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Groundwater Contamination Assessment

Fiskville Training College
4549 Geelong-Ballan Road, Fiskville, Vic

Job No. 212163.2

Prepared for Ashurst

March 2014

DOCUMENT CONTROL

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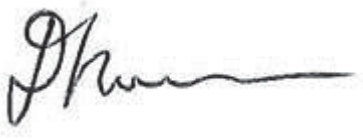
Signatures:	**Prepared By:**  **David Louwrens** *BSc Geol, MEnv* Project Manager/Associate Hydrogeologist	**Authorised By:**  **Anthony Lane** *CEnvP* Senior Principal Hydrogeologist

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GROUNDWATER CONTAMINATION ASSESSMENT

Fiskville Training College, 4549 Geelong-Ballan Road, Fiskville, Vic

EXECUTIVE SUMMARY

Cardno Lane Piper Pty Ltd was engaged by Ashurst ("the Client"), on behalf of the Country Fire Authority ("CFA"), to conduct a Groundwater Contamination Assessment at the CFA Fiskville Training College, 4549 Geelong-Ballan Road, Fiskville, Vic.

Objectives

The purpose of this assessment is to provide preliminary advice on the groundwater contamination status of the site and, in particular, to address recommendations in the report of the Independent Fiskville Investigation[1] (IFI). Recommendations 1 and 2 in the IFI report state that:

1. *Soil and groundwater quality be assessed in areas where fuel storage tanks are currently located or have been located in the past, both above and below ground.*
2. *Groundwater investigations be undertaken in the vicinity of the historical flammable liquids pad, the fuel mixing area, the historical foam training pits, the prop storage area, and the area used to rehabilitate contaminated soils in 1998.*

It is noted that soil quality at the site has been separately assessed and is presented in Cardno Lane Piper's "Targeted Soil Assessment" report (Cardno Lane Piper, 2014b).

The objectives of this assessment were as follows:

1. Assess the hydrogeological conditions at the site as a basis for understanding the occurrence and flow of groundwater and its vulnerability to contamination.
2. Identify the past or current activities at the site with potential to cause contamination of groundwater at the site.
3. Assess the groundwater for contaminants at Fiskville in the areas defined in the IFI report.
4. Provide a preliminary assessment of the feasibility for obtaining a supply of water from groundwater sources for fire fighter training at Fiskville.
5. Conduct the work to a standard which will enable it to be used as part of the assessment required by an EPA Auditor.

Scope of Work

Site History Review and Planning included a review of past groundwater investigations and a desktop hydrogeological assessment, as follows:

[1] Report prepared by Prof. Robert Joy (June 2012)

- The topography and surface water drainage of the site were defined, as well as the proximity to the nearest surface water body and any associated potentially sensitive aquatic ecosystems.
- The location of nearby sensitive environments and receptors such as residential, child-care facilities, primary schools, wetlands or streams were identified.
- A review of the regional and local hydrogeology from published sources was completed.
- Site infrastructure and potential sources of contamination were assessed, and features are shown in the Site Layout Plan (Figure 2, Appendix A).

Regional Groundwater Investigation and Characterisation of Hydrogeology (installation of groundwater bores in areas believed not to be contaminated by site activities) and *Targeted Groundwater Investigation* (installation of groundwater bores to investigate potential groundwater contamination in targeted areas that are listed in the IFI report):

- Cardno Lane Piper installed a total of eleven groundwater bores at the site. Figure 3, Appendix A, shows all existing and former groundwater bores that were installed at the site.
- Six bores were installed in the Newer Volcanics basalt. Of these, five were either dry or contained minimal groundwater, with only bore GW101 in the north-east of the site recording significant groundwater inflow.
- Two bores were installed in the Werribee Formation to depths of up to 60 m, and no groundwater was encountered. Bore depths of greater than 80 m in the Lower Werribee Formation may be required to assess the first regional aquifer beneath the site.
- Three bores were installed in perched groundwater at shallow depths (near Dams 1 & 2 and the FL PAD). The perched groundwater occurs in porous scoria fill which was imported to the site to construct the southern PAD area including Dam 2. This fill has been saturated by rainfall, water from fire fighter training activities and potentially by leakage from Dams 1 and 2 (dams used to store water discharged from the FL PAD).
- Sampling and analysis of groundwater samples was conducted for a broad range of analytes. This included three existing groundwater bores that were installed at the site during previous investigations.

Analysis & Reporting:

- Prepared a Conceptual Hydrogeological Model (CHM) as the basis for the assessment of potential impacts on the groundwater levels and quality.
- Developed a Conceptual Site Model of contamination occurrence based on the CHM, taking into account the history of potentially contaminating activities at the site and the hydrogeology.
- Assessed the impact of contamination on groundwater quality and beneficial uses.
- Reported the findings and recommendations relevant to the objectives of the assessment in a format consistent with EPA Publication 668 guidance.

Conclusions

Hydrogeological Understanding of the Site

An understanding of the hydrogeology of any investigation site, in its regional context, is fundamental to the investigation of groundwater contamination. The initial desktop assessment identified the shallow geological unit (Newer Volcanics) as the likely regional water table aquifer at the site. However, this unit had minimal water and is considered to be unsaturated, except in the north-eastern corner of the site. Deeper drilling to about 60 m in the Werribee Formation failed to find groundwater. Some groundwater was found in shallow

bores in the vicinity of Dam 2 and the FL PAD, and has been interpreted to be 'perched groundwater' in man-made fill, and not representative of the natural groundwater in aquifers used by farmers and others for a range of purposes in the region. For this reason, this perched groundwater may not need to be protected under *SEPP Groundwaters of Victoria*.

The interpreted hydrogeology indicates a low risk of groundwater contamination by sources at the site surface, or the subsequent contamination of surface waters by discharging groundwater, for the following reasons:

- The groundwater is very deep (more than 60 m) and is protected by overlying low permeability soils. This minimises the likelihood of seepage of contaminants to depths where the first aquifer is expected.
- The groundwater is classified as Segment B under *SEPP Groundwaters of Victoria,* based on published information. The perched water is 'fresh' and may be classified as Segment A, but should not be considered protected under the SEPP, given its artificial nature and limited extent.
- The small number of groundwater bore users near the Fiskville site indicates a low risk of impact on users of groundwater bores, in the unlikely event of the groundwater becoming contaminated at the site.
- The groundwater is too deep to discharge to the nearest surface water body (Lake Fiskville in the west of the site). The nearest possible point of regional groundwater discharge is expected to be Yaloak Creek to the east and south-east of the site. In the unlikely event that contaminants such as petroleum hydrocarbons entered the groundwater beneath the site, they would biodegrade during migration over such a long travel distance.
- The hydrogeology is sufficiently well understood and no further groundwater investigations are justified at this time. Further work may be required by an EPA Environmental Auditor recently engaged to comply with an EPA Clean Up Notice.

Potential Sources of Contamination & Risks

The sources of potential contamination set out in the IFI Report were reviewed in detail by the Cardno Lane Piper team, and reported separately in the Site History Review (Cardno Lane Piper, 2014a). In summary, this study concluded that there are currently, and historically, several potential sources of contamination of both soil and groundwater at the site, as listed in Section 3 of this report.

The subsequent investigation of soil contamination presented in the Cardno Lane Piper report titled "Targeted Soil Assessment" (Cardno Lane Piper, 2014b) identified very limited areas of contamination, including surface soil contaminated with petroleum hydrocarbons and Perfluorinated Compounds (PFCs) near the FL PAD, and one isolated occurrence of petroleum hydrocarbons in a former UST pit, now backfilled. Neither of these would be characterised as a significant source of these contaminants to the groundwater. It is noted that PFCs are foam chemicals that are used in fire training activities, and historically included Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA).

It is also noted that the soil in the FL PAD area was contaminated by petroleum hydrocarbons before being remediated in 1998. Up to 5,400 m^3 of soil was excavated from the FL PAD area and bio-remediated in the Soil Composting Area. This represents a significant reduction of a potential source of groundwater contamination in this area of the site.

It is concluded that there is a low risk of contaminated groundwater from these sources impacting the natural groundwater systems at the site and its vicinity.

Groundwater Contamination Observed

Only one of the groundwater bores monitored at the site is considered to be representative of the natural water table aquifer of the region (which most often occurs in the Newer Volcanics). A number of water samples were collected from bores which contained minor seepages. The seepage water was generally insufficient to obtain a representative sample from which reliable water quality data could be obtained.

Contamination was reported in perched water in imported fill in the vicinity of Dam 2 and the FL PAD. This included concentrations of PFCs reported in two shallow bores, as discussed in Section 6.3. The contaminated perched water is of no significance as 'groundwater contamination', as the water is limited to this area and would not be extracted for any use. (A common interpretation of *SEPP Groundwaters of Victoria* would indicate that this water would not be protected under the policy due to its mode of occurrence.) However, the water requires management for two reasons: a) it has the potential to seep towards the nearby stormwater drain, and b) the perched water is in hydraulic connection with the water in Dams 1 and 2, which are similarly contaminated and discharge to Lake Fiskville, and then potentially off-site. The perched water is proposed to be remediated together with the contents of the dams, and the proposed further investigations will contribute to the design of this remedial response.

The contaminants found in the perched water do not present a vapour contamination risk and therefore do not present a health risk to site occupants via that pathway. Further, the low concentration of petroleum hydrocarbons reported in one of the bores is also not a vapour risk.

In summary, it is considered highly unlikely that the fire fighter training activities at the site have resulted in any significant contamination of the regional aquifers deep beneath the site. Groundwater contamination is limited to perched water near Dam 2 and the FL PAD, and presents no significant risk to site occupants.

Water Supply from Groundwater

The assessment has shown that there is no substantial aquifer with permanent water within 60 m of the surface. The desktop study has shown that the most prospective water supply aquifer in the region is the Werribee Formation Aquifer. However, this aquifer contains relatively saline water and may not be suitable for fire fighter training activities (if not treated by reverse osmosis) due to the need to discharge used water to a fresh water creek.

It is possible that the deeper units of the Werribee Formation Aquifer could yield a useful water supply. However, deep (200 m) exploratory drilling would be required to assess this prospect. Given the high cost of such exploration and the likelihood of obtaining saline water, such expenditure is not proposed at this time. In the event that a Reverse Osmosis water treatment plant is installed at the site for other reasons, then the feasibility of using deep groundwater as a water supply for fire fighter training should be considered.

Recommendations

Based on the conclusions of this investigation:

1. Further work is recommended to investigate the extent of PFC contamination in the shallow, perched water in the fill near Dams 1 and 2 and the FL PAD, and its potential to seep to the stormwater drainage system.
2. An assessment of the feasibility of remediating PFC contamination in the perched water should be completed after the further investigation of the area, including hydraulic testing of the fill.

3. It is possible that some of the new bores installed during 2012 may 'gain' groundwater over time. During the next monitoring round, it is recommended that all bores should gauged for water level and, if sufficient water is present, the bores should be developed and sampled to establish a scope for the investigation of regional groundwater.
4. While further investigation of the regional aquifers is not required at this time, the EPA Environmental Auditor, engaged recently to audit the site in compliance with an EPA Clean Up Notice, should be consulted to ascertain his requirements for any further investigations.
5. In the event that a Reverse Osmosis water treatment plant is installed at the site, the feasibility of using the plant to treat the deep saline groundwater as a water supply for fire fighter training should be considered.

Limitations

While this Executive Summary has endeavoured to accurately summarise the key points of the Report, the latter shall take precedence and the Executive Summary must be read in conjunction with the full report (Cardno Lane Piper document ref. 212163.2Report01.7.docx).

While this report has been undertaken in accordance with the current industry guidelines and practices, there may be some limitations on the meaning and use of this report. The reader is advised to read this report in conjunction with the attached document *About Site Environmental Assessment Reports* (Appendix I).

Cardno Lane Piper Pty Ltd

March 2014

GROUNDWATER CONTAMINATION ASSESSMENT

Fiskville Training College, 4549 Geelong-Ballan Road, Fiskville, Vic

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LIST OF ABBREVIATIONS AND UNITS

Chemical Names

BTEX	Benzene, Toluene, Ethylbenzene & Xylenes (subset of MAH)
CHC	Chlorinated Hydrocarbons
MAH	Monocyclic Aromatic Hydrocarbons
OCP	OrganoChlorine Pesticides
OPP	OrganoPhosphate Pesticides
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	PolyChlorinated Biphenyls
PHC	Petroleum Hydrocarbons
SVOC	Semi-Volatile Organic Compounds
TDS	Total Dissolved Solids (salinity of water)
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbons (= TPH)
VOC	Volatile Organic Compounds
VHC	Volatile Halogenated Compounds

Technical Terms

AGL	Above Ground Level
AHD	Australian Height Datum
AMG	Australian Map Grid
ANZECC	Australian and New Zealand Environment and Conservation Council
AST	Aboveground Storage Tank
BDL	Below Detection Limit
BGL	Below Ground Level
COC	Chain of Custody
CoEA	Certificate of Environmental Audit
CoPC	Chemicals of Potential Concern
DNAPL	Dense Non-Aqueous Phase Liquid
DO	Dissolved Oxygen
EC	Electrical Conductivity
EILs	Environmental Investigation Levels
EPA	Environmental Protection Authority
ESA	Environmental Site Assessment
GCMS	Gas Chromatograph - Mass Spectrometer

GDB	Groundwater Database (Department of Natural Resources and Environment)
GME	Groundwater Monitoring Event
HILs	Health Investigation Levels
LNAPL	Light Non-Aqueous Phase Liquid
LOR	Limit of Reporting
N/A	Not Applicable
NAPL	Non-Aqueous Phase Liquid
NEPM	National Environmental Protection Measure
PID	Photo-ionisation detector (measures in ppm)
PQL	Practical Quantitation Limit
PSH	Phase Separated Hydrocarbon
QA	Quality Assurance
QC	Quality Control
RL	Reduced Level
RPD	Relative Percentage Difference
SoEA	Statement of Environmental Audit
TIT	Triple Interceptor Trap
UCL	Upper confidence Limit ("95% UCL of the mean" is a value for the mean concentration from sampling which has only a 5% chance of being greater than the true mean value.)
UST	Underground Storage Tank

Units

ha	Hectares
mBGS	Metres Below Ground Surface
mg/kg	Milligram per Kilogram (approximately equivalent to ppm)
mg/L	Milligram per Litre
mTOC	Metres below Top of Casing
ppb	Part per Billion
ppm	Parts per Million
µg/kg	Microgram per Kilogram (approximately equivalent to ppb)
µg/L	Microgram per Litre
µS/cm	Micro Siemens per Centimetre (Electrical Conductivity - Water)

Site Specific

6:2 FTs	6:2 Fluorotelomer Sulfonate
CFA	Country Fire Authority
FL PAD	Flammable Liquids Practical Area Drill

IFI	Independent Fiskville Investigation (Prof. Rob Joy)
PAD	Practical Area Drills
PFC	Perfluorinated Compounds
PFOS	Perfluorooctane Sulfonate
PFOA	Perfluorooctanoic Acid
RTG	Regional Training Ground

GROUNDWATER CONTAMINATION ASSESSMENT

Fiskville Training College, 4549 Geelong-Ballan Road, Fiskville, Vic

1 INTRODUCTION

1.1 Background

Cardno Lane Piper Pty Ltd was engaged by Ashurst ("the Client") on behalf of the Country Fire Authority ("CFA"), to conduct a Groundwater Contamination Assessment at the CFA Fiskville Training College, 4549 Geelong-Ballan Road, Fiskville, Vic. The location and features of the site are shown in Figures 1 and 2 (Appendix A).

Cardno Lane Piper developed a work program to respond to recommendations in the Report of the Independent Fiskville Investigation[2] (IFI) in relation to site contamination, and other items considered to be strategic or prudent.

Following commencement of this work, EPA notified the CFA that a Clean Up Notice would be issued for the site and this would include an Environmental Audit by an EPA-appointed Environmental Auditor. This notice was issued by EPA on 22 January 2013. This report has been written in anticipation of involvement by an EPA Auditor.

1.2 Purpose & Objectives

The purpose of this assessment is to provide the Client with preliminary advice on the contamination status of the site and, in particular, to address Recommendations 1 and 2 in the IFI report, which state:

1. *Soil and groundwater quality be assessed in areas where fuel storage tanks are currently located or have been located in the past, both above and below ground.*
2. *Groundwater investigations be undertaken in the vicinity of: the historical flammable liquids pad, the fuel mixing area, the historical foam training pits, the prop storage area, and the area used to rehabilitate contaminated soils in 1998.*

The objectives of this assessment were as follows:

1. Assess the hydrogeological conditions at the site as a basis for understanding the occurrence and flow of groundwater and its vulnerability to contamination.
2. Identify the past or current activities at the site with potential to cause contamination of groundwater at the site.
3. Assess the groundwater for contaminants at Fiskville in the areas defined in the IFI report.
4. Provide a preliminary assessment of the feasibility for obtaining a supply of water from groundwater sources for fire fighter training at Fiskville.
5. Conduct the work to a standard which will enable it to be used as part of the assessment required by an EPA Auditor.

[2] Report prepared by Robert Joy (June 2012)

1.3 Scope of Assessment

This investigation included the following work:

- Site History Review & Planning – including a review of past groundwater investigations and a desktop Hydrogeological Assessment.
- Regional Groundwater Investigation & Characterisation of Hydrogeology – including the installation of groundwater bores in parts of the site that are believed not to have been contaminated by site activities.
- Targeted Groundwater Investigation – including the installation of groundwater bores to investigate potential groundwater contamination in targeted areas listed in the IFI report, including:
  - ASTs and USTs (former and current)
  - Flammable Liquid PAD
  - Fuel mixing area
  - Foam training pits
  - Props storage
  - Soil remediation area
  - Drum fire area
  - Landfill areas (south-west of site)
  - Drum burial areas

As a result of the absence of groundwater during the investigation, it was decided not to install seven of the proposed groundwater bores. These included bores targeting drum burial, soil remediation, landfill and former UST areas, and one regional hydrogeology bore. This is discussed in more detail in Section 4.2.

Cardno Lane Piper carried out the following tasks in order to satisfy the purpose and objectives of this assessment:

Define the Site, Features & Surrounds

1. Defined the topography and surface water drainage of the site and its proximity to the nearest surface water body and any associated potentially sensitive aquatic ecosystems.
2. Identified the location of nearby sensitive environments and receptors such as residential, child-care facilities, primary schools, wetlands or streams.

Hydrogeology & Groundwater Resource Use

3. Reviewed the regional and local hydrogeology to identify likely site soil and rock types, aquifers, groundwater occurrence, expected groundwater flow direction, quality and resource value.

Intrusive Site Investigation Sampling & Testing

4. Implemented a comprehensive work plan, including laboratory analysis of field quality control (QC) samples.
5. Conducted an intrusive investigation of groundwater conditions at the site by sampling at selected locations as set out in the following sections of this report, including the following general scope of work:
   - Drilling and installation of 11 groundwater monitoring bores
   - Survey of groundwater bores by a licensed surveyor

6. Conducted testing of groundwater samples in for a broad range of analytes (using a NATA accredited laboratory).

Analysis & Reporting

7. A Conceptual Hydrogeological Model (CHM) was prepared (based on the requirements of EPA Publication 668) as the basis for the assessment of the impacts on the groundwater levels and quality.
8. A Conceptual Site Model was developed based on the CHM and taking into account the history of potentially contaminating activities at the site.
9. An Assessment of the impact of contamination on groundwater quality and beneficial uses was undertaken.
10. This report was prepared to provide findings and recommendations relevant to the objectives of the assessment.

1.4 Standard of Assessment & Limitations

This assessment has been undertaken in accordance with the current "industry standards" for an environmental site assessment (ESA) for the purpose and objectives and scope identified in this report. These standards are set out in:

- *National Environment Protection [Assessment of Site Contamination] Measure* (NEPM), December 1999, National Environment Protection Council (NEPC)
- *Groundwater Sampling Guidelines.* EPA Publication 669, April 2000
- AS4482.1- 2005: *Guide to the sampling and investigation of potentially contaminated soil Part 1: Non-volatile and semi-volatile compounds*. Standards Australia (2005).
- *Hydrogeological Assessment (Groundwater Quality) Guidelines,* EPA Publication 668 September 2006

This assessment report is not a geotechnical report (and the bore logs or test pit logs may not be sufficient as the basis for geotechnical advice).

An overview of environmental site assessments and their limitations is included in Appendix I.

1.5 Assessment Timeline

The key milestones during this assessment are summarised in Table 1-1

Table 1-1: Site Assessment Timeline

Date	Activity/Milestone
19 July 2012	Cardno Lane Piper engaged by the Client
6 August 2012	Conducted site inspection
22 August to 11 September 2012	Installed groundwater bores
23 August 2012	Surveyed bore locations and levels
20 September 2012	Conducted groundwater sampling Surveyed bore locations and levels
20 March 2014	Issued revised final report

2 SITE DESCRIPTION & SETTING

2.1 Site Definition and Description

The CFA Fiskville site is rectangular in shape and occupies an area of approximately 150 ha, as shown in Figure 2-1. CFA site uses include the Practical Area Drill (PAD) training facility (also known as the Operational Area), administration, accommodation, amenities and recreational areas. The north-western, southern and south-eastern portions of the site are pastures which are leased to local farmers for livestock grazing. An airstrip and hanger are present near the central northern boundary of the site. Tree 'plantations' are located in several parts of the site, including a large area to the south of the airstrip and a smaller area in the south-east part of the site. Small wooded areas are also present near the residential housing area in the south-western part of the site.

The site is mostly flat-lying in the central and eastern parts, but is more undulating in the western part where the land slopes down to Beremboke Creek and Lake Fiskville. The site topography is described in more detail in Section 5.

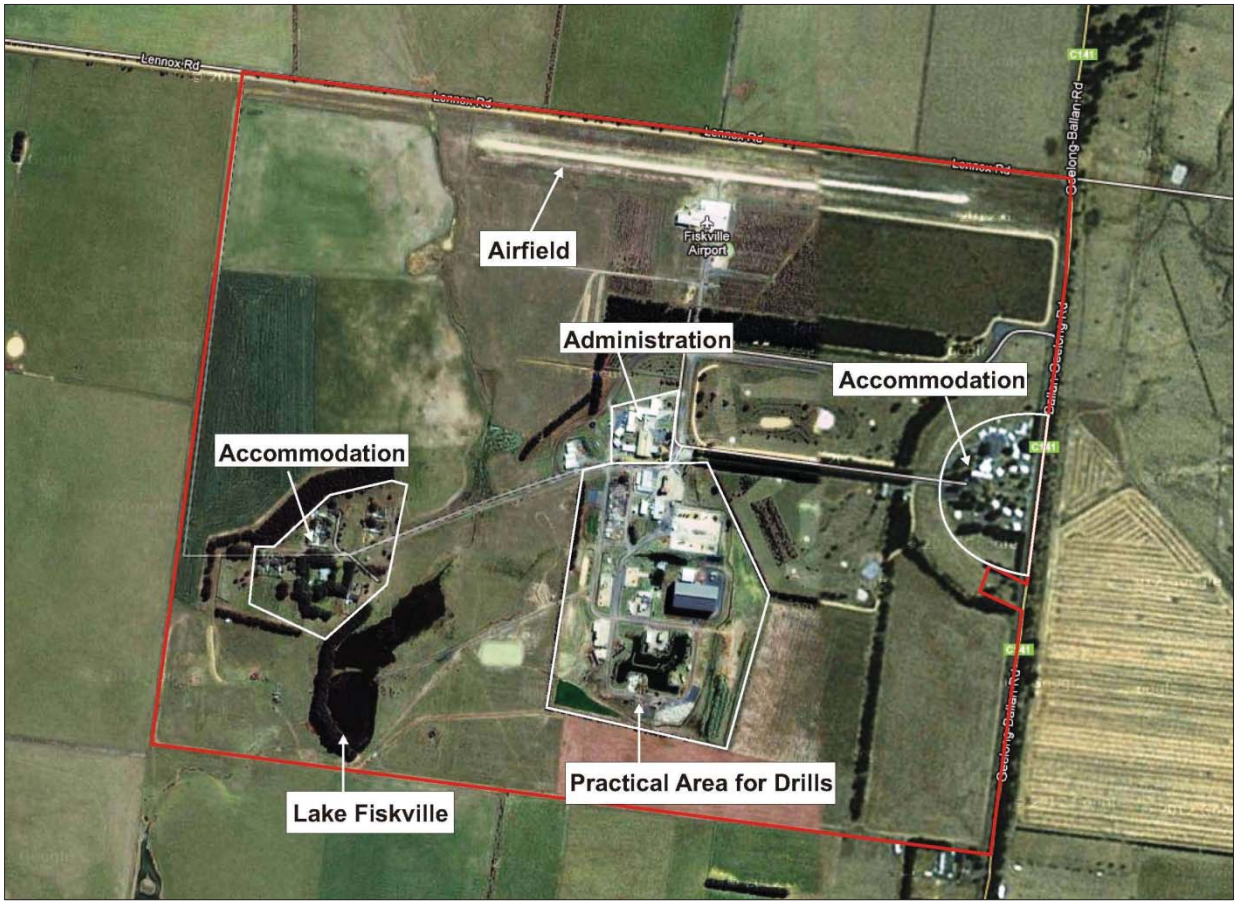

Figure 2-1: Aerial Photo of CFA Fiskville Site

Table 2-1 summarises the key details defining the site. Title information and property report documents are included in Appendix F. The location of the site is shown in Figure 1, Appendix A.

Table 2-1: Site Identification Details

Site Address	Fiskville Training College, 4549 Geelong-Ballan Road, Fiskville, Vic
Site Area	Approximately 150.3 ha
Title Details	Lots 1, 2, 3 and 4 on Title Plan 845669K Volume 09503, Folio 693
Municipality	Parish of Yaloak
Current Site Owner	Country Fire Authority
Planning Zone	Farming Zone

2.2 Surrounding Land Uses

The surrounding land uses and sensitive receptors are outlined in Table 2-2.

Table 2-2: Surrounding Land Uses

Direction	Land Use or Activity
North	• Lennox Lane, then farm land (livestock grazing) to the north
West	• Farm land (livestock grazing) • Beremboke Creek is present in the western part of the site (Beremboke Creek changes name to Swamp Gully further to the north and merges with Eclipse Creek to the south) • Lake Fiskville, near the south-western corner of the site, is a surface water body along Beremboke Creek
East	• Geelong-Ballan Road, then farm land (livestock grazing) to the east • Yaloak Creek is located approximately 250 m east of the site at its closest point
South	• Farm land (livestock grazing)

2.3 Site Use & Infrastructure

The Fiskville site is the CFA's largest fire fighter training facility in Victoria. Site infrastructure and features are shown in Figure 2, Appendix A and include:

- Administration buildings and reception
- Teaching centre
- Accommodation and meals facilities (near eastern site boundary)
- Residential housing (south-western part of site)
- PAD (Operational Area) – including fire fighting training facilities, fuel storage and props
- Workshop and storage facilities
- Amenities buildings
- VUT building
- Airstrip and hanger

- 4WD training area
- Water storages (Dams 1 to 4)
- Lake Fiskville
- Golf course
- Former landfill areas (south-western corner of site)
- Sewerage treatment plant
- Former Soil composting area

2.4 Previous Groundwater Assessment – Coffey 1996

A review of the documentation provided by CFA indicated that there has been one previous investigation which included a groundwater assessment. This was by Coffey Partners International Pty Ltd (Coffey) who prepared a report titled "Groundwater Monitoring Network Installation (1996)"'.

Of the eight bores installed by Coffey, three remain at the site, namely bores BH3, BH4 and BH5. The location of all former and existing groundwater bores are shown in Figure 3, Appendix A.

Areas targeted during the Coffey investigation included the following:

- Drum burial pit
- Sludge burial pit
- Underground storage tank (UST)
- Flammable liquid PAD (FL PAD)
- Fuel mixing areas
- Landfill
- Dam 1

Coffey installed four deep and four shallow groundwater bores at the site. The four deep bores (BH1 to BH4) were installed to depths ranging from 17 to 25 m depth in basalts of the Newer Volcanics. While all four bores were initially dry, bore BH2 later reported a groundwater level at a depth of 14.8 m below ground level. The four shallow bores (BH5 to BH8) were installed to depths ranging from 1.8 to 2.8 m to investigate the possible presence of perched groundwater associated with areas of known or suspected filling.

Groundwater sampling was conducted about two weeks after installation of the bores. All bores were dry, with the exception of deep bore BH2 and shallow bore BH5. Bore BH2 targeted the FL PAD, and bore BH5 targeted the suspected drum burial area near the airfield. Groundwater samples collected from these bores were tested for a range of analytes, including TPH, BTEX, eight metals and nitrate.

Bores BH2 and BH5 reported copper, nickel and zinc above ecological assessment criteria, with bore BH2 reporting an elevated zinc concentration of 0.13 mg/L. All other analytes were either below laboratory detection limits or below the relevant assessment criteria in both bores.

In summary, the investigation by Coffey in 1996 indicated a general absence of a regional water table aquifer to a depth of 25 m. Some perched groundwater was found potentially associated with disturbed ground where filling had occurred. The groundwater found at BH2 at 14.8 m may also be from seepage of perched groundwater, as no other groundwater was found. In the bores where groundwater was encountered, laboratory testing results did not report any significant contamination for the analytes tested.

3 POTENTIAL SOURCES OF CONTAMINATION

Past or current activities at the site with the potential to be sources of groundwater contamination are also those with potential to contaminate the soil. A site history review (Cardno Lane Piper, 2014a) has been undertaken by the Cardno Lane Piper team and reported under separate cover. In summary, this study concluded that there are several potential past or present sources of groundwater contamination at the site. These are listed below and their locations are shown in Figure 2, Appendix A.

The key features or facilities with potential as sources of contamination are:

- Storage of flammable liquids in drums and tanks in the storage areas (includes “props” storage and “drum fire” areas) west of the FL PAD
- Former FL PAD and “Foam Pits”
- Dams 1 & 2 containing contaminated water
- Soil remediation compost area
- Fire training props outside the FL PAD where flammable liquids were used
- Drum burial area
- Former Landfill 1 & 2
- Sewage treatment plant infiltration field
- Former underground fuel storage tank

The features listed above include the features identified in the IFI Report as requiring investigation for groundwater contamination which were described as:

- ASTs and USTs (former and current)
- Flammable Liquids PAD
- Fuel mixing area
- Foam training pits
- Props storage
- Soil remediation area
- Drum fire area
- Landfill areas (south-west of site)
- Drum burial areas

4 SITE INVESTIGATIONS & RESULTS

This section outlines the program of work to obtain the necessary groundwater data for the objectives of the study. It describes the drilling and bore construction program, as well as the groundwater level monitoring, sampling and laboratory testing. It also identifies the factual data obtained and validates the quality of the data.

The interpretation of results is discussed in Section 5, where the hydrogeology is explained, and in Section 6 where the contamination status of the groundwater is discussed.

Field work was conducted during the period 20 August to 20 September 2012 and included the following:

- Drilling, installation and development of groundwater monitoring bores (GW101 to GW111)
- Survey of bores for location and level
- Groundwater sampling from bores.

4.1 Drilling and Bore Construction

Prior to the commencement of drilling, Cardno Lane Piper obtained (from Southern Rural Water) a Bore Construction Licence (BCL) on behalf of the CFA, for the installation of groundwater monitoring bores at the site. The BCL is included in Appendix C. The drilling contractor, South Western Drilling Pty Ltd, provided two water bore drillers who are licensed for this work under the *Water Act* 1989. A photograph taken at the location of bore GW102, showing the type of drilling equipment, is presented as Figure 4-1.

Figure 4-1: Drilling of Groundwater Bore GW102

Bores GW101 to GW111 were installed from 22 August to 11 September 2012. These included five bores installed to assess the 'regional' or background conditions and six bores in the Operational Area. Groundwater bore locations are shown in Figure 3, Appendix A.

The bores were drilled using a hand-auger and/or solid flight auger from surface to depths ranging from 0.5 to 4.5 m, and using downhole hammer to depths of up to 31 m. Two bores were advanced below the base of the Newer Volcanics basalt into the Werribee Formation using the rotary mud drilling method to depths of up to 60 m, as described in Table 4-1. The geology encountered is described in Section 5.

Excess drill cuttings from bores installed in the Operational Area were stored in drums provided by Chemsal, and subsequently removed from the site by Chemsal. EPA Waste Transport Certificates were completed by Chemsal and are included in Appendix G.

Bores in the 'regional' areas were fitted with a pad-locked protective cover (metal standpipe/ monument cover) to preserve the bores for future monitoring. Figure 4-2 shows an example of this completion method at bore GW104, installed as a background bore in the Newer Volcanics Aquifer in the south-eastern part of the site.

Figure 4-2: Protective Cover on Bore GW104

Bores in the Operational Areas were installed with a flush-mounted road box. Figure 4-3 shows an example of this completion method at bore GW107, installed in fill near the service station prop area.

Figure 4-3: Protective Cover on Bore GW107

Details of the groundwater monitoring bore drilling and construction activities are presented in Table 4-1.

Table 4-1: Groundwater Monitoring Bore Installation Summary

Activity	Details
Dates of Field Activity	22 August 2012 to 11 September 2012 (Bores GW101 to GW111)
Drilling Contractor	South Western Drilling
Bore Construction	Bores were installed in accordance with the requirements of a Bore Construction Licence, which was obtained in advance (Appendix C). The work was performed by a driller licensed to perform this level of bore installation under the *Water Act* 1989, and supervised by a qualified Cardno Lane Piper environmental scientist. <u>Bores installed in the Newer Volcanics were constructed as follows</u>: • Drilled using downhole air hammer (100 mm diameter drill bit) • Constructed bore with 50 mm, flush jointed, class 18 PVC, threaded screen and casing. <u>Bores installed in the Werribee Formation were constructed as follows</u>: • Drilled through basalt using downhole air hammer (190 mm diameter drill bit) • Installed 125 mm PVC casing to the base of the Newer Volcanics basalt as a pre-collar. • Drilled Werribee Formation using rotary mud method (110 mm rock roller drill bit). • The drilling fluid used was an organic polymer called AMC Bio-Vis Xtra (Bio-Vis). Bio-Vis is an organic polymer that is an effective viscosifier in either fresh or salty water and, in itself, forms a complete mud system. Bio-Vis is a modified Guar Gum in the form of a granular powder. It is recommended for rotary mud drilling is not expected to detrimentally affect groundwater quality in monitoring bores

Activity	Details
	following development. The Material Safety Data Sheet (MSDS) for Bio-Vis is included in Appendix C. • Constructed bore with 50 mm, flush jointed, class 18 PVC, threaded screen and casing, with a 1 m length sump at the base. Bore construction details are provided in Appendix C, and summarised in Section 4.2.
Bore Pack Type and Arrangement	In most bores, the sand filter pack was raised approximately 1 m above the top of the screen. A bentonite seal was set an additional 1 m above the top of the filter pack. The bores were grout sealed from the bentonite seal to the surface and capped with a concrete-set, monument covers or flush-mounted roadbox covers depending on their locations at the site. Bores in the Operational Area were secured with roadbox covers and bores in 'regional' areas of the site were secured with monument covers.
Surveying	Bores were surveyed to Map Grid Australia (MGA) and Australian Height Datum (AHD) by a licensed surveyor. Bore survey details are presented in Table 4-3. The survey report is included in Appendix D.
Bore Development	Given the generally low water levels in bores installed at the site, only two bores could be adequately developed. These included bore GW101, which was developed using the air lifting technique, and bore GW107 which was developed using a bailer. Bore development is summarised in Table C-1, Appendix C.

Bores GW101 to GW107, GW110 and GW111 were constructed with the screen intervals in basalt. Bores GW108 and GW109 were constructed with the screen intervals in silty to sandy clays. Comprehensive bore construction and aquifer details are presented in Table C-1 in Appendix C. Key bore construction details are presented in Table 4-2.

Table 4-2: Bore Construction Details

Bore ID	Drilled Depth (m)	Bore Depth (m)	Unit Monitored	Protective Cover	Screened Interval (m bgl)	Filter Pack Interval (m bgl)
GW101	18	18	Basalt	Monument Cover	12 – 18	11 – 18
GW102	25	23.5	Basalt	Monument Cover	17.5 – 23.5	16.5 – 23.5
GW103	31.5	29	Basalt	Monument Cover	23 – 29	22 – 29
GW104	29	26	Basalt	Monument Cover	14 – 26	13 – 26
GW105	28	26	Basalt	Road Box	17 – 26	16 – 26
GW106	27	24.5	Basalt	Road Box	18.5 – 24.5	17.5 – 24.5
GW107	2.7	2.7	Fill / Basalt	Road Box	0.2 – 2.7	0.2 – 2.7
GW108	59.5	41	Silty Sands	Monument Cover	30 – 40	29 – 41
GW109	49.5	47	Silty Sands	Road Box	40 – 46	39 – 47
GW110	2.9	2.9	Fill / Basalt	Road Box	0.3 – 2.9	0.3 – 2.9
GW111	4.5	4.5	Fill / Basalt	Road Box	0.3 – 4.5	0.3 – 4.5
BH3	21	21	Basalt	Monument Cover	15 – 21	12 – 21
BH4	20	20	Basalt	Monument Cover	14 – 20	5.3 – 20
BH5	1.8	1.8	Basalt	Monument Cover	0.8 – 1.8	0.4 – 1.8

4.2 Discussion of Bore Installation Results

It was originally proposed to install 17 groundwater bores to test the groundwater in both the regional background areas and target areas at the site, as described in the scope of work in Section 1. However, given that many of the bores were dry, it was decided to discontinue the program and only 11 bores were installed. The 11 bores included one additional bore (GW108), where a nested pair was installed to test both the Newer Volcanics and Werribee Formation aquifers. Figure 3, Appendix A, shows all current and previously installed groundwater bores, as well as the locations of the bores that were not installed.

The seven target locations where proposed bores were not installed include the following:

- Drum burial area (golf course)
- Drum burial area (north of Administration buildings)
- Former UST
- Sewage treatment plant infiltration field
- Former soil remediation area
- Former Landfill 1
- Regional hydrogeology (near southern site boundary)

The first bore drilled by Cardno Lane Piper was GW101 near the north-east corner of the site. Groundwater was intersected in the Newer Volcanics basalt at a depth approximately 15 m and the standing water level (SWL) was later recorded at 9.5 m below ground level. The final bore depth was 18 m.

The next five bores (GW102 to GW106) were drilled through the Newer Volcanics into the top of the Werribee Formation without intersecting any substantial quantity groundwater in the Newer Volcanics. All bores were installed in the lower part of the Newer Volcanics. The depth to the Newer Volcanics - Werribee Formation contact ranges from 24 to 30 m below ground level in these bores. The bores were either dry, or a small amount of water collected at the base of the bores following installation.

The next bore, GW107, intersected a significant amount of perched groundwater at a shallow depth, and the bore was installed in scoria fill and natural basaltic clays to a depth of 2.7 m.

It was decided to drill a deep bore to test for groundwater in the Werribee Formation at one of the 'regional' locations. Bore GW108 was drilled adjacent to bore GW104 in the south-east part of the site. It was drilled using the mud rotary method to a depth of 59.5 m, approximately 33 m below the base of the Newer Volcanics, but intersected a minor quantity of groundwater when tested at completion depth. After drilling to this target depth, the drill rods were removed from the bore and drilling mud was airlifted out of the bore. After the bore was left to stand for a period of time, it was dipped to test for standing groundwater. There was no groundwater at this depth. It was decided to install the bore to 41 m depth, with the screen from 30 to 40 m, and a 1 m sump at the base. The screen interval of 30 to 40 m was selected as it was considered the most likely interval to 'make' groundwater, based on the coarse sands and gravels that were intersected. However, as noted above, the bore did not make any groundwater.

Bore GW09, sited adjacent to the FL PAD, did not intersect groundwater in the Newer Volcanics and was therefore drilled deeper, into the Werribee Formation. The presence of groundwater was assessed using the same method as above, and it was determined that none was present to depth of 49.5 m. The bore casing and screen was installed to 47 m depth, with the screen from 40 to 46 m, and a 1 m sump at the base.

Given that most of the bores did not intersect groundwater in the Newer Volcanics, bores GW110 and GW111 (drilled in the Operational Area) were installed at shallow depth to monitor perched groundwater in scoria fill and weathered basalt.

Bores GW101 and GW107 were developed following installation. Bore GW110 was not developed after installation but was purged prior to sampling. Given the shallow depth of the bore and the porous nature of the near-surface fill, it is unlikely that the groundwater sampling would have been compromised through not developing the bore. All other bores contain very little groundwater, as shown in Table 4-4 and could not be developed. It was decided not to purge these bores prior to sampling, to ensure that a sample could be collected.

It is noted that the inability to develop and/or purge some of the bores indicates that the data from these bores may be of low reliability for the following reasons:

- The small volume of water available (less than 0.5 m of water depth) could adversely affect both the representativeness and repeatability of the groundwater sample analyses.
- The water may be adversely affected by the effects of drilling (cross-contamination from equipment or drilling fluids) which are less significant in bores with groundwater inflow.

Subsequent to installation, the SWLs in two of the bores (GW101 and GW107) rose to levels above the screen intervals. Bore GW101 was installed as a background bore (approximately 400 m north and hydraulically up-gradient of site infrastructure) and there is an extremely low chance of separate phase hydrocarbons or LNAPL. No dissolved petroleum hydrocarbons were detected in GW101, indicating that no LNAPL is present. The SWL in Bore GW107 is only 15 mm above the screen, and no petroleum hydrocarbons were reported in the groundwater sample. These bore are considered suitable for their purpose.

Bore survey details are presented in Table 4-3.

Table 4-3: Bore Survey Details

Bore ID	Easting	Northing	RL GL (m AHD)	RL TOC (m AHD)	Casing Stick-up (m agl)
GW101	255454.31	5826176.96	438.165	438.848	0.683
GW102	254526.10	5826117.92	441.547	442.225	0.678
GW103	254043.81	5825894.15	446.233	446.785	0.552
GW104	255205.96	5825603.34	438.885	439.609	0.724
GW105	254739.62	5825754.74	441.775	441.639	-0.136
GW106	254726.51	5825700.15	441.525	441.438	-0.087
GW107	254754.21	5825581.59	441.435	441.37	-0.065
GW108	255205.92	5825605.55	438.861	439.661	0.800
GW109	254914.33	5825709.28	440.945	440.859	-0.086
GW110	254877.99	5825667.37	440.832	440.746	-0.086
GW111	254862.12	5825470.46	441.054	440.975	-0.079
BH3	254085.09	5825436.43	440.096	440.524	0.428
BH4	254761.04	5826135.19	442.720	443.168	0.448
BH5	254761.13	5826137.57	442.747	443.15	0.407

4.3 Groundwater Monitoring Event

4.3.1 Groundwater Levels

Standing water level (SWL)[3] measurements were recorded for all groundwater bores during the Groundwater Monitoring Event (GME) on 20 September 2012. Three bores were dry. The SWLs were converted to relative water levels (RWLs as m AHD) using the top of casing (TOC) values from survey data. The groundwater levels are presented in Table 4-4 and in Figure 4, Appendix A.

Table 4-4: Groundwater Elevation (20 September 2012)

Bore ID	Bore Depth (m)	SWL (m bgl)	SWL (m bTOC)	RWL (m AHD)	Water Column in Bore (m)
GW101	18.0	9.412	10.095	428.75	8.59
GW102	23.5	Dry	Dry	-	-
GW103	29.0	28.498	29.050	417.74	0.50
GW104	26.0	Dry	Dry	-	-
GW105	26.0	Dry	Dry	-	-
GW106	24.5	24.162	24.075	417.36	0.34
GW107	2.7	0.185	0.120	441.25	2.52
GW108	41.0	40.135	40.935	398.73	0.87
GW109	47.0	46.791	46.705	394.15	0.21
GW110	2.9	0.526	0.440	440.31	2.37
GW111	4.5	4.064	3.985	436.99	0.44
BH3	21.0	20.197	20.625	419.90	0.80
BH4	20.0	19.407	19.855	423.31	0.59
BH5	1.8	0.903	1.310	441.85	0.90

SWL = Standing Water Level; RWL = Relative Water Level

4.3.2 Groundwater Sampling

The GME was carried out in accordance with the EPA guidelines for groundwater sampling (EPA Publication 669) and Cardno Lane Piper field procedures. Groundwater sampling field records are included in Appendix G. The GME activities are summarised in Table 4-5.

Table 4-5: Groundwater Monitoring Events Summary

Activity	Details
Date of Field Activity	20 September 2012 (Bores GW101 to GW111; BH3 to BH5)
Bore gauging	Monitoring bores were gauged using an oil/water interface probe. Gauging was completed prior to purging and sampling. All bores were measured

[3] Depth to groundwater level below ground level or the top of the PVC casing

Activity	Details
	against a specified mark at the top of the PVC casing.
Bore purging	Groundwater bores GW101, GW107 and GW110 contained groundwater column sufficient for bore purging and measurement of field parameters (dissolved oxygen, electrical conductivity, pH, oxidation-reduction potential and temperature).The field parameters for bores GW101, GW107 and GW110 were recorded between each purge volume. Purging continued until parameters had stabilised. Field parameters were recorded for bores BH3, BH4 and BH5, but purging of these bores was not possible due to the small water volumes in the bores. Bore purging and sampling records and field meter calibration certificates are provided in Appendix G.
Sampling and NAPL detection	Samples would not be collected if non-aqueous phase liquid (NAPL) was present. NAPL was not identified in any of the bores.
Bore purging and sampling procedures	Disposable polyethylene bailers equipped with low flow bottom emptying sampling devices were used to undertake purging and obtain groundwater samples. Groundwater samples were directly obtained into sample containers (pre-preserved where appropriate) provided by the laboratory and sampled without headspace. Samples for metals analysis were field filtered to 0.45 µm. All samples were labelled with an indelible marker pen on water resistant labels attached to the sample bottles.
Decontamination procedure	All non-disposable field equipment (including the interface probe) was cleaned using Decon 90 and rinsed with deionised water between each bore.
Sample preservation and transport	Samples were stored on ice, in an esky while on-site and in transit to the laboratory, under Chain of Custody documentation
Disposal of purged groundwater	For two of the bores, purged groundwater was transferred via buckets to a steel drum which was temporarily stored on-site and later transported and disposed of off-site by an EPA certified waste transport contractor (Waste Transport Certificates in Appendix G). For all other bores, there was insufficient water for purging prior to collecting the samples.

4.3.3 Field Physicochemical Parameters

As part of the sample gathering process, groundwater samples are also tested in the field using water quality meters. This measures physicochemical parameters including:

- Temperature
- Electrical Conductivity
- pH
- Dissolved oxygen
- Oxidation-Reduction Potential

These provide valuable supplementary information for interpretation of groundwater chemistry data and also assist in guiding the sample quality control process.

The initial standing water level and stabilised physicochemical parameters recorded during the GME are summarised in Table 4-6. Further observations on water turbidity, colour and odour can be found in the field sampling record sheets presented in Appendix G.

Table 4-6: Groundwater Physicochemical Parameters

Bore ID	Standing Water Level (m bgl)	Electrical Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Temp (°C)	pH	Redox Potential (mV)
GW101	9.41	2,578	4.19	16.3	6.95	47.1
GW102	Dry	-	-	-	-	-
GW103[1]	28.49	-	-	-	-	-
GW104	Dry	-	-	-	-	-
GW105	Dry	-	-	-	-	-
GW106[1]	24.15	-	-	-	-	-
GW107	0.21	797	6.70	11.5	7.21	-73.5
GW108[1]	40.2	-	-	-	-	-
GW109[2]	46.79	-	-	-	-	-
GW110	0.53	718	5.68	12.1	7.22	92.1
GW111[1]	4.06	-	-	-	-	-
BH3	19.84	6,647	6.46	15.4	7.0	124.6
BH4	19.41	492	4.38	15.0	7.9	98.6
BH5	0.63	2,970	3.57	12.5	7.1	-28.0

1. *Insufficient groundwater to measure physicochemical parameters*
2. *Insufficient groundwater to collect sample or measure physicochemical parameters*

4.4 Laboratory Testing – Groundwater

Groundwater samples were analysed for the range of analytes presented in Table 4-7.

