			Received by		
Name	Signature	Date	Name	Signature	Date
JAMES NGU	jn	21/03/2012	Pratiutha (ELS)	PT	21/3/12.

Legend:

WG	Water sample, glass bottle	USG	Undisturbed soil sample (glass jar)	DSP	Disturbed soil sample (small plastic bag)	* Purge & Trap	@ mole H^+/tonne
WP	Water sample, plastic bottle	DSG	Disturbed soil sample (glass jar)	✓	Test required	# Geotechnique Screen	

G EOTECHNIQUE PTY LTD

Laboratory Test Request / Chain of Custody Record

Note: Groundwater samples must be analysed at low LOR as per ANZECC 2000 Water Guidelines.

Lemko Place
PENRITH NSW 2750

P O Box 880
PENRITH NSW 2751

Tel: (02) 4722 2700
Fax: (02) 4722 6161
email: info@geotech.com.au

TO: SGS ENVIRONMENTAL SERVICES
UNIT 16
33 MADDOX STREET
ALEXANDRIA NSW 2015

PH: 02 8594 0400 **FAX:** 02 8594 0499
ATTN: MS ANGELA MAMALICOS

Sampling By: LY
Job No: 12609/3
Project:
Project Manager: JN
Location: North Penrith

Results required by: Normal TAT

Sampling details				Sample type											
Location	Depth (m)	Date	Time	Soil	Water	TKN, Nitrite Nitrate & Total N (Low LOR)	Ammonia (Low LOR)	Total Phosphorous (Low LOR)	Soluble Fluoride (Low LOR)	Total Dissolved Solids (TDS)	pH	OIL & GREASE (Low LOR)			KEEP SAMPLE
S1	-	21/03/2012	-		WG/WP/Vial	✓	✓	✓	✓	✓	✓	✓			YES

Relinquished by			Received by		
Name	Signature	Date	Name	Signature	Date
JAMES NGU	jn	21/03/2012		PT	

Legend:

WG	Water sample, glass bottle	USG	Undisturbed soil sample (glass jar)	DSP	Disturbed soil sample (small plastic bag)	* Purge & Trap	@ mole H^+/tonne
WP	Water sample, plastic bottle	DSG	Disturbed soil sample (glass jar)	✓	Test required	# Geotechnique Screen	

Job no: 70711