The primary laboratory was ALS in Clayton, Melbourne. The secondary laboratory (quality control) was mgt-LabMark in Oakleigh, Melbourne. Both laboratories are NATA-accredited for the parameters tested.

Table 4-7: Laboratory Testing Program

Sample ID	Analysis
GW101	NEPM Water Screen, Major Ions, TDS, EC, pH, TKN, Ammonia (N), Nitrate (N), Total P
GW102	Dry – not sampled
GW103	NEPM Water Screen, Major Ions, TDS, EC, pH, TKN, Ammonia (N), Nitrate (N), Total P
GW104	Dry – not sampled
GW105	Dry – not sampled
GW106	NEPM Water Screen, Major Ions, TDS, EC, pH, TKN, Ammonia (N), Nitrate (N), Total P
GW107	NEPM Water Screen, Major Ions, TDS, EC, pH, TKN,

Sample ID	Analysis
	Ammonia (N), Nitrate (N), Total P Perchlorate, PFOS/PFOA, PCDD/PCDF
GW108	NEPM Water Screen, Major Ions, TDS, EC, pH, TKN, Ammonia (N), Nitrate (N), Total P
GW109	Insufficient water – not sampled
GW110	NEPM Water Screen, Major Ions, TDS, EC, pH, TKN, Ammonia (N), Nitrate (N), Total P Perchlorate, PFOS/PFOA, PCDD/PCDF
GW111	NEPM Water Screen, Major Ions, TDS, EC, pH, TKN, Ammonia (N), Nitrate (N), Total P
BH3	
BH4	
BH5	
Analytical Screen Definition	
NEPM Water Screen: Hexavalent Chromium , Metals (21), PCB, Fluoride, Cyanide, Total Recoverable Hydrocarbons (TRH), VOC and SVOC Screen (including OC Pesticides, PAH, Phenols, Phthalates)	

Copies of the NATA stamped laboratory reports and Chain of Custody documentation are included in Appendix E. Tabulated laboratory results are presented in Appendix B. The quality control/ quality assurance (QA/QC) of the groundwater sampling program is discussed in Section 4.5.

4.5 Quality Control / Quality Assurance

A critical aspect of hydrogeological assessments is the demonstration of the quality of the data used as the basis for the assessment. This is achieved through a Data Validation process which includes a review of the following aspects of data collection:

- Project Quality Objectives and Plans
- Data Representativeness
- Data Precision & Accuracy
- Laboratory Performance
- Data Comparability
- Data Set Completeness

A detailed review of these aspects has been undertaken, the results of which are presented in Appendix E.

The data validation has concluded that there are no significant systematic errors in the data collection process for groundwater. Therefore, the dataset used as the basis for the groundwater assessment is considered valid and complete.

5 CONCEPTUAL HYDROGEOLOGICAL MODEL

In accordance with EPA Publication 668 *Hydrogeological Assessment (Groundwater Quality) Guidelines*, the hydrogeology of the study area should be characterised as the basis for interpretation of the occurrence of contamination observed. This based on an interpretation of both public record data and that produced during a site investigation. This summary description is referred to as the Conceptual Hydrogeological Model and consists of descriptions of:

- Geographic Setting and Climate
- Geology and Aquifers
- Groundwater Occurrence and Flow Systems
- Groundwater Quality & Beneficial Uses
- Groundwater Resource Utilisation.

5.1 Geographic Setting and Climate

The site is located in a rural setting, approximately 65 km west-north-west of Melbourne. It is situated near the south-eastern margin of the Western Uplands physiographic region at an elevation of approximately 440 m AHD. Bacchus Marsh, some 15 km to the east of Fiskville is at an elevation of approximately 140 m AHD, which represents a fall of some 300 m over this distance.

The topography of the site and its immediate surrounds are gently undulating and generally of low relief. The lowest point of the site is near the south-western corner, where Beremboke Creek 'exits' the site in its southerly flow direction. The land is elevated in the central part of the site and falls away towards Yaloak Creek to the east and towards Beremboke Creek and Lake Fiskville to the west. The land is also elevated on the western boundary of the site, sloping down towards Beremboke Creek and Lake Fiskville to the east. The maximum surface elevation difference across the site is approximately 8 m.

Figure 5-1 shows the average monthly rainfall for the Fiskville weather station compared to evaporation for the Moorabool Reservoir weather station (located about 20 km to the north of the site), obtained from the Bureau of Meteorology (September 2012). The graph indicates that there is a potential for rainfall to infiltrate the subsurface (rainfall excess over evaporation) during the months of June to September and recharge the local aquifers.

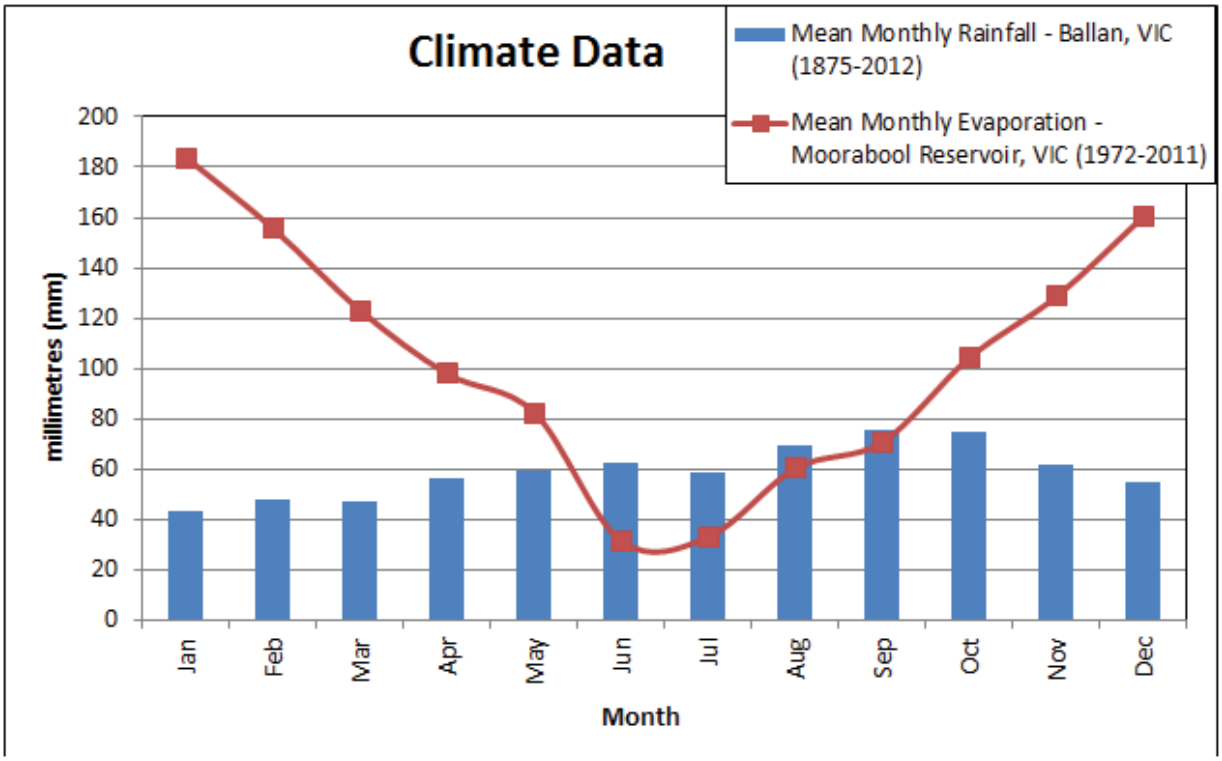

Figure 5-1: Moorabool Reservoir Weather Station Data

5.2 Geology and Aquifers

5.2.1 Regional and Local Geology

The geology of the site in its regional setting has been ascertained from the following sources:

- Birch, W.D. (2003) Geology of Victoria
- Ballan 1:50,000 Geological Map Series (Geological Survey of Victoria, 1986)
- Melbourne 1:250,000 Geological Map Series (Geological Survey of Victoria, 1997)
- DPI GeoVic Website – August 2012

Fiskville is situated within the Bendigo Zone of the Western Lachlan Fold Belt. The Bendigo Zone is a structural domain within which there has been significant uplift, which has resulted in the exposure of older, bedrock lithologies mostly of Ordovician age. The Rowsley Fault forms a significant fault scarp near Bacchus Marsh, believed to form the eastern margin of this uplifted zone. Within the Bendigo Zone, Fiskville is located within a downthrown block known as a graben. East-west trending faults, Spring Creek Fault to the south and Coimadai Fault to the north, form the margins of the graben. The regional geology of the area is shown in Figure 5-2 below.

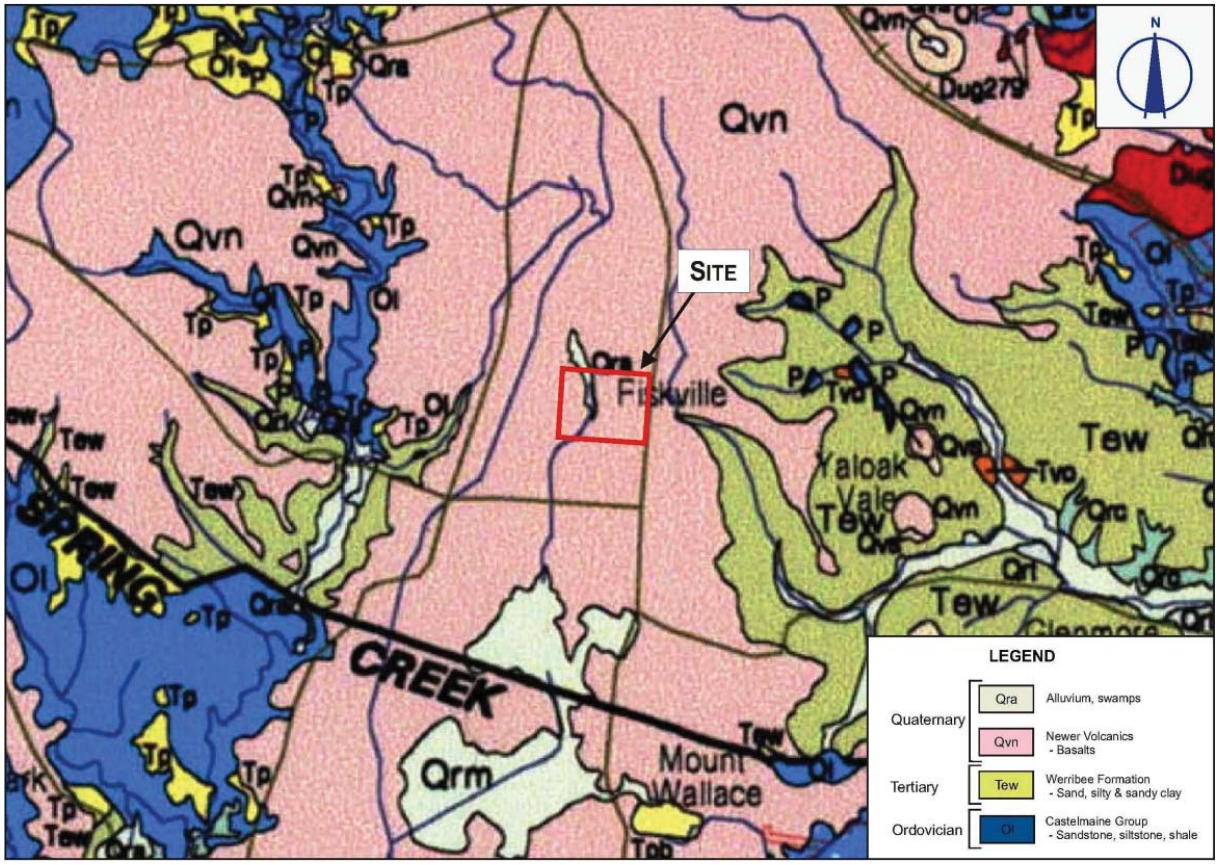

Figure 5-2: Regional Geology of Fiskville Area

Local areas of Quaternary age alluvium and swamp/marsh deposits are associated with present day drainage lines in the region, including Beremboke Creek and the upper reaches of Yaloak Creek.

The CFA Fiskville site is underlain by Newer Volcanics basalts of Quaternary age. The basalts are derived from lava flows from volcanic eruption centres that were scattered across a wide area to the west of Melbourne. Based on bores drilled by Cardno Lane Piper, the basalt is up to 29 m thick at the site. The basalt is variably weathered and clayey intervals were commonly intersected in the bores. A relatively continuous clay band was interpreted in bores drilled in the Operational Area and in the south-eastern part of the site.

Werribee Formation sediments of Tertiary age underlie the Newer Volcanics, with its upper surface intersected recorded at depths ranging from 24 to 29 m across the site. The Werribee Formation is of fluvial origin and comprises largely unconsolidated sediments including silty to sandy clay, sands and gravels. Intervals of ligneous clay and brown coal are also reported. The Werribee Formation outcrops in Yaloak Creek to the east of the site and in the Moorabool River East Branch to the west of the site. In these locations, the creeks have eroded through the Newer Volcanics, exposing the underlying Werribee Formation. The younger and potentially overlying Brighton Group (fluvial sands, silts and gravels) occurs to the west of the site (Moorabool River East Branch) but is absent in bores at the site.

The Castlemaine Group underlies the Werribee Formation and consists of sandstone, siltstone, shale and chert of marine origin (deep sea turbidite deposits). The Castlemaine Group is of Ordovician age and may be described at bedrock in the Fiskville area. The depth to bedrock at the site is not known, but is expected to be in excess of 120 m, based on information from geological and topographical plans and references.

Cardno Lane Piper has interpreted the geological logs and prepared a geological cross-section for the site. Geological section A-A' is orientated west to east and is presented as Figure 5 (Appendix A). The position of the cross-section line is shown in Figure 3 (Appendix A) and includes four of the groundwater bores installed by Cardno Lane Piper.

This geological framework is supported by the results of drilling at the site, and inspection at the site and surrounding areas.

The key geological observations or interpretations from drilling at the site are as follows:

- Basalt extends across the entire site, from near-surface to a depth of up to 30 m below ground surface;
- Within the basalt, a layer of red-brown clay or extremely weathered basalt, forms a continuous horizon at a consistent depth (25 to 27 m) across much of the site; and
- Werribee Formation sediments were intersected in seven of the eleven bores drilled by Cardno Lane Piper.

5.2.2 Regional and Local Aquifers

Aquifers are geological units that contain and transmit groundwater. Regional geological units that are expected to form principal aquifers in the vicinity of the site include:

- Newer Volcanics Aquifer (NVA)
- Werribee Formation Aquifer (WFA)
- Ordovician Bedrock Aquifer (OBA)

A summary of the properties of these potential aquifers is as follows:

The NVA is a Quaternary age, fractured basalt, water table aquifer with highly variable permeability, but generally providing low bore yields. It can locally provide high bore yields especially in the vicinity of scoria cone eruption centres like Black Hills near Gordon.

The WFA is a Tertiary age porous media aquifer which may contain sand and gravel units. The formation sometimes contains intervals of ligneous clay and lignite/coal seams. This aquifer is confined and areas of lower elevation may occur as flowing artesian bores. The WFA provides variable bore yields, as low as 3 L/sec, and as much as 20 L/sec.

The OBA is an Ordovician age fractured shale, mudstone and sandstone aquifer; it has low primary porosity and permeability and, where overlain by younger deposits, can be confined to semi-confined. Jointing and fracturing have produced secondary porosity and permeability.

Observations made during drilling at the site indicate that the Newer Volcanics and Werribee Formation, while significant potential aquifers, are largely dry due to the high elevation of the site. The significance of this in terms of potential for groundwater contamination is discussed further in Section 5.3.

5.3 Groundwater Occurrence and Flow Systems

5.3.1 Groundwater Levels and Flow Direction

Based on previous drilling at the site, groundwater was expected to occur at a depth of 20 to 30 m below ground level (mbgl) where it would form the water table in the NVA.

Groundwater was believed to be too deep to discharge to the nearest surface water body (Lake Fiskville in the west of the site). The nearest possible point of regional groundwater discharge was expected to be Yaloak Creek to the east and south-east of the site.

Site investigations found that the NVA was dry across the majority of the site. Only bore GW101, located in the north-east corner of the site and approximately 250 m west of Yaloak Creek, intersected significant groundwater in the NVA. All other bores constructed in the NVA were either dry, or contained minimal groundwater, as discussed in Section 5.4.

Groundwater was also found to be absent in the underlying Werribee Formation, which was drilled to a depth of up to 60 m below ground level.

5.3.2 Groundwater Flow Systems

Groundwater flow systems in any terrain characterise the occurrence of groundwater and its flow from areas of recharge to areas of discharge, often into surface water bodies. The main influences on groundwater occurrence and flow at the site are:

- Rainfall (providing limited recharge to groundwater, since rainfall exceeds evaporation for only four months of the year, from June to September)
- Lakes, dams
- Lower permeability, clayey layers within the aquifer which have the potential to slow the percolation of infiltrating water (eg. clay layers identified in the Newer Volcanics)
- Groundwater extraction (eg. stock supply wells)

Groundwater elevations are presented in plan view in Figure 4, Appendix A. There is insufficient data on groundwater occurrence or levels to enable a conventional contour plan of water level elevation to be prepared for this site. Groundwater levels are also shown in cross-section A-A' (Figure 5, Appendix A), which includes bores GW103, GW105, GW108 and GW109.

Based on topography and regional geology it was expected that the regional groundwater flow direction is to the south-east towards the deep valley incised by Yaloak Creek, which is located 200 m from the site at its closest point. Lake Fiskville seems unlikely to receive any discharge from groundwater as it is located well above the regional water table. Historically, Lake Fiskville has become dry, as it relies on flow in Beremboke Creek.

The actual groundwater flow direction in the water table aquifer at the site could not be determined, as the groundwater occurrences are interpreted to be "perched" above the regional water table which had not been intersected at a depth of 60m.

The distance of the site from the nearest surface water body (Yaloak Creek) with potential to receive groundwater discharge, and the great depth of groundwater at the site, indicates a low likelihood of any contaminant in the shallow subsurface at the site, firstly entering the regional water table aquifer beneath the site, and then secondly migrating with regional groundwater flow to an area of possible groundwater discharge at Yaloak Creek.

5.3.3 Local Seepage from Perched Aquifer

The perched fill aquifer around Dam 2 has a shallow water table which has been interpreted to flow outward from Dam 2 when its level is high, and towards Dam 2, when its level is low. In the event that the flow is away from Dam 2, there is potential for some shallow seepage into the embankment around the dam and above the perimeter stormwater drain.

This presents a potential pathway of a small amount of perched groundwater (reported in Section 6.1 to be contaminated) to enter the stormwater drainage system. This should be further investigated and remediated if necessary.

Minor perched water was reported in test pits in the landfill near the south-west corner of the site. This perched water is believed to be present as a result of rainwater infiltration into disturbed soils and presence of permeable materials in the landfill, contrasting with the low permeability clay soils beneath. It is considered highly unlikely that Lake Fiskville to the east would receive contaminated perched water derived from the landfill for the following reasons:

- Land slopes away from the landfill and not towards the lake;
- The LFG bores install around the landfills did not report perched water;
- The landfill has not been identified as a source of high concentrations of relevant contaminants; and
- The travel distance between the landfill and the lake would provide opportunity for attenuation of metals and organic compounds if a pathway existed.

5.4 Groundwater Quality & Beneficial Uses

5.4.1 Groundwater Salinity

The regional groundwater quality is reported in public records to range from 3,501 to 13,000 mg/L TDS[4] (DCNR, 1995). Groundwater samples collected at the site reported TDS concentrations ranging from 376 to 4,530 mg/L, as shown in Table B-1, Appendix B. A number of the bores were installed dry, and subsequently 'made' water over time (including the Coffey bores, BH3 and BH4). Groundwater bores installed regionally in the Newer Volcanics are reported to have a mean TDS of approximately 3,200 mg/L (Leonard, 1992).

It is noted that two of the bores (GW107 and GW110) reporting low TDS values were installed in shallow, 'perched' groundwater in the Operational Area of the site. They were screened in scoria fill and weathered basalt, and do not reflect the true chemistry of the regional Newer Volcanics Aquifer which could be the benchmark quality for protection of groundwater quality at the site.

One of the bores (GW108) reporting a low TDS value was installed in the Werribee Formation and it is considered that the groundwater does not properly reflect the chemistry of the Werribee Formation. It is possible that this water, which was found in the sump of the constructed bore, is partly derived from water used in the drilling fluid. During future sampling programs (likely to be required by the EPA Auditor), the groundwater will be purged from this bore to ensure that a representative sample is collected.

5.4.2 Groundwater Major Ion Chemistry

Interpretation of major ion chemistry (naturally occurring chemicals, as opposed to contaminant chemicals introduced by human activity) is a key component in the understanding of groundwater occurrence and water quality data. This interpretation often utilises graphical formats to present large amounts of chemistry data, including the Piper Diagram and the Stiff Diagram.

Bores plotting close together on the Piper Diagram can indicate that they are installed in the same aquifer and typically at similar positions in the flow system. The Piper Diagram for this

[4] TDS = Total Dissolved Solids

site (Figure 6, Appendix A) shows that the following bores plot close together, suggesting similar groundwater chemistry:

- Bores BH5, GW103 and GW106

However, the Piper Diagram shows no pattern and supports the view that groundwater at the site is largely perched and locally derived by infiltration of rainwater or fire training water discharge.

Stiff Diagrams (Figure 7, Appendix A) present the same chemistry in a different manner, providing a plot of major ions that may be easily interpreted in terms of relative percentages of cations and anions, with the overall "mass" of the diagram being proportional to TDS. These diagrams confirm a consistent chemistry between bores GW103, GW106 and BH5 in the NVA. All other bores seem to be distorted by "freshening" processes associated with rainfall infiltration or "salinising" processes associated with evaporated dam water (e.g. bore GW111 near Dam 2).

5.4.3 Protected Beneficial Uses of Groundwater

Table 5-1 presents the classification of beneficial uses of groundwater protected in accordance with *State Environment Protection Policy* (*SEPP) Groundwaters of Victoria (1997)*.

Table 5-1: Protected Beneficial Uses of Groundwater Segments

Beneficial Uses	Segments (mg/L TDS)				
	A1 (0-500)	A2 (501-1,000)	B (1,001-3,500)	C (3,501-13,000)	D (greater than 13,000)
1. Maintenance of ecosystems	✓	✓	✓	✓	✓
2. Potable water supply					
Desirable	✓				
Acceptable		✓			
3. Potable mineral water supply	✓	✓	✓		
4. Agriculture, parks & gardens	✓	✓	✓		
5. Stock watering	✓	✓	✓	✓	
5. Industrial water use	✓	✓	✓	✓	✓
6. Primary contact recreation (e.g. Bathing, swimming)	✓	✓	✓	✓	
7. Buildings and structures	✓	✓	✓	✓	✓

✓ = Protected Beneficial Use

The Victorian Groundwater Beneficial Uses Map Series (1995) shows the groundwater in the Fiskville area to have a salinity in the range of 3,501 to 13,000 mg/L TDS[5], and is therefore classified as Segment C according to the SEPP *Groundwaters of Victoria (1997)*.

Based on the testing program undertaken at the site, the groundwater in the NVA at this site has the following salinity and Segment classification under SEPP *Groundwaters of Victoria (1997)*:

[5] Assumes a conversion of electrical conductivity (EC) and TDS as follows: EC x 0.65 µS/cm = TDS mg/L.

- 376 to 4,530 mg/L TDS
- Average (mean) 2,590 mg/L TDS
- is classified as Segment B

Segment B groundwater falls within the salinity or TDS range of 1,001 to 3,500 mg/L, and water of this quality is protected for all beneficial uses listed in Table 5-1, with the exception of potable water supply. The 'fresh' groundwater in the perched fill aquifer may be classified as Segment A, but should not be considered protected under the SEPP, given its limited extent and artificial nature.

5.5 Groundwater Resource Utilisation

It is relevant to any assessment of groundwater contamination to know if the groundwater at or in the vicinity of the investigation site is used by owners of groundwater bores. All bores in Victoria should be registered with the relevant rural water authority in compliance with the *Water Act 1989*.

A search of the State Groundwater Management System database identified a total of 22 registered groundwater bores within a 5 km radius of the site, as shown in Figure 8 (Appendix A) and listed in Table 5-2. Further details of these bores, including bore depth, screen intervals and lithology are presented in Table H-1, Appendix H.

A summary of these bores is as follows:

- 22 bores within 5 km of the site, of which ten are non-groundwater bores, five are for investigation purposes, two are for stock, two are for domestic, three are for domestic and/or stock, one is for irrigation, and for one has an unknown purpose.
- None of the bores are considered significant for this assessment (potential private bore users) given their large distance from the site.
- Salinity data which can indicate the potential for groundwater being utilised (fresh groundwater is generally more widely used than brackish water), was not available for any of the bores.

It is also worth noting that, in the experience of Cardno Lane Piper, groundwater may also be utilised by persons with unregistered bores not appearing on the database. This should be taken into account in any assessment of impact on groundwater quality at a site.

Table 5-2 presents selected information for 12 groundwater bores (excludes non-groundwater bores) within 5 km of the site.

Table 5-2: Nearby Registered Groundwater Bores

Bore ID	Depth (m)	Date Completed	Distance (km) from site	Direction from site	Bore Use*	Lithology
B53380	55.16	31-Dec-39	4.18	SSW	IV	-
B53381	60.96	31-Dec-39	4.35	SSW	IV	-
B53382	33.00	23-Dec-78	2.36	S	IR	Basalt
B53383	56.38	17-May-82	3.94	S	DM	Basalt/Clay
B53384	50.30	19-May-82	3.47	S	DM	Basalt/Clay
B53385	91.44	9-Feb-83	2.43	S	ST	Basalt/Sandstone

Bore ID	Depth (m)	Date Completed	Distance (km) from site	Direction from site	Bore Use*	Lithology
B106570	21.30	31-Dec-39	2.78	N	IV	-
B106571	73.80	31-Dec-39	1.03	S	IV	-
B106573	61.00	2-Mar-83	1.70	W	IV	Basalt
B135442	76.00	15-Mar-98	3.31	NNE	DM/ST	Basalt/Clay
BG8010825/01	60.00	28-Jun-04	3.09	NW	DM/ST	Basalt
BS9019239/1	61.00	29-Mar-04	2.93	NNE	DM/ST	-

* Bore Use: NKN = Not known; IV = Investigation; DM = Domestic; ST = Stock; DM/ST = Domestic/Stock; IR = Irrigation

This information indicates that there is no registered use of groundwater within approximately 1 km of the site. The most common use is as 'stock' bores which are used to supply stock water, and 'domestic' bores which are used for non-potable domestic purposes such as garden watering and toilet flushing[6]. Also, apart from two of the bores, it is noted that the bores are deep (50 to 90 m), confirming that groundwater in the region is deep.

The great depth of regional groundwater and the thickness of clay soil layers between the base of the basalt and the likely depth of groundwater indicate that the regional water table aquifer has low vulnerability to contamination. Further, the low frequency of groundwater use at or near the Fiskville site indicates a low risk of impact on users of groundwater bores in the unlikely event of the groundwater becoming contaminated.

[6] Farm bores are rarely used for potable supply which is normally derived from rainwater tanks.

6 GROUNDWATER CONTAMINATION ASSESSMENT

6.1 Interpretation of Laboratory Results

The results of laboratory analysis are presented in Table B-1 in Appendix B and the laboratory reports are included in Appendix E.

The results of laboratory analysis have been compared against the water quality criteria relevant for each beneficial use of groundwater protected under SEPP *Groundwaters of Victoria (1997)*. This has shown that:

- All samples reported certain metals above the adopted assessment criteria.
- Two samples reported fluoride above the adopted assessment criteria.
- Two samples reported PFCs above the adopted assessment criteria.
- Two samples reported bis(2-ethylhexyl) phthalate above the adopted assessment criteria.
- Five samples reported ammonia (N) above the adopted assessment criteria.
- One sample reported nitrate (N) above the adopted assessment criteria.

A review of the fieldwork records indicated that the turbid nature of four samples prevented field filtration for dissolved metals. The laboratory (ALS) took 'metals' samples from an unpreserved sample bottle and filtered these samples in the laboratory. It is noted that for bores BH5, GW103 and GW106, ALS commented that the samples were "diluted due to sample matrix values and the LORs were raised accordingly. This has resulted in the high aluminium concentrations (and possibly other metals) in these samples. The high aluminium concentrations in bores BH5 and GW106 are considered to be 'false positives' caused by the high turbidity, and are therefore not included in Table 6-1. Further consideration needs to be given to the validity of any samples from such low yield bores, and the work plan for future field sampling may need to be amended. For example, the use of a hydro-sleeve samplers and also vacuum assisted filtration may be considered for such bores.

Bores GW106 and GW108, installed in the Newer Volcanics and Werribee Formation respectively, reported phthalate[7] concentrations which exceed the assessment criterion for drinking water. The source of the phthalate is unclear. However, it is unlikely to be from wastes or processes at the site, given the locations sampled (GW108 was installed in an area that is considered to be representative of background water quality). The phthalate was most likely introduced to the sample by the sampling equipment. This will be assessed during any further groundwater sampling, if required by the Auditor.

Bores BH5 and GW106, installed in the Newer Volcanics, reported concentrations of fluoride which exceed adopted assessment criteria. The source of the fluoride is not known, and will be monitored during the next sampling program.

The chromium (total) concentration (above assessment criterion for Primary Contact Recreation) in bore BH5 is due to chromium III only, as chromium VI reported a value below LOR. Bore GW106 reported chromium (total) above the assessment criterion for Agriculture/ Irrigation. Chromium VI laboratory results were not reported for bore GW106, possibly due to insufficient sample. This will be checked during the next groundwater sampling program.

It is possible that some of the new bores installed during 2012 may 'gain' groundwater over time. During the next monitoring round, it is recommended that all bores should gauged for

[7] The phthalate reported was bis(2-ethylhexyl)phthalate, a chemical used to make polymers 'plastic'.

water level and, if sufficient water is present, the bores should be developed and sampled to establish a scope for the further investigation of regional groundwater.

These results exceeding criteria are listed in Table 6-1 and interpreted in Sections 6.2 and 6.3 below.

Table 6-1: Summary of Groundwater Results Above Criteria

Analyte	Adopted Criteria (mg/L)	Sample ID	Reported Concentration (mg/L)
Aluminium	0.055[1]	BH4_200912	0.07
		GW101_200912	0.67
		GW103_200912	0.82
Arsenic	0.01[2]	BH5_200912	0.037
Chromium (total)	0.5[5]	BH5_200912	0.986
	1[3]	GW106_200912	1.45
Cobalt	0.05[3]	BH5_200912	0.16
		GW106_200912	0.242
Copper	0.0014[1]	BH3_200912	0.002
		BH4_200912	0.005
		BH5_200912	0.163
		GW101_200912	0.002
		GW106_200912	0.200
		GW107_200912	0.002
		GW108_200912	0.002
		GW110_200912	0.009
		GW111_200912	0.003
Iron	3[5]	BH5_200912	338
		GW106_200912	540
	1[3]	GW107_200912	2.19
Lead	0.0034[1], 0.1[4]	BH5_200912	0.165
		GW106_200912	0.146
Manganese	0.5[2]	BH5_200912	0.542
		GW106_200912	0.628
		GW107_200912	0.891
	0.5[2], 1[5]	GW111_200912	1.22
Molybdenum	0.01[3], 0.01[4]	GW103_200912	0.028
Nickel	0.011[1]	GW107_200912	0.02
		GW110_200912	0.013
	0.011[1], 0.02[2]	GW111_200912	0.049
	0.011[1], 0.02[2], 0.2[3]	BH5_200912	0.575

Analyte	Adopted Criteria (mg/L)	Sample ID	Reported Concentration (mg/L)
		GW106_200912	0.611
Vanadium	0.1[3]	BH5_200912	0.51
Zinc	0.008[1]	BH3_200912	0.017
		GW101_200912	0.009
		GW106_200912	0.627
		GW110_200912	0.015
		GW111_200912	0.049
	0.008[1], 2[3]	BH5_200912	4.55
Ammonia (N)	0.1[5]	GW106_200912	0.27
		GW107_200912	0.18
		GW108_200912	0.49
		GW110_200912	0.38
		GW111_200912	0.17
Nitrate (N)	7.2[1], 11.3[2]	BH3_200912	21.1
Fluoride	1[3]	BH5_200912	1.1
	1.5[2], 1[3]	GW106_200912	1.6
TPH	50[6]	GW110_200912	310
	600[7]	BH3_200912	810
		GW106_200912	1380
Bis(2-ethylhexyl) phthalate	10[2] ug/L	GW106_200912	175 ug/L
		GW108_200912	78 ug/L
PFOA	0.0004[8]	GW107_200912	0.157
		GW110_200912	0.092
PFOS	0.0002[8]	GW107_200912	0.139
		GW110_200912	3.32
6:2 FTS	0.0002[8]	GW107_200912	0.0579
		GW110_200912	1.21

Notes:

1. Maintenance of Ecosystems (ANZECC 2000 - Fresh Water 95%)
2. Australian Drinking Water (NHMRC 2011)
3. Agriculture/ Irrigation (ANZECC 1992)
4. Stock Watering (ANZECC 1992)
5. Primary Contact Recreation (ANZECC 1992)
6. Dutch Target - shallow groundwater < 10 m (2000)
7. Dutch Intervention (2000)
8. Provisional Health Advisory for PFOA and PFOS (US EPA 2009)

6.2 Interpretation against Beneficial Uses of Groundwater

The results have also been interpreted with reference to the beneficial uses of groundwater in SEPP *Groundwaters of Victoria (1997)* and the respective water quality criteria for each use. This section discusses potential risks posed to the protected beneficial uses of groundwater based on the results of the groundwater investigation.

6.2.1 Maintenance of Aquatic Ecosystems

The beneficial use 'maintenance of aquatic ecosystems' (in surface waters) is often relevant when assessing sites, given the connections that can occur between surface water and groundwater. However, as discussed in Section 5.3.2, this relevance can be tested in each case by considering the likelihood of groundwater at the site discharging to a specific surface water body and whether the contaminants observed at the site could be expected to migrate to the 'point of groundwater discharge' at the surface water body. The nearest off-site receptor is Yaloak Creek which is approximately 200 m to the east of the site at its closest point. The on-site receptors include Lake Fiskville and Beremboke Creek which are located approximately 200 m west of the Operational Area, as well as a number of smaller lakes and dams which occur at various locations at the site. These are not in connection with the groundwater which occurs very deep below the site.

Aluminium, copper, lead, nickel, zinc and nitrate concentrations were reported above the adopted ANZECC 2000 criteria in some bores. TPH concentrations slightly exceeded the adopted assessment criteria (Dutch 2000) in three bores at the site. These included TPH C_{10}-C_{14} in bore BH3 and TPH C_{15}-C_{28} in bores GW106 and GW110. However, if groundwater were to discharge from this site, it is unlikely to impact the nearest surface water body given the distance and time required for this to occur.

The metal concentrations exceeding the criteria are highest in bores BH5 and GW106 and may be considered to represent contamination from industrial activities. The water in bore GW106 is considered unrepresentative of the NVA, as the bore was dry when it was first drilled, and only a small amount of water seeped in, subsequently making the sample very turbid and making it difficult to obtain reliable results.

The perched groundwater in some bores in the Operational Area is believed to be the same as the water used for on-site training activities and stored in dams. This is due to the water occurring in permeable fill (scoria) used to form Dam 2. The groundwater chemistry and contamination levels are very similar to the water in Dam 2. Shallow, perched groundwater was not encountered during Cardno Lane Piper's drilling in regional, 'background' areas of the site.

It is considered possible that the elevated metal concentrations in the perched groundwater are in connection with the water bodies in Dams 1 and 2 in the Operational Area. Given the distance from the Operational Area, and limited extent of the fill holding the perched groundwater, discharge of this perched groundwater to Beremboke Creek and Lake Fiskville to the south-west of the site is considered unlikely and therefore only poses a negligible risk to natural aquatic ecosystems. However, measures are required to prevent the perched groundwater around Dam 2 from entering the stormwater drains in this area.

Nitrate concentrations only exceeded the adopted criterion in bore BH3, which was installed by Coffey (1996) to monitor the former landfill in the south-west of the site. However, for the same reasons as for other contaminants, this is not of relevance.

On balance, the groundwater quality results indicate some relevant results but only if the groundwater at the site discharged to a surface water body at or immediately proximal to the site. Given that this discharge is highly unlikely (as discussed in section 5.3.2), then this

beneficial use is not detrimentally affected by the condition of groundwater quality at the Fiskville site.

6.2.2 Potable Water Supply

The groundwater in the regional aquifer at the site is generally too saline to be used for drinking purposes and therefore this beneficial use does not need to be protected at the site and no further assessment is provided. The perched aquifer is interpreted not to be an aquifer protected by policy, a position that may need to be clarified with EPA or an EPA Environmental Auditor.

6.2.3 Potable Mineral Water

The site is in a recognised mineral water province as envisaged in EPA Publication 592 *Policy Impact Assessment of SEPP Groundwaters of Victoria.* A mineral spring occurs near the town of Ballan, approximately 10 km north of the Fiskville site. This could indicate that this beneficial use may be relevant to the site and requires further consideration.

It is concluded that this benefical use is not precluded due to the condition of groundwater at the site for the following reasons:

- Groundwater found to be contaminated at the site is shallow perched water in a man-made scoria "aquifer" which is not the regional aquifer potentially used in the vicinity of the site for drinking purposes.
- The groundwater does not conform to the definition of mineral water (*potable groundwater which in its natural state contains carbon dioxide and other soluble matter in sufficient concentration to cause effervescence or impart a distinctive taste,* SEPP *Groundwaters of Victoria*).

6.2.4 Agriculture, Parks & Gardens

This beneficial use is intended for the protection of crops and gardens irrigated with water from groundwater bores.

The reporting of aluminium, boron, chromium, cobalt, iron, molybdenum, nickel, vanadium, zinc and fluoride at concentrations above the adopted ANZECC 1992 criteria indicates some potential for harm to some sensitive flora, if this water was used for irrigation uses.

However, it is concluded that this beneficial use is not precluded due to the condition of groundwater at the site for the following reasons:

- The groundwater is not fresh, and while the salinity class is theoretically protected for this site, the water salinity and soil type (clay) would make this use unlikely.
- It is highly unlikely that groundwater will be used for this purpose, particularly given that no significant groundwater was intersected in the majority of bores at the site, and the availability of reticulated water at the site.

6.2.5 Stock Watering

This beneficial use is intended to protect the use of groundwater from bores (often with windmills) for livestock drinking water. The presence of livestock both at the site and on adjacent properties suggests that this beneficial use may occur in the area. However, the absence of groundwater in the shallow geological units makes it unlikely that groundwater will be used for this purpose in close proximity to the site.

The reporting of aluminium, lead and molybdenum at concentrations above the adopted ANZECC 1992 criteria for Stock Watering requires comment.

Molybdenum only slightly exceeds the assessment criterion in one bore. The aluminium and lead concentrations in two bores are well above assessment criteria. However, one bore (BH5) is installed in perched groundwater, and the other bore (GW106) believed not to be representative of the NVA due to the turbidity of the water in this bore.

The natural salinity (TDS) of the groundwater at the site may make the water unsuitable for Stock Watering.

Bore GW101 is the only bore that is considered to be representative of permanent groundwater in the NVA, and has a TDS of 4,530 mg/L, which is protected by SEPP Groundwaters of Victoria for this beneficial use. However, it is noted that this may be too saline for some stock without supplementary fresh water.

6.2.6 Industrial Water Use

This benefical use is intended to protect users of bores who wish to use groundwater for one of a wide range of industrial uses. Some industrial uses demand water that is purer than drinking water, while others can tolerate saline water. It is noted that wash-down water for stockyards/abattoirs is a potential industrial water use that needs to be considered.

On balance, it is concluded that this beneficial use is not precluded due to the condition of groundwater at the site for the following reasons:

- The naturally elevated natural salinity of the groundwater may restrict its use for a range of industrial purposes.
- It is highly unlikely that groundwater will be used for this purpose at the site, particularly given that no significant groundwater was intersected in the majority of bores at the site, and the availability of reticulated water at the site.
- The zoning of the area (farming) would also limit the likelihood of industrial land use, and therefore industrial water use in the vicinity of the site, with the exception of use for stockyard wash-down.

6.2.7 Primary Contact Recreation

This beneficial use is intended to protect people who might swim in water derived from a groundwater source, such as a bore used to fill a swimming pool. It can also relate to situations where a water body occurs at a site where it receives groundwater discharge and may be used for swimming. The latter is not relevant to this site as discussed above in relation to ‘maintenance of aquatic ecosystems’

Aluminium and iron significantly exceed the relevant assessment criteria in bores BH5 and GW106. Chromium slightly exceeds the assessment criterion in bores BH5 and GW106, and manganese slightly exceeds the criterion in bore GW111. TPH concentrations slightly exceeded the adopted assessment criteria (Dutch 2000) in three bores, including TPH C_{10}-C_{14} in bore BH3 and TPH C_{15}-C_{28} in bores GW106 and GW110.

PFOS and PFOA exceed the adopted assessment criteria (adopted Drinking Water criterion x10) for bores GW107 and GW110 (installed in perched groundwater).

It is concluded that this beneficial use is not precluded due to the condition of groundwater at the site for the following reasons:

- The bores with the highest contaminant levels are either perched or otherwise not representative of the regional aquifer.
- It is understood that the construction of a swimming pool supplied by groundwater is not proposed for this site and would be very unlikely.

6.2.8 Buildings & Structures

This beneficial use is intended to protect buildings and in-ground structures that may come into contact with groundwater and be harmed (by corrosion or chemical attack) if that groundwater was contaminated.

While a full assessment of potential risks to buildings and structures falls outside the scope for this assessment, field observations combined with the results of pH and sulphate analysis suggest a low likelihood of corrosion risk due to contamination of groundwater at the site. Sulphate, chloride and pH results from site groundwater were compared to the guidance in AS2159-2009. Sulphate ranged from 12 to 177 mg/L, chloride ranged from 40 to 1,900 mg/L and pH ranged from 6.6 to 7.9. Based on these results, groundwater at the site is considered to be “non-aggressive” to concrete structures.

However, this report is not a geotechnical or corrosion risk assessment and specialist advice would be needed to assess potential corrosion risk to buildings and structures.

Furthermore, the fact that most of the bores at the site were dry indicates that buildings are unlikely to be in contact with groundwater, with the exception of those areas where perched groundwater was encountered.

Therefore, this beneficial use of groundwater is considered not to be precluded by contamination.

6.3 Risks to Groundwater

As part of this groundwater assessment, Cardno Lane Piper initially proposed to target the water table aquifer in the fractured basalt of the NVA. The recent monitoring of bores installed by Coffey (1996) reported groundwater at depths ranging from 18 to 20 m below ground level in two bores, and at 0.7 m below ground level in a bore installed to 1.8 m. It would appear that Coffey did not drill to the Newer Volcanics - Werribee Formation contact, and therefore the thickness of the Newer Volcanics at the site was not previously known. However, published geology maps show the underlying Werribee Formation outcropping along Yaloak Creek to the east and south-east of the site. Prior to commencement of drilling, Cardno Lane Piper estimated (based on extrapolation of geology and contour intervals) that the depth of the Newer Volcanics - Werribee Formation contact at the Fiskville site may be in the order of 25 to 30 m below ground level. This target depth was found to be correct.

The main aim of this investigation was to assess whether or not on-site activities had contaminated the water table aquifer at the site. Ten of the 14 bores contained sufficient groundwater to be sampled and tested, but only one of these (bore GW101) may be representative of the water table aquifer. The other bores either had insufficient water to be properly purged prior to sampling, or they were installed to monitor perched (shallow) groundwater. Some of the samples were turbid due to the lack of water inflow, and this limits the ability to obtain representative results.

Given that the Newer Volcanics (expected to be the uppermost or water table aquifer at the site) is largely unsaturated, it was decided to assess groundwater in the Werribee Formation. Bores GW108 and GW109 were drilled to depths of 60 m and 50 m respectively. To prevent potential groundwater cross-contamination, both bores were cased off in the Newer Volcanics before drilling into the Werribee Formation. The Werribee Formation was dry to depths of 20 m and 30 m below the base of the Newer Volcanics in bores GW108 and GW109 respectively.

Drilling deeper into the Werribee Formation to determine the depth to the regional water table was not pursued as the prospect of any contamination from the surface infiltrating to these depths through intervening clay units, was considered to be very low. Further exploratory drilling was suspended.

While a water table aquifer has not, as such, been intersected at the site, the investigation indicates that there is limited potential for on-site or off-site migration of contamination via groundwater. The only bore that intersected appreciable groundwater, which could sustain a low yield water supply bore, is bore GW101 which is located a significant distance to the north-east, and most probably hydraulically upgradient, of the Operational Area or other potentially impacted areas of the site.

Bores drilled in the Operational Area did not intersect significant groundwater in the NVA. However, perched groundwater was encountered in near-surface fill and clayey basalt in three bores in the Operational Area. The fill included scoria which was imported to the site to build up the area and form Dam 2 in 1999. The bores included one bore to the south of the service station prop (GW107), one bore to the south of the FL PAD (GW110) and one bore adjacent to Dam 2 (GW111). Bores GW107 and GW110 recorded elevated concentrations of PFOS and PFOA. These concentrations exceeded the adopted assessment criteria for Drinking Water and Primary Contact Recreation, though drinking or primary contact are highly unlikely to occur. Elevated concentrations of PFCs in perched groundwater in the Operational Area could result in localised impact, including discharge of groundwater to on-site dams and/or drainage channels. These results suggest that further investigation of shallow groundwater in the Operational Area is warranted.

A schematic diagram is presented as Figure 9, Appendix A. The diagram presents a cross-section showing potential contamination in the Operational Area of the site, including perched groundwater in the vicinity of the FL PAD and storage dam. The cross-section shows that the perched groundwater is limited to the porous scoria fill (found in the Operational Area), and that the deeper NVA is largely dry, with the exception of minor groundwater which is sometimes encountered at the base of the NVA.

The degree to which these features or activities have potential to contaminate groundwater depends on the actual amount of contamination released from each, and the unattenuated seepage of these materials to a depth where groundwater occurs. The soil investigations to date do not indicate significant residual contamination, following a major remediation effort in 1998. Further, the low permeability soils overlying the deep aquifer (believed to be in the lower Werribee Formation) would prevent significant vertical seepage of contaminants to the regional groundwater.

In summary, it is considered highly unlikely that the fire fighter training activities at the site have resulted in any significant contamination of groundwater, given the great depth of regional groundwater aquifer and the thickness of clay layers between the base of the basalt and the likely depth of the groundwater. Further, the low frequency of groundwater use at or near the Fiskville site indicates a low risk of impact on users of groundwater bores, in the unlikely event of groundwater becoming contaminated.

7 SUPPLEMENTARY WATER SUPPLY

The site is located in a region where deep aquifer units in the Werribee Formation are known to produce high groundwater bore yields. Given the opportunity to explore this aquifer during the groundwater contamination assessment, Cardno Lane Piper was also able to evaluate the resource potential of this unit.

The assessment has shown that there is no substantial aquifer with permanent water within 60m of surface. While it is possible that deeper units of the WFA could yield a useful water supply, further exploratory drilling (possible from 80 to 120m) would be required to confirm this.

The desktop study has shown that the regional salinity of groundwater in the WFA ranges from 2,500 to 4,000 mg/L TDS. This salinity makes the groundwater marginal as a water supply for training purposes, where the water is likely to be discharged to the surface water environment which contains fresh water. Such a saline groundwater could have a deleterious effect on the ecosystem of the aquatic environment into which the water discharges. Treatment of saline groundwater using a Reverse Osmosis process would be necessary to remove the salts and make the water suitable for discharge to the environment.

Consequently, and assuming that a Reverse Osmosis treatment plant would not be feasible to desalinate the groundwater, it is not advisable to invest the substantial funds required to install an exploratory water supply bore (diameter and cost would be much greater than for an environmental monitoring bore) to evaluate the productivity of the Werribee Formation Aquifer at the site. In the event that water availability becomes critical in the future, and if a reverse osmosis treatment plant had been installed to treat chemicals in the fire training water, then the feasibility of using deep groundwater resources should be reconsidered.

8 CONCLUSIONS

This section presents the conclusions of the groundwater contamination assessment which includes a conceptual 'hydrogeological assessment' of site conditions. It also concludes against the objectives of the investigation including the likely sources of contamination, including those identified in the IFI Report; it characterises the contamination status of the groundwater at the site and identifies the feasibility of using groundwater as a source of water for fire fighter training drills.

8.1 Hydrogeological Understanding of the Site

An understanding of the hydrogeology of any investigation site, in its regional context, is fundamental to the investigation of groundwater contamination. The initial desktop assessment identified the shallow geological unit (Newer Volcanics) as the likely regional water table aquifer at the site. However, this unit had minimal water and is considered to be unsaturated, except in the north-eastern corner of the site. Deeper drilling to about 60 m in the Werribee Formation failed to find groundwater. Some groundwater was found in shallow bores in the vicinity of Dam 2 and the FL PAD, and has been interpreted to be 'perched groundwater' in man-made fill, and not representative of the natural groundwater in aquifers used by farmers and others for a range of purposes in the region. For this reason, this perched groundwater may not need to be protected under *SEPP Groundwaters of Victoria*.

The interpreted hydrogeology indicates a low risk of groundwater contamination by sources at the site surface, or the subsequent contamination of surface waters by discharging groundwater, for the following reasons:

- The groundwater is very deep (more than 60 m) and is protected by overlying low permeability soils. This minimises the likelihood of seepage of contaminants to depths where the first aquifer is expected.
- The groundwater is classified as Segment B under *SEPP Groundwaters of Victoria,* based on published information. The perched water is 'fresh' and may be classified as Segment A, but should not be considered protected under the SEPP, given its artificial nature and limited extent.
- The small number of groundwater bore users near the Fiskville site indicates a low risk of impact on users of groundwater bores, in the unlikely event of the groundwater becoming contaminated at the site.
- The groundwater is too deep to discharge to the nearest surface water body (Lake Fiskville in the west of the site). The nearest possible point of regional groundwater discharge is expected to be Yaloak Creek to the east and south-east of the site. In the unlikely event that contaminants such as petroleum hydrocarbons entered the groundwater beneath the site, they would biodegrade during migration over such a long travel distance.

The hydrogeology is sufficiently well understood and no further groundwater investigations are justified at this time. Further work may be required by an EPA Environmental Auditor recently engaged to comply with an EPA Clean Up Notice.

8.2 Potential Sources of Contamination and Risks

The sources of potential contamination set out in the IFI Report were reviewed in detail by the Cardno Lane Piper team, and reported separately in the Site History Review (Cardno Lane Piper, 2014a). In summary, this study concluded that there are currently, and historically, several potential sources of contamination of both soil and groundwater at the site, as listed in Section 3 of this report.

The subsequent investigation of soil contamination presented in the Cardno Lane Piper Report titled "Targeted Soil Assessment" (Cardno Lane Piper, 2014b) identified very limited areas of contamination, including surface soil contaminated with petroleum hydrocarbons and PFCs near the FL PAD, and one isolated occurrence of petroleum hydrocarbons in a former UST pit, now backfilled. Neither of these would be characterised as a significant source of these contaminants to the groundwater.

It is also noted that the soil in the FL PAD area was contaminated by petroleum hydrocarbons before being remediated in 1998. Up to 5,400 m^3 of soil was excavated from the FL PAD area and bio-remediated in the Soil Composting Area. This represents a significant reduction of a potential source of groundwater contamination in this area of the site.

It is concluded that there is a low risk of contaminated groundwater from these sources impacting the natural groundwater systems at the site and its vicinity.

8.3 Groundwater Contamination Observed

Only one of the groundwater bores monitored at the site is considered to be representative of the natural water table aquifer of the region (which most often occurs in the Newer Volcanics). A number of water samples were collected from bores which contained minor seepages. The seepage water was generally insufficient to obtain a representative sample from which reliable water quality data could be obtained.

Contamination was reported in perched water in imported fill in the vicinity of Dam 2 and the FL PAD. This included concentrations of PFCs reported in two shallow bores, as discussed in Section 6.3. The contaminated perched water is of no significance as 'groundwater contamination', as the water is limited to this area and would not be extracted for any use. (A common interpretation of *SEPP Groundwaters of Victoria* would indicate that this water would not be protected under the policy due to its mode of occurrence.) However, the water requires management for two reasons: a) it has the potential to seep towards the nearby stormwater drain, and b) the perched water is in hydraulic connection with the water in Dams 1 and 2, which are similarly contaminated and discharge to Lake Fiskville, and then potentially off-site. The perched water is proposed to be remediated together with the contents of the dams, and the proposed further investigations will contribute to the design of this remedial response.

The contaminants found in the perched water do not present a vapour contamination risk and therefore do not present a health risk to site occupants via that pathway. Further, the low concentration of petroleum hydrocarbons reported in one of the bores is also not a vapour risk.

In summary, it is considered highly unlikely that the fire fighter training activities at the site have resulted in any significant contamination of the regional aquifers deep beneath the site. Groundwater contamination is limited to perched water near Dam 2 and the FL PAD, and presents no significant risk to site occupants.

8.4 Water Supply from Groundwater

The assessment has shown that there is no substantial aquifer with permanent water within 60 m of the surface. The desktop study has shown that the most prospective water supply aquifer in the region is the Werribee Formation Aquifer. However, this aquifer contains relatively saline water and may not be suitable for fire fighter training activities (if not treated by reverse osmosis) due to the need to discharge used water to a fresh water creek.

It is possible that the deeper units of the Werribee Formation Aquifer could yield a useful water supply. However, deep (200 m) exploratory drilling would be required to assess this prospect. Given the high cost of such exploration and the likelihood of obtaining saline water, such expenditure is not proposed at this time. In the event that a Reverse Osmosis water treatment plant is installed at the site for other reasons, then the feasibility of using deep groundwater as a water supply for fire fighter training should be considered.

9 RECOMMENDATIONS

Based on the conclusions of this investigation:

1. Further work is recommended to investigate the extent of PFC contamination in the shallow, perched water in the fill near Dams 1 and 2 and the FL PAD, and its potential to seep to the stormwater drainage system.
2. An assessment of the feasibility of remediating PFC contamination in the perched water should be completed after the further investigation of the area, including hydraulic testing of the fill.
3. It is possible that some of the new bores installed during 2012 may 'gain' groundwater over time. During the next monitoring round, it is recommended that all bores should gauged for water level and, if sufficient water is present, the bores should be developed and sampled to establish a scope for the investigation of regional groundwater.
4. While further investigation of the regional aquifers is not required at this time, the EPA Environmental Auditor, engaged recently to audit the site in compliance with an EPA Clean Up Notice, should be consulted to ascertain his requirements for any further investigations.
5. In the event that a Reverse Osmosis water treatment plant is installed at the site, the feasibility of using the plant to treat the deep saline groundwater as a water supply for fire fighter training should be considered.

10 REFERENCES

Legislation and Guidelines

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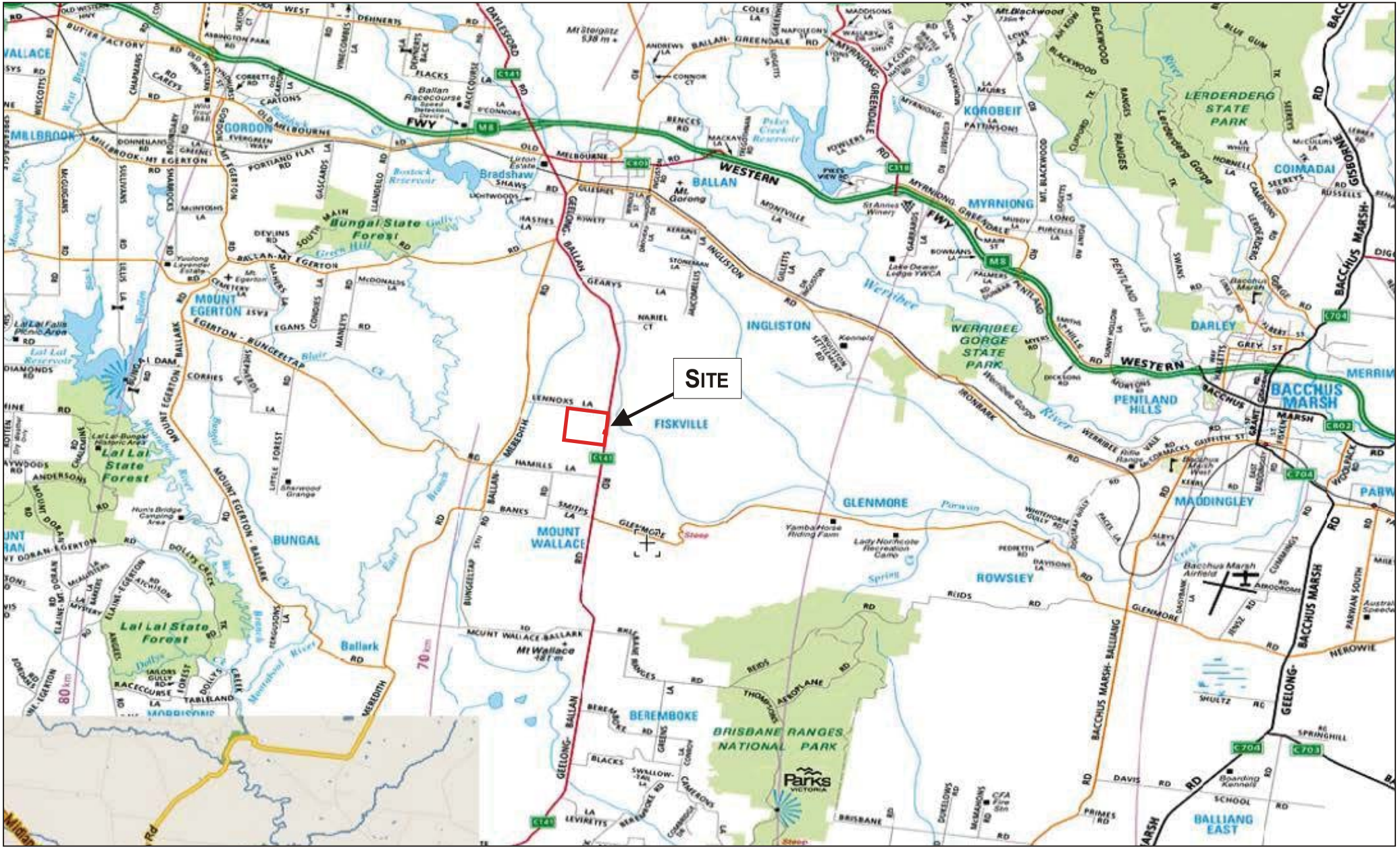
Appendix A
9 Pages

Figures

Figure 1: Site Locality Plan
Figure 2: Site Aerial Photograph
Figure 3: Groundwater Bore Locations
Figure 4: Groundwater Elevation Plan
Figure 5: Topographic Plan
Figure 6: Regional Geology Plan
Figure 7: Geological Section A-A'
Figure 8: Piper Diagram
Figure 9: Stiff Diagrams



After: Melway Street Directory website (2012)

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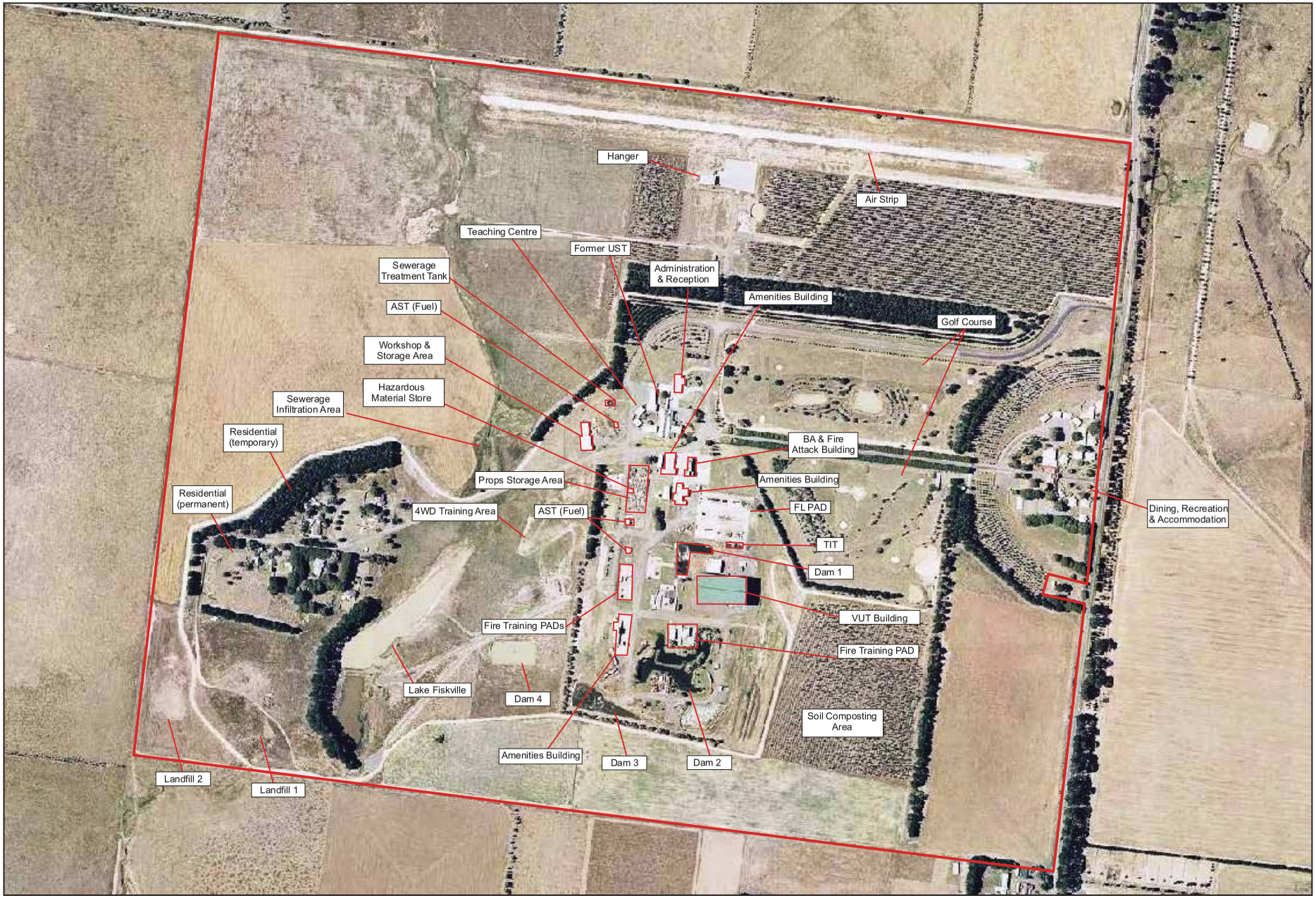

Base Plan: 2007 Aerial Photograph

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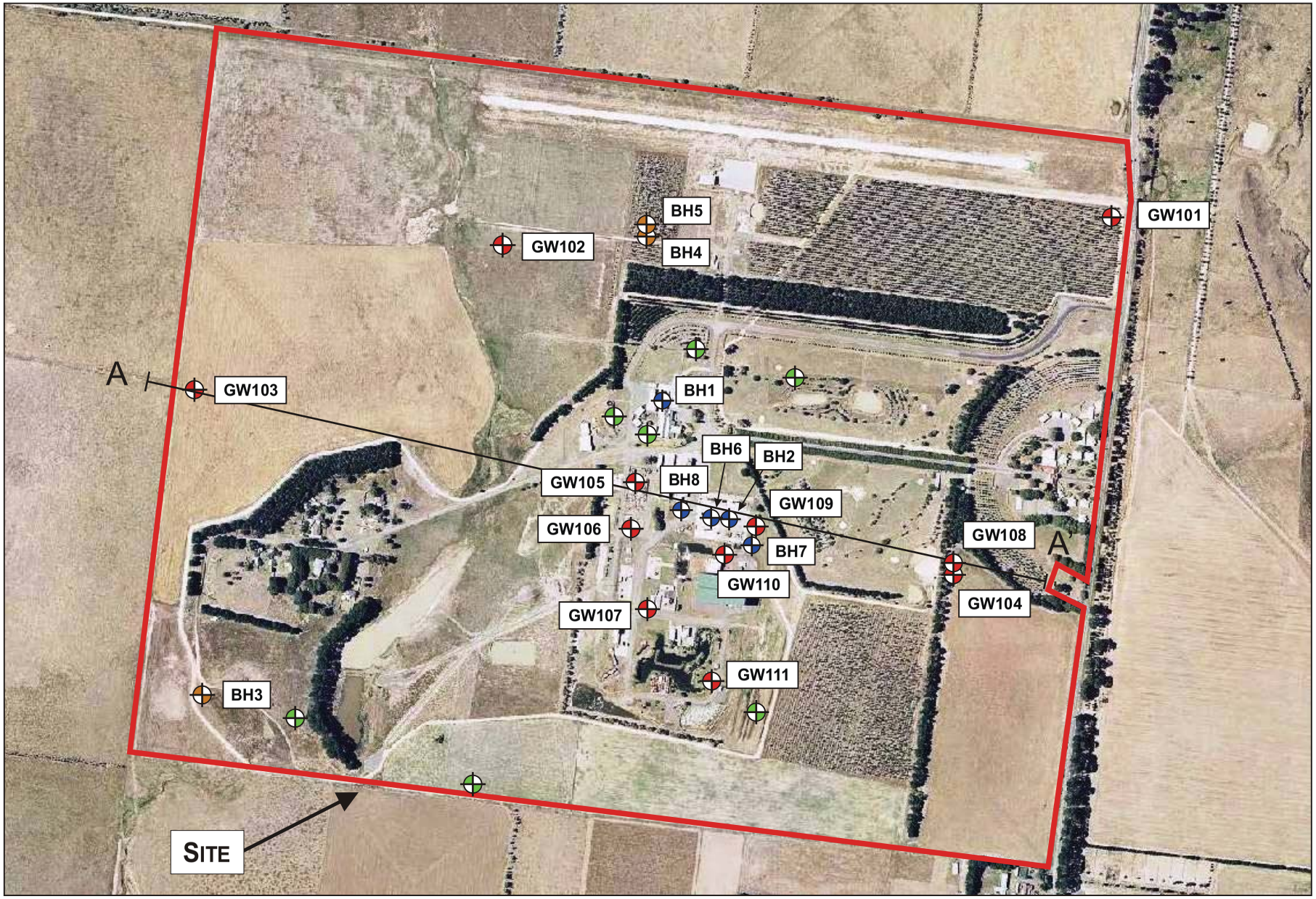

Base Plan: 2007 Aerial Photograph

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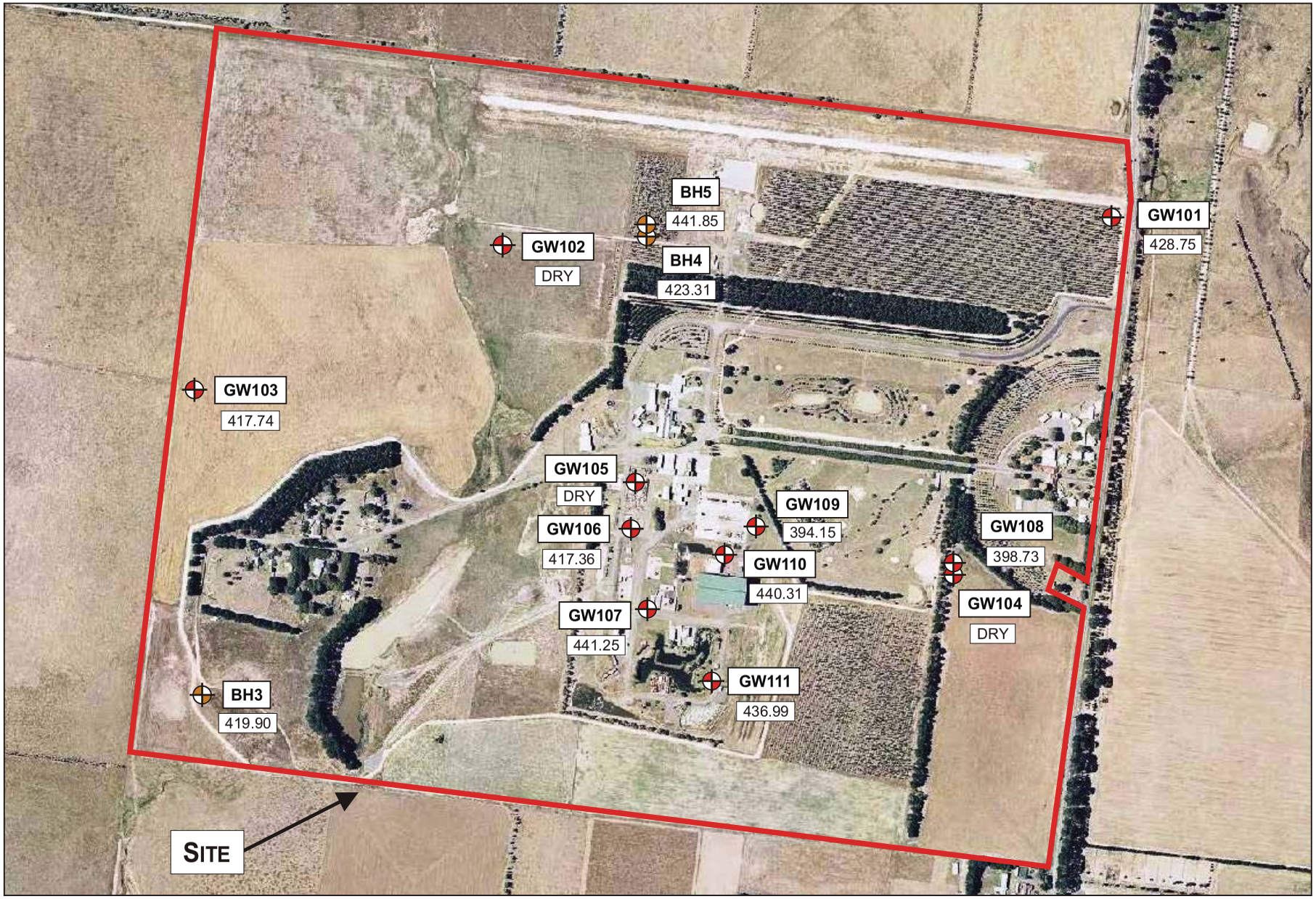

Base Plan: 2007 Aerial Photograph

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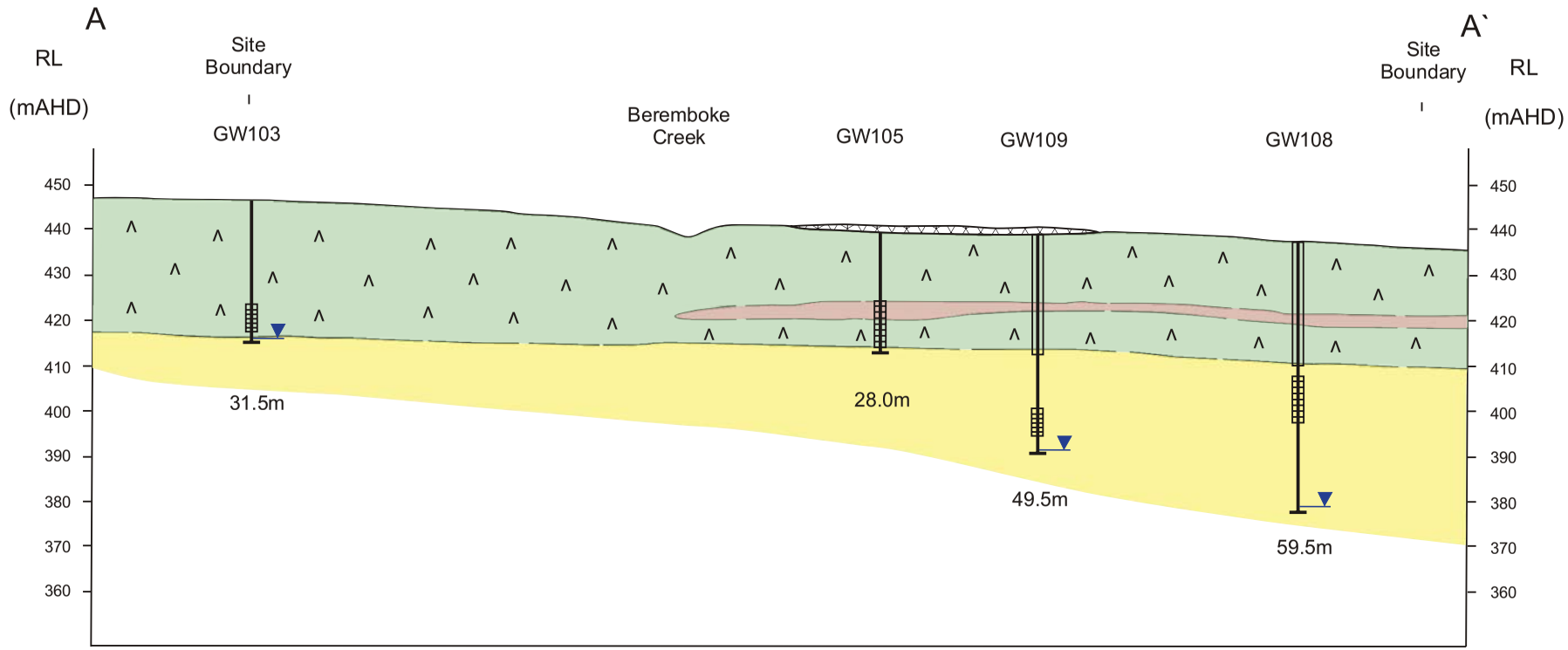
PROJECT: Groundwater Contamination Assessment
Fiskville Training College

SCALE: See scale bar	DATE: September 2012	TITLE: Groundwater Elevation Plan	
DRAWN: DJL	JOB No: 212163.2		
REF: Figure4.cdr		REV: 1	FIG: 4

SECTION A-A`
(Looking North)



LEGEND

- FILL
- QUATERNARY — NEWER VOLCANICS — BASALT (WITH CLAY LAYER)
- TERTIARY — WERRIBEE FORMATION — SILT, SAND, CLAY
- Drill Hole Trace showing precollar (top) and bore screen (bottom)
- Standing Water Level

HORIZONTAL SCALE

0 50 100 150 200 m

Cardno LanePiper
Shaping the Future

PROJECT: Groundwater Contamination Assessment Fiskville Training College	SCALE: As Shown	DATE: September 2012	TITLE: Geological Section A-A’
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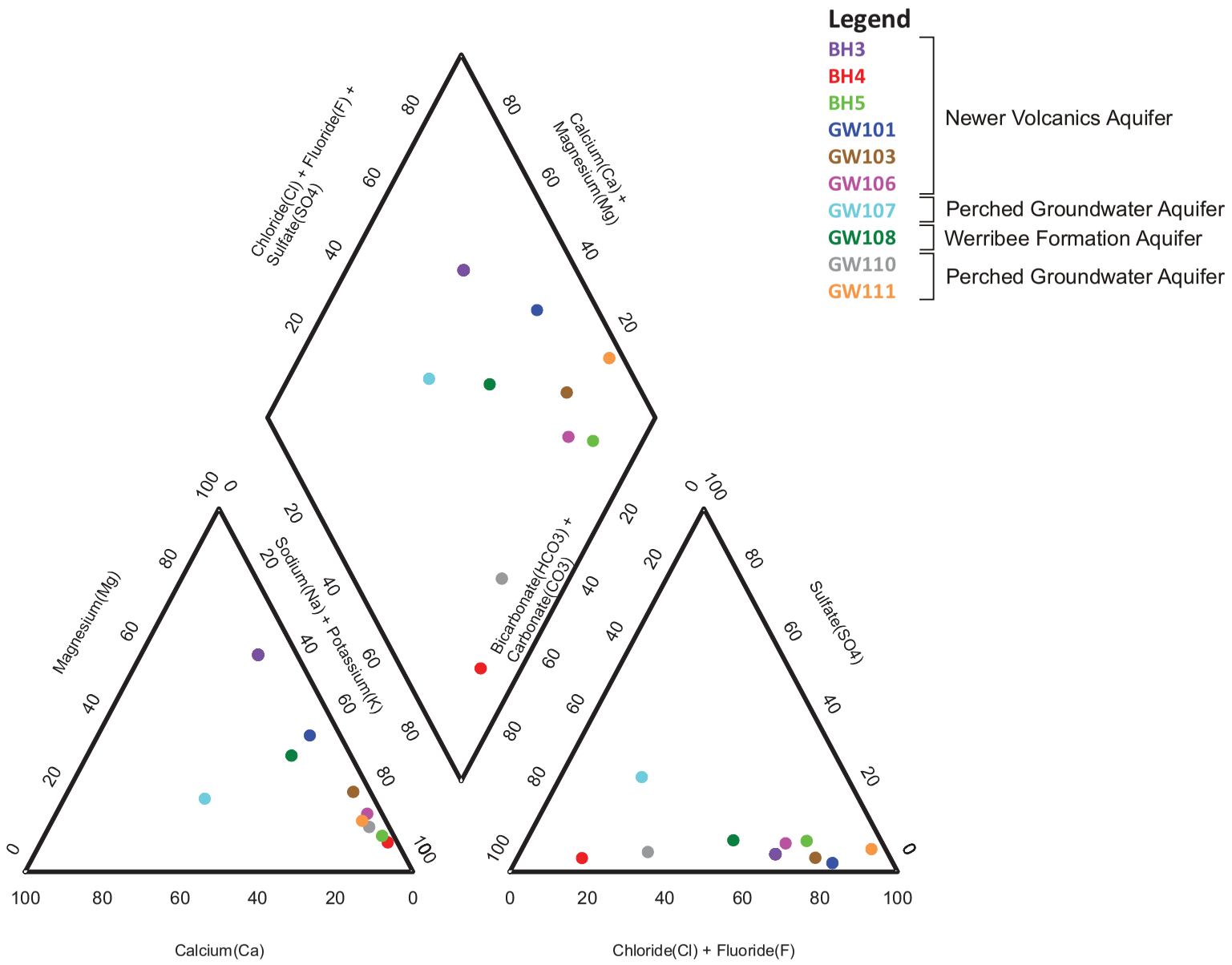

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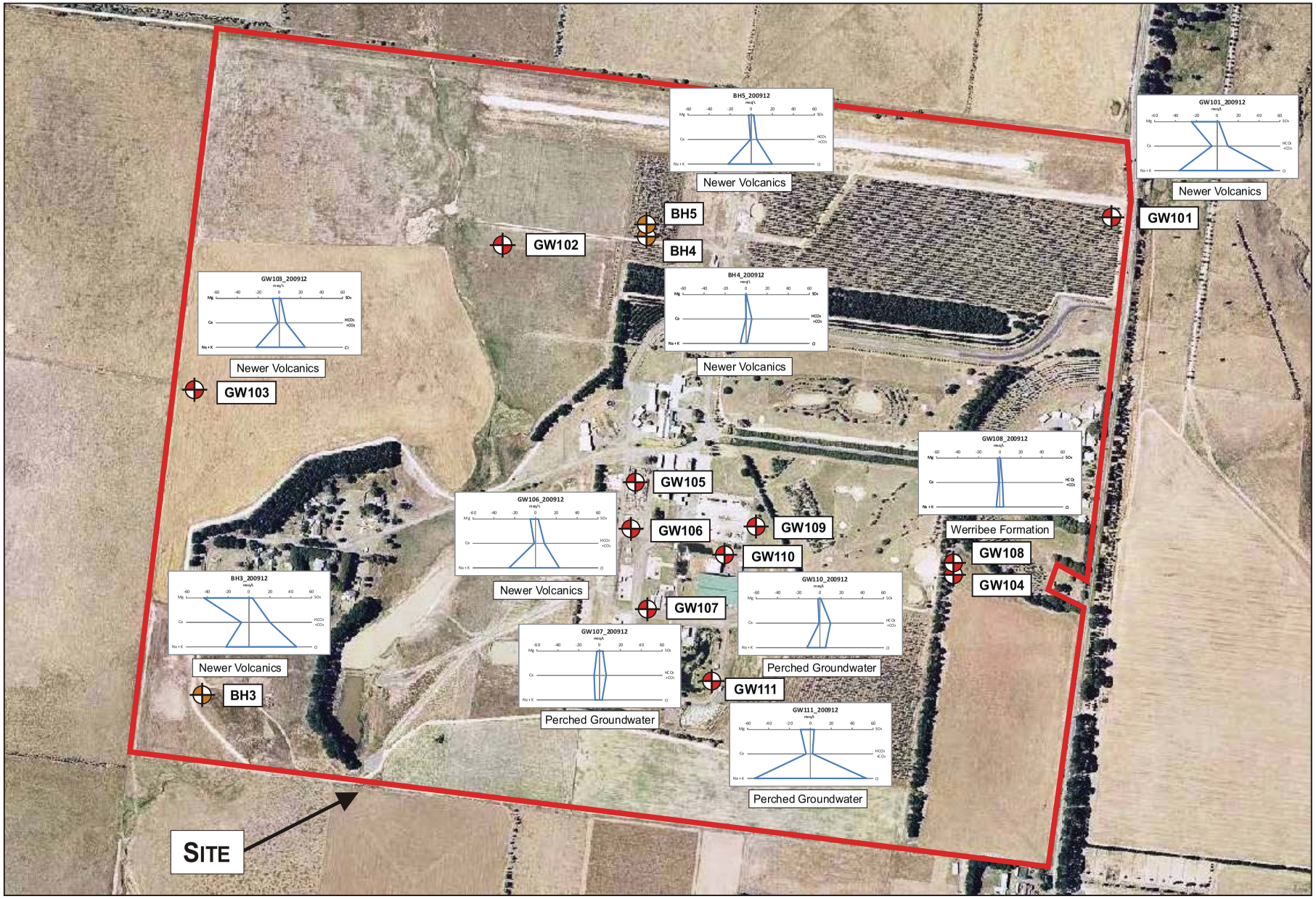

Base Plan: 2007 Aerial Photograph

Cardno LanePiper Shaping the Future	PROJECT: Groundwater Contamination Assessment Fiskville Training College	SCALE: See scale bar	DATE: September 2012	TITLE: Groundwater Chemistry Stiff Plots
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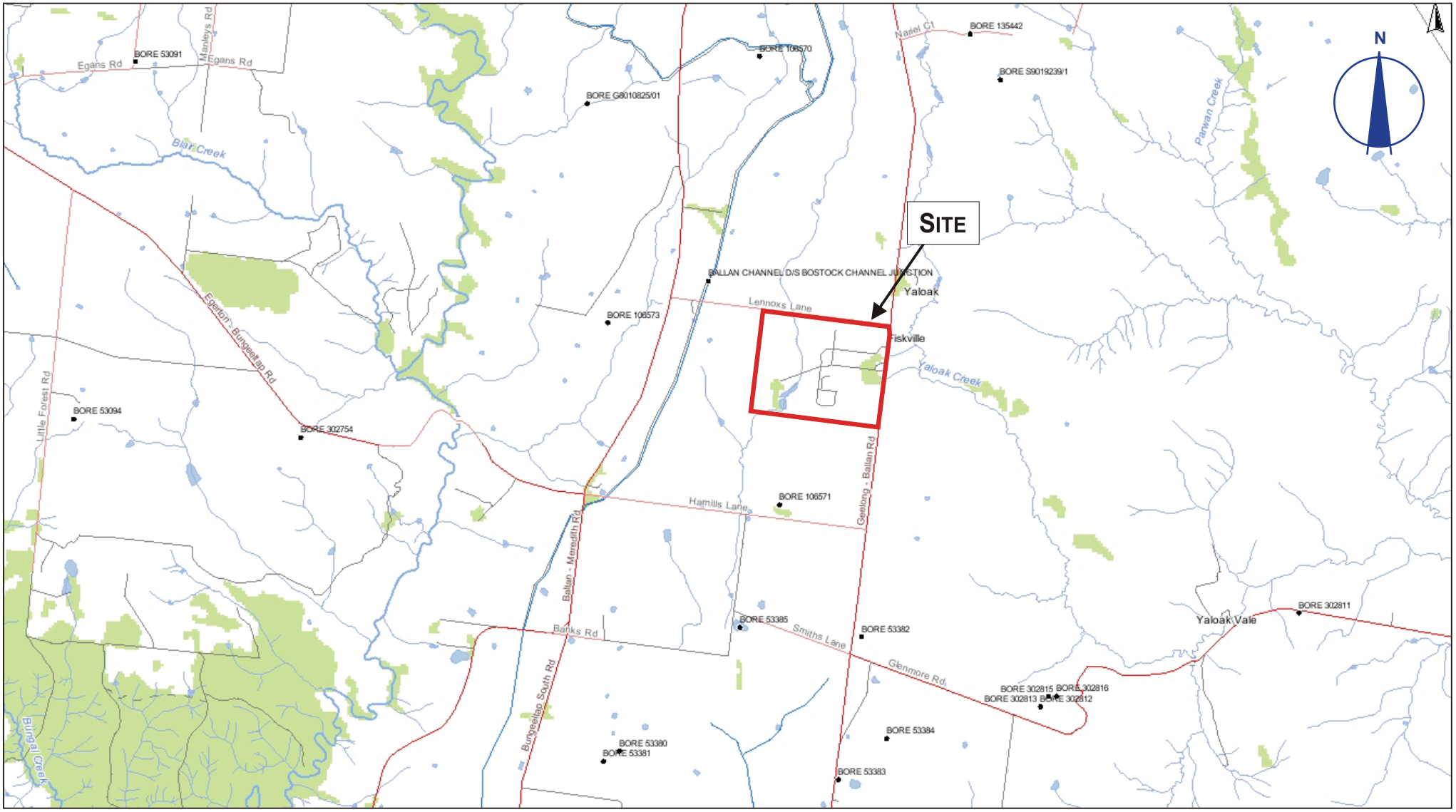

Source: Victorian Water Resources Data Warehouse

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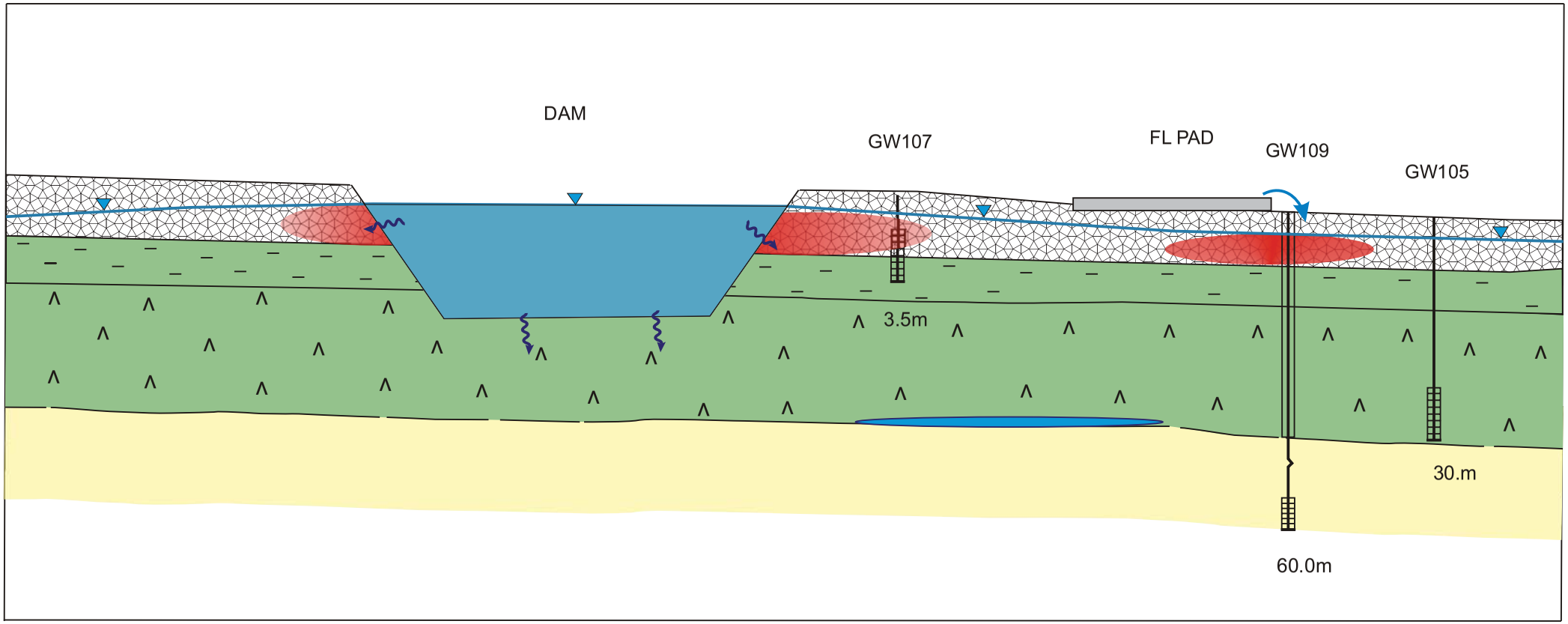

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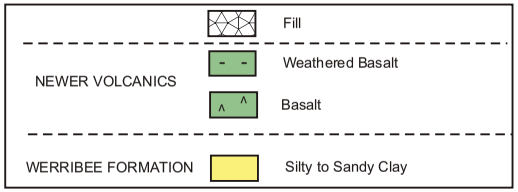
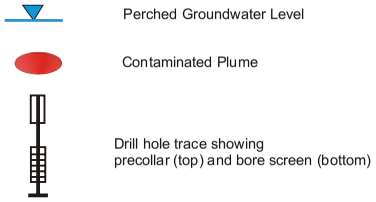




Cardno LanePiper
Shaping the Future

PROJECT:
Groundwater Contamination Assessment
Fiskville Training College

SCALE: Not to scale	DATE: September 2012	TITLE: Schematic Diagram	
DRAWN: DJL	JOB No: 212163.2		
REF: Figure9.cdr		REV: 1	FIG: 9

Appendix B
5 Pages

Tables of Laboratory Test Results

Table B-1: Groundwater Laboratory Results

Table B-2: RPD Results

Field_ID	BH3_200912	BH4_200912	BH5_200912	GW101_200912	GW103_200912	GW106_200912	GW107_200912	GW108_200912	GW110_200912	GW111_200912
Sampled_Date	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012
SDG	EM1211100	EM1211100	EM1211100	EM1211100	EM1211100	EM1211100	EM1211100	EM1211100	EM1211100	EM1211100

ChemName	Units	EQL	Dutch Criteria 2000	ANZECC 2000 Fresh Water (95%)	*ADWG 2011 Health*	ANZECC 1992 Agriculture/ Irrigation	ANZECC 1992 Stock Watering	ANZECC 1992 Primary Contact Recreation									
Amino Aliphatics																	
N-nitrosodiethylamine	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
N-nitrosodi-n-butylamine	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
N-nitrosodi-n-propylamine	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
N-Nitrosomethylethylamine	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
Amino Aromatics																	
1-naphthylamine	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
Anilines																	
2-nitroaniline	µg/L	4							<4	<4	<4	<4	<4	<4	<4	<4	<4
3-nitroaniline	µg/L	4							<4	<4	<4	<4	<4	<4	<4	<4	<4
4-chloroaniline	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
4-nitroaniline	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
2-methyl-5-nitroaniline	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
Aniline	µg/L	2		**250**[#12]					<2	<2	<2	<2	<2	<2	<2	<2	<2
BTEX																	
Benzene	µg/L	1		**950**	*1*		10	10	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	2			*300*				<2	<2	<2	<2	<2	<2	<2	<2	<2
Toluene	µg/L	2			*800*				<2	<2	<2	<2	<2	<2	<2	<2	<2
Xylene (m & p)	µg/L	2							<2	<2	<2	<2	3	<2	<2	<2	<2
Xylene (o)	µg/L	2		**350**					<2	<2	<2	<2	5	<2	<2	<2	<2
Xylene Total	µg/L				*600*				<4	<4	<4	<4	8	<4	<4	<4	<4
Chlorinated Hydrocarbons																	
1,1,1,2-tetrachloroethane	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1,1-trichloroethane	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1,2,2-tetrachloroethane	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1,2-trichloroethane	µg/L	5		**6500**					<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1-dichloroethane	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1-dichloroethene	µg/L	5			*30*		0.3	0.3	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1-dichloropropene	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5
1,2,3-trichloropropane	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5
1,2-dibromo-3-chloropropane	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5
1,2-dichloroethane	µg/L	5			*3*		10	10	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,2-dichloropropane	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5
1,3-dichloropropane	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5
2,2-dichloropropane	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5
Bromodichloromethane	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5
Bromoform	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5
Carbon tetrachloride	µg/L	5			*3*		3	3	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chlorodibromomethane	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5
Chloroethane	µg/L	50							<50	<50	<50	<50	<50	<50	<50	<50	<50
Chloroform	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5
Chloromethane	µg/L	50							<50	<50	<50	<50	<50	<50	<50	<50	<50
cis-1,2-dichloroethene	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5
cis-1,3-dichloropropene	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5
Dibromomethane	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5
Hexachlorobutadiene	µg/L	2			*0.7*				<2	<2	<2	<2	<2	<2	<2	<2	<2
Hexachlorocyclopentadiene	µg/L	10							<10	<10	<10	<10	<10	<10	<10	<10	<10
Hexachloroethane	µg/L	2		**360**					<2	<2	<2	<2	<2	<2	<2	<2	<2
Trichloroethene	µg/L	5					30	30	<5	<5	<5	<5	<5	<5	<5	<5	<5
Tetrachloroethene	µg/L	5			*50*		10	10	<5	<5	<5	<5	<5	<5	<5	<5	<5
trans-1,2-dichloroethene	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5
trans-1,3-dichloropropene	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5
Vinyl chloride	µg/L	50			*0.3*				<50	<50	<50	<50	<50	<50	<50	<50	<50
Explosives																	
1,3,5-Trinitrobenzene	mg/L	0.002							<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
2,4-Dinitrotoluene	µg/L	4		**65**[#12]					<4	<4	<4	<4	<4	<4	<4	<4	<4
2,6-dinitrotoluene	µg/L	4							<4	<4	<4	<4	<4	<4	<4	<4	<4
Nitrobenzene	µg/L	2		**550**					<2	<2	<2	<2	<2	<2	<2	<2	<2
Halogenated Benzenes																	
1,2,3-trichlorobenzene	µg/L	5		**10**					<5	<5	<5	<5	<5	<5	<5	<5	<5
1,2,4-trichlorobenzene	µg/L	2		**170**[#12]					<2	<2	<2	<2	<2	<2	<2	<2	<2
1,2-dichlorobenzene	µg/L	2		**160**	*1500*				<2	<2	<2	<2	<2	<2	<2	<2	<2
1,3-dichlorobenzene	µg/L	2		**260**					<2	<2	<2	<2	<2	<2	<2	<2	<2
1,4-dichlorobenzene	µg/L	2		**60**	*40*				<2	<2	<2	<2	<2	<2	<2	<2	<2
2-chlorotoluene	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5
4-chlorotoluene	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5
Bromobenzene	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5
Chlorobenzene	µg/L	5			*300*				<5	<5	<5	<5	<5	<5	<5	<5	<5
Hexachlorobenzene	µg/L	4							<4	<4	<4	<4	<4	<4	<4	<4	<4
Pentachlorobenzene	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
Halogenated Hydrocarbons																	
1,2-dibromoethane	µg/L	5			*1*				<5	<5	<5	<5	<5	<5	<5	<5	<5
Bromomethane	µg/L	50			*1*				<50	<50	<50	<50	<50	<50	<50	<50	<50
Dichlorodifluoromethane	µg/L	50							<50	<50	<50	<50	<50	<50	<50	<50	<50
Iodomethane	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5
Trichlorofluoromethane	µg/L	50							<50	<50	<50	<50	<50	<50	<50	<50	<50

Field_ID	BH3_200912	BH4_200912	BH5_200912	GW101_200912	GW103_200912	GW106_200912	GW107_200912	GW108_200912	GW110_200912	GW111_200912
Sampled_Date	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012
SDG	EM1211100	EM1211100	EM1211100	EM1211100	EM1211100	EM1211100	EM1211100	EM1211100	EM1211100	EM1211100

ChemName	Units	EQL	Dutch Criteria 2000	ANZECC 2000 Fresh Water (95%)	*ADWG 2011 Health*	ANZECC 1992 Agriculture/ Irrigation	ANZECC 1992 Stock Watering	ANZECC 1992 Primary Contact Recreation									
Halogenated Phenols																	
2,4,5-trichlorophenol	µg/L	2					1	1	<2	<2	<2	<2	<2	<2	<2	<2	<2
2,4,6-trichlorophenol	µg/L	2		**20**	*20*		10	10	<2	<2	<2	<2	<2	<2	<2	<2	<2
2,4-dichlorophenol	µg/L	2		**160**[#12]	*200*				<2	<2	<2	<2	<2	<2	<2	<2	<2
2,6-dichlorophenol	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
2-chlorophenol	µg/L	2		**490**[#12]	*300*				<2	<2	<2	<2	<2	<2	<2	<2	<2
Pentachlorophenol	µg/L	4		**10**	*10*		10	10	<4	<4	<4	<4	<4	<4	<4	<4	<4
Herbicides																	
Pronamide	µg/L	2			*70*				<2	<2	<2	<2	<2	<2	<2	<2	<2
Inorganics																	
Alkalinity (Bicarbonate as CaCO3)	mg/L	1							1000	268	264	512	308	425	320	129	500	108
Alkalinity (Carbonate as CaCO3)	mg/L	1							<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Alkalinity (Hydroxide) as CaCO3	µg/L	1000							<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000
Alkalinity (total) as CaCO3	mg/L	1							1000	268	264	512	308	425	320	129	500	108
Ammonia as N	µg/L	10						100[#2]	80	40	100	70	<10	270	180	490	380	170
Anions Total	meq/L	0.01							68.7	6.73	27.4	65.4	31.8	34	12.1	6.77	16.2	59.4
Cations Total	meq/L	0.01							72.2	6.13	25.1	65.8	29.6	31.5	11.9	6.18	14.7	66.5
Chloride	mg/L	1				30[#3]		4000[#2]	1610	40	704	1900	868	810	90	128	189	1900
Cyanide Total	mg/L	0.004		**0.007**	*0.08*			1[#2]	<0.004	<0.004	<0.04	<0.004	-	-	<0.004	<0.004	<0.004	<0.004
Electrical conductivity *(lab)	uS/cm	1							6830	662	2690	6850	3130	2920	1270	660	1540	6590
Fluoride	mg/L	0.1			*1.5*	1	2[#10]		0.1	0.3	1.1	0.1	0.5	*1.6*	0.3	0.2	0.4	0.2
Ionic Balance	%	0.01							2.5	4.73	4.57	0.36	3.61	3.83	0.74	4.55	4.85	5.62
Kjeldahl Nitrogen Total	mg/L	0.1							0.4	0.7	5.9	<0.1	1	11.1	1.8	2.8	0.9	0.5
Nitrate (as N)	mg/L	0.01		**7.2**[#20]	*11.3*		30[#22]	100[#2]	***21.1***	0.12	0.01	0.67	<0.01	0.04	0.04	0.16	0.34	0.51
Nitrite (as N)	mg/L	0.01			*0.9*		10	10[#2]	<0.01	<0.01	0.02	<0.01	<0.01	0.06	<0.01	0.1	0.02	0.05
Nitrogen (Total Oxidised)	mg/L	0.01							21.1	0.12	0.03	0.67	<0.01	0.1	0.04	0.26	0.36	0.56
Nitrogen (Total)	µg/L	100							21,500	800	5900	700	1000	11,200	1800	3100	1300	1100
pH (Lab)	Units	0.01				4.5-9		5-9	7.03	7.19	7.15	7.77	7.9	6.89	7.26	6.76	7.21	6.59
Sodium (Filtered)	mg/L	1						3000[#2]	495	125	501	821	495	580	97	72	277	1220
Sulphate (Filtered)	mg/L	1			*500*		1000	4000[#2]	158	12	111	74	58	127	151	28	42	177
TDS	mg/L	10					3000[#4]	1000	3790	376	3240	4530	1920	1700	780	400	434	3660
MAH																	
1,2,4-trimethylbenzene	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,3,5-trimethylbenzene	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Isopropylbenzene	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
n-butylbenzene	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
n-propylbenzene	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
p-isopropyltoluene	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
sec-butylbenzene	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Styrene	µg/L	5			*30*				<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
tert-butylbenzene	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Metals																	
Aluminium (Filtered)	mg/L	0.01		**0.055**[#14]		5	5	2[#2]	0.01	**0.07**	**1070**	**0.67**	**0.82**	**1170**	<0.01	<0.01	0.02	0.04
Antimony (Filtered)	mg/L	0.001			*0.003*				<0.001	<0.001	<0.01	<0.001	<0.01	<0.1	<0.001	<0.001	<0.001	<0.001
Arsenic (Filtered)	mg/L	0.001			*0.01*	0.1	0.5[#10]	0.5[#2]	<0.001	<0.001	*0.037*	<0.001	<0.01	<0.1	0.002	<0.001	0.001	<0.001
Barium (Filtered)	mg/L	0.001			*2*			10[#2]	0.01	0.004	0.842	0.194	0.065	0.731	0.06	0.022	0.08	0.129
Beryllium (Filtered)	mg/L	0.001			*0.06*	0.1	0.1		<0.001	<0.001	0.02	<0.001	<0.01	<0.1	<0.001	<0.001	<0.001	<0.001
Boron (Filtered)	mg/L	0.05		**0.37**[#12]	*4*	0.5-6[#5]	5	10[#2]	0.07	<0.05	0.32	<0.05	<0.1	<1	0.06	<0.05	0.06	0.21
Cadmium (Filtered)	mg/L	0.0001		**0.0002**	*0.002*	0.01	0.01	0.05[#2]	<0.0001	<0.0001	<0.001	<0.0001	<0.001	<0.01	<0.0001	<0.0001	<0.0001	0.0002
Calcium (Filtered)	mg/L	1					1000[#11]		145	3	15	103	26	24	104	19	15	81
Chromium (hexavalent) (Filtered)	mg/L	0.01		**0.001**[#12]	*0.05*	0.1			<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01
Chromium (III+VI) (Filtered)	mg/L	0.001				1	1	0.5[#2]	<0.001	<0.001	0.986	<0.001	<0.01	1.45	<0.001	<0.001	<0.001	0.002
Cobalt (Filtered)	mg/L	0.001				0.05	1		<0.001	<0.001	0.16	0.003	<0.01	0.242	0.014	<0.001	0.003	0.034
Copper (Filtered)	mg/L	0.001		**0.0014**	*2*	0.2	0.5[#10]	10[#2]	**0.002**	**0.005**	**0.163**	**0.002**	<0.01	**0.2**	**0.002**	**0.002**	**0.009**	**0.003**
Iron (Filtered)	mg/L	0.05				1		3[#2]	<0.05	0.06	338	0.71	0.56	540	2.19	<0.05	<0.05	<0.05
Lead (Filtered)	mg/L	0.001		**0.0034**	*0.01*	0.2	0.1	0.5[#2]	<0.001	<0.001	***0.165***	<0.001	<0.01	***0.146***	<0.001	<0.001	<0.001	<0.001
Lithium (Filtered)	mg/L	0.001				2.5[#18]			0.005	0.001	0.398	0.002	0.013	0.403	0.002	0.005	0.002	0.014
Magnesium (Filtered)	mg/L	1					600[#6]		524	6	30	300	79	61	29	24	22	113
Manganese (Filtered)	mg/L	0.001		**1.9**[#12]	*0.5*	2[#15]		1[#2]	0.009	0.001	*0.524*	0.148	0.132	*0.628*	*0.891*	0.298	0.121	*1.22*
Mercury (Filtered)	mg/L	0.0001		**0.0006**	*0.001*	0.002	0.002	0.01[#2]	<0.0001	<0.0001	<0.001	<0.0001	<0.0001	<0.01	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum (Filtered)	mg/L	0.001			*0.05*	0.01	0.01		<0.001	<0.001	<0.01	<0.001	0.028	<0.1	0.001	0.01	0.001	<0.001
Nickel (Filtered)	mg/L	0.001		**0.011**	*0.02*	0.2	1	1[#2]	0.006	0.008	***0.575***	0.008	<0.01	***0.611***	**0.02**	0.008	**0.013**	***0.049***
Phosphorus	mg/L	0.01							1.59	0.54	1.38	0.38	68.8	54.1	0.6	10.2	0.09	1.02
Potassium (Filtered)	mg/L	1							13	2	2	12	12	2	4	5	4	5
Selenium (Filtered)	mg/L	0.01		**0.011**	*0.01*	0.02	0.02	0.1[#2]	<0.01	<0.01	<0.1	<0.01	<0.1	<1	<0.01	<0.01	<0.01	<0.01
Silver (Filtered)	mg/L	0.001		**0.00005**	*0.1*			0.5[#2]	<0.001	<0.001	<0.01	<0.001	<0.01	<0.1	<0.001	<0.001	<0.001	<0.001
Thallium (Filtered)	mg/L	0.001							<0.001	<0.001	<0.01	<0.001	<0.01	<0.1	<0.001	<0.001	<0.001	<0.001
Vanadium (Filtered)	mg/L	0.01				0.1	0.1		<0.01	<0.01	0.51	<0.01	<0.1	<1	<0.01	<0.01	<0.01	<0.01
Zinc (Filtered)	mg/L	0.005		**0.008**[#12]		2[#17]	20	50[#2]	**0.017**	0.007	**4.55**	**0.009**	<0.05	**0.627**	0.007	<0.005	**0.015**	**0.049**
Nitroaromatics																	
2-Picoline	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
4-aminobiphenyl	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Pentachloronitrobenzene	µg/L	2			*30*		6	6	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Organochlorine Pesticides																	
4,4-DDE	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
a-BHC	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2	<2

Field_ID	BH3_200912	BH4_200912	BH5_200912	GW101_200912	GW103_200912	GW106_200912	GW107_200912	GW108_200912	GW110_200912	GW111_200912
Sampled_Date	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012
SDG	EM1211100	EM1211100	EM1211100	EM1211100	EM1211100	EM1211100	EM1211100	EM1211100	EM1211100	EM1211100

ChemName	Units	EQL	Dutch Criteria 2000	ANZECC 2000 Fresh Water (95%)	*ADWG 2011 Health*	ANZECC 1992 Agriculture/ Irrigation	ANZECC 1992 Stock Watering	ANZECC 1992 Primary Contact Recreation									
Aldrin	µg/L	2					1	1	<2	<2	<2	<2	<2	<2	<2	<2	<2
Aldrin + Dieldrin	µg/L	4			*0.3*				<4	<4	<4	<4	<4	<4	<4	<4	<4
b-BHC	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
d-BHC	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
DDD	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
DDT	µg/L	4		**0.01**	*9*		3	3	<4	<4	<4	<4	<4	<4	<4	<4	<4
DDT+DDE+DDD	µg/L	4							<4	<4	<4	<4	<4	<4	<4	<4	<4
Dieldrin	µg/L	2					1	1	<2	<2	<2	<2	<2	<2	<2	<2	<2
Endosulfan I	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
Endosulfan II	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
Endosulfan sulphate	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
Endrin	µg/L	2		**0.02**			1	1	<2	<2	<2	<2	<2	<2	<2	<2	<2
g-BHC (Lindane)	µg/L	2		**0.2**	*10*		10	10	<2	<2	<2	<2	<2	<2	<2	<2	<2
Heptachlor	µg/L	2		**0.09**	*0.3*		3	3	<2	<2	<2	<2	<2	<2	<2	<2	<2
Heptachlor epoxide	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
Organophosphorous Pesticides																	
Chlorfenvinphos	µg/L	2			*2*		10	10	<2	<2	<2	<2	<2	<2	<2	<2	<2
Chlorpyrifos	µg/L	2		**0.01**	*10*		2	2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Chlorpyrifos-methyl	mg/L	0.002							<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Diazinon	µg/L	2		**0.01**	*4*		10	10	<2	<2	<2	<2	<2	<2	<2	<2	<2
Dichlorvos	µg/L	2			*5*		20	20	<2	<2	<2	<2	<2	<2	<2	<2	<2
Dimethoate	µg/L	2		**0.15**	*7*		100	100	<2	<2	<2	<2	<2	<2	<2	<2	<2
Ethion	µg/L	2			*4*		6	6	<2	<2	<2	<2	<2	<2	<2	<2	<2
Fenthion	µg/L	2			*7*				<2	<2	<2	<2	<2	<2	<2	<2	<2
Malathion	µg/L	2		**0.05**	*70*		100	100	<2	<2	<2	<2	<2	<2	<2	<2	<2
Prothiofos	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
Other																	
6:2 Fluorotelomer Sulfonate (6:2 FtS)	mg/L	0.0001			*0.0002*[#24]			0.002[#25]	-	-	-	-	-	-	*0.0579*	-	*1.21*	-
N-Nitrosodiphenyl & Diphenylamine	µg/L	4							<4	<4	<4	<4	<4	<4	<4	<4	<4
Perchlorate	µg/L	0.2			*15*				-	-	-	-	-	-	<0.2	-	11	-
Perfluorooctanoate	mg/L	0.00002			*0.0004*[#24]			0.004[#25]	-	-	-	-	-	-	*0.0157*	-	*0.092*	-
PFOS	mg/L	0.00002			*0.0002*[#24]			0.002[#25]	-	-	-	-	-	-	*0.139*	-	*3.32*	-
PAH																	
7,12-dimethylbenz(a)anthracene	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
PAH/Phenols																	
2,4-dimethylphenol	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
2-chloronaphthalene	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
2-methylnaphthalene	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
2-methylphenol	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
2-nitrophenol	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
3-&4-methylphenol	µg/L	4							<4	<4	<4	<4	<4	<4	<4	<4	<4
3-methylcholanthrene	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
4-chloro-3-methylphenol	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
Acenaphthene	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
Acenaphthylene	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
Acetophenone	µg/L	2							<2	<2	<2	<2	4	<2	<2	<2	<2
Anthracene	µg/L	2							<2	<2	<2	<2	2	<2	<2	<2	<2
Benz(a)anthracene	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
Benzo(a) pyrene	µg/L	2			*0.01*		0.01	0.01	<2	<2	<2	<2	<2	<2	<2	<2	<2
Benzo(b)&(k)fluoranthene	µg/L	4							<4	<4	<4	<4	<4	<4	<4	<4	<4
Benzo(g,h,i)perylene	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
Chrysene	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
Dibenz(a,h)anthracene	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
Carcinogenic PAHs (as B(a)P TPE)	µg/L								<4.84	<4.84	<4.84	<4.84	<4.84	<4.84	<4.84	<4.84	<4.84
Carcinogenic PAHs (as B(a)P TPE, PEFx3)	µg/L								<14.52	<14.52	<14.52	<14.52	<14.52	<14.52	<14.52	<14.52	<14.52
Fluoranthene	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
Fluorene	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
Indeno(1,2,3-c,d)pyrene	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
Naphthalene	µg/L	2		**16**					<2	<2	<2	<2	9	<2	4	<2	<2
PAHs (Sum of total)	µg/L	2							<2	<2	<2	<2	13	<2	4	<2	<2
Phenanthrene	µg/L	2							<2	<2	<2	<2	2	<2	<2	<2	<2
Phenol	µg/L	2		**320**					<2	<2	<2	<2	<2	<2	<2	<2	<2
Pyrene	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
Pesticides																	
Chlorobenzilate	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
Pirimphos-ethyl	µg/L	2			*0.5*		1	1	<2	<2	<2	<2	<2	<2	<2	<2	<2
Phthalates																	
Bis(2-ethylhexyl) phthalate	µg/L	10			*10*				<10	<10	<10	<10	<10	*175*	<10	*78*	<10	<10
Butyl benzyl phthalate	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Diethylphthalate	µg/L	2		**1000**					<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Dimethyl phthalate	µg/L	2		**3700**					<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Di-n-butyl phthalate	µg/L	2		**26**					<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Di-n-octyl phthalate	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Polychlorinated Biphenyls																	
PCBs (Sum of total)	µg/L	1					0.1	0.1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Solvents																	

Field_ID	BH3_200912	BH4_200912	BH5_200912	GW101_200912	GW103_200912	GW106_200912	GW107_200912	GW108_200912	GW110_200912	GW111_200912
Sampled_Date	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012	20/09/2012
SDG	EM1211100	EM1211100	EM1211100	EM1211100	EM1211100	EM1211100	EM1211100	EM1211100	EM1211100	EM1211100

ChemName	Units	EQL	Dutch Criteria 2000	ANZECC 2000 Fresh Water (95%)	*ADWG 2011 Health*	ANZECC 1992 Agriculture/ Irrigation	ANZECC 1992 Stock Watering	ANZECC 1992 Primary Contact Recreation									
Methyl Ethyl Ketone	µg/L	50							<50	<50	<50	<50	<50	<50	<50	<50	<50
2-hexanone (MBK)	µg/L	50							<50	<50	<50	<50	<50	<50	<50	<50	<50
4-Methyl-2-pentanone	µg/L	50							<50	<50	<50	<50	<50	<50	<50	<50	<50
Carbon disulfide	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5
Isophorone	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
Vinyl acetate	µg/L	50							<50	<50	<50	<50	<50	<50	<50	<50	<50
SVOCs																	
2-(acetylamino) fluorene	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
3,3-Dichlorobenzidine	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
4-(dimethylamino) azobenzene	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
4-bromophenyl phenyl ether	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
4-chlorophenyl phenyl ether	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
4-Nitroquinoline-N-oxide	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
Azobenzene	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
Bis(2-chloroethoxy) methane	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
Bis(2-chloroisopropyl) ether	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
Carbazole	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
Dibenzofuran	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
Hexachloropropene	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
Methapyrilene	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
N-nitrosomorpholine	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
N-nitrosopiperidine	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
N-nitrosopyrrolidine	µg/L	4							<4	<4	<4	<4	<4	<4	<4	<4	<4
Phenacetin	µg/L	2							<2	<2	<2	<2	<2	<2	<2	<2	<2
Total Petroleum Hydrocarbons																	
C6 - C9	µg/L	20	50[#26] / 600[#27]						<20	<20	<20	<20	<20	<20	<20	<20	<20
C10 - C14	µg/L	50	50[#26] / 600[#27]						1380	<50	<50	<50	<50	<50	<50	<50	<50
C15 - C28	µg/L	100	50[#26] / 600[#27]						<100	<100	390	<100	<100	810	<100	390	310	<100
C29 - C36	µg/L	50	50[#26] / 600[#27]						<50	<50	70	<50	<50	190	<50	150	<50	<50
C10 - C36 (sum)	µg/L	50							1380	<50	460	<50	<50	1000	<50	540	310	<50
Total Recoverable Hydrocarbons (NEPM 2010 Draft)																	
C6-C10	µg/L	0.02							<20	<20	<20	<20	<20	<20	<20	<20	<20
>C10-C16	µg/L	0.1							1310	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C16-C34	µg/L	0.1							<100	<100	380	<100	<100	870	<0.1	470	300	<100
>C34 - C40	µg/L	0.1							<100	<100	<100	<100	<100	150	<100	<100	<100	<100
>C10 - C40 (sum)	µg/L	0.1							1310	<100	380	<100	<100	1020	<100	470	300	<100
VOCs																	
cis-1,4-Dichloro-2-butene	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Pentachloroethane	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
trans-1,4-Dichloro-2-butene	µg/L	5							<5	<5	<5	<5	<5	<5	<5	<5	<5	<5

Comments

#1 Two metolachlor compounds exist with different structure. Criterion for sum of them.
#2 The guideline criterion for Raw water for drinking times 10 has been adopted (based on NHMRC 2008 Risks in Recreational Water, section 9.3.2)
#3 See Tables 5.2, 5.3, 5.4 ANZECC 1992
#4 See Tables 5.12, 5.13 ANZECC 1992
#5 See Table 5.8 ANZECC 1992
#6 See Table 5.13 ANZECC 1992
#7 See Table 5.10 ANZECC 1992
#8 See Table 5.1 ANZECC 1992
#9 See Table 3.2 ANZECC 1992
#10 See Section 5.2.3 ANZECC 1992
#11 See Section 5.2.2 ANZECC 1992
#12 See Notes for Table 3.4.1
#13 See Figure 5.1 ANZECC 1992
#14 pH>6.5
#15 If acid soils, <0.2 mg/L
#16 Guideline value below current limit of reporting
#17 For sandy soils and pH below 6, <1.0 mg/L
#18 For citrus <0.075 mg/L
#19 Errata Slip June 2005; See Notes for Table 3.4.1
#20 Criterion from Memorandum 2002; Errata Slip June 2005 suggested to replace nitrate criteria with 'under review'
#21 As cyanide
#22 30 (horses), 40 (cattle), 60 (sheep)
#23 (2,4-Dichlorophenoxy) acetic acid
#24 Criterion from USEPA 2009 - Provisional Health Advisories for PFOA and PFOS
#25 Criterion from USEPA 2009 - Provisional Health Advisories for PFOA and PFOS (multiplied by 10 for Primary Contact Recreation)
#26 Criterion from Dutch Target (shallow < 10 m); bores GW101, GW107 and GW110 have groundwater at < 10 m below ground level (2000)
#27 Criterion from Dutch Intervention (2000)

	SDG	EM1211100	EM1211100	RPD	EM1211100	EM1211100	RPD	EM1211100	Interlab_D	RPD	EM1211100	Interlab_D	RPD
	Field_ID	GW107_200912	QC01_200912		GW110_200912	QC03_200912		GW107_200912	QC02_200912		GW110_200912	QC04_200912	
	Date Sampled	20/09/2012	20/09/2012		20/09/2012	20/09/2012		20/09/2012	20/09/2012		20/09/2012	20/09/2012	
ChemName	**Units**	**EQL**											
Inorganics													
Ammonia as N	µg/L	10	180.0	200.0	11	380.0	340.0	11	**180.0**	**<10.0**	**179**	380.0	270.0	34
Nitrate (as N)	mg/L	0.01 (Primary): 0.02 (Interlab)	**0.04**	**0.02**	**67**	0.34	0.34	0	**0.04**	**<0.02**	**67**	0.34	0.48	34
Nitrite (as N)	mg/L	0.01	<0.01	<0.01	0	0.02	0.03	40	<0.01			0.02		
Nitrogen (Total Oxidised)	mg/L	0.01	**0.04**	**0.02**	**67**	0.36	0.37	3	0.04			0.36		
pH (Lab)	pH_Units	0.01 (Primary): 0.1 (Interlab)	7.26	7.23	0	7.21	7.15	1	7.26	7.6	5	7.21	7.7	7
TDS	mg/L	10	780.0	690.0	12	**434.0**	**808.0**	**60**	780.0	970.0	22	**434.0**	**980.0**	**77**
Metals														
Aluminium (Filtered)	mg/L	0.01 (Primary): 0.05 (Interlab)	<0.01	0.02	67	0.02	0.02	0	<0.01	<0.05	0	0.02	<0.05	0
Antimony (Filtered)	mg/L	0.001 (Primary): 0.005 (Interlab)	**<0.001**	**0.003**	**100**	<0.001	<0.001	0	<0.001	<0.005	0	<0.001	<0.005	0
Arsenic (Filtered)	mg/L	0.001	0.002	0.002	0	0.001	<0.001	0	0.002	0.002	0	0.001	0.001	0
Barium (Filtered)	mg/L	0.001 (Primary): 0.02 (Interlab)	0.06	0.06	0	0.08	0.079	1	0.06	0.05	18	0.08	0.08	0
Beryllium (Filtered)	mg/L	0.001	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0
Boron (Filtered)	mg/L	0.05	0.06	0.06	0	0.06	0.05	18	0.06	0.06	0	0.06	0.06	0
Cadmium (Filtered)	mg/L	0.0001 (Primary): 0.0002 (Interlab)	<0.0001	<0.0001	0	<0.0001	<0.0001	0	<0.0001	<0.0002	0	<0.0001	<0.0002	0
Chromium (III+VI) (Filtered)	mg/L	0.001	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0
Cobalt (Filtered)	mg/L	0.001	0.014	0.014	0	0.003	0.003	0	0.014	0.012	15	0.003	0.004	29
Copper (Filtered)	mg/L	0.001	0.002	0.002	0	0.009	0.008	12	**0.002**	**0.001**	**67**	0.009	0.006	40
Iron (Filtered)	mg/L	0.05	2.19	2.49	13	<0.05	<0.05	0	2.19	2.6	17	**<0.05**	**0.1**	**67**
Lead (Filtered)	mg/L	0.001	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0
Lithium (Filtered)	mg/L	0.001	**0.002**	**0.001**	**67**	**0.002**	**0.001**	**67**	0.002			0.002		
Manganese (Filtered)	mg/L	0.001 (Primary): 0.005 (Interlab)	0.891	0.887	0	0.121	0.117	3	0.891	1.1	21	0.121	0.14	15
Mercury (Filtered)	mg/L	0.0001	<0.0001	<0.0001	0	<0.0001	<0.0001	0	<0.0001	<0.0001	0	<0.0001	<0.0001	0
Molybdenum (Filtered)	mg/L	0.001 (Primary): 0.005 (Interlab)	0.001	0.001	0	0.001	0.001	0	0.001	<0.005	0	0.001	<0.005	0
Nickel (Filtered)	mg/L	0.001	0.02	0.02	0	0.013	0.014	7	0.02	0.016	22	0.013	0.012	8
Selenium (Filtered)	mg/L	0.01 (Primary): 0.001 (Interlab)	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.001	0	<0.01	0.002	0
Silver (Filtered)	mg/L	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.005	0	<0.001	<0.005	0
Thallium (Filtered)	mg/L	0.001	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0
Vanadium (Filtered)	mg/L	0.01 (Primary): 0.005 (Interlab)	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.005	0	<0.01	<0.005	0
Zinc (Filtered)	mg/L	0.005 (Primary): 0.001 (Interlab)	0.007	0.008	13	0.015	0.013	14	0.007	0.006	15	0.015	0.01	40

Appendix C
35 Pages

Bore Construction Details

Groundwater Bore Logs GW101 to GW111

Cardno Lane Piper UCS

Bore Construction Details

MSDS for AMC Bio-Vis Xtra

Bore Construction Licence

Borehole Record: **GW101**

Project:	CFA Fiskville	**Position:**	255454.308 E	**Date Drilled:**	22 August 2012
	Groundwater Assessment		5826176.965 N	**Drill Rig:**	Boart- Longyear DB520
Location:	Fiskville, Victoria	**Surface Level:**	438.165 m	**Drilling Method:**	Solid Auger/
		Top of Casing:	438.848 m		Downhole Hammer
Job No.:	212163.2	**Inclination:**	Vertical	**Logged/Checked:**	DJL/GGS

Depth (m bgl)	Description of Strata	Graphic Log	Depth (m bgl)	Samples	PID (ppm) / Contam Rank	Well Graphic	Remarks
0.0	CLAY (CH) high plasticity, brown to grey,		0.0				
0.5	some basalt fragments, hand auger refusal at 0.5m		1.0				
	BASALT (SW) slightly weathered, grey brown, hard, common vesicles and amygdales		2.0				
			3.0				
			4.0				Class 18, 50mm dia. PVC Casing (0.0-12.0m bgl)
			5.0				
6.0	CLAY (CL) low plasticity, red-brown, soft, moist		6.0				
7.0	BASALT (MW) moderately weathered, dark grey-brown, red brown to orange brown, alteration/ veining, commonly vesicular, minor amygdales, minor clay intervals		7.0				
			8.0				Grout (0.0-10.0m bgl)
			9.0				
			10.0				Bentonite (10.0-11.0m bgl)
			11.0				
12.0	CLAY (CL) low plasticity, orange-brown, soft, moist, small basalt fragments still present		12.0				Class 18, 50mm dia. PVC Screen (12.0-18.0m bgl)
			13.0				
14.0	BASALT (SW) slightly weathered, grey-brown, hard, trace vesicles, mostly "massive", relatively fresh. Water encountered at approximately 15.5 m, drill cuttings have mud/ clay coating, but basalt chips are hard to end of hole. Light brown, muddy water from 15-18 m.		14.0				
			15.0				Sand Filter (11.0-18.0m bgl)
			16.0				
			17.0				
			18.0				End Cap (18.0m bgl)
	EOH at 18.0 m		19.0				
			20.0				
			21.0				
			22.0				
			23.0				
			24.0				
			25.0				
			26.0				
			27.0				
			28.0				
			29.0				
			30.0				
			31.0				
			32.0				
			33.0				
			34.0				

Key:
For explanation of abbreviations and symbols, refer to Cardno Lane Piper UCS or Rock Notes

Enviro GW_Soil_Gas Log 10/10

Notes:
Stick up: 0.70 m
SWL: 10.30 mbTOC (22/08/2012)
9.85 mbTOC (23/08/2012)

Groundwater Observations:
Groundwater encountered at 15.5 m

Borehole Record: **GW102**

Project:	CFA Fiskville	**Position:**	254526.104 E	**Date Drilled:**	23 August 2012
	Groundwater Assessment		5826117.924 N	**Drill Rig:**	Boart- Longyear DB520
Location:	Fiskville, Victoria	**Surface Level:**	441.547 m	**Drilling Method:**	Solid Auger/
		Top of Casing:	442.225 m		Downhole Hammer
Job No.:	212163.2	**Inclination:**	Vertical	**Logged/Checked:**	GGS/DJL

Depth (m bgl)	Description of Strata	Graphic Log	Depth (m bgl)	Samples	PID (ppm) / Contam Rank	Well Graphic	Remarks
0.0	CLAY (CH), residual basaltic clay, brown-redbrown, soft, wet, contains weathered basalt gravels		0.0				
1.5	BASALT (Fr) fresh-slightly weathered, no vesicles, little to no clay fractures		1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0 13.0 14.0				Class 18, 50mm dia. PVC Casing (0.0-17.5m bgl) Grout (0.0-15.5m bgl)
	increase in iron staining and clay fractures (slightly weathered to moderately weathered)						
15.0	BASALT (Fr) fresh, dark blue-green, no clay, no vesicles		15.0 16.0 17.0 18.0 19.0				Bentonite (15.5-16.5m bgl) Class 18, 50mm dia. PVC Screen (17.5-23.5m bgl)
19.5	BASALT (HW) highly weathered, brown-red, clayey, dry to slightly moist, contains minor quartz veins amygdales, clay is red-brown		20.0 21.0 22.0 23.0				Sand Filter (16.5-23.5m bgl) End Cap (23.5m bgl)
24.0	SAND (SP) poorly graded, fine-medium grained, loose, slightly moist (probable Werribee Formation)		24.0 25.0 26.0 27.0 28.0 29.0 30.0 31.0 32.0 33.0 34.0				
	EOH at 25.0 m						

Key:
For explanation of abbreviations and symbols, refer to Cardno Lane Piper UCS or Rock Notes

Enviro GW_Soil_Gas Log 10/10

Notes:
Stick up: 0.65 m

Groundwater Observations:
Dry at time of installation
Approximately 23.0 m at 3:30 pm (23/08/2012)

Borehole Record: **GW103**

Project:	CFA Fiskville Groundwater Assessment	**Position:**	254043.809 E 5825894.15	**Date Drilled:**	23 August 2012
Location:	Fiskville, Victoria	**Surface Level:**	446.233 m	**Drill Rig:**	Boart- Longyear DB520
		Top of Casing:	446.785 m	**Drilling Method:**	Solid Auger/ Downhole Hammer
Job No.:	212163.2	**Inclination:**	Vertical	**Logged/Checked:**	GGS/DJL

Depth (m bgl)	Description of Strata	Graphic Log	Depth (m bgl)	Samples	PID (ppm) / Contam Rank	Well Graphic	Remarks
0.0	CLAY(CH) high plasticity, light brown-red brown, soft, wet, contains weathered basalt fragments		0.0 1.0 2.0 3.0				
3.0	BASALT (MW) moderately weathered, red-brown, high strength, dry		4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0 13.0 14.0				Class 18, 50mm dia. PVC Casing (0.0-23.0m bgl) Grout (0.0-21.0m bgl)
14.7	BASALT (Fr), blue-grey, high strength, dry, no vesicles, minor quartz veins		15.0 16.0 17.0 18.0 19.0 20.0 21.0 22.0 23.0 24.0 25.0 26.0 27.0				Bentonite (21.0-22.0m bgl) Sand Filter (22.0-29.0m bgl) Class 18, 50mm dia. PVC Screen (23.0-29.0m bgl)
27.5	CLAY (CL) low plasticity, grey to yellow-brown, slightly moist, trace basalt fragments		28.0				
29.0	CLAY/SILT (ML) low plasticity, red-brown, loose, dry, fine grained sand (probable Werribee Formation)		29.0 30.0				End Cap (29.0m bgl)
30.5	Silty SAND (SM) well graded, coarse-fine, red-yellow		31.0 32.0				
	EOH at 31.5 m		33.0 34.0				

Key:
For explanation of abbreviations and symbols, refer to Cardno Lane Piper UCS or Rock Notes

Enviro GW_Soil_Gas Log 10/10

Notes:
Stick up: 0.55 m

Groundwater Observations:
None observed

Borehole Record: **GW104**

Page: 1 of 1

Project:	CFA Fiskville Groundwater Assessment	**Position:**	255205.957 E 5825603.34 N	**Date Drilled:**	23 August 2012
Location:	Fiskville, Victoria	**Surface Level:**	438.885 m	**Drill Rig:**	Boart- Longyear DB520
		Top of Casing:	439.609 m	**Drilling Method:**	Solid Auger/ Downhole Hammer
Job No.:	212163.2	**Inclination:**	Vertical	**Logged/Checked:**	GGS/DJL

Depth (m bgl)	Description of Strata	Graphic Log	Depth (m bgl)	Samples	PID (ppm) / Contam Rank	Well Graphic	Remarks
0.0	CLAY (CH) high plasticity, grey-brown mottled, firm, slightly moist. Hand auger to 1m, solid auger refusal at 1.9 m bgl		0.0				
1.9	BASALT (SW) slightly weathered, brown-grey, medium strength, dry, minor vesicles, minor clay in fractures		1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0 13.0 14.0 15.0				Class 18, 50mm dia. PVC Casing (0.0-14.0m bgl) Grout (0.0-12.0m bgl) Bentonite (12.0-13.0m bgl) Class 18, 50mm dia. PVC Screen (14.0-26.0m bgl)
15.5 16.0	BASALT (HW) highly weathered, orange-red, low strength, dry, contains iron nodules, high red- orange brown clay content		16.0				
	CLAY (CH) high plasticity, orange-red, dry, minor basalt fragments		17.0 18.0				
18.5	BASALT (MW) moderately weathered, medium strength, dry, contains amygdales		19.0 20.0 21.0 22.0 23.0 24.0 25.0 26.0 27.0				Sand Filter (13.0-26.0m bgl) End Cap (26.0m bgl)
27.5 28.0	Sandy CLAY (CH) medium plasticity, orange, loose, dry, minor weathered basalt fragments (probable Werribee Formation)		28.0				
	Clayey SAND (SP), poorly graded, fine grained, pink-orange, loose, dry		29.0 30.0				
	EOH at 29.0 m		31.0 32.0 33.0 34.0				

Key:
For explanation of abbreviations and symbols, refer to Cardno Lane Piper UCS or Rock Notes

Enviro GW_Soil_Gas Log 10/10

Notes:
Stick up: 0.72 m

Groundwater Observations:
None observed

Borehole Record: **GW105**

Project:	CFA Fiskville	**Position:**	254739.620 E	**Date Drilled:**	27 August 2012
	Groundwater Assessment		5825754.738 N	**Drill Rig:**	Boart- Longyear DB520
Location:	Fiskville, Victoria	**Surface Level:**	441.775 m	**Drilling Method:**	Solid Auger/
		Top of Casing:	441.639 m		Downhole Hammer
Job No.:	212163.2	**Inclination:**	Vertical	**Logged/Checked:**	DJL/GGS

Depth (m bgl)	Description of Strata	Graphic Log	Depth (m bgl)	Samples	PID (ppm) / Contam Rank	Well Graphic	Remarks
0.0	FILL: grey-brown to red-brown, moist, loose, comprises sand, gravel and clay. Hand auger to 1.9 m		0.0				
0.7			1.0				
1.9	Silty CLAY (CI) medium plasticity, light brown to brown, firm to stiff, moist, probably weathered basalt		2.0				
	BASALT (SW) slightly weathered, mottled grey-brown, hard, vesicular		3.0				
			4.0				Class 18, 50mm dia. PVC Casing (0.0-17.0m bgl)
			5.0				
			6.0				
			7.0				
			8.0				Grout (0.0-15.0m bgl)
	7-11: fresh, grey-green, relatively massive, minor vesicles		9.0				
			10.0				
			11.0				
	11-14: grey-brown, minor clay, minor limonite staining		12.0				
			13.0				
			14.0				
	14-17: dark grey-brown to light brown, high limonite content, slaty texture (more fissile)		15.0				Bentonite (15.0-16.0m bgl)
			16.0				
17.0	CLAY (CL) low plasticity, brown, light brown to orange-brown, soft, minor hard fragments, wet at 21.0 m		17.0				
			18.0				
			19.0				
			20.0				Class 18, 50mm dia. PVC Screen (17.0-26.0m bgl)
			21.0				
21.5	BASALT (MW) moderately weathered, mottled brown to light brown, hard, dry, moderate to high limonite staining		22.0				Sand Filter (16.0-26.0m bgl)
			23.0				
			24.0				
			25.0				
			26.0				End Cap (26.0m bgl)
27.0	Silty to sandy CLAY (SC), fine grained sand and silt, light brown to red-brown, mostly soft, moist, minor hard fragments (probable Werribee Formation)		27.0				
			28.0				
	EOH at 28.0 m		29.0				
			30.0				
			31.0				
			32.0				
			33.0				
			34.0				

Key:
For explanation of abbreviations and symbols, refer to Cardno Lane Piper UCS or Rock Notes

Enviro GW_Soil_Gas Log 10/10

Notes:
Stick up: -0.16 m

Groundwater Observations:
Minor groundwater encountered at 21.0 m

Borehole Record: **GW106**

Project:	CFA Fiskville Groundwater Assessment	**Position:**	254726.508 E 5825700.149 N	**Date Drilled:**	28 August 2012
Location:	Fiskville, Victoria	**Surface Level:**	441.525 m	**Drill Rig:**	Boart- Longyear DB520
		Top of Casing:	441.438 m	**Drilling Method:**	Solid Auger/ Downhole Hammer
Job No.:	212163.2	**Inclination:**	Vertical	**Logged/Checked:**	DJL/GGS

Depth (m bgl)	Description of Strata	Graphic Log	Depth (m bgl)	Samples	PID (ppm) / Contam Rank	Well Graphic	Remarks
0.0	Silty CLAY (CH) high plasticity, light grey to light brown, soft to firm, moist, basaltic topsoil to 1.0 m, basaltic clay to 2.1 m. Hand auger to 2.1 m		0.0 1.0 2.0				Class 18, 50mm dia. PVC Casing (0.0-18.5m bgl)
2.1	BASALT (SW) slightly weathered, mottled grey-brown, hard, dry, highly vesicular		3.0 4.0 5.0 6.0 7.0				
	5-13: fresh interval, grey to dark grey		8.0 9.0 10.0 11.0 12.0				Grout (0.0-16.5m bgl)
	13-15: minor to moderate limonite staining		13.0 14.0				
	15-17: high limonite content, slaty/fissile texture common		15.0 16.0				
	17-18: very clayey interval, high limonite, common basalt fragments		17.0 18.0				Bentonite (16.5-17.5m bgl)
18.0	CLAY (CL) low plasticity, red-brown, hematitic clay, soft, damp		19.0 20.0				Class 18, 50mm dia. PVC Screen (18.5-24.5m bgl)
20.5	BASALT (MW) 20.5-21.5: moderately weathered, dark brown to red brown, hard, highly altered (hematite), minor vesicles		21.0 22.0				Sand Filter (17.5-24.5m bgl)
	21.5-25.5: brown to dark brown, hard, limonitic alteration, slaty texture common		23.0 24.0 25.0				End Cap (24.5m bgl)
25.5	Sandy CLAY (SC), fine-medium grained sand, light brown to orange-brown, loose to firm, moist (probable Werribee Formation)		26.0 27.0				
	EOH at 27.0 m		28.0 29.0 30.0 31.0 32.0 33.0 34.0				

Key:
For explanation of abbreviations and symbols, refer to Cardno Lane Piper UCS or Rock Notes

Enviro GW_Soil_Gas Log 10/10

Notes:

Groundwater Observations:
No groundwater encountered (dry)

Borehole Record: **GW107**

Project:	CFA Fiskville Groundwater Assessment	**Position:**	254754.207 E 5825581.589 N	**Date Drilled:**	28 August 2012
Location:	Fiskville, Victoria	**Surface Level:**	441.435 m	**Drill Rig:**	Boart- Longyear DB520
		Top of Casing:	441.37 m	**Drilling Method:**	Hand Auger/ Solid Flight Auger
Job No.:	212163.2	**Inclination:**	Vertical	**Logged/Checked:**	DJL/GGS

Depth (m bgl)	Description of Strata	Graphic Log	Depth (m bgl)	Samples	PID (ppm) / Contam Rank	Well Graphic	Remarks
0.0	FILL: rubble includes rock fragments, scoria, plastics, metal, sponge, scoria, clay and sand, loose to firm, moist, wet		0.0				Class 18, 50mm dia. PVC Casing (0.0-0.2m bgl) Grout (0.0-0.1m bgl) Bentonite (0.1-0.2m bgl)
0.9	Silty CLAY (CL) low plasticity, mostly light brown, also red-brown and grey brown, stiff, moist, appears to be basaltic clay		1.0				Class 18, 50mm dia. PVC Screen (0.2-2.7m bgl)
			2.0				Sand Filter (0.2-2.7m bgl)
	Refusal on rock at 2.7 m						End Cap (2.7m bgl)

Key:
For explanation of abbreviations and symbols, refer to Cardno Lane Piper UCS or Rock Notes

Notes:
Stick up: -0.09 m

Groundwater Observations:
Perched groundwater encountered at 0.4 m

Borehole Record: **GW108**

Project:	CFA Fiskville	**Position:**	255205.916 E	**Date Drilled:**	10 September 2012
	Groundwater Assessment		5825605.553 N	**Drill Rig:**	Boart- Longyear DB520
Location:	Fiskville, Victoria	**Surface Level:**	438.861 m	**Drilling Method:**	Hand Auger/Downhole
		Top of Casing:	439.661 m		Hammer/Rotary Mud
Job No.:	212163.2	**Inclination:**	Vertical	**Logged/Checked:**	GGS/DJL

Depth (m bgl)	Description of Strata	Graphic Log	Depth (m bgl)	Samples	PID (ppm) / Contam Rank	Well Graphic	Remarks
0.0	CLAY (CH) high plasticity, mottled brown-grey, stiff, slightly moist		0.0				Class 18, 50mm dia. PVC Casing (0.0-30.0m bgl)
2.2	BASALT (FR) fresh, dark grey, high strength, vesicular						
10.0	BASALT (SW) slightly weathered, brown-dark grey, high strength, some red-brown clay, no vesicles		10.0				Grout (0.0-28.0m bgl)
15.5	CLAY (CH) high plasticity, red-brown, soft, slightly moist, contains weathered basalt fragments						
18.5	BASALT (SW) slightly weathered, high strength, dry. Contains some red clay & amygdales		20.0				
27.3	Sandy, silty CLAY (CH) high plasticity, pink-orange, soft (Werribee Formation)						Bentonite (28.0-29.0m bgl)
29.0	Sandy SILT (ML) low plasticity, yellow, soft. Sand is medium grained, subangular, generally dark coloured		30.0				Sand Filter (29.0-41.0m bgl)
31.5	Sandy SILT (ML) pink-orange, yellow, typically contains fine grained sands, contains numerous sand/gravel units. 31.6-31.8: fine grained GRAVEL 32.2-32.3: fine grained GRAVEL 35.0-36.0: fine SAND 37.8-38.5: coarse SAND 41-41.6: fine grained GRAVEL						Class 18, 50mm dia. PVC Screen (30.0-40.0m bgl) Class 18, 50mm dia. PVC Casing (40.0-41.0m bgl) End Cap (41.0m bgl)
45.0	Clayey SAND (SP) well graded, medium-coarse grained, grey, loose, subrounded		40.0				
46.7	Silty CLAY (CL), dark brown, contains sand units. 49.5-49.6: coarse grained SAND 51.0-54.3: charcoal fragments 54.2-54.3: coarse grained SAND 56.3-56.5: medium grained SAND		50.0				
	EOH at 59.5m		60.0				

Key:
For explanation of abbreviations and symbols, refer to Cardno Lane Piper UCS or Rock Notes

Enviro GW_Soil_Gas Log 10/10

Notes:
-hand auger/solid auger to 2.2m
-air hammer to to 27.3m
-precollar to 27.3m
-rotary mud to 59.5m

Groundwater Observations:
None observed

Borehole Record: **GW109**

Project:	CFA Fiskville	**Position:**	254914.326 E	**Date Drilled:**	5 September 2012
	Groundwater Assessment		5825709.282 N	**Drill Rig:**	Boart- Longyear DB520
Location:	Fiskville, Victoria	**Surface Level:**	440.945 m	**Drilling Method:**	Hand Auger/Downhole
		Top of Casing:	440.859 m		Hammer/Rotary Mud
Job No.:	212163.2	**Inclination:**	Vertical	**Logged/Checked:**	GGS/DJL

Depth (m bgl)	Description of Strata	Graphic Log	Depth (m bgl)	Samples	PID (ppm) / Contam Rank	Well Graphic	Remarks
0.0	FILL: Silty CLAY (CL) medium plasticity, grey-brown, firm, slightly moist, some sand. Contains motlets, trace gravel(reworked natural material)		0.0				Class 18, 50mm dia. PVC Casing (0.0-40.0m bgl)
1.5							
3.1	CLAY (CH) high platicity, grey-brown, very stiff, dry						
8.5	BASALT (FR) fresh, grey-blue, high strength, dry vesicular		10.0				Grout (0.0-37.0m bgl)
9.5	BASALT (MW) moderately weathered, brown-red, medium strength, dry, vesicular, contains red-brown clay, some amygdales						
	BASALT (SW) slightly weathered, grey-blue, high strength, dry, vesicular						
16.5	CLAY (CL) low plasticity, light brown, soft, slightly moist						
18.5	BASALT (SW) slightly weathered, brown-grey, high strength, dry, non-vesicular, some oxidation staining, alteration visible		20.0				
27.3	SAND (SP) poorly graded, fine grained, pink, loose, dry (Werribee Formation)						
28.0	Silty SAND (SP) well graded, fine-medium grained, brown grey to pink, loose		30.0				
30.5	Clayey SILT (ML) low plasticity, white grey, very soft, trace of dark coloured coarse sands						
31.5	Clayey SILT (ML) low plasticity, light grey-white, trace of sand. 31.5-37.5: medium grained SAND						Bentonite (37.0-39.0m bgl)
40.0	Silty SAND (SP), medium grained, poorly sorted, grey. 45.7: drilling fluid changes to red-brown		40.0				Class 18, 50mm dia. PVC Screen (40.0-46.0m bgl)
46.3	Sandy SILT (ML) low plasticity, yellow brown						Class 18, 50mm dia. PVC Casing (46.0-47.0m bgl)
47.5	46.7: colour change to red-brown 46.8: medium grained SAND		50.0				Sand Filter (39.5-47.0m bgl)
	Sandy CLAY (CL) low plasticity, dark brown, very soft sand, minor charcoal present (less than 15%)						End Cap (47.0m bgl)
	EOH at 49.5m		60.0				

Key:
For explanation of abbreviations and symbols, refer to Cardno Lane Piper UCS or Rock Notes

Enviro GW_Soil_Gas Log 10/10

Notes:
-hand auger/solid auger to 3.1m
downhole hammer to 27.3m
-precollar to 27.3m
-rotary mud to 49.5m

Groundwater Observations:
None observed

Borehole Record: **GW110**

Project:	CFA Fiskville Groundwater Assessment	**Position:**	254877.995 E 5825667.366 N	**Date Drilled:**	11 September 2012
Location:	Fiskville, Victoria	**Surface Level:**	440.832 m	**Drill Rig:**	Boart- Longyear DB520
		Top of Casing:	440.746 m	**Drilling Method:**	Hand Auger/ Solid Flight Auger
Job No.:	212163.2	**Inclination:**	Vertical	**Logged/Checked:**	GGS/DJL

Depth (m bgl)	Description of Strata	Graphic Log	Depth (m bgl)	Samples	PID (ppm) / Contam Rank	Well Graphic	Remarks
0.0	FILL: Gravelly, clayey SAND (SW) well graded, brown, loose-medium dense, contains red scoria gravel. 0.4: water encountered		0.0				Class 18, 50mm dia. PVC Casing (0.0-0.3m bgl) Grout (0.0-0.15m bgl) Bentonite (0.15-0.3m bgl) Class 18, 50mm dia. PVC Screen (0.3-2.9m bgl) Sand Filter (0.3-2.9m bgl)
0.6	Clayey SILT (ML) medium plasticity, dark grey, very soft, moist, contains trace pisolite nodules						
1.0	Silty CLAY (CH) high plasticity, mottled grey-brown-orange, stiff, slightly moist; contains iron-rich pisolite nodules		1.0				
			2.0				
	Refusal on rock at 2.9m		3.0				End Cap (2.9m bgl)
			4.0				

Key:
For explanation of abbreviations and symbols, refer to Cardno Lane Piper UCS or Rock Notes

Enviro GW_Soil_Gas Log 10/10

Notes:
No odour, no staining observed
-hand auger to 0.6m
-solid auger to 2.9m

Groundwater Observations:
Encountered at 0.4 m bgl

Borehole Record: **GW111**

Project:	CFA Fiskville Groundwater Assessment	**Position:**	254862.124 E 5825470.457 N	**Date Drilled:**	11 September 2012
Location:	Fiskville, Victoria	**Surface Level:**	441.054 m	**Drill Rig:**	Boart- Longyear DB520
		Top of Casing:	440.975 m	**Drilling Method:**	Hand Auger/ Solid Flight Auger
Job No.:	212163.2	**Inclination:**	Vertical	**Logged/Checked:**	GGS/DJL

Depth (m bgl)	Description of Strata	Graphic Log	Depth (m bgl)	Samples	PID (ppm) / Contam Rank	Well Graphic	Remarks
0.0	Gravelly CLAY (CH) high plasticity, dark red, soft, slightly moist, gravel is crushed rock 0.4: Increased moisture		0.0 1.0 2.0				Class 18, 50mm dia. PVC Casing (0.0-0.3m bgl) Grout (0.0-0.2m bgl) Bentonite (0.2-0.3m bgl) Class 18, 50mm dia. PVC Screen (0.3-4.5m bgl) Sand Filter (0.3-4.5m bgl)
2.5	Silty CLAY (CH) high plasticity, mottled grey-brown, firm, slightly moist, trace pisolite nodules		3.0 4.0				
	Refusal on rock at 4.5m						End Cap (4.5m bgl)

Key:
For explanation of abbreviations and symbols, refer to Cardno Lane Piper UCS or Rock Notes

Notes:
No odour, no staining observed

Groundwater Observations:
No groundwater encountered

Unified Classification System (Environmental)

(in accordance with AS1726)

PARTICLE SIZES

TERM	SIZE (mm)
BOULDER	>200
COBBLE	60 to 200
GRAVEL	
Coarse	20 to 60
Medium	6 to 20
Fine	2 to 6
SAND	
Coarse	0.6 to 2
Medium	0.2 to 0.6
Fine	0.06 to 0.2
SILT	0.002 to 0.06
CLAY	< 0.002

COHESIVE SOILS

TERM	UNDRAINED SHEAR STRENGTH (kPa)
Very Soft	0 to 12.5
Soft	12.5 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	≥ 200

COHESIONLESS SOILS

TERM	'N' (SPT) VALUE (blows / 300mm)	RELATIVE DENSITY (%)	ANGLE SHEAR RESISTANCE (degrees)
Very Loose	0 to 4	< 15	25 to 30
Loose	4 to 10	15 to 35	27 to 32
Medium Dense	10 to 30	35 to 65	30 to 35
Dense	30 to 50	65 to 85	35 to 40
Very Dense	> 50	≥ 85	38 to 43

STRUCTURE

TERM	SIZE OF BLOCKS (mm)
Blocky	> 60
Cloddy	20 to 60
Nutty	6 to 20
Granular	0.6 to 6
Prismatic	Stated
Shattered	< 10

SAMPLES

BS = Bulk sample
D = Disturbed sample
$U_{(n)}$ = Undisturbed tube sample ('n' denotes internal dia in mm)
BH3/1.0 = Environmental Soil Sample (Borehole No./Depth)
■ = Undisturbed tube recovery
▨ = Undisturbed tube non-recovery
H = Headspace vial

CONTAMINATION RANKING

V = Visual evidence of contamination
O = Olfactory evidence of contamination

0 = No odour or visual evidence of contamination
1 = Slight odour or visual evidence of contamination
2 = Odour or visual evidence of contamination
3 = Obvious visual evidence/strong odour of contamination

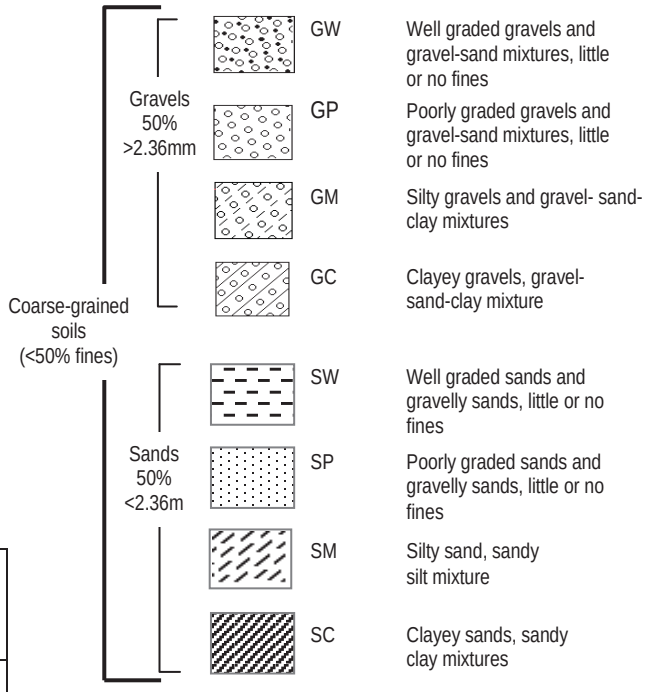
FIELD EQUIPMENT

PID = Photo ionization detector
CGD = Combustible gas detector

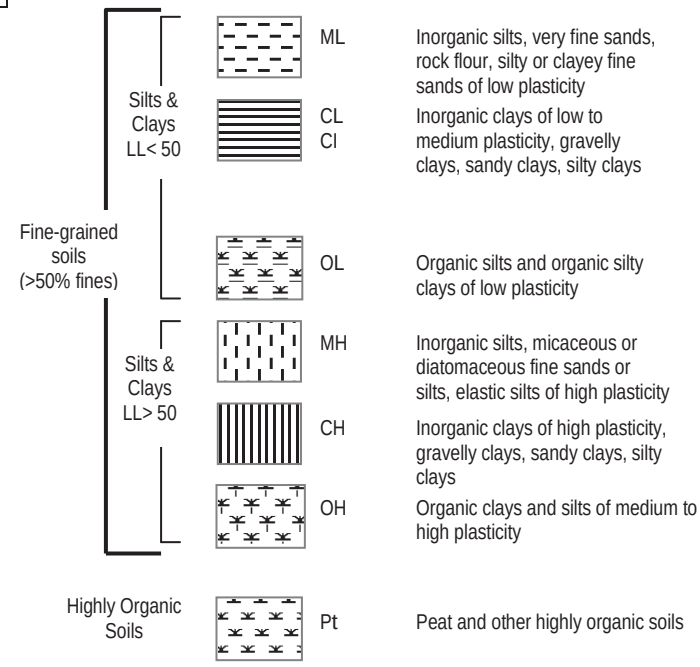
IDENTIFICATION OF SOILS

FILL

COARSE GRAINED SOILS



FINE GRAINED SOILS



GROUNDWATER

GW = Groundwater depth (m) or level (RL)
bgl = Below ground level
swl = Standing water level

TABLE C-1: BORE CONSTRUCTION DETAILS

Bore ID	GW101	GW102	GW103
Bore Location	North-east corner of site	North-west part of site	Central west boundary
Easting	255454.308	254526.104	254043.809
Northing	5826176.965	5826117.924	5825894.15
MGA Zone	55	55	55
RL GL (m AHD)	438.165	441.547	446.233
RL ToC (m AHD)	438.848	442.225	446.785
RL top protective casing (m AHD)	438.952	442.320	446.901
Survey Date	27/08/2012	27/08/2012	27/08/2012
Survey by	Think Spatial	Think Spatial	Think Spatial
Registered Bore No.	WRK070670	WRK070671	WRK070672
Date Drilled	22/08/2012	23/08/2012	24/08/2012
Designed/supervised by - Company	Cardno Lane Piper	Cardno Lane Piper	Cardno Lane Piper
Designed/supervised by - Name	DJ Louwrens	DJ Louwrens	DJ Louwrens
Drilling Company	South West Drilling	South West Drilling	South West Drilling
Driller Name	Phil Maule	Phil Maule	Phil Maule
Method	DHH	DHH	DHH
Aquifer Unit	Basalt	Basalt	Basalt
Drilled Depth (m)	18.0	25.0	31.5
Screen Top (m bgl)	12.0	17.5	23.0
Screen Bottom (m bgl)	18.0	23.5	29.0
Screen Type	Factory slotted (0.4 mm)	Factory slotted (0.4 mm)	Factory slotted (0.4 mm)
Collar Cement Grout (to m bgl)	10.0	15.5	21.0
Bentonite Seal - Top (m bgl)	10.0	15.5	21.0
Bentonite Seal - Bottom (m bgl)	11.0	16.5	22.0
Filter Pack - Top (m bgl)	11.0	16.5	22.0
Filter Pack - Bottom (m bgl)	18.0	23.5	29.0
Filter Pack Material	8/16 Graded sand	8/16 Graded sand	8/16 Graded sand
Casing & Screen Spec	50 mm uPVC (Class18)	50 mm uPVC (Class18)	50 mm uPVC (Class18)
PVC Casing Stick-up (m agl)	0.683	0.678	0.552
Protective Cover Type	Monument stand pipe	Monument stand pipe	Monument stand pipe
Bore Development Date	28/08/2012	-	-
Development Method	Airlift	-	-
Estimated Volume Removed (litre)	50	-	-
Developed Groundwater Description	Turbid (light brown)	-	-
Potential Contamination Observations	None	-	-
SWL (m bTOC)	10.14	Dry	28.65
SWL (m bgl)	9.46	Dry	28.10
SWL Date	28/08/2012	28/08/2012	28/08/2012

TABLE C-1: BORE CONSTRUCTION DETAILS

Bore ID	GW104	GW105	GW106
Bore Location	Central-east of site	Props Area	Fuel ASTs
Easting	255205.957	254739.620	254726.508
Northing	5825603.34	5825754.738	5825700.149
MGA Zone	55	55	55
RL GL (m AHD)	438.885	441.775	441.525
RL ToC (m AHD)	439.609	441.639	441.438
RL top protective casing (m AHD)	439.691	441.802	441.564
Survey Date	20/09/2012	20/09/2012	20/09/2012
Survey by	Think Spatial	Think Spatial	Think Spatial
Registered Bore No.	WRK070673	WRK070674	WRK070675
Date Drilled	24/08/2012	27/08/2012	28/08/2012
Designed/supervised by - Company	Cardno Lane Piper	Cardno Lane Piper	Cardno Lane Piper
Designed/supervised by - Name	DJ Louwrens	DJ Louwrens	DJ Louwrens
Drilling Company	South West Drilling	South West Drilling	South West Drilling
Driller Name	Phil Maule	Phil Maule	Phil Maule
Method	Downhole Hammer	Downhole Hammer	Downhole Hammer
Aquifer Unit	Basalt	Basalt	Basalt
Drilled Depth (m)	29.0	28.0	27.0
Screen Top (m bgl)	14.0	17.0	18.5
Screen Bottom (m bgl)	26.0	26.0	24.5
Screen Type	Factory slotted (0.4mm)	Factory slotted (0.4mm)	Factory slotted (0.4mm)
Collar Cement Grout (to m bgl)	12.0	15.0	16.5
Bentonite Seal - Top (m bgl)	12.0	15.0	16.5
Bentonite Seal - Bottom (m bgl)	13.0	16.0	17.5
Filter Pack - Top (m bgl)	13.0	16.0	17.5
Filter Pack - Bottom (m bgl)	29.0	26.0	24.5
Filter Pack Material	8/16 Graded sand	8/16 Graded sand	8/16 Graded sand
Casing & Screen Spec	50 mm uPVC (Class18)	50 mm uPVC (Class18)	50 mm uPVC (Class18)
PVC Casing Stick-up (m agl)	0.724	-0.136	-0.087
Protective Cover Type	Monument stand pipe	Flush-mounted gatic	Flush-mounted gatic
Bore Development Date	-	-	-
Development Method	-	-	-
Estimated Volume Removed (litre)	-	-	-
Developed Groundwater Description	-	-	-
Potential Contamination Observations	-	-	-
SWL (m bTOC)	Dry	25.07	Dry
SWL (m bgl)	Dry	25.23	Dry
SWL Date	28/08/2012	28/08/2012	-

TABLE C-1: BORE CONSTRUCTION DETAILS

Bore ID	GW107	GW108	GW109
Bore Location	Service Station Prop	Central East of Site	East of FL PAD
Easting	254754.207	255205.916	254914.326
Northing	5825581.589	5825605.553	5825709.282
AMG Zone	55	55	55
RL GL (m AHD)	441.435	438.861	440.945
RL TOC (m AHD)	441.37	439.661	440.859
RL top protective casing (m AHD)	441.456	439.823	440.972
Survey Date	20/09/2012	20/09/2012	20/09/2012
Survey by	Think Spatial	Think Spatial	Think Spatial
Registered Bore No.	WRK070676	WRK070677	WRK070678
Date Drilled	28/08/2012	11/09/2012	5/09/2012
Designed/supervised by - Company	Cardno Lane Piper	Cardno Lane Piper	Cardno Lane Piper
Designed/supervised by - Name	DJ Louwrens	DJ Louwrens	DJ Louwrens
Drilling Company	South West Drilling	South West Drilling	South West Drilling
Driller Name	Phil Maule	Jason Morrison	Jason Morrison
Method	Hand-auger	Downhole Hammer/ Rotary Mud	Downhole Hammer/ Rotary Mud
Aquifer Unit	Clay / Fill	Sand / Silt	Sand / Silt
Drilled Depth (m)	2.7	59.5	49.5
Screen Top (m bgl)	0.2	30	40
Screen Bottom (m bgl)	2.7	40	46
Screen Type	Factory slotted (0.4mm)	Factory slotted (0.4mm)	Factory slotted (0.4mm)
Collar Cement Grout (to m bgl)	0.1	28	37
Bentonite Seal - Top (m bgl)	0.1	28	37
Bentonite Seal - Bottom (m bgl)	0.2	29	39
Filter Pack - Top (m bgl)	0.2	29	39
Filter Pack - Bottom (m bgl)	2.7	41	47
Filter Pack Material	8/16 Graded sand	8/16 Graded sand	8/16 Graded sand
Casing & Screen Spec	50 mm uPVC (Class18)	50 mm uPVC (Class18)	50 mm uPVC (Class18)
PVC Casing Stick-up (m agl)	-0.065	0.800	-0.086
Protective Cover Type	Flush-mounted gatic	Monument stand pipe	Flush-mounted gatic
Bore Development Date	28/08/2012	-	-
Development Method	Bailer	-	-
Estimated Volume Removed (litre)	24	-	-
Developed Groundwater Description	Turbid; light brown	-	-
Potential Contamination Observations	None	-	-
SWL (m bTOC)	0.49	40.935	46.705
SWL (m bgl)	0.40	40.135	46.791
SWL Date	28/08/2012	20/09/12	20/09/12

TABLE C-1: BORE CONSTRUCTION DETAILS

Bore ID	GW110	GW111
Bore Location	South of FL PAD	South-east of Dam 2
Easting	254877.995	254862.124
Northing	5825667.366	5825470.457
AMG Zone	55	55
RL GL (m AHD)	440.832	441.054
RL TOC (m AHD)	440.746	440.975
RL top protective casing (m AHD)	440.843	441.069
Survey Date	20/09/2012	20/09/2012
Survey by	Think Spatial	Think Spatial
Registered Bore No.	WRK070679	WRK070680
Date Drilled	11/09/2012	11/09/2012
Designed/supervised by - Company	Cardno Lane Piper	Cardno Lane Piper
Designed/supervised by - Name	DJ Louwrens	DJ Louwrens
Drilling Company	South Western Drilling	South Western Drilling
Driller Name	Jason Morrison	Jason Morrison
Method	Hand-auger/ Solid Auger	Hand-auger/ Solid Auger
Aquifer Unit	Basalt	Basalt
Drilled Depth (m)	2.7	2.7
Screen Top (m bgl)	0.2	0.2
Screen Bottom (m bgl)	2.7	2.7
Screen Type	Factory slotted (0.4mm)	Factory slotted (0.4mm)
Collar Cement Grout (to m bgl)	0.1	0.1
Bentonite Seal - Top (m bgl)	0.1	0.1
Bentonite Seal - Bottom (m bgl)	0.2	0.2
Filter Pack - Top (m bgl)	0.2	0.2
Filter Pack - Bottom (m bgl)	2.7	2.7
Filter Pack Material	8/16 Graded sand	8/16 Graded sand
Casing & Screen Spec	50 mm uPVC (Class18)	50 mm uPVC (Class18)
PVC Casing Stick-up (m agl)	-0.086	-0.079
Protective Cover Type	Flush-mounted gatic	Flush-mounted gatic
Bore Development Date	-	-
Development Method	-	-
Estimated Volume Removed (litre)	-	-
Developed Groundwater Description	-	-
Potential Contamination Observations	-	-
SWL (m bTOC)	0.49	3.985
SWL (m bgl)	0.40	4.064
SWL Date	11/09/2012	20/09/2012

TABLE C-1: BORE CONSTRUCTION DETAILS

Bore ID	BH3	BH4	BH5
Bore Location	Near South-west corner	Near central-north boundary	Near central-north boundary
Easting	254085.093	254761.039	254761.134
Northing	5825436.43	5826135.196	5826137.568
MGA Zone	55	55	55
RL GL (m AHD)	440.096	442.72	442.74703
RL ToC (m AHD)	440.524	443.168	443.15386
RL top protective casing (m AHD)	440.642	443.267	443.26224
Survey Date	20/09/2012	20/09/2012	20/09/2012
Survey by	Think Spatial	Think Spatial	Think Spatial
Registered Bore No.	Not known	Not known	Not known
Date Drilled	9/09/1996	10/09/1996	11/09/1996
Designed/supervised by - Company	Coffey	Coffey	Coffey
Designed/supervised by - Name	Not known	Not known	Not known
Drilling Company	Not known	Not known	Not known
Driller Name	Not known	Not known	Not known
Method	DHH	DHH	Hand-auger
Aquifer Unit	Basalt	Basalt	Clay
Drilled Depth (m)	21.0	20.0	1.8
Screen Top (m bgl)	15.0	14.0	0.8
Screen Bottom (m bgl)	21.0	20.0	1.8
Screen Type	Factory slotted (0.3mm)	Factory slotted (0.3mm)	Factory slotted (0.3mm)
Collar Cement Grout (to m bgl)	11.7 (backfill)	4.6 (backfill)	0.2
Bentonite Seal - Top (m bgl)	11.7	4.6	0.2
Bentonite Seal - Bottom (m bgl)	12.1	5.3	0.4
Filter Pack - Top (m bgl)	12.1	5.3	0.4
Filter Pack - Bottom (m bgl)	21.0	20.0	1.8
Filter Pack Material	8/16 Graded sand	8/16 Graded sand	8/16 Graded sand
Casing & Screen Spec	50 mm uPVC (Class18)	50 mm uPVC (Class18)	50 mm uPVC (Class18)
PVC Casing Stick-up (m agl)	0.428	0.448	0.407
Protective Cover Type	Monument stand pipe	Monument stand pipe	Monument stand pipe
Bore Development Date	-	-	-
Development Method	-	-	-
Estimated Volume Removed (litre)	-	-	-
Developed Groundwater Description	-	-	-
Potential Contamination Observations	-	-	-
SWL (m bTOC)	20.78	18.87	1.31
SWL (m bgl)	20.35	18.42	0.903
SWL Date	28/08/2012	28/08/2012	20/09/12

AMC Bio-Vis Xtra

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
AMC Bio-Vis Xtra

PRODUCT USE
Drilling fluids compound; drilling viscosifier.

SUPPLIER

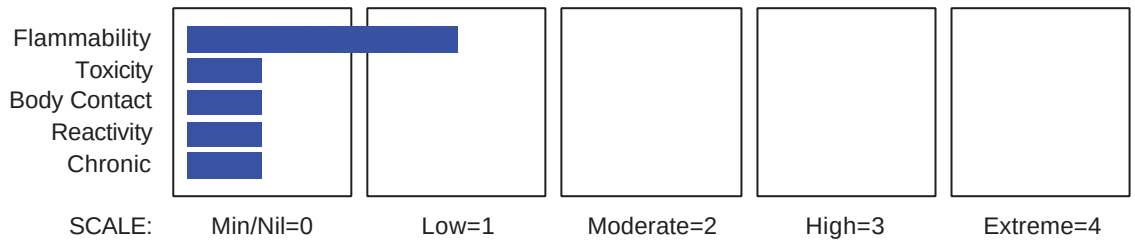
Company: AMC
Address:
PO Box 1141
Osborne Park
WA, 6916
Australia
Telephone: + 61 8 9445 4000
Emergency Tel:**Australia - 1800 039 008 or +613 9573 3112**
Emergency Tel:**International - +800 24 36 22 55 or +613 9573 3112 if the Toll Free number is not supported in your country**
Fax: +61 8 9445 4040

Company: AMC
Address:
5 Pitino Court
Osborne Park
WA, 6017
Australia
Telephone: +61 8 9445 4000
Emergency Tel:Australia - 1800 039 008 or +61 3 9573 3112
Emergency Tel: International - +800 24 36 22 55 or +61 3 9573 3112 if Toll Free number is not supported in your country
Fax: +61 8 9445 4040

Section 2 - HAZARDS IDENTIFICATION

STATEMENT OF HAZARDOUS NATURE
NON-HAZARDOUS SUBSTANCE. NON-DANGEROUS GOODS. According to NOHSC Criteria, and ADG Code.

CHEMWATCH HAZARD RATINGS



RISK
•None under normal operating conditions.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
polysaccharide polymers blend		100

continued...

Section 4 - FIRST AID MEASURES

SWALLOWED
• If swallowed do NOT induce vomiting.
• If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
• Observe the patient carefully.
• Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.

EYE
■ If this product comes in contact with the eyes:
• Wash out immediately with fresh running water.
• Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
• Seek medical attention without delay; if pain persists or recurs seek medical attention.
• Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN
■ If skin or hair contact occurs:
• Flush skin and hair with running water (and soap if available).
• Seek medical attention in event of irritation.

INHALED
• If dust is inhaled, remove from contaminated area.
• Encourage patient to blow nose to ensure clear passage of breathing.
• If irritation or discomfort persists seek medical attention.

NOTES TO PHYSICIAN
Treat symptomatically.

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA
• There is no restriction on the type of extinguisher which may be used.
• Use extinguishing media suitable for surrounding area.

FIRE FIGHTING
• Alert Fire Brigade and tell them location and nature of hazard.
• Wear breathing apparatus plus protective gloves in the event of a fire.
• Prevent, by any means available, spillage from entering drains or water courses.
• Use fire fighting procedures suitable for surrounding area.

FIRE/EXPLOSION HAZARD
• Solid which exhibits difficult combustion or is difficult to ignite.
• Avoid generating dust, particularly clouds of dust in a confined or unventilated space as dusts may form an explosive mixture with air, and any source of ignition, i.e. flame or spark, will cause fire or explosion.
• Dust clouds generated by the fine grinding of the solid are a particular hazard; accumulations of fine dust (420 micron or less) may burn rapidly and fiercely if ignited; once initiated larger particles up to 1400 microns diameter will contribute to the propagation of an explosion.
• A dust explosion may release of large quantities of gaseous products; this in turn creates a subsequent pressure rise of explosive force capable of damaging plant and buildings and injuring people.

FIRE INCOMPATIBILITY
• Avoid reaction with oxidising agents.

HAZCHEM
None

continued...

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS
• Clean up all spills immediately.
• Avoid contact with skin and eyes.
• Wear impervious gloves and safety glasses.
• Use dry clean up procedures and avoid generating dust.
Slippery when wet.

MAJOR SPILLS
• Clear area of personnel and move upwind.
• Alert Fire Brigade and tell them location and nature of hazard.
• Control personal contact with the substance, by using protective equipment and dust respirator.
• Prevent spillage from entering drains, sewers or water courses.
Slippery when wet.

Personal Protective Equipment advice is contained in Section 8 of the MSDS.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING
• Limit all unnecessary personal contact.
• Wear protective clothing when risk of exposure occurs.
• Use in a well-ventilated area.
• Avoid contact with incompatible materials.

SUITABLE CONTAINER
Multi-ply paper bag with sealed plastic liner or heavy gauge plastic bag.

NOTE: Bags should be stacked, blocked, interlocked, and limited in height so that they are stable and secure against sliding or collapse.
• Lined metal can, lined metal pail/ can.
• Plastic pail.
• Polyliner drum.
• Packing as recommended by manufacturer.

STORAGE INCOMPATIBILITY
Avoid contamination of water, foodstuffs, feed or seed.
• Avoid reaction with oxidising agents.

STORAGE REQUIREMENTS
• Store in original containers.
• Keep containers securely sealed.
• Store in a cool, dry, well-ventilated area.
• Store away from incompatible materials and foodstuff containers.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

MATERIAL DATA
AMC BIO-VIS XTRA:
Not available

PERSONAL PROTECTION

continued...

RESPIRATOR
•Particulate. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

EYE
• Safety glasses with side shields
• Chemical goggles.
• Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent].

HANDS/FEET
■ The selection of the suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Where the chemical is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.
The exact break through time for substances has to be obtained from the manufacturer of the protective gloves and has to be observed when making a final choice.
Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include:.
Experience indicates that the following polymers are suitable as glove materials for protection against undissolved, dry solids, where abrasive particles are not present.
• polychloroprene
• nitrile rubber
• butyl rubber
• fluorocaoutchouc.

OTHER
■ No special equipment needed when handling small quantities.
OTHERWISE:
• Overalls.
• Barrier cream.
• Eyewash unit.

ENGINEERING CONTROLS
■ Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.
The basic types of engineering controls are:
Process controls which involve changing the way a job activity or process is done to reduce the risk.
Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE
Cream coloured odourless powder; partly soluble in water.

PHYSICAL PROPERTIES

State	Divided Solid	Molecular Weight	Not Applicable
Melting Range (°C)	Not Available	Viscosity	Not Applicable
Boiling Range (°C)	Not Applicable	Solubility in water (g/L)	Partly Miscible
Flash Point (°C)	Not Applicable	pH (1% solution)	Not Available
Decomposition Temp (°C)	Not Available	pH (as supplied)	Not Applicable
Autoignition Temp (°C)	Not Available	Vapour Pressure (kPa)	Not Applicable

continued...

Upper Explosive Limit (%)	Not Available	Specific Gravity (water=1)	1.55- 1.60
Lower Explosive Limit (%)	Not Available	Relative Vapour Density (air=1)	Not Applicable
Volatile Component (%vol)	Not Available	Evaporation Rate	Not Applicable

Section 10 - STABILITY AND REACTIVITY

CONDITIONS CONTRIBUTING TO INSTABILITY
■ Product is considered stable and hazardous polymerisation will not occur.
For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED
■ The material has NOT been classified by EC Directives or other classification systems as "harmful by ingestion". This is because of the lack of corroborating animal or human evidence. The material may still be damaging to the health of the individual, following ingestion, especially where pre-existing organ (eg. liver, kidney) damage is evident. Present definitions of harmful or toxic substances are generally based on doses producing mortality rather than those producing morbidity (disease, ill-health). Gastrointestinal tract discomfort may produce nausea and vomiting. In an occupational setting however, ingestion of insignificant quantities is not thought to be cause for concern.

EYE
■ Although the material is not thought to be an irritant (as classified by EC Directives), direct contact with the eye may cause transient discomfort characterised by tearing or conjunctival redness (as with windburn). Slight abrasive damage may also result. The material may produce foreign body irritation in certain individuals.

SKIN
■ The material is not thought to produce adverse health effects or skin irritation following contact (as classified by EC Directives using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.

INHALED
■ The material is not thought to produce adverse health effects or irritation of the respiratory tract (as classified by EC Directives using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable control measures be used in an occupational setting.

CHRONIC HEALTH EFFECTS
■ Principal routes of exposure are by accidental skin and eye contact and inhalation of generated dusts.
Long-term exposure to the product is not thought to produce chronic effects adverse to the health (as classified by EC Directives using animal models); nevertheless exposure by all routes should be minimised as a matter of course.

TOXICITY AND IRRITATION
■ Not available. Refer to individual constituents.

Section 12 - ECOLOGICAL INFORMATION

No data
May be harmful to fauna if not disposed of according to Section 13 and legislative requirements. [AMC]

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility

continued...

AMC Bio- Vis Xtra	No Data Available	No Data Available	No Data Available	No Data Available

Section 13 - DISPOSAL CONSIDERATIONS

- Recycle wherever possible or consult manufacturer for recycling options.
- Consult State Land Waste Management Authority for disposal.
- Bury residue in an authorised landfill.
- Recycle containers if possible, or dispose of in an authorised landfill.

Section 14 - TRANSPORTATION INFORMATION

HAZCHEM:
None (ADG7)

NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS: UN, IATA, IMDG

Section 15 - REGULATORY INFORMATION

POISONS SCHEDULE
None

REGULATIONS

No data for AMC Bio-Vis Xtra (CW: 7176-83)

Section 16 - OTHER INFORMATION

■ Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.
A list of reference resources used to assist the committee may be found at:
www.chemwatch.net/references.

■ The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings.

Issue Date: 29-Aug-2012
Print Date: 10-Jan-2013

This is the end of the MSDS.

Works Licence ID:

WLE055602

Printed on: 15 Aug 2012 9:01:38 am

COPY OF RECORD IN THE VICTORIAN WATER REGISTER

LICENCE TO CONSTRUCT WORKS

under Section 67 of the Water Act 1989

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This licence authorises its holders to construct the described works, subject to the conditions.

Licence Holder(s)

COUNTRY FIRE AUTHORITY of 8 LAKESIDE DR BURWOOD EAST VIC 3151

Licence Contact Details

COUNTRY FIRE AUTHORITY	8 LAKESIDE DR BURWOOD EAST VIC 3151

Licence Details

Expiry date	13 Aug 2013
Status	Active
Authority	Southern Rural Water
Name of waterway or aquifer	UNC-Unincorporated
Water system	Unincorporated (GMU)

Summary of Licensed Works

The details in this section are a summary only. They are subject to the conditions specified in this licence.

Works ID	*Works type*	*Use of water*
WRK070670	Bore	Observation or investigation
WRK070671	Bore	Observation or investigation
WRK070672	Bore	Observation or investigation
WRK070673	Bore	Observation or investigation
WRK070674	Bore	Observation or investigation
WRK070675	Bore	Observation or investigation
WRK070676	Bore	Observation or investigation
WRK070677	Bore	Observation or investigation
WRK070678	Bore	Observation or investigation
WRK070679	Bore	Observation or investigation
WRK070680	Bore	Observation or investigation
WRK070681	Bore	Observation or investigation
WRK070682	Bore	Observation or investigation
WRK070683	Bore	Observation or investigation
WRK070684	Bore	Observation or investigation
WRK070685	Bore	Observation or investigation
WRK070686	Bore	Observation or investigation

Description of Licensed Works

WORKS ID WRK070670

Works type	Bore
Works subtype	Drilled bore
Maximum depth	100.000 metres

Extraction Details

Use of water	Observation or investigation

Works location

Easting	*Northing*	*Zone MGA*
Nil		

Land description

Volume 9503 Folio 693
Lot 1 of Plan TP845669K

Property address

4549 GEELONG - BALLAN ROAD, FISKVILLE, VIC 3342

Description of Licensed Works

WORKS ID WRK070671

Works type	Bore
Works subtype	Drilled bore
Maximum depth	100.000 metres

Extraction Details

Use of water Observation or investigation

Works location

Easting	*Northing*	*Zone MGA*
Nil		

Land description

Volume 9503 Folio 693
Lot 1 of Plan TP845669K

Property address

4549 GEELONG - BALLAN ROAD, FISKVILLE, VIC 3342

Description of Licensed Works

WORKS ID WRK070672

Works type Bore
Works subtype Drilled bore
Maximum depth 100.000 metres

Extraction Details

Use of water Observation or investigation

Works location

Easting	*Northing*	*Zone MGA*
Nil		

Land description

Volume 9503 Folio 693
Lot 1 of Plan TP845669K

Property address

4549 GEELONG - BALLAN ROAD, FISKVILLE, VIC 3342

Description of Licensed Works

WORKS ID WRK070673

Works type Bore
Works subtype Drilled bore
Maximum depth 100.000 metres

Extraction Details

Use of water Observation or investigation

Works location

Easting	*Northing*	*Zone MGA*
Nil		

Land description
Volume 9503 Folio 693
Lot 1 of Plan TP845669K

Property address
4549 GEELONG - BALLAN ROAD, FISKVILLE, VIC 3342

Description of Licensed Works

WORKS ID WRK070674

Works type	Bore
Works subtype	Drilled bore
Maximum depth	100.000 metres

Extraction Details

Use of water	Observation or investigation

Works location

Easting	*Northing*	*Zone MGA*
Nil		

Land description
Volume 9503 Folio 693
Lot 1 of Plan TP845669K

Property address
4549 GEELONG - BALLAN ROAD, FISKVILLE, VIC 3342

Description of Licensed Works

WORKS ID WRK070675

Works type	Bore
Works subtype	Drilled bore
Maximum depth	100.000 metres

Extraction Details

Use of water	Observation or investigation

Works location

Easting	*Northing*	*Zone MGA*
Nil		

Land description
Volume 9503 Folio 693
Lot 2 of Plan TP845669K

Property address

4549 GEELONG - BALLAN ROAD, FISKVILLE, VIC 3342

Description of Licensed Works

WORKS ID WRK070676

Works type	Bore
Works subtype	Drilled bore
Maximum depth	100.000 metres

Extraction Details

Use of water	Observation or investigation

Works location

Easting	*Northing*	*Zone MGA*
Nil		

Land description

Volume 9503 Folio 693
Lot 2 of Plan TP845669K

Property address

4549 GEELONG - BALLAN ROAD, FISKVILLE, VIC 3342

Description of Licensed Works

WORKS ID WRK070677

Works type	Bore
Works subtype	Drilled bore
Maximum depth	100.000 metres

Extraction Details

Use of water	Observation or investigation

Works location

Easting	*Northing*	*Zone MGA*
Nil		

Land description

Volume 9503 Folio 693
Lot 2 of Plan TP845669K

Property address

4549 GEELONG - BALLAN ROAD, FISKVILLE, VIC 3342

Description of Licensed Works

WORKS ID WRK070678

Works type	Bore
Works subtype	Drilled bore
Maximum depth	100.000 metres

Extraction Details

Use of water	Observation or investigation

Works location

Easting	*Northing*	*Zone MGA*
Nil		

Land description

Volume 9503 Folio 693
Lot 2 of Plan TP845669K

Property address

4549 GEELONG - BALLAN ROAD, FISKVILLE, VIC 3342

Description of Licensed Works

WORKS ID WRK070679

Works type	Bore
Works subtype	Drilled bore
Maximum depth	100.000 metres

Extraction Details

Use of water	Observation or investigation

Works location

Easting	*Northing*	*Zone MGA*
Nil		

Land description

Volume 9503 Folio 693
Lot 3 of Plan TP845669K

Property address

4549 GEELONG - BALLAN ROAD, FISKVILLE, VIC 3342

Description of Licensed Works

WORKS ID WRK070680

Works type	Bore
Works subtype	Drilled bore
Maximum depth	100.000 metres

Extraction Details

Use of water	Observation or investigation

Works location

Easting	*Northing*	*Zone MGA*
Nil		

Land description
Volume 9503 Folio 693
Lot 3 of Plan TP845669K

Property address
4549 GEELONG - BALLAN ROAD, FISKVILLE, VIC 3342

Description of Licensed Works

WORKS ID WRK070681

Works type	Bore
Works subtype	Drilled bore
Maximum depth	100.000 metres

Extraction Details

Use of water	Observation or investigation

Works location

Easting	*Northing*	*Zone MGA*
Nil		

Land description
Volume 9503 Folio 693
Lot 3 of Plan TP845669K

Property address
4549 GEELONG - BALLAN ROAD, FISKVILLE, VIC 3342

Description of Licensed Works

WORKS ID WRK070682

Works type	Bore
Works subtype	Drilled bore
Maximum depth	100.000 metres

Extraction Details

Use of water	Observation or investigation

Works location

Easting	*Northing*	*Zone MGA*
Nil		

Land description
Volume 9503 Folio 693
Lot 3 of Plan TP845669K

Property address
4549 GEELONG - BALLAN ROAD, FISKVILLE, VIC 3342

Description of Licensed Works

WORKS ID WRK070683

Works type	Bore
Works subtype	Drilled bore
Maximum depth	100.000 metres

Extraction Details

Use of water	Observation or investigation

Works location

Easting	*Northing*	*Zone MGA*
Nil		

Land description
Volume 9503 Folio 693
Lot 4 of Plan TP845669K

Property address
4549 GEELONG - BALLAN ROAD, FISKVILLE, VIC 3342

Description of Licensed Works

WORKS ID WRK070684

Works type	Bore
Works subtype	Drilled bore
Maximum depth	100.000 metres

Extraction Details

Use of water	Observation or investigation

Works location

Easting	*Northing*	*Zone MGA*
Nil		

Land description
Volume 9503 Folio 693
Lot 4 of Plan TP845669K

Property address
4549 GEELONG - BALLAN ROAD, FISKVILLE, VIC 3342

Description of Licensed Works

WORKS ID WRK070685

Works type	Bore
Works subtype	Drilled bore
Maximum depth	100.000 metres

Extraction Details

Use of water	Observation or investigation

Works location

Easting	*Northing*	*Zone MGA*
Nil		

Land description
Volume 9503 Folio 693
Lot 4 of Plan TP845669K

Property address
4549 GEELONG - BALLAN ROAD, FISKVILLE, VIC 3342

Description of Licensed Works

WORKS ID WRK070686

Works type	Bore
Works subtype	Drilled bore
Maximum depth	100.000 metres

Extraction Details

Use of water	Observation or investigation

Works location

Easting	*Northing*	*Zone MGA*
Nil		

Land description
Volume 9503 Folio 693
Lot 4 of Plan TP845669K

Property address
4549 GEELONG - BALLAN ROAD, FISKVILLE, VIC 3342

Related Instruments

Related entitlements Nil

Related water-use entities Nil

Application History

Reference	*Type*	*Status*	*Lodged date*	*Approved date*	*Recorded date*
WLI014780	Issue	Approved	13 Aug 2012	15 Aug 2012	

Conditions

Licence WLE055602 is subject to the following conditions:

Siting and construction

1 The bore must be constructed on the land described in the licence, at coordinates E: 255230.0, N: 5825430.0, Zone: 55.

2 The bore(s) must be drilled at the location specified in the application approved by the Authority, but if after drilling a bore is considered unsatisfactory, a replacement bore may be drilled at an alternative site no greater than 20 metres from the authorised site and no closer to neighbouring bores or nearby waterways, or as authorised by the Authority before the commencement of drilling.

Preventing pollution

3 All earthworks must be carried out, and all drilling fluids and waters produced during construction and development must be disposed of, in ways that avoid contaminating native vegetation, waterways, aquifers, the riparian environment, the riverine environment or other people's property.

4 Construction must stop immediately if the Authority reasonably believes that fuel, lubricant, drilling fluid, soil or water produced during construction and development is at risk of being spilled into native vegetation, waterways, aquifers, the riparian environment, the riverine environment or other people's property.

5 The licence holder must construct and maintain bund walls, in accordance with the timeframe, specifications, guidelines or standards prescribed by the Authority, to prevent fuel, lubricant, drilling fluid, soil or water produced during construction and development from being spilled into native vegetation, waterways, aquifers, the riparian environment, the riverine environment or other people's property.

Construction standards

6 The bore(s) must be constructed, and where relevant decommissioned, in accordance with the Minimum Construction Requirements for Water Bores in Australia, Edition 3.

Drilling licence and supervision requirements

7 The bore(s) must be constructed by, or under the direct supervision of, a driller licensed under the Water Act 1989 and endorsed as a Class 1, 2, or 3 driller, with appropriate endorsements.

8 The licence holder must ensure that the licensed driller notifies the Authority's Drilling Inspector at least one day prior to work commencing on any grouting operations and must not proceed with the work unless authorised by the Drilling Inspector.

Bore completion report

9 The licence holder must ensure that the licensed driller sends a Bore Completion Report to the Authority within twenty-eight working days of the bore(s) being completed.

10 The works referred to in the licence must not be made operational until the Authority acknowledges receipt of an acceptable Bore Completion Report.

11 The works referred to in the licence must not be made operational until the licence holder sends a water sample to the laboratory nominated by the Authority.

Protecting water resources

12 No more than 17 bore(s) may be brought to final development under this licence.

13 At the completion of drilling, and before the drilling rig leaves the site, all but 17 bore(s) must be decommissioned so as to eliminate physical hazards, conserve aquifer yield, prevent groundwater contamination and prevent the intermingling of desirable and undesirable waters.

Protecting water quality

14 The bore(s) must be constructed so as to prevent aquifer contamination caused by vertical flow outside the casing.

15 If two or more aquifers are encountered, the bore(s) must be constructed to ensure that an

impervious seal is made and maintained between each aquifer to prevent aquifer connection through vertical flow outside the casing; under no circumstances are two or more aquifers to be screened within the one bore or in any other manner to allow connection between them.

16 Boreheads must be constructed, to ensure that no flood water, surface runoff or potential subsurface contaminated soakage can enter the bore or bore annulus.

17 Drilling must not exceed the maximum depth unless the Authority approves, in advance, drilling beyond this depth.

Protecting other water users

18 The diameter of the bore-casing must not exceed 50 millimetres.

19 The licence holder must, at the licence-holder's expense, if required by the Authority, conduct a pumping test and obtain a hydrogeological report, to the Authority's specification, on the potential for bore operation to interfere with any bore, aquifer, groundwater dependent ecosystem or waterway.

Fees and charges

20 The licence holder must, when requested by the Authority, pay all fees, costs and other charges under the Water Act 1989 in respect of this licence.

END OF COPY OF RECORD

Appendix D
3 Pages

Survey Report

think spatial

SURVEY REPORT

24th September 2012

David Louwrens
Cardno Lane Piper
Building 2, 154 Highbury Road
Burwood, Victoria 3125

RE: CFA Fiskville Groundwater Bore Survey

Dear David,

The results of the surveying conducted on Monday 27th August and Thursday 20th September at the CFA Training Facility in Fiskville are as follows:

Point	AHD RL (m)	Notes
GW101-NS	438.165	Natural Surface
GW101-PVC	438.848	Top of PVC Pipe
GW101-Standpipe	438.952	Top of standpipe
GW102-NS	441.547	Natural Surface
GW102-PVC	442.225	Top of PVC Pipe
GW102-Standpipe	442.32	Top of standpipe
GW103-NS	446.233	Natural Surface
GW103-PVC	446.785	Top of PVC Pipe
GW103-Standpipe	446.901	Top of standpipe
GW104_NS	438.885	Natural Surface
GW104_PVC	439.609	Top of PVC Pipe
GW104_Standpipe	439.691	Top of standpipe
GW105_NS	441.775	Natural Surface
GW105_PVC	441.639	Top of PVC Pipe
GW105_Cover	441.802	Top of Cover
GW106_NS	441.525	Natural Surface
GW106_PVC	441.438	Top of PVC Pipe
GW106_Cover	441.564	Top of Cover
GW107_NS	441.435	Natural Surface
GW107_PVC	441.370	Top of PVC Pipe
GW107_Cover	441.456	Top of Cover
GW108_NS	438.861	Natural Surface
GW108_PVC	439.661	Top of PVC Pipe
GW108_Standpipe	439.823	Top of standpipe

GW109_NS	440.945	Natural Surface
GW109_PVC	440.859	Top of PVC Pipe
GW109_Cover	440.972	Top of Cover
GW110_NS	440.832	Natural Surface
GW110_PVC	440.746	Top of PVC Pipe
GW110_Cover	440.843	Top of Cover
GW111_NS	441.054	Natural Surface
GW111_PVC	440.975	Top of PVC Pipe
GW111_Cover	441.069	Top of Cover
BH3-NS	440.096	Natural Surface
BH3-PVC	440.524	Top of PVC Pipe
BH3-Standpipe	440.642	Top of standpipe
BH4-NS	442.720	Natural Surface
BH4-PVC	443.168	Top of PVC Pipe
BH4-Standpipe	443.267	Top of standpipe
BH5-NS	442.747	Natural Surface
BH5-PVC	443.1539	Top of PVC Pipe
BH5-Standpipe	443.2622	Top of standpipe

Table 1: Levelled Heights

The horizontal coordinates of the boreholes (determined via GNSS) were:

Point	Easting	Northing
GW101	255454.308	5826176.965
GW102	254526.104	5826117.924
GW103	254043.809	5825894.150
GW104	255205.957	5825603.340
GW105	254739.620	5825754.738
GW106	254726.508	5825700.149
GW107	254754.207	5825581.589
GW108	255205.916	5825605.553
GW109	254914.326	5825709.282
GW110	254877.995	5825667.366
GW111	254862.124	5825470.457
BH3	254085.093	5825436.430
BH4	254761.039	5826135.196
BH5	254761.134	5826137.568

Table 2: Borehole Coordinates (MGA94 Zone 55)

Please feel free to contact me if you have any questions.

Yours Sincerely,

Simon Fuller

Appendix E
75 Pages

Laboratory Reports & Chain of Custody Records

Chain of Custody Records
ALS Report No. EM1211100
mgt-LabMark Report No. 352941-W
Data Quality Validation Report

Cardno LanePiper

Chain of Custody

Bottles #1: 1x PFC, 1x Cyanide, 1x Cr, 2x vials, 1x amber, 2x green plastic, 1x purple, 2x metals (As part of ALS quote ID: ME/441/12-V2)

Bottles #2: 1x cyanide, 1x Cr, 2x vials, 1x amber, 2x green plastic, 1x purple, 2x metals

(2 ESKIES)

Sheet 1 of 2

Name: MARCUS BOYD

Phone: 03 9888 0100 Fax: 03 9808 3511 Mobile: 0411 300 608

Address: Building 2, 154 Highbury Rd, Burwood, Vic, 3125

Email: marcus.boyd@cardno.com.au & CC: david.louwrens@cardno.com.au

Project Number: 212163.2 Site: FISKVILLE

Laboratory (name, phone, fax no & contact person) Sarah Hodgeson ALS (03)85499600

ALS

	Sample ID	Laboratory ID	Container	Sampling Date	Sampling Time	Sample Matrix: Water	Soil	Sludge	Other (Specify)	Composite	Sample preservation: Ice bricks	HNO_3/HCl	Unpreserved	Other (Specify)	Analysis: NEPM Water Screen	NT-01 & NT-02: Major Ions*	EA015H: TDS	EA010: EC	INT-8: TKN, Ammonia as N, Total P, Nitrate	EA005: pH	Metals (22)	PFCs (PFOA/PFOS, PCDD/PCDF + perchlorate EP 216, 2312, 300)	Hold	TPH (C_6-C_9)	Ammonia (N)	Nitrate (N)
1	QC01_200912		Bottles #1	20/9	3:55pm	X					X						X			X	X				X	X
2	QC03_200912		Bottles #1	↓	5:55pm	↓					↓						X			X	X				X	X
3	QC05_200912		Bottles #2	↓	6:40pm	↓					↓										X					
4	QC07_200912		1x vial	20/9	8:30am	X																	X			
5	QC06_200912		↓	↓	↓	↓																		X		
6	QC09_200912		↓	↓	↓	↓																		X		
7	GW101_200912		2x vials, 1x amber, 2x Green plastic 1x purple, 2x metals 1x Cr, 1x cyanide		10:55am	↓									X	X	X	X	X	X	X					
8	BH4_200912		" "		11:20am										X	X	X	X	X	X	X					
9	BH5_200912		" "		11:50am										X	X	X	X	X	X	X					
10	GW103_200912		" "		2pm										X	X	X	X	X	X	X					
11	BH3_200912		" "		2:29pm										X	X	X	X	X	X	X					
12	GW111_200912		" "		3:13pm										X	X	X	X	X	X	X					
13	GW107_200912		" " + PFC		5:55pm										X	X	X	X	X	X	X	X				
14	GW106_200912		1x green & 1x amber 1x vial, 1x metal 1x purple	↓	4:28pm	↓					↓				X	X	X	X	X	X	X					

Environmental Division Melbourne

Work Order

EM1211100

Telephone : +61-3-8549 9600

Samples sent to lab for
Micro Nitrate BOD pH
Colour Turbidity RP
Other
Date RL/RL 21/09.

Sampler: I attest that the proper field sampling proceedures were used during the collection of these samples.

Sampler name: (print and signature) Marcus Boyd Date: 20/9/12

Relinquished by (Sampler): (print and signature)	Date	Time	Received by (Courier/Lab): (print and signature)	Date	Time	
Marcus Boyd	21/9/12			21/9/12	10:30	RL (ALS)
Relinquished by: (print and signature)	Date	Time	Received by: (print and signature)	Date	Time	
	21/9/12	11:20		21/9/12	11:20	21/9/12
Relinquished by: (print and signature)	Date	Time	Received by: (print and signature)	Date	Time	11:48

Please supply results electronically in spreadsheet and ESDAT files.

Turn around time: (24 hour/48 hour/5 days)

Please circle

In accordance with your acceptance of our standard or customised Terms of Agreement between Cardno Lane Piper Pty Ltd and Service or Equipment Providers

(*) GW106_200912 : Analysis preference if insufficient sample in Green Bottle : Ammonia, Nitrate, TDS, pH, Major Ions, then : fluoride, nitrite, chloride.

Cardno LanePiper

Chain of Custody

Sheet 2 of 2

Name: MARCUS BOYD

Phone: 03 9888 0100 Fax: 03 9808 3511 Mobile: 0411 300 608

Address: Building 2, 154 Highbury Rd, Burwood, Vic, 3125

Email: marcus.boyd@cardno.com.au & CC: david.louwrens@cardno.com.au

Project Number: 212163.2 Site: FISKVILLE

Laboratory (name, phone,fax no & contact person) Sarah Hodgeson ALS (03)85499600

ALS

	Sample ID	Laboratory ID	Container	Sampling Date	Sampling Time	Sample Matrix: Water	Soil	Sludge	Other (Specify)	Composite	Sample preservation: Ice bricks	HNO_3/HCl	Unpreserved	Other (Specify)	Analysis: NEPM Water Screen	NT-01 & NT-02: Major Ions*	EA015H: TDS	EA010: EC	NT-8: TKN, Ammonia as N, Total	EA005: pH	Metals (22)	PFCs (PFOA/ PFOA, PCDD/PCDF + EP 216, 231 and 300 perchlorate	Hold
15	GW110-200912		2x vials, 1x amber	~~20/9~~	5:55pm	X					X				X	X	X	X	X	X	X	X	
			2x green plastic	20/9																			
			1x purple, 2x metals 1x Cr, 1x cyanide																				
			1x PFOS/Cs																				
16	GW108-200912		2x vials, 1x amber, 2x green plastic	20/9	6:30pm	X					X				X	X	X	X	X	X	X		
17	QC02-200912 (Extra vial) - BN 21/9		1x purple, 2x metals 1x Cr, 1x cyanide																				

Sampler: I attest that the proper field sampling proceedures were used during the collection of these samples.

Sampler name:(print and signature) Marcus Boyd Date: 20/~~21~~/9/12

	Date	Time		Date	Time
Relinquished by (Sampler): (print and signature) Marcus Boyd	21/9/12		Received by (Courier/Lab): (print and signature)	21/9/12	10:30
Relinquished by: (print and signature)	21/9/12	17:20	Received by: (print and signature)	21/9/12	11:20
Relinquished by: (print and signature)	Date	Time	Received by: (print and signature)	Date	Time

RW (Alex) 21/9/12 @11:48

Please supply results electronically in spreadsheet and ESDAT files.

Turn around time: (24 hour/48 hour/5 days)

Please circle

In accordance with your acceptance of our standard or customised Terms of Agreement between Cardno Lane Piper Pty Ltd and Service or Equipment Providers

Ranil Weerakkody

From: on behalf of Samples Melbourne
To: Sarah Hodgson
Subject: EM1211100

Hi Sarah,

For the attached COC, there are some issues:

i) Received 2 Unspecified metals bottles for sample QC05 (sample 3)

ii) Received one extra vial labelled as QC02, but received only one vial for sample QC01.(sample 1)

iii) We have not received a hexachrom bottle for sample GW103 (sample 10)

(iV) There are some samples received with 2 filtered bottles, others received with 2 total bottles and also samples received with a filtered and a total bottle.

Can you please check with the client regarding these issues.

Regards,
Bharathi.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EM1211100**	Page	: 1 of 23
Client	: **CARDNO LANE PIPER PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: MR MARCUS BOYD (Cardno)	Contact	: Sarah Hodgson
Address	: 154 HIGHBURY ROAD BURWOOD VIC, AUSTRALIA 3125	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: marcus.boyd@cardno.com.au	E-mail	: sarah.hodgson@alsenviro.com
Telephone	: +61 03 98880100	Telephone	: 03 8549 9652
Facsimile	: +61 03 98083511	Facsimile	: 03 8549 9626
Project	: 212163 2	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 21-SEP-2012
Sampler	: MB	Issue Date	: 03-OCT-2012
Site	: Fiskville		
		No. of samples received	: 17
Quote number	: ME/441/12	No. of samples analysed	: 15

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics
Eric Chau	Metals Team Leader	Melbourne Inorganics
Lana Nguyen	Senior LCMS Chemist	Sydney Organics
Nancy Wang	Senior Semivolatile Instrument Chemist	Melbourne Organics
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics

General Comments

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- **EG020F: Sample EM1211100-009, 010 and 014 have been diluted due to sample matrix and LORs have been raised accordingly.**
- **EG035F 100x dilution has been applied for EM121100#14 due to sample matrix, LOR has been raised accordingly.**
- **EG035F 10x dilution has been applied for EM121100#9 due to sample matrix, LOR has been raised accordingly.**
- **EK026SF: EM1211100-009 required dilution prior to analysis due to matrix interferences. LOR values have been adjusted accordingly.**
- **EK040P: EM1211100- #9 & #14 have been diluted x10 due to sample matrix for Fluoride analysis.**
- **EP075: 'Sum of PAH' is the sum of the USEPA 16 priority PAHs**
- **EP231: PFOA & PFOS results are reported as an aggregate of linear and branched isomers. Matrix spike recovery for PFOS not determined due to high background level of target analyte.**
- **For samples where a filtered metals bottle was not received they were filtered through a 0.45um filter prior to the dissolved metals analysis from the nautral plastic bottle.**
- **Ionic Balance out of acceptable limits for EM1211100 #12 due to analytes not quantified in this report.**
- **Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.**
- **Perchlorate and PFOS/PFOA analysis conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.**
- **Samples have been received with limited time to adhere to recommended analytical holding times for hexavalent chromium. Results should be scrutinised accordingly.**
- **TDS by method EA-015 for EM1211100 #9 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: QC01_200912	QC03_200912	QC05_200912	QC06_200912	QC09_200912
				Client sampling date / time: 20-SEP-2012 15:45	20-SEP-2012 17:45	20-SEP-2012 18:40	20-SEP-2012 08:30	20-SEP-2012 08:30
				EM1211100-001	EM1211100-002	EM1211100-003	EM1211100-005	EM1211100-006
EA005: pH								
pH Value	----	0.01	pH Unit	**7.23**	**7.15**	----	----	----
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	**690**	**808**	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.02**	**0.02**	<0.01	----	----
Antimony	7440-36-0	0.001	mg/L	**0.003**	<0.001	<0.001	----	----
Arsenic	7440-38-2	0.001	mg/L	**0.002**	<0.001	<0.001	----	----
Barium	7440-39-3	0.001	mg/L	**0.060**	**0.079**	<0.001	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----
Cobalt	7440-48-4	0.001	mg/L	**0.014**	**0.003**	<0.001	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L	**0.002**	**0.008**	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L	**0.887**	**0.117**	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L	**0.020**	**0.014**	<0.001	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	----	----
Zinc	7440-66-6	0.005	mg/L	**0.008**	**0.013**	<0.005	----	----
Lithium	7439-93-2	0.001	mg/L	**0.001**	**0.001**	<0.001	----	----
Molybdenum	7439-98-7	0.001	mg/L	**0.001**	**0.001**	<0.001	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	----	----
Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Thallium	7440-28-0	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Boron	7440-42-8	0.05	mg/L	**0.06**	**0.05**	<0.05	----	----
Iron	7439-89-6	0.05	mg/L	**2.49**	<0.05	<0.05	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.20**	**0.34**	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	<0.01	**0.03**	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**0.02**	**0.34**	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.02**	**0.37**	----	----	----
EP080/071: Total Petroleum Hydrocarbons								

Analytical Results

Sub-Matrix: WATER				Client sample ID	QC01_200912	QC03_200912	QC05_200912	QC06_200912	QC09_200912
				Client sampling date / time	20-SEP-2012 15:45	20-SEP-2012 17:45	20-SEP-2012 18:40	20-SEP-2012 08:30	20-SEP-2012 08:30
Compound	CAS Number	LOR	Unit		EM1211100-001	EM1211100-002	EM1211100-003	EM1211100-005	EM1211100-006
EP080/071: Total Petroleum Hydrocarbons - Continued									
C6 - C9 Fraction	----	20	µg/L		----	----	----	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft									
C6 - C10 Fraction	----	20	µg/L		----	----	----	<20	<20
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		----	----	----	**91.9**	**97.6**
Toluene-D8	2037-26-5	0.1	%		----	----	----	**83.2**	**85.2**
4-Bromofluorobenzene	460-00-4	0.1	%		----	----	----	**70.7**	**70.7**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: GW101_200912 Client sampling date / time: 20-SEP-2012 10:45 EM1211100-007	Client sample ID: BH4_200912 Client sampling date / time: 20-SEP-2012 11:20 EM1211100-008	Client sample ID: BH5_200912 Client sampling date / time: 20-SEP-2012 11:50 EM1211100-009	Client sample ID: GW103_200912 Client sampling date / time: 20-SEP-2012 14:00 EM1211100-010	Client sample ID: BH3_200912 Client sampling date / time: 20-SEP-2012 14:29 EM1211100-011
EA005: pH								
pH Value	----	0.01	pH Unit	7.77	7.19	7.15	7.90	7.03
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	6850	662	2690	3130	6830
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	4530	376	3240	1920	3790
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	512	268	264	308	1000
Total Alkalinity as CaCO3	----	1	mg/L	512	268	264	308	1000
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	74	12	111	58	158
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	1900	40	704	868	1610
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	103	3	15	26	145
Magnesium	7439-95-4	1	mg/L	300	6	30	79	524
Sodium	7440-23-5	1	mg/L	821	125	501	495	495
Potassium	7440-09-7	1	mg/L	12	2	2	12	13
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.67	0.07	1070	0.82	0.01
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.010	<0.010	<0.001
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.037	<0.010	<0.001
Barium	7440-39-3	0.001	mg/L	0.194	0.004	0.842	0.065	0.010
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.020	<0.010	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0010	<0.0010	<0.0001
Cobalt	7440-48-4	0.001	mg/L	0.003	<0.001	0.160	<0.010	<0.001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.986	<0.010	<0.001
Copper	7440-50-8	0.001	mg/L	0.002	0.005	0.163	<0.010	0.002
Manganese	7439-96-5	0.001	mg/L	0.148	0.001	0.524	0.132	0.009
Nickel	7440-02-0	0.001	mg/L	0.008	0.008	0.575	<0.010	0.006
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.165	<0.010	<0.001
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.51	<0.10	<0.01
Zinc	7440-66-6	0.005	mg/L	0.009	0.007	4.55	<0.050	0.017
Lithium	7439-93-2	0.001	mg/L	0.002	0.001	0.398	0.013	0.005
Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	<0.010	0.028	<0.001

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: GW101_200912 Client sampling date / time: 20-SEP-2012 10:45 EM1211100-007	BH4_200912 20-SEP-2012 11:20 EM1211100-008	BH5_200912 20-SEP-2012 11:50 EM1211100-009	GW103_200912 20-SEP-2012 14:00 EM1211100-010	BH3_200912 20-SEP-2012 14:29 EM1211100-011
EG020F: Dissolved Metals by ICP-MS - Continued								
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.10	<0.10	<0.01
Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	<0.010	<0.010	<0.001
Thallium	7440-28-0	0.001	mg/L	<0.001	<0.001	<0.010	<0.010	<0.001
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	**0.32**	<0.10	**0.07**
Iron	7439-89-6	0.05	mg/L	**0.71**	**0.06**	**338**	**0.56**	<0.05
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0010	<0.0001	<0.0001
EG050F: Dissolved Hexavalent Chromium								
Hexavalent Chromium	18540-29-9	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EK026SF: Total CN by Segmented Flow Analyser								
Total Cyanide	57-12-5	0.004	mg/L	<0.004	<0.004	<0.040	----	<0.004
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.1**	**0.3**	**1.1**	**0.5**	**0.1**
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.07**	**0.04**	**0.10**	<0.01	**0.08**
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	<0.01	<0.01	**0.02**	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**0.67**	**0.12**	**0.01**	<0.01	**21.1**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.67**	**0.12**	**0.03**	<0.01	**21.1**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	**0.7**	**5.9**	**1.0**	**0.4**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**0.7**	**0.8**	**5.9**	**1.0**	**21.5**
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.38**	**0.54**	**1.38**	**68.8**	**1.59**
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	**65.4**	**6.73**	**27.4**	**31.8**	**68.7**
Total Cations	----	0.01	meq/L	**65.8**	**6.13**	**25.1**	**29.6**	**72.2**
Ionic Balance	----	0.01	%	**0.36**	**4.73**	**4.57**	**3.61**	**2.50**
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	1	µg/L	<1	<1	<1	<1	<1
EP074A: Monocyclic Aromatic Hydrocarbons								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: GW101_200912	BH4_200912	BH5_200912	GW103_200912	BH3_200912
				Client sampling date / time: 20-SEP-2012 10:45	20-SEP-2012 11:20	20-SEP-2012 11:50	20-SEP-2012 14:00	20-SEP-2012 14:29
				EM1211100-007	EM1211100-008	EM1211100-009	EM1211100-010	EM1211100-011
EP074A: Monocyclic Aromatic Hydrocarbons - Continued								
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	3	<2
Styrene	100-42-5	5	µg/L	<5	<5	<5	<5	<5
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	5	<2
Isopropylbenzene	98-82-8	5	µg/L	<5	<5	<5	<5	<5
n-Propylbenzene	103-65-1	5	µg/L	<5	<5	<5	<5	<5
1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	<5	<5	<5	<5
sec-Butylbenzene	135-98-8	5	µg/L	<5	<5	<5	<5	<5
1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	<5	<5	<5	<5
tert-Butylbenzene	98-06-6	5	µg/L	<5	<5	<5	<5	<5
p-Isopropyltoluene	99-87-6	5	µg/L	<5	<5	<5	<5	<5
n-Butylbenzene	104-51-8	5	µg/L	<5	<5	<5	<5	<5
EP074B: Oxygenated Compounds								
Vinyl Acetate	108-05-4	50	µg/L	<50	<50	<50	<50	<50
2-Butanone (MEK)	78-93-3	50	µg/L	<50	<50	<50	<50	<50
4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	<50	<50	<50	<50
2-Hexanone (MBK)	591-78-6	50	µg/L	<50	<50	<50	<50	<50
EP074C: Sulfonated Compounds								
Carbon disulfide	75-15-0	5	µg/L	<5	<5	<5	<5	<5
EP074D: Fumigants								
2.2-Dichloropropane	594-20-7	5	µg/L	<5	<5	<5	<5	<5
1.2-Dichloropropane	78-87-5	5	µg/L	<5	<5	<5	<5	<5
cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	<5	<5	<5
trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	<5	<5	<5
1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	<5	<5	<5
EP074E: Halogenated Aliphatic Compounds								
Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	<50	<50	<50
Chloromethane	74-87-3	50	µg/L	<50	<50	<50	<50	<50
Vinyl chloride	75-01-4	50	µg/L	<50	<50	<50	<50	<50
Bromomethane	74-83-9	50	µg/L	<50	<50	<50	<50	<50
Chloroethane	75-00-3	50	µg/L	<50	<50	<50	<50	<50
Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	<50	<50	<50
1.1-Dichloroethene	75-35-4	5	µg/L	<5	<5	<5	<5	<5
Iodomethane	74-88-4	5	µg/L	<5	<5	<5	<5	<5
trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	<5	<5	<5

Analytical Results

Sub-Matrix: WATER				Client sample ID	GW101_200912	BH4_200912	BH5_200912	GW103_200912	BH3_200912
				Client sampling date / time	20-SEP-2012 10:45	20-SEP-2012 11:20	20-SEP-2012 11:50	20-SEP-2012 14:00	20-SEP-2012 14:29
Compound	CAS Number	LOR	Unit		EM1211100-007	EM1211100-008	EM1211100-009	EM1211100-010	EM1211100-011
EP074E: Halogenated Aliphatic Compounds - Continued									
1.1-Dichloroethane	75-34-3	5	µg/L		<5	<5	<5	<5	<5
cis-1.2-Dichloroethene	156-59-2	5	µg/L		<5	<5	<5	<5	<5
1.1.1-Trichloroethane	71-55-6	5	µg/L		<5	<5	<5	<5	<5
1.1-Dichloropropylene	563-58-6	5	µg/L		<5	<5	<5	<5	<5
Carbon Tetrachloride	56-23-5	5	µg/L		<5	<5	<5	<5	<5
1.2-Dichloroethane	107-06-2	5	µg/L		<5	<5	<5	<5	<5
Trichloroethene	79-01-6	5	µg/L		<5	<5	<5	<5	<5
Dibromomethane	74-95-3	5	µg/L		<5	<5	<5	<5	<5
1.1.2-Trichloroethane	79-00-5	5	µg/L		<5	<5	<5	<5	<5
1.3-Dichloropropane	142-28-9	5	µg/L		<5	<5	<5	<5	<5
Tetrachloroethene	127-18-4	5	µg/L		<5	<5	<5	<5	<5
1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L		<5	<5	<5	<5	<5
trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L		<5	<5	<5	<5	<5
cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L		<5	<5	<5	<5	<5
1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L		<5	<5	<5	<5	<5
1.2.3-Trichloropropane	96-18-4	5	µg/L		<5	<5	<5	<5	<5
Pentachloroethane	76-01-7	5	µg/L		<5	<5	<5	<5	<5
1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L		<5	<5	<5	<5	<5
EP074F: Halogenated Aromatic Compounds									
Chlorobenzene	108-90-7	5	µg/L		<5	<5	<5	<5	<5
Bromobenzene	108-86-1	5	µg/L		<5	<5	<5	<5	<5
2-Chlorotoluene	95-49-8	5	µg/L		<5	<5	<5	<5	<5
4-Chlorotoluene	106-43-4	5	µg/L		<5	<5	<5	<5	<5
1.2.3-Trichlorobenzene	87-61-6	5	µg/L		<5	<5	<5	<5	<5
EP074G: Trihalomethanes									
Chloroform	67-66-3	5	µg/L		<5	<5	<5	<5	<5
Bromodichloromethane	75-27-4	5	µg/L		<5	<5	<5	<5	<5
Dibromochloromethane	124-48-1	5	µg/L		<5	<5	<5	<5	<5
Bromoform	75-25-2	5	µg/L		<5	<5	<5	<5	<5
EP075A: Phenolic Compounds									
Phenol	108-95-2	2	µg/L		<2	<2	<2	<2	<2
2-Chlorophenol	95-57-8	2	µg/L		<2	<2	<2	<2	<2
2-Methylphenol	95-48-7	2	µg/L		<2	<2	<2	<2	<2
3- & 4-Methylphenol	1319-77-3	4	µg/L		<4	<4	<4	<4	<4
2-Nitrophenol	88-75-5	2	µg/L		<2	<2	<2	<2	<2
2.4-Dimethylphenol	105-67-9	2	µg/L		<2	<2	<2	<2	<2

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: GW101_200912	BH4_200912	BH5_200912	GW103_200912	BH3_200912
				Client sampling date / time: 20-SEP-2012 10:45	20-SEP-2012 11:20	20-SEP-2012 11:50	20-SEP-2012 14:00	20-SEP-2012 14:29
				EM1211100-007	EM1211100-008	EM1211100-009	EM1211100-010	EM1211100-011
EP075A: Phenolic Compounds - Continued								
2.4-Dichlorophenol	120-83-2	2	µg/L	<2	<2	<2	<2	<2
2.6-Dichlorophenol	87-65-0	2	µg/L	<2	<2	<2	<2	<2
4-Chloro-3-Methylphenol	59-50-7	2	µg/L	<2	<2	<2	<2	<2
2.4.6-Trichlorophenol	88-06-2	2	µg/L	<2	<2	<2	<2	<2
2.4.5-Trichlorophenol	95-95-4	2	µg/L	<2	<2	<2	<2	<2
Pentachlorophenol	87-86-5	4	µg/L	<4	<4	<4	<4	<4
EP075B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	2	µg/L	<2	<2	<2	<2	<2
2-Methylnaphthalene	91-57-6	2	µg/L	<2	<2	<2	<2	<2
2-Chloronaphthalene	91-58-7	2	µg/L	<2	<2	<2	<2	<2
Acenaphthylene	208-96-8	2	µg/L	<2	<2	<2	<2	<2
Acenaphthene	83-32-9	2	µg/L	<2	<2	<2	<2	<2
Fluorene	86-73-7	2	µg/L	<2	<2	<2	<2	<2
Phenanthrene	85-01-8	2	µg/L	<2	<2	<2	<2	<2
Anthracene	120-12-7	2	µg/L	<2	<2	<2	<2	<2
Fluoranthene	206-44-0	2	µg/L	<2	<2	<2	<2	<2
Pyrene	129-00-0	2	µg/L	<2	<2	<2	<2	<2
N-2-Fluorenyl Acetamide	53-96-3	2	µg/L	<2	<2	<2	<2	<2
Benz(a)anthracene	56-55-3	2	µg/L	<2	<2	<2	<2	<2
Chrysene	218-01-9	2	µg/L	<2	<2	<2	<2	<2
Benzo(b) & Benzo(k)fluoranthene	205-99-2 207-08-9	4	µg/L	<4	<4	<4	<4	<4
7.12-Dimethylbenz(a)anthracene	57-97-6	2	µg/L	<2	<2	<2	<2	<2
Benzo(a)pyrene	50-32-8	2	µg/L	<2	<2	<2	<2	<2
3-Methylcholanthrene	56-49-5	2	µg/L	<2	<2	<2	<2	<2
Indeno(1.2.3.cd)pyrene	193-39-5	2	µg/L	<2	<2	<2	<2	<2
Dibenz(a.h)anthracene	53-70-3	2	µg/L	<2	<2	<2	<2	<2
Benzo(g.h.i)perylene	191-24-2	2	µg/L	<2	<2	<2	<2	<2
^ Sum of PAHs	----	2	µg/L	<2	<2	<2	<2	<2
^ Benzo(a)pyrene TEQ (WHO)	----	2	µg/L	<2	<2	<2	<2	<2
EP075C: Phthalate Esters								
Dimethyl phthalate	131-11-3	2	µg/L	<2	<2	<2	<2	<2
Diethyl phthalate	84-66-2	2	µg/L	<2	<2	<2	<2	<2
Di-n-butyl phthalate	84-74-2	2	µg/L	<2	<2	<2	<2	<2
Butyl benzyl phthalate	85-68-7	2	µg/L	<2	<2	<2	<2	<2
bis(2-ethylhexyl) phthalate	117-81-7	10	µg/L	<10	<10	<10	<10	<10

Analytical Results

Sub-Matrix: WATER				Client sample ID	GW101_200912	BH4_200912	BH5_200912	GW103_200912	BH3_200912
				Client sampling date / time	20-SEP-2012 10:45	20-SEP-2012 11:20	20-SEP-2012 11:50	20-SEP-2012 14:00	20-SEP-2012 14:29
Compound	CAS Number	LOR	Unit		EM1211100-007	EM1211100-008	EM1211100-009	EM1211100-010	EM1211100-011
EP075C: Phthalate Esters - Continued									
Di-n-octylphthalate	117-84-0	2	µg/L		<2	<2	<2	<2	<2
EP075D: Nitrosamines									
N-Nitrosomethylethylamine	10595-95-6	2	µg/L		<2	<2	<2	<2	<2
N-Nitrosodiethylamine	55-18-5	2	µg/L		<2	<2	<2	<2	<2
N-Nitrosopyrrolidine	930-55-2	4	µg/L		<4	<4	<4	<4	<4
N-Nitrosomorpholine	59-89-2	2	µg/L		<2	<2	<2	<2	<2
N-Nitrosodi-n-propylamine	621-64-7	2	µg/L		<2	<2	<2	<2	<2
N-Nitrosopiperidine	100-75-4	2	µg/L		<2	<2	<2	<2	<2
N-Nitrosodibutylamine	924-16-3	2	µg/L		<2	<2	<2	<2	<2
N-Nitrosodiphenyl & Diphenylamine	86-30-6 122-39-4	4	µg/L		<4	<4	<4	<4	<4
Methapyrilene	91-80-5	2	µg/L		<2	<2	<2	<2	<2
EP075E: Nitroaromatics and Ketones									
2-Picoline	109-06-8	2	µg/L		<2	<2	<2	<2	<2
Acetophenone	98-86-2	2	µg/L		<2	<2	<2	<2	<2
Nitrobenzene	98-95-3	2	µg/L		<2	<2	<2	<2	<2
Isophorone	78-59-1	2	µg/L		<2	<2	<2	<2	<2
2.6-Dinitrotoluene	606-20-2	4	µg/L		<4	<4	<4	<4	<4
2.4-Dinitrotoluene	121-14-2	4	µg/L		<4	<4	<4	<4	<4
1-Naphthylamine	134-32-7	2	µg/L		<2	<2	<2	<2	<2
4-Nitroquinoline-N-oxide	56-57-5	2	µg/L		<2	<2	<2	<2	<2
5-Nitro-o-toluidine	99-55-8	2	µg/L		<2	<2	<2	<2	<2
Azobenzene	103-33-3	2	µg/L		<2	<2	<2	<2	<2
1.3.5-Trinitrobenzene	99-35-4	2	µg/L		<2	<2	<2	<2	<2
Phenacetin	62-44-2	2	µg/L		<2	<2	<2	<2	<2
4-Aminobiphenyl	92-67-1	2	µg/L		<2	<2	<2	<2	<2
Pentachloronitrobenzene	82-68-8	2	µg/L		<2	<2	<2	<2	<2
Pronamide	23950-58-5	2	µg/L		<2	<2	<2	<2	<2
Dimethylaminoazobenzene	60-11-7	2	µg/L		<2	<2	<2	<2	<2
Chlorobenzilate	510-15-6	2	µg/L		<2	<2	<2	<2	<2
EP075F: Haloethers									
Bis(2-chloroethyl) ether	111-44-4	2	µg/L		<2	<2	<2	<2	<2
Bis(2-chloroethoxy) methane	111-91-1	2	µg/L		<2	<2	<2	<2	<2
4-Chlorophenyl phenyl ether	7005-72-3	2	µg/L		<2	<2	<2	<2	<2
4-Bromophenyl phenyl ether	101-55-3	2	µg/L		<2	<2	<2	<2	<2
EP075G: Chlorinated Hydrocarbons									

Analytical Results

Sub-Matrix: WATER				Client sample ID	GW101_200912	BH4_200912	BH5_200912	GW103_200912	BH3_200912
				Client sampling date / time	20-SEP-2012 10:45	20-SEP-2012 11:20	20-SEP-2012 11:50	20-SEP-2012 14:00	20-SEP-2012 14:29
Compound	CAS Number	LOR	Unit		EM1211100-007	EM1211100-008	EM1211100-009	EM1211100-010	EM1211100-011
EP075G: Chlorinated Hydrocarbons - Continued									
1.3-Dichlorobenzene	541-73-1	2	µg/L		<2	<2	<2	<2	<2
1.4-Dichlorobenzene	106-46-7	2	µg/L		<2	<2	<2	<2	<2
1.2-Dichlorobenzene	95-50-1	2	µg/L		<2	<2	<2	<2	<2
Hexachloroethane	67-72-1	2	µg/L		<2	<2	<2	<2	<2
1.2.4-Trichlorobenzene	120-82-1	2	µg/L		<2	<2	<2	<2	<2
Hexachloropropylene	1888-71-7	2	µg/L		<2	<2	<2	<2	<2
Hexachlorobutadiene	87-68-3	2	µg/L		<2	<2	<2	<2	<2
Hexachlorocyclopentadiene	77-47-4	10	µg/L		<10	<10	<10	<10	<10
Pentachlorobenzene	608-93-5	2	µg/L		<2	<2	<2	<2	<2
Hexachlorobenzene (HCB)	118-74-1	4	µg/L		<4	<4	<4	<4	<4
EP075H: Anilines and Benzidines									
Aniline	62-53-3	2	µg/L		<2	<2	<2	<2	<2
4-Chloroaniline	106-47-8	2	µg/L		<2	<2	<2	<2	<2
2-Nitroaniline	88-74-4	4	µg/L		<4	<4	<4	<4	<4
3-Nitroaniline	99-09-2	4	µg/L		<4	<4	<4	<4	<4
Dibenzofuran	132-64-9	2	µg/L		<2	<2	<2	<2	<2
4-Nitroaniline	100-01-6	2	µg/L		<2	<2	<2	<2	<2
Carbazole	86-74-8	2	µg/L		<2	<2	<2	<2	<2
3.3`-Dichlorobenzidine	91-94-1	2	µg/L		<2	<2	<2	<2	<2
EP075I: Organochlorine Pesticides									
alpha-BHC	319-84-6	2	µg/L		<2	<2	<2	<2	<2
beta-BHC	319-85-7	2	µg/L		<2	<2	<2	<2	<2
gamma-BHC	58-89-9	2	µg/L		<2	<2	<2	<2	<2
delta-BHC	319-86-8	2	µg/L		<2	<2	<2	<2	<2
Heptachlor	76-44-8	2	µg/L		<2	<2	<2	<2	<2
Aldrin	309-00-2	2	µg/L		<2	<2	<2	<2	<2
Heptachlor epoxide	1024-57-3	2	µg/L		<2	<2	<2	<2	<2
alpha-Endosulfan	959-98-8	2	µg/L		<2	<2	<2	<2	<2
4.4`-DDE	72-55-9	2	µg/L		<2	<2	<2	<2	<2
Dieldrin	60-57-1	2	µg/L		<2	<2	<2	<2	<2
Endrin	72-20-8	2	µg/L		<2	<2	<2	<2	<2
beta-Endosulfan	33213-65-9	2	µg/L		<2	<2	<2	<2	<2
4.4`-DDD	72-54-8	2	µg/L		<2	<2	<2	<2	<2
Endosulfan sulfate	1031-07-8	2	µg/L		<2	<2	<2	<2	<2
4.4`-DDT	50-29-3	4	µg/L		<4	<4	<4	<4	<4
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	4	µg/L		<4	<4	<4	<4	<4

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: GW101_200912	BH4_200912	BH5_200912	GW103_200912	BH3_200912
				Client sampling date / time: 20-SEP-2012 10:45	20-SEP-2012 11:20	20-SEP-2012 11:50	20-SEP-2012 14:00	20-SEP-2012 14:29
				EM1211100-007	EM1211100-008	EM1211100-009	EM1211100-010	EM1211100-011
EP075I: Organochlorine Pesticides - Continued								
^ Sum of DDD + DDE + DDT	----	4	µg/L	<4	<4	<4	<4	<4
EP075J: Organophosphorus Pesticides								
Dichlorvos	62-73-7	2	µg/L	<2	<2	<2	<2	<2
Dimethoate	60-51-5	2	µg/L	<2	<2	<2	<2	<2
Diazinon	333-41-5	2	µg/L	<2	<2	<2	<2	<2
Chlorpyrifos-methyl	5598-13-0	2	µg/L	<2	<2	<2	<2	<2
Malathion	121-75-5	2	µg/L	<2	<2	<2	<2	<2
Fenthion	55-38-9	2	µg/L	<2	<2	<2	<2	<2
Chlorpyrifos	2921-88-2	2	µg/L	<2	<2	<2	<2	<2
Pirimphos-ethyl	23505-41-1	2	µg/L	<2	<2	<2	<2	<2
Chlorfenvinphos	470-90-6	2	µg/L	<2	<2	<2	<2	<2
Prothiofos	34643-46-4	2	µg/L	<2	<2	<2	<2	<2
Ethion	563-12-2	2	µg/L	<2	<2	<2	<2	<2
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	**1380**
C15 - C28 Fraction	----	100	µg/L	<100	<100	**390**	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	**70**	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	**460**	<50	**1380**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft								
C6 - C10 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	**1310**
>C16 - C34 Fraction	----	100	µg/L	<100	<100	**380**	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	**380**	<100	**1310**
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	**81.9**	**76.0**	**54.1**	**89.2**	**84.3**
EP074S: VOC Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.1	%	**101**	**109**	**107**	**79.4**	**105**
Toluene-D8	2037-26-5	0.1	%	**95.8**	**103**	**102**	**103**	**99.0**
4-Bromofluorobenzene	460-00-4	0.1	%	**81.9**	**83.8**	**82.0**	**85.6**	**81.6**
EP075S: Acid Extractable Surrogates								
2-Fluorophenol	367-12-4	0.1	%	**31.3**	**33.5**	**48.1**	**29.4**	**30.0**
Phenol-d6	13127-88-3	0.1	%	**18.3**	**18.7**	**23.1**	**21.4**	**13.6**
2-Chlorophenol-D4	93951-73-6	0.1	%	**46.6**	**52.6**	**57.6**	**55.1**	**47.4**
2.4.6-Tribromophenol	118-79-6	0.1	%	**50.5**	**77.2**	**73.5**	**70.2**	**74.9**

Analytical Results

Sub-Matrix: WATER				Client sample ID	GW101_200912	BH4_200912	BH5_200912	GW103_200912	BH3_200912
				Client sampling date / time	20-SEP-2012 10:45	20-SEP-2012 11:20	20-SEP-2012 11:50	20-SEP-2012 14:00	20-SEP-2012 14:29
Compound	CAS Number	LOR	Unit		EM1211100-007	EM1211100-008	EM1211100-009	EM1211100-010	EM1211100-011
EP075T: Base/Neutral Extractable Surrogates									
Nitrobenzene-D5	4165-60-0	0.1	%		66.2	69.9	66.0	74.2	78.0
1.2-Dichlorobenzene-D4	2199-69-1	0.1	%		53.0	61.0	55.4	64.5	61.1
2-Fluorobiphenyl	321-60-8	0.1	%		97.7	56.6	60.3	65.4	80.5
Anthracene-d10	1719-06-8	0.1	%		83.6	81.1	65.4	89.5	89.8
4-Terphenyl-d14	1718-51-0	0.1	%		86.8	82.6	85.9	95.2	69.0
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		94.3	103	98.1	83.4	98.1
Toluene-D8	2037-26-5	0.1	%		85.7	90.6	90.6	97.7	87.5
4-Bromofluorobenzene	460-00-4	0.1	%		73.5	74.2	71.8	84.2	72.0

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: GW111_200912 Client sampling date / time: 20-SEP-2012 15:13 EM1211100-012	Client sample ID: GW107_200912 Client sampling date / time: 20-SEP-2012 15:45 EM1211100-013	Client sample ID: GW106_200912 Client sampling date / time: 20-SEP-2012 16:28 EM1211100-014	Client sample ID: GW110_200912 Client sampling date / time: 20-SEP-2012 17:45 EM1211100-015	Client sample ID: GW108_200912 Client sampling date / time: 20-SEP-2012 18:30 EM1211100-016
EA005: pH								
pH Value	----	0.01	pH Unit	6.59	7.26	6.89	7.21	6.76
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	6590	1270	2920	1540	660
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	3660	780	1700	434	400
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	108	320	425	500	129
Total Alkalinity as CaCO3	----	1	mg/L	108	320	425	500	129
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	177	151	127	42	28
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	1900	90	810	189	128
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	81	104	24	15	19
Magnesium	7439-95-4	1	mg/L	113	29	61	22	24
Sodium	7440-23-5	1	mg/L	1220	97	580	277	72
Potassium	7440-09-7	1	mg/L	5	4	2	4	5
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.04	<0.01	1170	0.02	<0.01
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.100	<0.001	<0.001
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.002	<0.100	0.001	<0.001
Barium	7440-39-3	0.001	mg/L	0.129	0.060	0.731	0.080	0.022
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.100	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	0.0002	<0.0001	<0.0100	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	0.034	0.014	0.242	0.003	<0.001
Chromium	7440-47-3	0.001	mg/L	0.002	<0.001	1.45	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	0.003	0.002	0.200	0.009	0.002
Manganese	7439-96-5	0.001	mg/L	1.22	0.891	0.628	0.121	0.298
Nickel	7440-02-0	0.001	mg/L	0.049	0.020	0.611	0.013	0.008
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.146	<0.001	<0.001
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<1.00	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L	0.049	0.007	0.627	0.015	<0.005
Lithium	7439-93-2	0.001	mg/L	0.014	0.002	0.403	0.002	0.005
Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.001	<0.100	0.001	0.010

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: GW111_200912	GW107_200912	GW106_200912	GW110_200912	GW108_200912
				Client sampling date / time: 20-SEP-2012 15:13	20-SEP-2012 15:45	20-SEP-2012 16:28	20-SEP-2012 17:45	20-SEP-2012 18:30
				EM1211100-012	EM1211100-013	EM1211100-014	EM1211100-015	EM1211100-016
EG020F: Dissolved Metals by ICP-MS - Continued								
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<1.00	<0.01	<0.01
Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	<0.100	<0.001	<0.001
Thallium	7440-28-0	0.001	mg/L	<0.001	<0.001	<0.100	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L	**0.21**	**0.06**	<1.00	**0.06**	<0.05
Iron	7439-89-6	0.05	mg/L	<0.05	**2.19**	**540**	<0.05	<0.05
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0100	<0.0001	<0.0001
EG050F: Dissolved Hexavalent Chromium								
Hexavalent Chromium	18540-29-9	0.01	mg/L	<0.01	<0.01	----	<0.01	<0.01
EK026SF: Total CN by Segmented Flow Analyser								
Total Cyanide	57-12-5	0.004	mg/L	<0.004	<0.004	----	<0.004	<0.004
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.2**	**0.3**	**1.6**	**0.4**	**0.2**
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.17**	**0.18**	**0.27**	**0.38**	**0.49**
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	**0.05**	<0.01	**0.06**	**0.02**	**0.10**
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**0.51**	**0.04**	**0.04**	**0.34**	**0.16**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.56**	**0.04**	**0.10**	**0.36**	**0.26**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.5**	**1.8**	**11.1**	**0.9**	**2.8**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**1.1**	**1.8**	**11.2**	**1.3**	**3.1**
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**1.02**	**0.60**	**54.1**	**0.09**	**10.2**
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	**59.4**	**12.1**	**34.0**	**16.2**	**6.77**
Total Cations	----	0.01	meq/L	**66.5**	**11.9**	**31.5**	**14.7**	**6.18**
Ionic Balance	----	0.01	%	**5.62**	**0.74**	**3.83**	**4.85**	**4.55**
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	1	µg/L	<1	<1	<1	<1	<1
EP074A: Monocyclic Aromatic Hydrocarbons								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: GW111_200912	GW107_200912	GW106_200912	GW110_200912	GW108_200912
				Client sampling date / time: 20-SEP-2012 15:13	20-SEP-2012 15:45	20-SEP-2012 16:28	20-SEP-2012 17:45	20-SEP-2012 18:30
				EM1211100-012	EM1211100-013	EM1211100-014	EM1211100-015	EM1211100-016
EP074A: Monocyclic Aromatic Hydrocarbons - Continued								
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2
Styrene	100-42-5	5	µg/L	<5	<5	<5	<5	<5
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2
Isopropylbenzene	98-82-8	5	µg/L	<5	<5	<5	<5	<5
n-Propylbenzene	103-65-1	5	µg/L	<5	<5	<5	<5	<5
1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	<5	<5	<5	<5
sec-Butylbenzene	135-98-8	5	µg/L	<5	<5	<5	<5	<5
1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	<5	<5	<5	<5
tert-Butylbenzene	98-06-6	5	µg/L	<5	<5	<5	<5	<5
p-Isopropyltoluene	99-87-6	5	µg/L	<5	<5	<5	<5	<5
n-Butylbenzene	104-51-8	5	µg/L	<5	<5	<5	<5	<5
EP074B: Oxygenated Compounds								
Vinyl Acetate	108-05-4	50	µg/L	<50	<50	<50	<50	<50
2-Butanone (MEK)	78-93-3	50	µg/L	<50	<50	<50	<50	<50
4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	<50	<50	<50	<50
2-Hexanone (MBK)	591-78-6	50	µg/L	<50	<50	<50	<50	<50
EP074C: Sulfonated Compounds								
Carbon disulfide	75-15-0	5	µg/L	<5	<5	<5	<5	<5
EP074D: Fumigants								
2.2-Dichloropropane	594-20-7	5	µg/L	<5	<5	<5	<5	<5
1.2-Dichloropropane	78-87-5	5	µg/L	<5	<5	<5	<5	<5
cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	<5	<5	<5
trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	<5	<5	<5
1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	<5	<5	<5
EP074E: Halogenated Aliphatic Compounds								
Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	<50	<50	<50
Chloromethane	74-87-3	50	µg/L	<50	<50	<50	<50	<50
Vinyl chloride	75-01-4	50	µg/L	<50	<50	<50	<50	<50
Bromomethane	74-83-9	50	µg/L	<50	<50	<50	<50	<50
Chloroethane	75-00-3	50	µg/L	<50	<50	<50	<50	<50
Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	<50	<50	<50
1.1-Dichloroethene	75-35-4	5	µg/L	<5	<5	<5	<5	<5
Iodomethane	74-88-4	5	µg/L	<5	<5	<5	<5	<5
trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	<5	<5	<5

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: GW111_200912	GW107_200912	GW106_200912	GW110_200912	GW108_200912
				Client sampling date / time: 20-SEP-2012 15:13	20-SEP-2012 15:45	20-SEP-2012 16:28	20-SEP-2012 17:45	20-SEP-2012 18:30
				EM1211100-012	EM1211100-013	EM1211100-014	EM1211100-015	EM1211100-016
EP074E: Halogenated Aliphatic Compounds - Continued								
1.1-Dichloroethane	75-34-3	5	µg/L	<5	<5	<5	<5	<5
cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	<5	<5	<5	<5
1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	<5	<5	<5	<5
1.1-Dichloropropylene	563-58-6	5	µg/L	<5	<5	<5	<5	<5
Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	<5	<5	<5
1.2-Dichloroethane	107-06-2	5	µg/L	<5	<5	<5	<5	<5
Trichloroethene	79-01-6	5	µg/L	<5	<5	<5	<5	<5
Dibromomethane	74-95-3	5	µg/L	<5	<5	<5	<5	<5
1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	<5	<5	<5	<5
1.3-Dichloropropane	142-28-9	5	µg/L	<5	<5	<5	<5	<5
Tetrachloroethene	127-18-4	5	µg/L	<5	<5	<5	<5	<5
1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	<5	<5	<5
trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	<5	<5	<5	<5
cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	<5	<5	<5
1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	<5	<5	<5
1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	<5	<5	<5	<5
Pentachloroethane	76-01-7	5	µg/L	<5	<5	<5	<5	<5
1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	<5	<5	<5
EP074F: Halogenated Aromatic Compounds								
Chlorobenzene	108-90-7	5	µg/L	<5	<5	<5	<5	<5
Bromobenzene	108-86-1	5	µg/L	<5	<5	<5	<5	<5
2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	<5	<5	<5
4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	<5	<5	<5
1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	<5	<5	<5
EP074G: Trihalomethanes								
Chloroform	67-66-3	5	µg/L	<5	<5	<5	<5	<5
Bromodichloromethane	75-27-4	5	µg/L	<5	<5	<5	<5	<5
Dibromochloromethane	124-48-1	5	µg/L	<5	<5	<5	<5	<5
Bromoform	75-25-2	5	µg/L	<5	<5	<5	<5	<5
EP075A: Phenolic Compounds								
Phenol	108-95-2	2	µg/L	<2	<2	<2	<2	<2
2-Chlorophenol	95-57-8	2	µg/L	<2	<2	<2	<2	<2
2-Methylphenol	95-48-7	2	µg/L	<2	<2	<2	<2	<2
3- & 4-Methylphenol	1319-77-3	4	µg/L	<4	<4	<4	<4	<4
2-Nitrophenol	88-75-5	2	µg/L	<2	<2	<2	<2	<2
2.4-Dimethylphenol	105-67-9	2	µg/L	<2	<2	<2	<2	<2

Analytical Results

Sub-Matrix: WATER				Client sample ID	GW111_200912	GW107_200912	GW106_200912	GW110_200912	GW108_200912
				Client sampling date / time	20-SEP-2012 15:13	20-SEP-2012 15:45	20-SEP-2012 16:28	20-SEP-2012 17:45	20-SEP-2012 18:30
Compound	CAS Number	LOR	Unit		EM1211100-012	EM1211100-013	EM1211100-014	EM1211100-015	EM1211100-016
EP075A: Phenolic Compounds - Continued									
2.4-Dichlorophenol	120-83-2	2	µg/L		<2	<2	<2	<2	<2
2.6-Dichlorophenol	87-65-0	2	µg/L		<2	<2	<2	<2	<2
4-Chloro-3-Methylphenol	59-50-7	2	µg/L		<2	<2	<2	<2	<2
2.4.6-Trichlorophenol	88-06-2	2	µg/L		<2	<2	<2	<2	<2
2.4.5-Trichlorophenol	95-95-4	2	µg/L		<2	<2	<2	<2	<2
Pentachlorophenol	87-86-5	4	µg/L		<4	<4	<4	<4	<4
EP075B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	2	µg/L		<2	<2	**9**	<2	**4**
2-Methylnaphthalene	91-57-6	2	µg/L		<2	<2	<2	<2	<2
2-Chloronaphthalene	91-58-7	2	µg/L		<2	<2	<2	<2	<2
Acenaphthylene	208-96-8	2	µg/L		<2	<2	<2	<2	<2
Acenaphthene	83-32-9	2	µg/L		<2	<2	<2	<2	<2
Fluorene	86-73-7	2	µg/L		<2	<2	<2	<2	<2
Phenanthrene	85-01-8	2	µg/L		<2	<2	**2**	<2	<2
Anthracene	120-12-7	2	µg/L		<2	<2	**2**	<2	<2
Fluoranthene	206-44-0	2	µg/L		<2	<2	<2	<2	<2
Pyrene	129-00-0	2	µg/L		<2	<2	<2	<2	<2
N-2-Fluorenyl Acetamide	53-96-3	2	µg/L		<2	<2	<2	<2	<2
Benz(a)anthracene	56-55-3	2	µg/L		<2	<2	<2	<2	<2
Chrysene	218-01-9	2	µg/L		<2	<2	<2	<2	<2
Benzo(b) & Benzo(k)fluoranthene	205-99-2 207-08-9	4	µg/L		<4	<4	<4	<4	<4
7.12-Dimethylbenz(a)anthracene	57-97-6	2	µg/L		<2	<2	<2	<2	<2
Benzo(a)pyrene	50-32-8	2	µg/L		<2	<2	<2	<2	<2
3-Methylcholanthrene	56-49-5	2	µg/L		<2	<2	<2	<2	<2
Indeno(1.2.3.cd)pyrene	193-39-5	2	µg/L		<2	<2	<2	<2	<2
Dibenz(a.h)anthracene	53-70-3	2	µg/L		<2	<2	<2	<2	<2
Benzo(g.h.i)perylene	191-24-2	2	µg/L		<2	<2	<2	<2	<2
^ Sum of PAHs	----	2	µg/L		<2	<2	**13**	<2	**4**
^ Benzo(a)pyrene TEQ (WHO)	----	2	µg/L		<2	<2	<2	<2	<2
EP075C: Phthalate Esters									
Dimethyl phthalate	131-11-3	2	µg/L		<2	<2	<2	<2	<2
Diethyl phthalate	84-66-2	2	µg/L		<2	<2	<2	<2	<2
Di-n-butyl phthalate	84-74-2	2	µg/L		<2	<2	<2	<2	<2
Butyl benzyl phthalate	85-68-7	2	µg/L		<2	<2	<2	<2	<2
bis(2-ethylhexyl) phthalate	117-81-7	10	µg/L		<10	<10	**175**	<10	**78**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: GW111_200912	GW107_200912	GW106_200912	GW110_200912	GW108_200912
				Client sampling date / time: 20-SEP-2012 15:13	20-SEP-2012 15:45	20-SEP-2012 16:28	20-SEP-2012 17:45	20-SEP-2012 18:30
				EM1211100-012	EM1211100-013	EM1211100-014	EM1211100-015	EM1211100-016
EP075C: Phthalate Esters - Continued								
Di-n-octylphthalate	117-84-0	2	µg/L	<2	<2	<2	<2	<2
EP075D: Nitrosamines								
N-Nitrosomethylethylamine	10595-95-6	2	µg/L	<2	<2	<2	<2	<2
N-Nitrosodiethylamine	55-18-5	2	µg/L	<2	<2	<2	<2	<2
N-Nitrosopyrrolidine	930-55-2	4	µg/L	<4	<4	<4	<4	<4
N-Nitrosomorpholine	59-89-2	2	µg/L	<2	<2	<2	<2	<2
N-Nitrosodi-n-propylamine	621-64-7	2	µg/L	<2	<2	<2	<2	<2
N-Nitrosopiperidine	100-75-4	2	µg/L	<2	<2	<2	<2	<2
N-Nitrosodibutylamine	924-16-3	2	µg/L	<2	<2	<2	<2	<2
N-Nitrosodiphenyl & Diphenylamine	86-30-6 122-39-4	4	µg/L	<4	<4	<4	<4	<4
Methapyrilene	91-80-5	2	µg/L	<2	<2	<2	<2	<2
EP075E: Nitroaromatics and Ketones								
2-Picoline	109-06-8	2	µg/L	<2	<2	<2	<2	<2
Acetophenone	98-86-2	2	µg/L	<2	<2	4	<2	<2
Nitrobenzene	98-95-3	2	µg/L	<2	<2	<2	<2	<2
Isophorone	78-59-1	2	µg/L	<2	<2	<2	<2	<2
2.6-Dinitrotoluene	606-20-2	4	µg/L	<4	<4	<4	<4	<4
2.4-Dinitrotoluene	121-14-2	4	µg/L	<4	<4	<4	<4	<4
1-Naphthylamine	134-32-7	2	µg/L	<2	<2	<2	<2	<2
4-Nitroquinoline-N-oxide	56-57-5	2	µg/L	<2	<2	<2	<2	<2
5-Nitro-o-toluidine	99-55-8	2	µg/L	<2	<2	<2	<2	<2
Azobenzene	103-33-3	2	µg/L	<2	<2	<2	<2	<2
1.3.5-Trinitrobenzene	99-35-4	2	µg/L	<2	<2	<2	<2	<2
Phenacetin	62-44-2	2	µg/L	<2	<2	<2	<2	<2
4-Aminobiphenyl	92-67-1	2	µg/L	<2	<2	<2	<2	<2
Pentachloronitrobenzene	82-68-8	2	µg/L	<2	<2	<2	<2	<2
Pronamide	23950-58-5	2	µg/L	<2	<2	<2	<2	<2
Dimethylaminoazobenzene	60-11-7	2	µg/L	<2	<2	<2	<2	<2
Chlorobenzilate	510-15-6	2	µg/L	<2	<2	<2	<2	<2
EP075F: Haloethers								
Bis(2-chloroethyl) ether	111-44-4	2	µg/L	<2	<2	<2	<2	<2
Bis(2-chloroethoxy) methane	111-91-1	2	µg/L	<2	<2	<2	<2	<2
4-Chlorophenyl phenyl ether	7005-72-3	2	µg/L	<2	<2	<2	<2	<2
4-Bromophenyl phenyl ether	101-55-3	2	µg/L	<2	<2	<2	<2	<2
EP075G: Chlorinated Hydrocarbons								

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: GW111_200912	GW107_200912	GW106_200912	GW110_200912	GW108_200912
				Client sampling date / time: 20-SEP-2012 15:13	20-SEP-2012 15:45	20-SEP-2012 16:28	20-SEP-2012 17:45	20-SEP-2012 18:30
				EM1211100-012	EM1211100-013	EM1211100-014	EM1211100-015	EM1211100-016
EP075G: Chlorinated Hydrocarbons - Continued								
1.3-Dichlorobenzene	541-73-1	2	µg/L	<2	<2	<2	<2	<2
1.4-Dichlorobenzene	106-46-7	2	µg/L	<2	<2	<2	<2	<2
1.2-Dichlorobenzene	95-50-1	2	µg/L	<2	<2	<2	<2	<2
Hexachloroethane	67-72-1	2	µg/L	<2	<2	<2	<2	<2
1.2.4-Trichlorobenzene	120-82-1	2	µg/L	<2	<2	<2	<2	<2
Hexachloropropylene	1888-71-7	2	µg/L	<2	<2	<2	<2	<2
Hexachlorobutadiene	87-68-3	2	µg/L	<2	<2	<2	<2	<2
Hexachlorocyclopentadiene	77-47-4	10	µg/L	<10	<10	<10	<10	<10
Pentachlorobenzene	608-93-5	2	µg/L	<2	<2	<2	<2	<2
Hexachlorobenzene (HCB)	118-74-1	4	µg/L	<4	<4	<4	<4	<4
EP075H: Anilines and Benzidines								
Aniline	62-53-3	2	µg/L	<2	<2	<2	<2	<2
4-Chloroaniline	106-47-8	2	µg/L	<2	<2	<2	<2	<2
2-Nitroaniline	88-74-4	4	µg/L	<4	<4	<4	<4	<4
3-Nitroaniline	99-09-2	4	µg/L	<4	<4	<4	<4	<4
Dibenzofuran	132-64-9	2	µg/L	<2	<2	<2	<2	<2
4-Nitroaniline	100-01-6	2	µg/L	<2	<2	<2	<2	<2
Carbazole	86-74-8	2	µg/L	<2	<2	<2	<2	<2
3.3`-Dichlorobenzidine	91-94-1	2	µg/L	<2	<2	<2	<2	<2
EP075I: Organochlorine Pesticides								
alpha-BHC	319-84-6	2	µg/L	<2	<2	<2	<2	<2
beta-BHC	319-85-7	2	µg/L	<2	<2	<2	<2	<2
gamma-BHC	58-89-9	2	µg/L	<2	<2	<2	<2	<2
delta-BHC	319-86-8	2	µg/L	<2	<2	<2	<2	<2
Heptachlor	76-44-8	2	µg/L	<2	<2	<2	<2	<2
Aldrin	309-00-2	2	µg/L	<2	<2	<2	<2	<2
Heptachlor epoxide	1024-57-3	2	µg/L	<2	<2	<2	<2	<2
alpha-Endosulfan	959-98-8	2	µg/L	<2	<2	<2	<2	<2
4.4`-DDE	72-55-9	2	µg/L	<2	<2	<2	<2	<2
Dieldrin	60-57-1	2	µg/L	<2	<2	<2	<2	<2
Endrin	72-20-8	2	µg/L	<2	<2	<2	<2	<2
beta-Endosulfan	33213-65-9	2	µg/L	<2	<2	<2	<2	<2
4.4`-DDD	72-54-8	2	µg/L	<2	<2	<2	<2	<2
Endosulfan sulfate	1031-07-8	2	µg/L	<2	<2	<2	<2	<2
4.4`-DDT	50-29-3	4	µg/L	<4	<4	<4	<4	<4
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	4	µg/L	<4	<4	<4	<4	<4

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: GW111_200912	GW107_200912	GW106_200912	GW110_200912	GW108_200912
				Client sampling date / time: 20-SEP-2012 15:13	20-SEP-2012 15:45	20-SEP-2012 16:28	20-SEP-2012 17:45	20-SEP-2012 18:30
				EM1211100-012	EM1211100-013	EM1211100-014	EM1211100-015	EM1211100-016
EP075I: Organochlorine Pesticides - Continued								
^ Sum of DDD + DDE + DDT	----	4	µg/L	<4	<4	<4	<4	<4
EP075J: Organophosphorus Pesticides								
Dichlorvos	62-73-7	2	µg/L	<2	<2	<2	<2	<2
Dimethoate	60-51-5	2	µg/L	<2	<2	<2	<2	<2
Diazinon	333-41-5	2	µg/L	<2	<2	<2	<2	<2
Chlorpyrifos-methyl	5598-13-0	2	µg/L	<2	<2	<2	<2	<2
Malathion	121-75-5	2	µg/L	<2	<2	<2	<2	<2
Fenthion	55-38-9	2	µg/L	<2	<2	<2	<2	<2
Chlorpyrifos	2921-88-2	2	µg/L	<2	<2	<2	<2	<2
Pirimphos-ethyl	23505-41-1	2	µg/L	<2	<2	<2	<2	<2
Chlorfenvinphos	470-90-6	2	µg/L	<2	<2	<2	<2	<2
Prothiofos	34643-46-4	2	µg/L	<2	<2	<2	<2	<2
Ethion	563-12-2	2	µg/L	<2	<2	<2	<2	<2
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	**810**	**310**	**390**
C29 - C36 Fraction	----	50	µg/L	<50	<50	**190**	<50	**150**
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	**1000**	**310**	**540**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft								
C6 - C10 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	<100	**870**	**300**	**470**
>C34 - C40 Fraction	----	100	µg/L	<100	<100	**150**	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	**1020**	**300**	**470**
EP216: Perchlorate by LC/MS								
Perchlorate	7601-90-3	0.2	µg/L	----	<0.2	----	**11.0**	----
EP231: Perfluorooctyl Acids and Sulfonates.								
PFOS	1763-23-1	0.02	µg/L	----	**139**	----	**3320**	----
PFOA	335-67-1	0.02	µg/L	----	**15.7**	----	**92.0**	----
6:2 Fluorotelomer Sulfonate (6:2 FtS)	27619-97-2	0.1	µg/L	----	**57.9**	----	**1210**	----
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	**77.4**	**67.2**	**24.5**	**93.6**	**71.4**
EP074S: VOC Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.1	%	**100**	**83.9**	**109**	**107**	**104**

Analytical Results

Sub-Matrix: WATER				Client sample ID	GW111_200912	GW107_200912	GW106_200912	GW110_200912	GW108_200912
				Client sampling date / time	20-SEP-2012 15:13	20-SEP-2012 15:45	20-SEP-2012 16:28	20-SEP-2012 17:45	20-SEP-2012 18:30
Compound	CAS Number	LOR	Unit		EM1211100-012	EM1211100-013	EM1211100-014	EM1211100-015	EM1211100-016
EP074S: VOC Surrogates - Continued									
Toluene-D8	2037-26-5	0.1	%		94.8	107	100	98.5	93.4
4-Bromofluorobenzene	460-00-4	0.1	%		79.4	88.6	87.4	79.7	80.6
EP075S: Acid Extractable Surrogates									
2-Fluorophenol	367-12-4	0.1	%		25.7	29.1	16.4	27.7	29.4
Phenol-d6	13127-88-3	0.1	%		17.4	17.9	14.4	21.8	22.3
2-Chlorophenol-D4	93951-73-6	0.1	%		45.5	46.2	20.4	64.2	59.1
2.4.6-Tribromophenol	118-79-6	0.1	%		81.3	54.5	23.5	85.1	68.2
EP075T: Base/Neutral Extractable Surrogates									
Nitrobenzene-D5	4165-60-0	0.1	%		64.9	64.5	25.6	65.7	60.7
1.2-Dichlorobenzene-D4	2199-69-1	0.1	%		57.8	54.5	19.7	63.7	52.5
2-Fluorobiphenyl	321-60-8	0.1	%		72.2	66.4	32.3	81.0	61.0
Anthracene-d10	1719-06-8	0.1	%		85.8	75.7	28.2	102	69.8
4-Terphenyl-d14	1718-51-0	0.1	%		85.6	74.1	37.4	76.2	53.7
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		93.4	88.3	102	99.9	97.2
Toluene-D8	2037-26-5	0.1	%		83.3	101	88.0	87.0	82.3
4-Bromofluorobenzene	460-00-4	0.1	%		79.4	85.1	75.4	71.8	70.6

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	27.8	134
EP074S: VOC Surrogates			
1.2-Dichloroethane-D4	17060-07-0	72	132
Toluene-D8	2037-26-5	74	128
4-Bromofluorobenzene	460-00-4	70	132
EP075S: Acid Extractable Surrogates			
2-Fluorophenol	367-12-4	10	83
Phenol-d6	13127-88-3	10	49
2-Chlorophenol-D4	93951-73-6	20.3	101
2.4.6-Tribromophenol	118-79-6	19.5	134
EP075T: Base/Neutral Extractable Surrogates			
Nitrobenzene-D5	4165-60-0	18.2	114
1.2-Dichlorobenzene-D4	2199-69-1	18.8	100
2-Fluorobiphenyl	321-60-8	25.3	122
Anthracene-d10	1719-06-8	35	137
4-Terphenyl-d14	1718-51-0	32	136
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	131
Toluene-D8	2037-26-5	72	124
4-Bromofluorobenzene	460-00-4	70	126

QUALITY CONTROL REPORT

Work Order	: **EM1211100**	Page	: 1 of 19
Client	: **CARDNO LANE PIPER PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: MR MARCUS BOYD (Cardno)	Contact	: Sarah Hodgson
Address	: 154 HIGHBURY ROAD BURWOOD VIC, AUSTRALIA 3125	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: marcus.boyd@cardno.com.au	E-mail	: sarah.hodgson@alsenviro.com
Telephone	: +61 03 98880100	Telephone	: 03 8549 9652
Facsimile	: +61 03 98083511	Facsimile	: 03 8549 9626
Project	: 212163 2	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: Fiskville		
C-O-C number	: ----	Date Samples Received	: 21-SEP-2012
Sampler	: MB	Issue Date	: 03-OCT-2012
Order number	: ----		
		No. of samples received	: 17
Quote number	: ME/441/12	No. of samples analysed	: 15

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

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics
Eric Chau	Metals Team Leader	Melbourne Inorganics
Lana Nguyen	Senior LCMS Chemist	Sydney Organics
Nancy Wang	Senior Semivolatile Instrument Chemist	Melbourne Organics
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics

General Comments

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

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

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

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

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR:- No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:- 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005: pH (QC Lot: 2516410)									
EM1211083-001	Anonymous	EA005: pH Value	---	0.01	pH Unit	5.89	5.92	0.5	0% - 20%
EM1211100-007	GW101_200912	EA005: pH Value	---	0.01	pH Unit	7.77	7.81	0.5	0% - 20%
EA010: Conductivity (QC Lot: 2523718)									
EM1211100-007	GW101_200912	EA010: Electrical Conductivity @ 25°C	---	1	µS/cm	6850	6900	0.7	0% - 20%
EM1211206-001	Anonymous	EA010: Electrical Conductivity @ 25°C	---	1	µS/cm	10000	9960	0.5	0% - 20%
EA015: Total Dissolved Solids (QC Lot: 2519737)									
EM1211069-001	Anonymous	EA015H: Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	1160	1150	0.7	0% - 20%
EM1211100-009	BH5_200912	EA015H: Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	3240	3300	1.8	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2518793)									
EM1211032-015	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	3	2	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	32	31	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	---	1	mg/L	34	34	2.9	0% - 20%
EM1211071-005	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	4	5	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	37	36	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	---	1	mg/L	41	41	0.0	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2518795)									
EM1211100-008	BH4_200912	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	268	265	1.1	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	---	1	mg/L	268	265	1.1	0% - 20%
EM1211149-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Total Alkalinity as CaCO3	---	1	mg/L	<1	<1	0.0	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2516279)									
EM1211100-007	GW101_200912	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	74	74	0.0	0% - 20%
EM1211100-015	GW110_200912	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	42	43	0.0	0% - 20%
ED045G: Chloride Discrete analyser (QC Lot: 2516278)									
EM1211100-007	GW101_200912	ED045G: Chloride	16887-00-6	1	mg/L	1900	1850	2.2	0% - 20%
EM1211100-015	GW110_200912	ED045G: Chloride	16887-00-6	1	mg/L	189	190	0.5	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2516277)									
EM1211100-007	GW101_200912	ED093F: Calcium	7440-70-2	1	mg/L	103	105	2.0	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED093F: Dissolved Major Cations (QC Lot: 2516277) - continued									
EM1211100-007	GW101_200912	ED093F: Magnesium	7439-95-4	1	mg/L	300	302	0.5	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	821	824	0.3	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	12	12	0.0	0% - 50%
EM1211100-015	GW110_200912	ED093F: Calcium	7440-70-2	1	mg/L	15	15	0.0	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	22	22	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	277	277	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	4	4	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2525557)									
EM1211100-001	QC01_200912	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Antimony	7440-36-0	0.001	mg/L	0.003	0.002	50.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.060	0.059	2.0	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.014	0.013	0.0	0% - 50%
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lithium	7439-93-2	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.887	0.942	6.0	0% - 20%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.020	0.019	0.0	0% - 50%
		EG020A-F: Thallium	7440-28-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.008	0.007	13.3	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.02	0.03	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.06	0.06	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	2.49	2.64	6.0	0% - 20%
EM1211100-013	GW107_200912	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.060	0.058	3.0	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.014	0.013	0.0	0% - 50%
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lithium	7439-93-2	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.891	0.868	2.7	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2525557) - continued									
EM1211100-013	GW107_200912	EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.020	0.019	7.8	0% - 50%
		EG020A-F: Thallium	7440-28-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.007	0.013	60.0	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.02	85.7	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.06	0.06	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	2.19	2.18	0.5	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2525559)									
EM1211100-001	QC01_200912	EG020B-F: Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EM1211100-013	GW107_200912	EG020B-F: Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2525555)									
EM1211100-001	QC01_200912	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EM1211100-013	GW107_200912	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EG050F: Dissolved Hexavalent Chromium (QC Lot: 2518555)									
EM1211100-010	GW103_200912	EG050F: Hexavalent Chromium	18540-29-9	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EG050F: Dissolved Hexavalent Chromium (QC Lot: 2522412)									
EM1211100-007	GW101_200912	EG050F: Hexavalent Chromium	18540-29-9	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EM1211233-002	Anonymous	EG050F: Hexavalent Chromium	18540-29-9	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK026SF: Total CN by Segmented Flow Analyser (QC Lot: 2518020)									
EM1211149-002	Anonymous	EK026SF: Total Cyanide	57-12-5	0.004	mg/L	<0.004	<0.004	0.0	No Limit
EM1211149-008	Anonymous	EK026SF: Total Cyanide	57-12-5	0.004	mg/L	<0.004	<0.004	0.0	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 2518794)									
EM1211069-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.1	0.1	0.0	No Limit
EM1211100-011	BH3_200912	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.1	0.1	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2521030)									
EM1211100-001	QC01_200912	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.20	0.20	0.0	0% - 20%
EM1211100-015	GW110_200912	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.38	0.38	0.0	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2516276)									
EM1211100-007	GW101_200912	EK057G: Nitrite as N	---	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EM1211100-015	GW110_200912	EK057G: Nitrite as N	---	0.01	mg/L	0.02	0.02	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2521029)									
EM1211028-001	Anonymous	EK059G: Nitrite + Nitrate as N	---	0.01	mg/L	0.58	0.59	0.0	0% - 20%
EM1211100-002	QC03_200912	EK059G: Nitrite + Nitrate as N	---	0.01	mg/L	0.37	0.38	0.0	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 2517360)									
EM1211100-007	GW101_200912	EK061G: Total Kjeldahl Nitrogen as N	---	0.1	mg/L	<0.1	<0.1	0.0	No Limit
EM1211100-016	GW108_200912	EK061G: Total Kjeldahl Nitrogen as N	---	0.1	mg/L	2.8	4.7	49.8	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2517361)									
EM1211100-007	GW101_200912	EK067G: Total Phosphorus as P	---	0.01	mg/L	0.38	0.37	4.8	0% - 20%
EM1211100-016	GW108_200912	EK067G: Total Phosphorus as P	---	0.01	mg/L	10.2	8.44	18.9	0% - 20%
EP074A: Monocyclic Aromatic Hydrocarbons (QC Lot: 2523230)									
EM1211100-007	GW101_200912	EP074: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP074: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP074: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP074: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP074: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP074: Styrene	100-42-5	5	µg/L	<5	<5	0.0	No Limit
		EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	<5	0.0	No Limit
		EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	<5	0.0	No Limit
		EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	<5	0.0	No Limit
		EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	<5	0.0	No Limit
		EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	<5	0.0	No Limit
		EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	<5	0.0	No Limit
		EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	<5	0.0	No Limit
		EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	<5	0.0	No Limit
EM1211100-015	GW110_200912	EP074: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP074: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP074: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP074: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP074: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP074: Styrene	100-42-5	5	µg/L	<5	<5	0.0	No Limit
		EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	<5	0.0	No Limit
		EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	<5	0.0	No Limit
		EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	<5	0.0	No Limit
		EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	<5	0.0	No Limit
		EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	<5	0.0	No Limit
		EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	<5	0.0	No Limit
		EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	<5	0.0	No Limit
		EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	<5	0.0	No Limit
EP074B: Oxygenated Compounds (QC Lot: 2523230)									
EM1211100-007	GW101_200912	EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	<50	0.0	No Limit
		EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	<50	0.0	No Limit
		EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	<50	0.0	No Limit
		EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	<50	0.0	No Limit
EM1211100-015	GW110_200912	EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	<50	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP074B: Oxygenated Compounds (QC Lot: 2523230) - continued									
EM1211100-015	GW110_200912	EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	<50	0.0	No Limit
		EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	<50	0.0	No Limit
		EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	<50	0.0	No Limit
EP074C: Sulfonated Compounds (QC Lot: 2523230)									
EM1211100-007	GW101_200912	EP074: Carbon disulfide	75-15-0	5	µg/L	<5	<5	0.0	No Limit
EM1211100-015	GW110_200912	EP074: Carbon disulfide	75-15-0	5	µg/L	<5	<5	0.0	No Limit
EP074D: Fumigants (QC Lot: 2523230)									
EM1211100-007	GW101_200912	EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	<5	0.0	No Limit
		EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	<5	0.0	No Limit
		EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	0.0	No Limit
		EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	0.0	No Limit
		EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	0.0	No Limit
EM1211100-015	GW110_200912	EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	<5	0.0	No Limit
		EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	<5	0.0	No Limit
		EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	0.0	No Limit
		EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	0.0	No Limit
		EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	0.0	No Limit
EP074E: Halogenated Aliphatic Compounds (QC Lot: 2523230)									
EM1211100-007	GW101_200912	EP074: 1.1-Dichloroethene	75-35-4	5	µg/L	<5	<5	0.0	No Limit
		EP074: Iodomethane	74-88-4	5	µg/L	<5	<5	0.0	No Limit
		EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	0.0	No Limit
		EP074: 1.1-Dichloroethane	75-34-3	5	µg/L	<5	<5	0.0	No Limit
		EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	<5	0.0	No Limit
		EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	<5	0.0	No Limit
		EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	<5	0.0	No Limit
		EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	0.0	No Limit
		EP074: 1.2-Dichloroethane	107-06-2	5	µg/L	<5	<5	0.0	No Limit
		EP074: Trichloroethene	79-01-6	5	µg/L	<5	<5	0.0	No Limit
		EP074: Dibromomethane	74-95-3	5	µg/L	<5	<5	0.0	No Limit
		EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	<5	0.0	No Limit
		EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	<5	0.0	No Limit
		EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	<5	0.0	No Limit
		EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	0.0	No Limit
		EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	<5	0.0	No Limit
		EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	0.0	No Limit
		EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	0.0	No Limit
		EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	<5	0.0	No Limit
		EP074: Pentachloroethane	76-01-7	5	µg/L	<5	<5	0.0	No Limit
		EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP074E: Halogenated Aliphatic Compounds (QC Lot: 2523230) - continued									
EM1211100-007	GW101_200912	EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	0.0	No Limit
		EP074: Chloromethane	74-87-3	50	µg/L	<50	<50	0.0	No Limit
		EP074: Vinyl chloride	75-01-4	50	µg/L	<50	<50	0.0	No Limit
		EP074: Bromomethane	74-83-9	50	µg/L	<50	<50	0.0	No Limit
		EP074: Chloroethane	75-00-3	50	µg/L	<50	<50	0.0	No Limit
		EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	0.0	No Limit
EM1211100-015	GW110_200912	EP074: 1.1-Dichloroethene	75-35-4	5	µg/L	<5	<5	0.0	No Limit
		EP074: Iodomethane	74-88-4	5	µg/L	<5	<5	0.0	No Limit
		EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	0.0	No Limit
		EP074: 1.1-Dichloroethane	75-34-3	5	µg/L	<5	<5	0.0	No Limit
		EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	<5	0.0	No Limit
		EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	<5	0.0	No Limit
		EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	<5	0.0	No Limit
		EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	0.0	No Limit
		EP074: 1.2-Dichloroethane	107-06-2	5	µg/L	<5	<5	0.0	No Limit
		EP074: Trichloroethene	79-01-6	5	µg/L	<5	<5	0.0	No Limit
		EP074: Dibromomethane	74-95-3	5	µg/L	<5	<5	0.0	No Limit
		EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	<5	0.0	No Limit
		EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	<5	0.0	No Limit
		EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	<5	0.0	No Limit
		EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	0.0	No Limit
		EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	<5	0.0	No Limit
		EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	0.0	No Limit
		EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	0.0	No Limit
		EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	<5	0.0	No Limit
		EP074: Pentachloroethane	76-01-7	5	µg/L	<5	<5	0.0	No Limit
		EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	0.0	No Limit
		EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	0.0	No Limit
		EP074: Chloromethane	74-87-3	50	µg/L	<50	<50	0.0	No Limit
		EP074: Vinyl chloride	75-01-4	50	µg/L	<50	<50	0.0	No Limit
		EP074: Bromomethane	74-83-9	50	µg/L	<50	<50	0.0	No Limit
		EP074: Chloroethane	75-00-3	50	µg/L	<50	<50	0.0	No Limit
		EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	0.0	No Limit
EP074F: Halogenated Aromatic Compounds (QC Lot: 2523230)									
EM1211100-007	GW101_200912	EP074: Chlorobenzene	108-90-7	5	µg/L	<5	<5	0.0	No Limit
		EP074: Bromobenzene	108-86-1	5	µg/L	<5	<5	0.0	No Limit
		EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	0.0	No Limit
		EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	0.0	No Limit
		EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP074F: Halogenated Aromatic Compounds (QC Lot: 2523230) - continued									
EM1211100-015	GW110_200912	EP074: Chlorobenzene	108-90-7	5	µg/L	<5	<5	0.0	No Limit
		EP074: Bromobenzene	108-86-1	5	µg/L	<5	<5	0.0	No Limit
		EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	0.0	No Limit
		EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	0.0	No Limit
		EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	0.0	No Limit
EP074G: Trihalomethanes (QC Lot: 2523230)									
EM1211100-007	GW101_200912	EP074: Chloroform	67-66-3	5	µg/L	<5	<5	0.0	No Limit
		EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	<5	0.0	No Limit
		EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	<5	0.0	No Limit
		EP074: Bromoform	75-25-2	5	µg/L	<5	<5	0.0	No Limit
EM1211100-015	GW110_200912	EP074: Chloroform	67-66-3	5	µg/L	<5	<5	0.0	No Limit
		EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	<5	0.0	No Limit
		EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	<5	0.0	No Limit
		EP074: Bromoform	75-25-2	5	µg/L	<5	<5	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2516052)									
EM1211149-003	Anonymous	EP071: C15 - C28 Fraction	---	100	µg/L	580	490	16.3	No Limit
		EP071: C10 - C14 Fraction	---	50	µg/L	<50	<50	0.0	No Limit
		EP071: C29 - C36 Fraction	---	50	µg/L	660	590	11.2	0% - 50%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2523229)									
EM1211100-007	GW101_200912	EP080: C6 - C9 Fraction	---	20	µg/L	<20	<20	0.0	No Limit
EM1211100-015	GW110_200912	EP080: C6 - C9 Fraction	---	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QC Lot: 2516052)									
EM1211149-003	Anonymous	EP071: >C10 - C16 Fraction	---	100	µg/L	<100	<100	0.0	No Limit
		EP071: >C16 - C34 Fraction	---	100	µg/L	1080	940	13.2	No Limit
		EP071: >C34 - C40 Fraction	---	100	µg/L	340	300	9.8	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QC Lot: 2523229)									
EM1211100-007	GW101_200912	EP080: C6 - C10 Fraction	---	20	µg/L	<20	<20	0.0	No Limit
EM1211100-015	GW110_200912	EP080: C6 - C10 Fraction	---	20	µg/L	<20	<20	0.0	No Limit
EP216: Perchlorate by LC/MS (QC Lot: 2516184)									
EM1211100-013	GW107_200912	EP216: Perchlorate	7601-90-3	0.2	µg/L	<0.2	<0.2	0.0	No Limit
EP231: Perfluorooctyl Acids and Sulfonates. (QC Lot: 2516351)									
EB1224875-001	Anonymous	EP231: PFOS	1763-23-1	0.02	µg/L	10.3	9.89	4.0	0% - 20%
		EP231: PFOA	335-67-1	0.02	µg/L	0.19	0.19	0.0	No Limit
		EP231: 6:2 Fluorotelomer Sulfonate (6:2 FtS)	27619-97-2	0.1	µg/L	<0.1	<0.1	0.0	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA010: Conductivity (QCLot: 2523718)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1413 µS/cm	101	98	102
EA015: Total Dissolved Solids (QCLot: 2519737)								
EA015H: Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	<10	2000 mg/L	100	98	104
ED037P: Alkalinity by PC Titrator (QCLot: 2518793)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	200 mg/L	99.0	77	127
ED037P: Alkalinity by PC Titrator (QCLot: 2518795)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	200 mg/L	97.2	77	127
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2516279)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	12.5 mg/L	116	81	125
ED045G: Chloride Discrete analyser (QCLot: 2516278)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	103	89	117
ED093F: Dissolved Major Cations (QCLot: 2516277)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	5 mg/L	103	83	129
ED093F: Magnesium	7439-95-4	1	mg/L	<1	5 mg/L	102	80	124
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	101	77	125
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	93.1	77	123
EG020F: Dissolved Metals by ICP-MS (QCLot: 2525557)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	101	80	120
EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	0.1 mg/L	88.6	80	124
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	101	87	109
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	103	70	124
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	104	88	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	97.9	88	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	101	86	112
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	106	87	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	104	86	108
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	97.1	90	110
EG020A-F: Lithium	7439-93-2	0.001	mg/L	<0.001	0.1 mg/L	104	60	130
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	89.0	87	111
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	95.9	84	108
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	102	86	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	95.6	83	111
EG020A-F: Thallium	7440-28-0	0.001	mg/L	<0.001	0.1 mg/L	92.7	77	107

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2525557) - continued								
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	94.9	85	113
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	99.4	86	120
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.1 mg/L	104	61	133
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	105	79	119
EG020F: Dissolved Metals by ICP-MS (QCLot: 2525559)								
EG020B-F: Silver	7440-22-4	0.001	mg/L	<0.001	----	----	----	----
EG035F: Dissolved Mercury by FIMS (QCLot: 2525555)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.0100 mg/L	107	71	125
EG050F: Dissolved Hexavalent Chromium (QCLot: 2518555)								
EG050F: Hexavalent Chromium	18540-29-9	0.01	mg/L	<0.01	0.5 mg/L	101	80	120
EG050F: Dissolved Hexavalent Chromium (QCLot: 2522412)								
EG050F: Hexavalent Chromium	18540-29-9	0.01	mg/L	<0.01	0.5 mg/L	101	80	120
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 2518020)								
EK026SF: Total Cyanide	57-12-5	0.004	mg/L	<0.004	0.2 mg/L	91.6	85	125
EK040P: Fluoride by PC Titrator (QCLot: 2518794)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	98.8	78	120
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2521030)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	94.2	76	122
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2516276)								
EK057G: Nitrite as N	----	0.01	mg/L	<0.01	0.5 mg/L	95.7	84	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2521029)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	91.6	73	127
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2517360)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	103	63	117
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2517361)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	104	73	117
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 2516051)								
EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	10 µg/L	63.0	45	137
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 2523230)								
EP074: Benzene	71-43-2	1	µg/L	<1	20 µg/L	94.1	79	121
EP074: Toluene	108-88-3	2	µg/L	<2	20 µg/L	93.1	80	124
EP074: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	84.8	79	121
EP074: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	82.4	80	122
EP074: Styrene	100-42-5	5	µg/L	<5	20 µg/L	80.3	74	122
EP074: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	88.8	81	123
EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	20 µg/L	86.7	80	120

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 2523230) - continued								
EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	20 µg/L	83.0	70	120
EP074: 1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	20 µg/L	81.2	71	119
EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	20 µg/L	87.6	72	120
EP074: 1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	20 µg/L	83.0	73	119
EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	20 µg/L	85.1	73	119
EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	20 µg/L	83.9	71	121
EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	20 µg/L	78.8	65	121
EP074B: Oxygenated Compounds (QCLot: 2523230)								
EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	200 µg/L	86.1	57	131
EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	200 µg/L	92.2	69	135
EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	200 µg/L	89.6	68	136
EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	200 µg/L	87.0	68	138
EP074C: Sulfonated Compounds (QCLot: 2523230)								
EP074: Carbon disulfide	75-15-0	5	µg/L	<5	20 µg/L	70.0	67	127
EP074D: Fumigants (QCLot: 2523230)								
EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	20 µg/L	89.8	59	128
EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	20 µg/L	92.9	77	121
EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	20 µg/L	73.9	70	118
EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	20 µg/L	69.0	66	120
EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	20 µg/L	83.7	78	124
EP074E: Halogenated Aliphatic Compounds (QCLot: 2523230)								
EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	200 µg/L	94.9	58	148
EP074: Chloromethane	74-87-3	50	µg/L	<50	200 µg/L	110	62	142
EP074: Vinyl chloride	75-01-4	50	µg/L	<50	200 µg/L	100	61	141
EP074: Bromomethane	74-83-9	50	µg/L	<50	200 µg/L	126	57	131
EP074: Chloroethane	75-00-3	50	µg/L	<50	200 µg/L	96.4	64	138
EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	200 µg/L	98.4	67	131
EP074: 1.1-Dichloroethene	75-35-4	5	µg/L	<5	20 µg/L	92.0	71	125
EP074: Iodomethane	74-88-4	5	µg/L	<5	20 µg/L	# 152	61	135
EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	20 µg/L	93.8	75	121
EP074: 1.1-Dichloroethane	75-34-3	5	µg/L	<5	20 µg/L	97.8	77	121
EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	20 µg/L	95.5	78	122
EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	20 µg/L	94.0	70	120
EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	20 µg/L	95.8	74	122
EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	20 µg/L	84.5	57	123
EP074: 1.2-Dichloroethane	107-06-2	5	µg/L	<5	20 µg/L	113	75	125
EP074: Trichloroethene	79-01-6	5	µg/L	<5	20 µg/L	88.8	77	121
EP074: Dibromomethane	74-95-3	5	µg/L	<5	20 µg/L	97.1	76	122

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP074E: Halogenated Aliphatic Compounds (QCLot: 2523230) - continued								
EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	20 µg/L	96.1	78	126
EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	20 µg/L	96.3	79	125
EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	20 µg/L	88.8	76	122
EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	20 µg/L	80.6	65	119
EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	20 µg/L	78.6	46	126
EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	20 µg/L	85.5	54	132
EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	20 µg/L	90.9	75	131
EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	20 µg/L	95.6	75	133
EP074: Pentachloroethane	76-01-7	5	µg/L	<5	20 µg/L	66.6	46	118
EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	20 µg/L	66.3	54	124
EP074F: Halogenated Aromatic Compounds (QCLot: 2523230)								
EP074: Chlorobenzene	108-90-7	5	µg/L	<5	20 µg/L	93.2	81	121
EP074: Bromobenzene	108-86-1	5	µg/L	<5	20 µg/L	88.2	75	119
EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	20 µg/L	87.6	73	121
EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	20 µg/L	85.0	72	120
EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	20 µg/L	84.6	69	123
EP074G: Trihalomethanes (QCLot: 2523230)								
EP074: Chloroform	67-66-3	5	µg/L	<5	20 µg/L	99.3	77	121
EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	20 µg/L	81.7	69	117
EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	20 µg/L	67.2	59	119
EP074: Bromoform	75-25-2	5	µg/L	<5	20 µg/L	60.8	49	121
EP075A: Phenolic Compounds (QCLot: 2516050)								
EP075: Phenol	108-95-2	2	µg/L	<2	10 µg/L	18.7	10	65
EP075: 2-Chlorophenol	95-57-8	2	µg/L	<2	10 µg/L	41.5	29.8	108
EP075: 2-Methylphenol	95-48-7	2	µg/L	<2	10 µg/L	53.2	21.9	110
EP075: 3- & 4-Methylphenol	1319-77-3	2	µg/L	----	10 µg/L	44.9	10	108
		4	µg/L	<4	----	----	----	----
EP075: 2-Nitrophenol	88-75-5	2	µg/L	<2	10 µg/L	56.4	31.2	123
EP075: 2.4-Dimethylphenol	105-67-9	2	µg/L	<2	10 µg/L	56.0	36	124
EP075: 2.4-Dichlorophenol	120-83-2	2	µg/L	<2	10 µg/L	51.4	31.2	125
EP075: 2.6-Dichlorophenol	87-65-0	2	µg/L	<2	10 µg/L	59.0	33	123
EP075: 4-Chloro-3-Methylphenol	59-50-7	2	µg/L	<2	10 µg/L	57.8	39	125
EP075: 2.4.6-Trichlorophenol	88-06-2	2	µg/L	<2	10 µg/L	60.8	23.9	134
EP075: 2.4.5-Trichlorophenol	95-95-4	2	µg/L	<2	10 µg/L	64.3	31.6	136
EP075: Pentachlorophenol	87-86-5	2	µg/L	----	10 µg/L	47.6	47	153
		4	µg/L	<4	----	----	----	----
EP075B: Polynuclear Aromatic Hydrocarbons (QCLot: 2516050)								
EP075: Naphthalene	91-20-3	2	µg/L	<2	10 µg/L	60.7	33	117
EP075: 2-Methylnaphthalene	91-57-6	2	µg/L	<2	10 µg/L	59.1	33	123

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP075B: Polynuclear Aromatic Hydrocarbons (QCLot: 2516050) - continued								
EP075: 2-Chloronaphthalene	91-58-7	2	µg/L	<2	10 µg/L	49.8	22.6	133
EP075: Acenaphthylene	208-96-8	2	µg/L	<2	10 µg/L	60.0	35	131
EP075: Acenaphthene	83-32-9	2	µg/L	<2	10 µg/L	60.8	37	127
EP075: Fluorene	86-73-7	2	µg/L	<2	10 µg/L	63.2	39	133
EP075: Phenanthrene	85-01-8	2	µg/L	<2	10 µg/L	63.3	42	134
EP075: Anthracene	120-12-7	2	µg/L	<2	10 µg/L	63.2	41	135
EP075: Fluoranthene	206-44-0	2	µg/L	<2	10 µg/L	62.9	40	146
EP075: Pyrene	129-00-0	2	µg/L	<2	10 µg/L	62.3	42	142
EP075: N-2-Fluorenyl Acetamide	53-96-3	2	µg/L	<2	10 µg/L	65.4	40	146
EP075: Benz(a)anthracene	56-55-3	2	µg/L	<2	10 µg/L	62.2	41	143
EP075: Chrysene	218-01-9	2	µg/L	<2	10 µg/L	61.9	40	146
EP075: Benzo(b) & Benzo(k)fluoranthene	205-99-2 207-08-9	4	µg/L	<4	20 µg/L	65.2	21	151
EP075: 7.12-Dimethylbenz(a)anthracene	57-97-6	2	µg/L	<2	10 µg/L	66.7	39	151
EP075: Benzo(a)pyrene	50-32-8	2	µg/L	<2	10 µg/L	66.0	39	141
EP075: 3-Methylcholanthrene	56-49-5	2	µg/L	<2	10 µg/L	55.4	33	139
EP075: Indeno(1.2.3.cd)pyrene	193-39-5	2	µg/L	<2	10 µg/L	62.8	31.5	139
EP075: Dibenz(a.h)anthracene	53-70-3	2	µg/L	<2	10 µg/L	67.0	30.1	140
EP075: Benzo(g.h.i)perylene	191-24-2	2	µg/L	<2	10 µg/L	62.2	29.5	138
EP075C: Phthalate Esters (QCLot: 2516050)								
EP075: Dimethyl phthalate	131-11-3	2	µg/L	<2	10 µg/L	65.7	41	141
EP075: Diethyl phthalate	84-66-2	2	µg/L	<2	10 µg/L	73.6	45	139
EP075: Di-n-butyl phthalate	84-74-2	2	µg/L	<2	10 µg/L	65.3	42	150
EP075: Butyl benzyl phthalate	85-68-7	2	µg/L	<2	10 µg/L	61.8	36	152
EP075: bis(2-ethylhexyl) phthalate	117-81-7	10	µg/L	<10	----	----	----	----
		20	µg/L	----	10 µg/L	72.4	42	158
EP075: Di-n-octylphthalate	117-84-0	2	µg/L	<2	10 µg/L	78.6	43	141
EP075D: Nitrosamines (QCLot: 2516050)								
EP075: N-Nitrosomethylethylamine	10595-95-6	2	µg/L	<2	10 µg/L	67.2	10	109
EP075: N-Nitrosodiethylamine	55-18-5	2	µg/L	<2	10 µg/L	40.1	23.5	124
EP075: N-Nitrosopyrrolidine	930-55-2	4	µg/L	<4	10 µg/L	38.5	18.8	97
EP075: N-Nitrosomorpholine	59-89-2	2	µg/L	<2	10 µg/L	44.2	18.3	94
EP075: N-Nitrosodi-n-propylamine	621-64-7	2	µg/L	<2	10 µg/L	57.5	30.6	129
EP075: N-Nitrosopiperidine	100-75-4	2	µg/L	<2	10 µg/L	54.8	32	126
EP075: N-Nitrosodibutylamine	924-16-3	2	µg/L	<2	10 µg/L	61.6	29.1	135
EP075: N-Nitrosodiphenyl & Diphenylamine	86-30-6 122-39-4	4	µg/L	<4	10 µg/L	62.1	39	139
EP075: Methapyrilene	91-80-5	2	µg/L	<2	10 µg/L	28.2	28.1	70
EP075E: Nitroaromatics and Ketones (QCLot: 2516050)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075E: Nitroaromatics and Ketones (QCLot: 2516050) - continued								
EP075: 2-Picoline	109-06-8	2	µg/L	<2	10 µg/L	# 16.3	28.4	57
EP075: Acetophenone	98-86-2	2	µg/L	<2	10 µg/L	55.4	34	126
EP075: Nitrobenzene	98-95-3	2	µg/L	<2	10 µg/L	53.9	36	120
EP075: Isophorone	78-59-1	2	µg/L	<2	10 µg/L	59.4	38	124
EP075: 2.6-Dinitrotoluene	606-20-2	4	µg/L	<4	10 µg/L	66.0	38	142
EP075: 2.4-Dinitrotoluene	121-14-2	4	µg/L	<4	10 µg/L	65.8	44	138
EP075: 1-Naphthylamine	134-32-7	2	µg/L	<2	10 µg/L	# 6.0	29.8	152
EP075: 4-Nitroquinoline-N-oxide	56-57-5	2	µg/L	<2	10 µg/L	71.5	25.9	168
EP075: 5-Nitro-o-toluidine	99-55-8	2	µg/L	<2	10 µg/L	42.5	26.2	138
EP075: Azobenzene	103-33-3	2	µg/L	<2	10 µg/L	64.2	43	135
EP075: 1.3.5-Trinitrobenzene	99-35-4	2	µg/L	<2	10 µg/L	61.8	10	158
EP075: Phenacetin	62-44-2	2	µg/L	<2	10 µg/L	57.4	37	131
EP075: 4-Aminobiphenyl	92-67-1	2	µg/L	<2	10 µg/L	40.3	10	150
EP075: Pentachloronitrobenzene	82-68-8	2	µg/L	<2	10 µg/L	64.4	38	146
EP075: Pronamide	23950-58-5	2	µg/L	<2	10 µg/L	66.3	45	139
EP075: Dimethylaminoazobenzene	60-11-7	2	µg/L	<2	10 µg/L	65.3	37	147
EP075: Chlorobenzilate	510-15-6	2	µg/L	<2	10 µg/L	64.0	42	148
EP075F: Haloethers (QCLot: 2516050)								
EP075: Bis(2-chloroethyl) ether	111-44-4	2	µg/L	<2	10 µg/L	51.9	10	142
EP075: Bis(2-chloroethoxy) methane	111-91-1	2	µg/L	<2	10 µg/L	60.0	34	126
EP075: 4-Chlorophenyl phenyl ether	7005-72-3	2	µg/L	<2	10 µg/L	62.8	39	133
EP075: 4-Bromophenyl phenyl ether	101-55-3	2	µg/L	<2	10 µg/L	64.2	39	137
EP075G: Chlorinated Hydrocarbons (QCLot: 2516050)								
EP075: 1.4-Dichlorobenzene	106-46-7	2	µg/L	<2	10 µg/L	60.8	23	109
EP075: 1.3-Dichlorobenzene	541-73-1	2	µg/L	<2	10 µg/L	43.8	19.8	112
EP075: 1.2-Dichlorobenzene	95-50-1	2	µg/L	<2	10 µg/L	53.7	25.2	109
EP075: Hexachloroethane	67-72-1	2	µg/L	<2	10 µg/L	54.8	17.4	115
EP075: 1.2.4-Trichlorobenzene	120-82-1	2	µg/L	<2	10 µg/L	53.5	25.7	112
EP075: Hexachloropropylene	1888-71-7	2	µg/L	<2	10 µg/L	50.4	19.1	115
EP075: Hexachlorobutadiene	87-68-3	2	µg/L	<2	10 µg/L	55.3	21.1	117
EP075: Hexachlorocyclopentadiene	77-47-4	10	µg/L	<10	10 µg/L	21.2	10	120
EP075: Pentachlorobenzene	608-93-5	2	µg/L	<2	10 µg/L	59.4	36	130
EP075: Hexachlorobenzene (HCB)	118-74-1	4	µg/L	<4	20 µg/L	61.2	11.1	135
EP075H: Anilines and Benzidines (QCLot: 2516050)								
EP075: Aniline	62-53-3	2	µg/L	<2	10 µg/L	43.1	19.8	96
EP075: 4-Chloroaniline	106-47-8	2	µg/L	<2	10 µg/L	# 15.7	16.4	130
EP075: 2-Nitroaniline	88-74-4	4	µg/L	<4	10 µg/L	59.5	38	138
EP075: 3-Nitroaniline	99-09-2	4	µg/L	<4	10 µg/L	22.0	10	135
EP075: Dibenzofuran	132-64-9	2	µg/L	<2	10 µg/L	63.3	39	129

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP075H: Anilines and Benzidines (QCLot: 2516050) - continued								
EP075: 4-Nitroaniline	100-01-6	2	µg/L	<2	10 µg/L	53.4	22.8	133
EP075: Carbazole	86-74-8	2	µg/L	<2	10 µg/L	64.5	44	138
EP075: 3.3`-Dichlorobenzidine	91-94-1	2	µg/L	<2	10 µg/L	35.5	14.6	107
EP075I: Organochlorine Pesticides (QCLot: 2516050)								
EP075: alpha-BHC	319-84-6	2	µg/L	<2	10 µg/L	64.2	41	143
EP075: beta-BHC	319-85-7	2	µg/L	<2	10 µg/L	61.7	39	145
EP075: gamma-BHC	58-89-9	2	µg/L	<2	10 µg/L	63.3	39	143
EP075: delta-BHC	319-86-8	2	µg/L	<2	10 µg/L	63.5	42	142
EP075: Heptachlor	76-44-8	2	µg/L	<2	10 µg/L	57.9	39	139
EP075: Aldrin	309-00-2	2	µg/L	<2	10 µg/L	65.8	40	142
EP075: Heptachlor epoxide	1024-57-3	2	µg/L	<2	10 µg/L	62.4	37	147
EP075: alpha-Endosulfan	959-98-8	2	µg/L	<2	10 µg/L	82.9	42	146
EP075: 4.4`-DDE	72-55-9	2	µg/L	<2	10 µg/L	59.0	41	141
EP075: Dieldrin	60-57-1	2	µg/L	<2	10 µg/L	62.2	42	144
EP075: Endrin	72-20-8	2	µg/L	<2	10 µg/L	54.1	41	145
EP075: beta-Endosulfan	33213-65-9	2	µg/L	<2	10 µg/L	62.2	42	146
EP075: 4.4`-DDD	72-54-8	2	µg/L	<2	10 µg/L	60.1	40	148
EP075: Endosulfan sulfate	1031-07-8	2	µg/L	<2	10 µg/L	63.4	38	152
EP075: 4.4`-DDT	50-29-3	4	µg/L	<4	10 µg/L	54.3	33	145
EP075J: Organophosphorus Pesticides (QCLot: 2516050)								
EP075: Dichlorvos	62-73-7	2	µg/L	<2	10 µg/L	60.1	38	132
EP075: Dimethoate	60-51-5	2	µg/L	<2	10 µg/L	57.0	36	138
EP075: Diazinon	333-41-5	2	µg/L	<2	10 µg/L	63.6	43	141
EP075: Chlorpyrifos-methyl	5598-13-0	2	µg/L	<2	10 µg/L	61.4	43	141
EP075: Malathion	121-75-5	2	µg/L	<2	10 µg/L	65.0	44	148
EP075: Fenthion	55-38-9	2	µg/L	<2	10 µg/L	61.1	42	144
EP075: Chlorpyrifos	2921-88-2	2	µg/L	<2	10 µg/L	62.9	42	142
EP075: Pirimphos-ethyl	23505-41-1	2	µg/L	<2	10 µg/L	62.3	44	142
EP075: Chlorfenvinphos	470-90-6	2	µg/L	<2	10 µg/L	63.4	44	146
EP075: Prothiofos	34643-46-4	2	µg/L	<2	10 µg/L	58.5	40	142
EP075: Ethion	563-12-2	2	µg/L	<2	10 µg/L	59.5	42	146
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2516052)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2585 µg/L	80.4	64	124
EP071: C15 - C28 Fraction	----	100	µg/L	<100	9720 µg/L	89.6	70	130
EP071: C29 - C36 Fraction	----	50	µg/L	<50	3340 µg/L	87.3	68	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2523229)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	83.1	72	136
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2516052)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2516052) - continued								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	4055 µg/L	86.2	70	130
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	10355 µg/L	89.7	70	130
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	890 µg/L	86.4	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2523229)								
EP080: C6 - C10 Fraction	----	20	µg/L	<20	450 µg/L	79.8	70	130
EP216: Perchlorate by LC/MS (QCLot: 2516184)								
EP216: Perchlorate	7601-90-3	0.2	µg/L	<0.2	5 µg/L	107	65	139
EP231: Perfluorooctyl Acids and Sulfonates. (QCLot: 2516351)								
EP231: PFOS	1763-23-1	0.02	µg/L	<0.02	0.25 µg/L	74.4	70	136
EP231: PFOA	335-67-1	0.02	µg/L	<0.02	0.25 µg/L	122	72	134
EP231: 6:2 Fluorotelomer Sulfonate (6:2 FtS)	27619-97-2	0.1	µg/L	<0.1	1.25 µg/L	104	61	145

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2516279)							
EM1211100-008	BH4_200912	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	85.0	70	130
ED045G: Chloride Discrete analyser (QCLot: 2516278)							
EM1211100-008	BH4_200912	ED045G: Chloride	16887-00-6	200 mg/L	105	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2525557)							
EM1211100-001	QC01_200912	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	119	89	139
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	112	64	138
		EG020A-F: Barium	7440-39-3	0.2 mg/L	105	80	122
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	109	75	131
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	98.8	70	130
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	113	77	129
		EG020A-F: Copper	7440-50-8	0.2 mg/L	109	71	127
		EG020A-F: Lead	7439-92-1	0.2 mg/L	96.1	71	123
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	# Not Determined	66	132
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	105	73	129
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	96.3	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	107	68	136
EG035F: Dissolved Mercury by FIMS (QCLot: 2525555)							
EM1211100-001	QC01_200912	EG035F: Mercury	7439-97-6	0.0100 mg/L	94.0	70	130
EG050F: Dissolved Hexavalent Chromium (QCLot: 2518555)							
EM1211139-001	Anonymous	EG050F: Hexavalent Chromium	18540-29-9	0.5 mg/L	99.8	70	130
EG050F: Dissolved Hexavalent Chromium (QCLot: 2522412)							
EM1211100-008	BH4_200912	EG050F: Hexavalent Chromium	18540-29-9	0.5 mg/L	84.6	70	130
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 2518020)							
EM1211100-008	BH4_200912	EK026SF: Total Cyanide	57-12-5	0.2 mg/L	91.3	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2518794)							
EM1211073-001	Anonymous	EK040P: Fluoride	16984-48-8	5.0 mg/L	84.4	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2521030)							
EM1211100-007	GW101_200912	EK055G: Ammonia as N	7664-41-7	0.5 mg/L	85.8	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2516276)							
EM1211100-008	BH4_200912	EK057G: Nitrite as N	----	0.5 mg/L	103	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2521029)							
EM1211028-003	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	# Not Determined	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2517360)							
EM1211100-008	BH4_200912	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	90.1	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2517361)							
EM1211100-008	BH4_200912	EK067G: Total Phosphorus as P	----	1 mg/L	104	70	130
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 2523230)							
EM1211100-008	BH4_200912	EP074: Benzene	71-43-2	20 µg/L	86.3	64	121
		EP074: Toluene	108-88-3	20 µg/L	87.5	63	125
EP074E: Halogenated Aliphatic Compounds (QCLot: 2523230)							
EM1211100-008	BH4_200912	EP074: 1.1-Dichloroethene	75-35-4	20 µg/L	66.2	52	104
		EP074: Trichloroethene	79-01-6	20 µg/L	83.7	59	120
EP074F: Halogenated Aromatic Compounds (QCLot: 2523230)							
EM1211100-008	BH4_200912	EP074: Chlorobenzene	108-90-7	20 µg/L	90.2	63	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2516052)							
EM1211149-003	Anonymous	EP071: C10 - C14 Fraction	----	2585 µg/L	93.8	64	124
		EP071: C15 - C28 Fraction	----	9720 µg/L	98.5	70	130
		EP071: C29 - C36 Fraction	----	3340 µg/L	96.2	68	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2523229)							
EM1211100-008	BH4_200912	EP080: C6 - C9 Fraction	----	280 µg/L	79.2	51	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2516052)							
EM1211149-003	Anonymous	EP071: >C10 - C16 Fraction	----	4055 µg/L	97.6	70	130
		EP071: >C16 - C34 Fraction	----	10355 µg/L	98.3	70	130
		EP071: >C34 - C40 Fraction	----	890 µg/L	97.4	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2523229)							
EM1211100-008	BH4_200912	EP080: C6 - C10 Fraction	----	330 µg/L	75.1	70	130
EP216: Perchlorate by LC/MS (QCLot: 2516184)							
EM1211100-013	GW107_200912	EP216: Perchlorate	7601-90-3	5 µg/L	96.4	67	131
EP231: Perfluorooctyl Acids and Sulfonates. (QCLot: 2516351)							
EB1224875-001	Anonymous	EP231: PFOS	1763-23-1	0.25 µg/L	# Not Determined	70	136
		EP231: PFOA	335-67-1	0.25 µg/L	109	72	134
		EP231: 6:2 Fluorotelomer Sulfonate (6:2 FtS)	27619-97-2	1.25 µg/L	85.4	61	145

Environmental Division

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **EM1211100**	Page	: 1 of 17
Client	: CARDNO LANE PIPER PTY LTD	Laboratory	: Environmental Division Melbourne
Contact	: MR MARCUS BOYD (Cardno)	Contact	: Sarah Hodgson
Address	: 154 HIGHBURY ROAD BURWOOD VIC, AUSTRALIA 3125	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: marcus.boyd@cardno.com.au	E-mail	: sarah.hodgson@alsenviro.com
Telephone	: +61 03 98880100	Telephone	: 03 8549 9652
Facsimile	: +61 03 98083511	Facsimile	: 03 8549 9626
Project	: 212163 2	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: Fiskville		
C-O-C number	: ----	Date Samples Received	: 21-SEP-2012
Sampler	: MB	Issue Date	: 03-OCT-2012
Order number	: ----		
		No. of samples received	: 17
Quote number	: ME/441/12	No. of samples analysed	: 15

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

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non-volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005: pH								
Clear Plastic Bottle - Natural								
QC01_200912, GW101_200912, BH5_200912, BH3_200912, GW107_200912, GW110_200912	QC03_200912, BH4_200912, GW103_200912, GW111_200912, GW106_200912,	**20-SEP-2012**	**----**	----	----	**25-SEP-2012**	20-SEP-2012	×
Clear Plastic Bottle - Natural								
GW108_200912		**20-SEP-2012**	**----**	----	----	**25-SEP-2012**	21-SEP-2012	×
EA010: Conductivity								
Clear Plastic Bottle - Natural								
GW101_200912, BH5_200912, BH3_200912, GW107_200912, GW110_200912,	BH4_200912, GW103_200912, GW111_200912, GW106_200912, GW108_200912	**20-SEP-2012**	**----**	----	----	**29-SEP-2012**	18-OCT-2012	✓
EA015: Total Dissolved Solids								
Clear Plastic Bottle - Natural								
QC01_200912, GW101_200912, BH5_200912, BH3_200912, GW107_200912, GW110_200912,	QC03_200912, BH4_200912, GW103_200912, GW111_200912, GW106_200912, GW108_200912	**20-SEP-2012**	**---**	27-SEP-2012	----	**27-SEP-2012**	27-SEP-2012	✓
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural								
GW101_200912, BH5_200912, BH3_200912, GW107_200912, GW110_200912,	BH4_200912, GW103_200912, GW111_200912, GW106_200912, GW108_200912	**20-SEP-2012**	**---**	04-OCT-2012	----	**26-SEP-2012**	04-OCT-2012	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural							
GW101_200912, BH4_200912, BH5_200912, GW103_200912, BH3_200912, GW111_200912, GW107_200912, GW106_200912, GW110_200912, GW108_200912	**20-SEP-2012**	---	18-OCT-2012	----	**27-SEP-2012**	18-OCT-2012	✓
ED045G: Chloride Discrete analyser							
Clear Plastic Bottle - Natural							
GW101_200912, BH4_200912, BH5_200912, GW103_200912, BH3_200912, GW111_200912, GW107_200912, GW106_200912, GW110_200912, GW108_200912	**20-SEP-2012**	---	18-OCT-2012	----	**27-SEP-2012**	18-OCT-2012	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural							
GW101_200912, BH4_200912, BH5_200912, GW103_200912, BH3_200912, GW111_200912, GW107_200912, GW106_200912, GW110_200912, GW108_200912	**20-SEP-2012**	---	27-SEP-2012	----	**26-SEP-2012**	27-SEP-2012	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Natural							
BH5_200912, GW103_200912, GW106_200912, GW108_200912	**20-SEP-2012**	---	19-MAR-2013	----	**03-OCT-2012**	19-MAR-2013	✓
Clear Plastic Bottle - Nitric Acid; Filtered							
QC01_200912, QC03_200912, GW101_200912, BH4_200912, BH3_200912, GW111_200912, GW107_200912, GW110_200912	**20-SEP-2012**	---	19-MAR-2013	----	**03-OCT-2012**	19-MAR-2013	✓
Clear Plastic Bottle - Nitric Acid; Unspecified							
QC05_200912	**20-SEP-2012**	---	19-MAR-2013	----	**03-OCT-2012**	19-MAR-2013	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Natural							
BH5_200912, GW103_200912, GW106_200912, GW108_200912	**20-SEP-2012**	---	18-OCT-2012	----	**03-OCT-2012**	18-OCT-2012	✓
Clear Plastic Bottle - Nitric Acid; Filtered							
QC01_200912, QC03_200912, GW101_200912, BH4_200912, BH3_200912, GW111_200912, GW107_200912, GW110_200912	**20-SEP-2012**	---	18-OCT-2012	----	**03-OCT-2012**	18-OCT-2012	✓
Clear Plastic Bottle - Nitric Acid; Unspecified							
QC05_200912	**20-SEP-2012**	---	04-OCT-2012	----	**03-OCT-2012**	04-OCT-2012	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG050F: Dissolved Hexavalent Chromium								
Clear Plastic Bottle - NaOH								
GW101_200912,	BH4_200912,	**20-SEP-2012**	**----**	----	----	**28-SEP-2012**	18-OCT-2012	✓
BH5_200912,	BH3_200912,							
GW111_200912,	GW107_200912,							
GW110_200912,	GW108_200912							
Clear Plastic Bottle - Natural								
GW103_200912		**20-SEP-2012**	**----**	----	----	**27-SEP-2012**	21-SEP-2012	×
EK026SF: Total CN by Segmented Flow Analyser								
White Plastic Bottle-NaOH								
GW101_200912,	BH4_200912,	**20-SEP-2012**	**---**	04-OCT-2012	----	**26-SEP-2012**	04-OCT-2012	✓
BH5_200912,	BH3_200912,							
GW111_200912,	GW107_200912,							
GW110_200912,	GW108_200912							
EK040P: Fluoride by PC Titrator								
Clear Plastic Bottle - Natural								
GW101_200912,	BH4_200912,	**20-SEP-2012**	**---**	18-OCT-2012	----	**26-SEP-2012**	18-OCT-2012	✓
BH5_200912,	GW103_200912,							
BH3_200912,	GW111_200912,							
GW107_200912,	GW106_200912,							
GW110_200912,	GW108_200912							
EK055G: Ammonia as N by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid								
QC01_200912,	QC03_200912,	**20-SEP-2012**	**---**	18-OCT-2012	----	**01-OCT-2012**	18-OCT-2012	✓
GW101_200912,	BH4_200912,							
BH5_200912,	GW103_200912,							
BH3_200912,	GW111_200912,							
GW107_200912,	GW106_200912,							
GW110_200912,	GW108_200912							
EK057G: Nitrite as N by Discrete Analyser								
Clear Plastic Bottle - Natural								
QC01_200912,	QC03_200912,	**20-SEP-2012**	**---**	22-SEP-2012	----	**21-SEP-2012**	22-SEP-2012	✓
GW101_200912,	BH4_200912,							
BH5_200912,	GW103_200912,							
BH3_200912,	GW111_200912,							
GW107_200912,	GW106_200912,							
GW110_200912,	GW108_200912							
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid								
QC01_200912,	QC03_200912,	**20-SEP-2012**	**---**	18-OCT-2012	----	**01-OCT-2012**	18-OCT-2012	✓
GW101_200912,	BH4_200912,							
BH5_200912,	GW103_200912,							
BH3_200912,	GW111_200912,							
GW107_200912,	GW106_200912,							
GW110_200912,	GW108_200912							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid							
GW101_200912, BH4_200912, BH5_200912, GW103_200912, BH3_200912, GW111_200912, GW107_200912, GW106_200912, GW110_200912, GW108_200912	**20-SEP-2012**	**26-SEP-2012**	18-OCT-2012	✓	**27-SEP-2012**	18-OCT-2012	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid							
GW101_200912, BH4_200912, BH5_200912, GW103_200912, BH3_200912, GW111_200912, GW107_200912, GW106_200912, GW110_200912, GW108_200912	**20-SEP-2012**	**26-SEP-2012**	18-OCT-2012	✓	**27-SEP-2012**	18-OCT-2012	✓
EP066: Polychlorinated Biphenyls (PCB)							
Amber Glass Bottle - Unpreserved							
GW101_200912, BH4_200912, BH5_200912, GW103_200912, BH3_200912, GW111_200912, GW107_200912, GW106_200912, GW110_200912, GW108_200912	**20-SEP-2012**	**25-SEP-2012**	27-SEP-2012	✓	**28-SEP-2012**	04-NOV-2012	✓
EP074A: Monocyclic Aromatic Hydrocarbons							
Amber VOC Vial - Sulfuric Acid							
GW101_200912, BH4_200912, BH5_200912, GW103_200912, BH3_200912, GW111_200912, GW107_200912, GW106_200912, GW110_200912, GW108_200912	**20-SEP-2012**	**28-SEP-2012**	04-OCT-2012	✓	**28-SEP-2012**	04-OCT-2012	✓
EP074B: Oxygenated Compounds							
Amber VOC Vial - Sulfuric Acid							
GW101_200912, BH4_200912, BH5_200912, GW103_200912, BH3_200912, GW111_200912, GW107_200912, GW106_200912, GW110_200912, GW108_200912	**20-SEP-2012**	**28-SEP-2012**	04-OCT-2012	✓	**28-SEP-2012**	04-OCT-2012	✓
EP074C: Sulfonated Compounds							
Amber VOC Vial - Sulfuric Acid							
GW101_200912, BH4_200912, BH5_200912, GW103_200912, BH3_200912, GW111_200912, GW107_200912, GW106_200912, GW110_200912, GW108_200912	**20-SEP-2012**	**28-SEP-2012**	04-OCT-2012	✓	**28-SEP-2012**	04-OCT-2012	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP074D: Fumigants							
Amber VOC Vial - Sulfuric Acid							
GW101_200912, BH4_200912, BH5_200912, GW103_200912, BH3_200912, GW111_200912, GW107_200912, GW106_200912, GW110_200912, GW108_200912	**20-SEP-2012**	**28-SEP-2012**	04-OCT-2012	✓	**28-SEP-2012**	04-OCT-2012	✓
EP074E: Halogenated Aliphatic Compounds							
Amber VOC Vial - Sulfuric Acid							
GW101_200912, BH4_200912, BH5_200912, GW103_200912, BH3_200912, GW111_200912, GW107_200912, GW106_200912, GW110_200912, GW108_200912	**20-SEP-2012**	**28-SEP-2012**	04-OCT-2012	✓	**28-SEP-2012**	04-OCT-2012	✓
EP074F: Halogenated Aromatic Compounds							
Amber VOC Vial - Sulfuric Acid							
GW101_200912, BH4_200912, BH5_200912, GW103_200912, BH3_200912, GW111_200912, GW107_200912, GW106_200912, GW110_200912, GW108_200912	**20-SEP-2012**	**28-SEP-2012**	04-OCT-2012	✓	**28-SEP-2012**	04-OCT-2012	✓
EP074G: Trihalomethanes							
Amber VOC Vial - Sulfuric Acid							
GW101_200912, BH4_200912, BH5_200912, GW103_200912, BH3_200912, GW111_200912, GW107_200912, GW106_200912, GW110_200912, GW108_200912	**20-SEP-2012**	**28-SEP-2012**	04-OCT-2012	✓	**28-SEP-2012**	04-OCT-2012	✓
EP075A: Phenolic Compounds							
Amber Glass Bottle - Unpreserved							
GW101_200912, BH4_200912, BH5_200912, GW103_200912, BH3_200912, GW111_200912, GW107_200912, GW106_200912, GW110_200912, GW108_200912	**20-SEP-2012**	**25-SEP-2012**	27-SEP-2012	✓	**28-SEP-2012**	04-NOV-2012	✓
EP075B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved							
GW101_200912, BH4_200912, BH5_200912, GW103_200912, BH3_200912, GW111_200912, GW107_200912, GW106_200912, GW110_200912, GW108_200912	**20-SEP-2012**	**25-SEP-2012**	27-SEP-2012	✓	**28-SEP-2012**	04-NOV-2012	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP075C: Phthalate Esters							
Amber Glass Bottle - Unpreserved							
GW101_200912, BH4_200912, BH5_200912, GW103_200912, BH3_200912, GW111_200912, GW107_200912, GW106_200912, GW110_200912, GW108_200912	**20-SEP-2012**	**25-SEP-2012**	27-SEP-2012	✓	**28-SEP-2012**	04-NOV-2012	✓
EP075D: Nitrosamines							
Amber Glass Bottle - Unpreserved							
GW101_200912, BH4_200912, BH5_200912, GW103_200912, BH3_200912, GW111_200912, GW107_200912, GW106_200912, GW110_200912, GW108_200912	**20-SEP-2012**	**25-SEP-2012**	27-SEP-2012	✓	**28-SEP-2012**	04-NOV-2012	✓
EP075E: Nitroaromatics and Ketones							
Amber Glass Bottle - Unpreserved							
GW101_200912, BH4_200912, BH5_200912, GW103_200912, BH3_200912, GW111_200912, GW107_200912, GW106_200912, GW110_200912, GW108_200912	**20-SEP-2012**	**25-SEP-2012**	27-SEP-2012	✓	**28-SEP-2012**	04-NOV-2012	✓
EP075F: Haloethers							
Amber Glass Bottle - Unpreserved							
GW101_200912, BH4_200912, BH5_200912, GW103_200912, BH3_200912, GW111_200912, GW107_200912, GW106_200912, GW110_200912, GW108_200912	**20-SEP-2012**	**25-SEP-2012**	27-SEP-2012	✓	**28-SEP-2012**	04-NOV-2012	✓
EP075G: Chlorinated Hydrocarbons							
Amber Glass Bottle - Unpreserved							
GW101_200912, BH4_200912, BH5_200912, GW103_200912, BH3_200912, GW111_200912, GW107_200912, GW106_200912, GW110_200912, GW108_200912	**20-SEP-2012**	**25-SEP-2012**	27-SEP-2012	✓	**28-SEP-2012**	04-NOV-2012	✓
EP075H: Anilines and Benzidines							
Amber Glass Bottle - Unpreserved							
GW101_200912, BH4_200912, BH5_200912, GW103_200912, BH3_200912, GW111_200912, GW107_200912, GW106_200912, GW110_200912, GW108_200912	**20-SEP-2012**	**25-SEP-2012**	27-SEP-2012	✓	**28-SEP-2012**	04-NOV-2012	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP075I: Organochlorine Pesticides								
Amber Glass Bottle - Unpreserved								
GW101_200912,	BH4_200912,	**20-SEP-2012**	**25-SEP-2012**	27-SEP-2012	✓	**28-SEP-2012**	04-NOV-2012	✓
BH5_200912,	GW103_200912,							
BH3_200912,	GW111_200912,							
GW107_200912,	GW106_200912,							
GW110_200912,	GW108_200912							
EP075J: Organophosphorus Pesticides								
Amber Glass Bottle - Unpreserved								
GW101_200912,	BH4_200912,	**20-SEP-2012**	**25-SEP-2012**	27-SEP-2012	✓	**28-SEP-2012**	04-NOV-2012	✓
BH5_200912,	GW103_200912,							
BH3_200912,	GW111_200912,							
GW107_200912,	GW106_200912,							
GW110_200912,	GW108_200912							
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved								
GW101_200912,	BH4_200912,	**20-SEP-2012**	**25-SEP-2012**	27-SEP-2012	✓	**28-SEP-2012**	04-NOV-2012	✓
BH5_200912,	GW103_200912,							
BH3_200912,	GW111_200912,							
GW107_200912,	GW106_200912,							
GW110_200912,	GW108_200912							
Amber VOC Vial - Sulfuric Acid								
QC06_200912,	QC09_200912,	**20-SEP-2012**	**28-SEP-2012**	04-OCT-2012	✓	**28-SEP-2012**	04-OCT-2012	✓
GW101_200912,	BH4_200912,							
BH5_200912,	GW103_200912,							
BH3_200912,	GW111_200912,							
GW107_200912,	GW106_200912,							
GW110_200912,	GW108_200912							
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft								
Amber Glass Bottle - Unpreserved								
GW101_200912,	BH4_200912,	**20-SEP-2012**	**25-SEP-2012**	27-SEP-2012	✓	**28-SEP-2012**	04-NOV-2012	✓
BH5_200912,	GW103_200912,							
BH3_200912,	GW111_200912,							
GW107_200912,	GW106_200912,							
GW110_200912,	GW108_200912							
Amber VOC Vial - Sulfuric Acid								
QC06_200912,	QC09_200912,	**20-SEP-2012**	**28-SEP-2012**	04-OCT-2012	✓	**28-SEP-2012**	04-OCT-2012	✓
GW101_200912,	BH4_200912,							
BH5_200912,	GW103_200912,							
BH3_200912,	GW111_200912,							
GW107_200912,	GW106_200912,							
GW110_200912,	GW108_200912							
EP216: Perchlorate by LC/MS								
Clear Plastic Bottle - Natural								
GW107_200912,	GW110_200912	**20-SEP-2012**	**----**	----	----	**27-SEP-2012**	18-OCT-2012	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231: Perfluorooctyl Acids and Sulfonates.							
Clear Plastic Bottle GW107_200912, GW110_200912	**20-SEP-2012**	**----**	----	----	**25-SEP-2012**	19-MAR-2013	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser	EK055G	2	18	**11.1**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity	EA010	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Mercury by FIMS	EG035F	2	13	**15.4**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	13	**15.4**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	2	13	**15.4**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	2	16	**12.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Hexavalent Chromium - Dissolved	EG050F	3	24	**12.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	12	**16.7**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Perchlorate by LC/MS	EP216	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PFOS and PFOA	EP231	1	4	**25.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH	EA005	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Cyanide by Segmented Flow Analyser	EK026SF	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	19	**5.3**	**10.0**	×	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Volatile Organic Compounds	EP074	2	15	**13.3**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	40	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser	EK055G	1	18	**5.6**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity	EA010	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Mercury by FIMS	EG035F	1	13	**7.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	13	**7.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	13	**7.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	16	**6.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Hexavalent Chromium - Dissolved	EG050F	2	24	**8.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	12	**8.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Perchlorate by LC/MS	EP216	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PFOS and PFOA	EP231	1	4	**25.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Polychlorinated Biphenyls (PCB)	EP066	1	10	**10.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Control Samples (LCS) - Continued							
Semivolatile Organic Compounds	EP075	1	10	**10.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Cyanide by Segmented Flow Analyser	EK026SF	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	19	**5.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Volatile Organic Compounds	EP074	1	15	**6.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	18	**5.6**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity	EA010	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Mercury by FIMS	EG035F	1	13	**7.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	13	**7.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	13	**7.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	16	**6.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Hexavalent Chromium - Dissolved	EG050F	2	24	**8.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	12	**8.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Perchlorate by LC/MS	EP216	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PFOS and PFOA	EP231	1	4	**25.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Polychlorinated Biphenyls (PCB)	EP066	1	10	**10.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Semivolatile Organic Compounds	EP075	1	10	**10.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Cyanide by Segmented Flow Analyser	EK026SF	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	19	**5.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Volatile Organic Compounds	EP074	1	15	**6.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	18	**5.6**	**5.0**	✓	ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Dissolved Mercury by FIMS	EG035F	1	13	**7.7**	**5.0**	✓	ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	13	**7.7**	**5.0**	✓	ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	16	**6.3**	**5.0**	✓	ALS QCS3 requirement
Hexavalent Chromium - Dissolved	EG050F	2	24	**8.3**	**5.0**	✓	ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	12	**8.3**	**5.0**	✓	ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Perchlorate by LC/MS	EP216	1	2	**50.0**	**5.0**	✓	ALS QCS3 requirement

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
PFOS and PFOA	EP231	1	4	**25.0**	**5.0**	✓	ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Total Cyanide by Segmented Flow Analyser	EK026SF	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	19	**5.3**	**5.0**	✓	ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Volatile Organic Compounds	EP074	1	15	**6.7**	**5.0**	✓	ALS QCS3 requirement

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH	EA005	WATER	APHA 21st ed. 4500 H+ B. pH of water samples is determined by ISE either manually or by automated pH meter. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Conductivity	EA010	WATER	APHA 21st ed., 2510 B Conductivity is determined by ISE, either manually or automated measurement. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Dissolved Solids (High Level)	EA015H	WATER	In-House, APHA 21st ed., 2540C A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Alkalinity by PC Titrator	ED037-P	WATER	APHA 21st ed., 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	APHA 21st ed., 4500-SO4 Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Chloride by Discrete Analyser	ED045G	WATER	APHA 21st ed., 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	Major Cations is determined based on APHA 21st ed., 3120; USEPA SW 846 - 6010 The ICPAES technique ionises the 0.45um filtered sample atoms emitting a characteristic spectrum. This spectrum is then compared against matrix matched standards for quantification. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2) Sodium Absorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2) Hardness parameters are calculated based on APHA 21st ed., 2340 B. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): Samples are 0.45 um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals by ICP-MS - Suite B	EG020B-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): Samples are 0.45 um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	AS 3550, APHA 21st ed. 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45 um filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Hexavalent Chromium - Dissolved	EG050F	WATER	APHA 21st ed., 3500 Cr-B. Samples are 0.45 um filtered prior to analysis. Hexavalent chromium is determined on filtered water sample as received by pH adjustment and colour development using dephenylcarbazide. Each run of samples is measured against a five-point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Cyanide by Segmented Flow Analyser	EK026SF	WATER	APHA 4500-CN-O. Sodium hydroxide preserved samples are introduced into an automated segmented flow analyser. Complex bound cyanide is decomposed in a continuously flowing stream, at a pH of 3.8, by the effect of UV light. A UV-B lamp (312 nm) and a decomposition spiral of borosilicate glass are used to filter out UV light with a wavelength of less than 290 nm thus preventing the conversion of thiocyanate into cyanide. The hydrogen cyanide present at a pH of 3.8 is separated by gas dialysis. The hydrogen cyanide is then determined photometrically, based on the reaction of cyanide with chloramine-T to form cyanogen chloride. This then reacts with 4-pyridine carboxylic acid and 1,3-dimethylbarbituric acid to give a red colour which is measured at 600 nm. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Fluoride by PC Titrator	EK040P	WATER	APHA 21st ed., 4500 F--C CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ammonia as N by Discrete analyser	EK055G	WATER	APHA 21st ed., 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite as N by Discrete Analyser	EK057G	WATER	APHA 21st ed., 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrate as N by Discrete Analyser	EK058G	WATER	APHA 21st ed., 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	APHA 21st ed., 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	APHA 21st ed., 4500-Norg D. 25mL water samples are digested using a traditional Kjeldahl digestion followed by determination by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	APHA 21st ed., 4500-Norg / 4500-NO3-. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	APHA 21st ed., 4500-P B&F This procedure involves sulphuric acid digestion of a 100mL sample to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	APHA 21st Ed. 1030F. The Ionic Balance is calculated based on the major Anions and Cations. The major anions include Alkalinity, Chloride and Sulfate which determined by PCT and DA. The Cations are determined by Turbi SO4 by DA. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Polychlorinated Biphenyls (PCB)	EP066	WATER	USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

Analytical Methods	Method	Matrix	Method Descriptions
TPH - Semivolatile Fraction	EP071	WATER	USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Volatile Organic Compounds	EP074	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Semivolatile Organic Compounds	EP075	WATER	USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
TPH Volatiles/BTEX	EP080	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Perchlorate by LC/MS	EP216	WATER	US EPA Method 6850: A sample is acidified with acetic acid and analysed by LC/MS in ESI (negative) mode.
PFOS and PFOA	EP231	WATER	In-house: Direct injection analysis of linear and branched pefluorooctyl sulfonates and acids by LC-Electrospray-MS-MS, Negative Mode using MRM.

Preparation Methods	Method	Matrix	Method Descriptions
Separatory Funnel Extraction of Liquids	ORG14	WATER	USEPA SW 846 - 3510B 500 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2). ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries							
EP074E: Halogenated Aliphatic Compounds	2991055-007	----	**Iodomethane**	74-88-4	152 %	61-135%	**Recovery greater than upper control limit**
EP075E: Nitroaromatics and Ketones	2982391-001	----	**2-Picoline**	109-06-8	16.3 %	28.4-57%	**Recovery less than lower control limit**
EP075E: Nitroaromatics and Ketones	2982391-001	----	**1-Naphthylamine**	134-32-7	6.0 %	29.8-152%	**Recovery less than lower control limit**
EP075H: Anilines and Benzidines	2982391-001	----	**4-Chloroaniline**	106-47-8	15.7 %	16.4-130%	**Recovery less than lower control limit**
Matrix Spike (MS) Recoveries							
EG020F: Dissolved Metals by ICP-MS	EM1211100-001	QC01_200912	**Manganese**	7439-96-5	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Ar	EM1211028-003	Anonymous	**Nitrite + Nitrate as N**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231: Perfluorooctyl Acids and Sulfonates.	EB1224875-001	Anonymous	**PFOS**	1763-23-1	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

- **For all matrices, no Method Blank value outliers occur.**
- **For all matrices, no Duplicate outliers occur.**

Regular Sample Surrogates

Sub-Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Samples Submitted							
EP066S: PCB Surrogate	EM1211100-014	GW106_200912	**Decachlorobiphenyl**	2051-24-3	24.5 %	27.8-134 %	**Recovery less than lower data quality objective**
EP075T: Base/Neutral Extractable Surrogates	EM1211100-014	GW106_200912	**Anthracene-d10**	1719-06-8	28.2 %	35-137 %	**Recovery less than lower data quality objective**

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

Matrix: **WATER**

Method	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)	*Date extracted*	*Due for extraction*	***Days overdue***	*Date analysed*	*Due for analysis*	***Days overdue***
EA005: pH						

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005: pH - Analysis Holding Time Compliance						
Clear Plastic Bottle - Natural						
QC01_200912, QC03_200912, GW101_200912, BH4_200912, BH5_200912, GW103_200912, BH3_200912, GW111_200912, GW107_200912, GW106_200912, GW110_200912	----	----	----	25-SEP-2012	20-SEP-2012	**5**
Clear Plastic Bottle - Natural						
GW108_200912	----	----	----	25-SEP-2012	21-SEP-2012	**4**
EG050F: Dissolved Hexavalent Chromium						
Clear Plastic Bottle - Natural						
GW103_200912	----	----	----	27-SEP-2012	21-SEP-2012	**6**

Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TPH - Semivolatile Fraction	1	19	5.3	10.0	NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Cardno LanePiper

Chain of Custody

Sheet 1 of 1

Name: MARCUS BOYD

Phone: 03 9888 0100 **Fax:** 03 9808 3511 **Mobile:** 0411 300 608

Address: Building 2, 154 Highbury Rd, Burwood, Vic, 3125

Email: marcus.boyd@cardno.com.au & CC: david.louwrens@cardno.com.au

Project Number: 212163.2 **Site:** FISKVILLE

Laboratory (name, phone,fax no & contact person)

mgt-LabMark NATALIE KRASSELT: MGT: 0395647055

Sample ID	Laboratory ID	Container	Sampling Date	Sampling Time	Sample Matrix: Water	Soil	Sludge	Other (Specify)	Composite	Sample preservation: Ice bricks	HNO_3/HCl	Unpreserved	Other (Specify)	Analysis: NEPM Water Screen	NT-01 & NT-02: Major Ions*	EA015H: TDS	EA010: EC	NT-8: TKN, Ammonia as N, Total P, Nitrate	EA005: pH	Metals (22)	PFCs (PFOA/ PFOA, PCDD/PCD	Hold	TPH C6-C9	Nitrate (N)	Ammonia (N)
QC02-200912		Bottles #1	20/9	3:55pm	X					X						X			X	X				X	X
QC04-200912		Bottles #1	20/9	5:45pm	X					X						X			X	X				X	X
QC08-200912		1x vial	20/9	8:30am	X					X													X		
Bottles #1 consist of:		2x vials, 1x amber, 2x green plastic, 1x purple, 2x metals, 1x Cr, 1x cyanide																							

Sampler: I attest that the proper field sampling proceedures were used during the collection of these samples.

Sampler name:(print and signature) Marcus Boyd Date: 20/9/12

	Date	Time		Date	Time
Relinquished by (Sampler): (print and signature) Marcus Boyd	21/9/12	10:30	Received by (Courier/Lab): (print and signature)	21/9/12	10:30
Relinquished by: (print and signature) Kane Kilmartin	21/9/12	15:00	Received by: (print and signature) J Stephens	2/9/12	15:00
Relinquished by: (print and signature)	21/9/2012	5:17pm	Received by: (print and signature) Matt	21/9/2012	5:17pm

Please supply results electronically in spreadsheet and ~~ESDAT files~~.

Turn around time: (24 hour/48 hour/5 days)

Please circle

In accordance with your acceptance of our standard or customised Terms of Agreement between Cardno Lane Piper Pty Ltd and Service or Equipment Providers

352941

mgt LabMark ENVIRONMENTAL LABORATORIES

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Lane Cove West NSW 2066
Phone : +61 2 8215 6222
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Sample Receipt Advice

Company name: **Cardno Lane Piper Pty Ltd**

Contact name: Marcus Boyd
Client job number: FISKVILLE 212163.2
COC number: Not provided
Turn around time: 5 Day
Date/Time received: Sep 21, 2012 5:15 PM
mgt-LabMark reference: **352941**

Sample information

☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.

☑ All samples have been received as described on the above COC.

☑ COC has been completed correctly.

☑ Attempt to chill was evident.

☑ Appropriately preserved sample containers have been used.

☑ All samples were received in good condition.

☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

☑ Organic samples had Teflon liners.

☑ Sample containers for volatile analysis received with zero headspace.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Notes

Samples received by the laboratory after 4pm are deemed to have been received the following working day.

Contact notes

If you have any questions with respect to these samples please contact:

Natalie Krasselt on Phone : (+61) (3) 8564 5000 or by e.mail:
Natalie.Krasselt@mgtlabmark.com.au

Results will be delivered electronically via e.mail to Marcus Boyd - marcus.boyd@lanepiper.com.au.

mgt-LabMark Sample Receipt

mgt LabMark ENVIRONMENTAL LABORATORIES

Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Cardno Lane Piper Pty Ltd
Building 2, 154 Highbury Road
Burwood
VIC 3125

Attention:Marcus Boyd

Report **352941-W**
Client Reference FISKVILLE 212163.2
Received Date Sep 21, 2012

Client Sample ID			**QC02_200912**	**QC04_200912**	**QC08_200912**
Sample Matrix			**Water**	**Water**	**Water**
mgt-LabMark Sample No.			**M12-Se19204**	**M12-Se19205**	**M12-Se19206**
Date Sampled			**Sep 20, 2012**	**Sep 20, 2012**	**Sep 20, 2012**
Test/Reference	LOR	Unit			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions					
TRH C6-C9	0.02	mg/L	-	-	< 0.02
Ammonia (as N)	0.01	mg/L	< 0.01	0.27	-
Nitrate (as N)	0.02	mg/L	< 0.02	0.48	-
pH	0.1	units	7.6	7.7	-
Total Dissolved Solids	10	mg/L	970	980	-
Heavy Metals					
Thallium (filtered)	0.001	mg/L	< 0.001	< 0.001	-
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	-
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	-
Nickel (filtered)	0.001	mg/L	0.016	0.012	-
Antimony (filtered)	0.005	mg/L	< 0.005	< 0.005	-
Arsenic (filtered)	0.001	mg/L	0.002	0.001	-
Beryllium (filtered)	0.001	mg/L	< 0.001	< 0.001	-
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002	-
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.001	-
Cobalt (filtered)	0.001	mg/L	0.012	0.004	-
Copper (filtered)	0.001	mg/L	0.001	0.006	-
Molybdenum (filtered)	0.005	mg/L	< 0.005	< 0.005	-
Selenium (filtered)	0.001	mg/L	< 0.001	0.002	-
Tin (filtered)	0.005	mg/L	< 0.005	< 0.005	-
Zinc (filtered)	0.001	mg/L	0.006	0.010	-
Iron (filtered)	0.05	mg/L	2.6	0.10	-
Boron (filtered)	0.05	mg/L	0.06	0.06	-
Manganese (filtered)	0.005	mg/L	1.1	0.14	-
Vanadium (filtered)	0.005	mg/L	< 0.005	< 0.005	-
Barium (filtered)	0.02	mg/L	0.05	0.08	-
Aluminium (filtered)	0.05	mg/L	< 0.05	< 0.05	-
Silver (filtered)	0.005	mg/L	< 0.005	< 0.005	-

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions - Method: TRH C6-C36 - MGT 100A	Melbourne	Sep 24, 2012	7 Day
Ammonia (as N) - Method: APHA 4500-NH3 Ammonia Nitrogen by FIA	Melbourne	Sep 24, 2012	28 Day
Nitrate (as N) - Method: APHA 4500-NO3 Nitrate Nitrogen by FIA	Melbourne	Sep 24, 2012	2 Day
pH - Method: APHA 4500 pH by Direct Measurement - ** Samples analysed outside holding time. Analysis should be performed in situ.	Melbourne	Sep 24, 2012	0 Hours
Total Dissolved Solids - Method: APHA 2540C Total Dissolved Solids	Melbourne	Sep 27, 2012	7 Day
NEPM 5B Metals : Metals M22 filtered - Method: USEPA 6010/6020 Heavy Metals & USEPA 7470/71 Mercury	Melbourne	Sep 24, 2012	28 Day

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Phone : +61 2 8215 6222
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Company Name:	Cardno Lane Piper Pty Ltd	**Order No.:**		**Received:**	Sep 21, 2012 5:15 PM
Address:	Building 2, 154 Highbury Road Burwood VIC 3125	**Report #:**	352941	**Due:**	Oct 1, 2012
		Phone:	9888 0100	**Priority:**	5 Day
		Fax:	9808 3511	**Contact Name:**	Marcus Boyd
Client Job No.:	FISKVILLE 212163.2				

mgt-LabMark Client Manager: Natalie Krasselt

Sample Detail					Ammonia (as N)	Nitrate (as N)	pH	Total Dissolved Solids	TRH C6-C9	NEPM 5B Metals : Metals M22 filtered
Laboratory where analysis is conducted										
Melbourne Laboratory - NATA Site # 1254 & 14271					X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217										
Brisbane Laboratory - NATA Site # 20794										
External Laboratory										
Sample ID	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**						
QC02_200912	Sep 20, 2012	3:45PM	Water	M12-Se19204	X	X	X	X		X
QC04_200912	Sep 20, 2012	3:45PM	Water	M12-Se19205	X	X	X	X		X
QC08_200912	Sep 20, 2012	3:45PM	Water	M12-Se19206					X	

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual PQLs are matrix dependant. Quoted PQLs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis.
7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001)

For samples received on the last day of holding time, notification of testing requirements should have been received at least

6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgment

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as an RPD

UNITS

mg/kg:milligrams per Kilogram
µg/L:micrograms per litre
ppb: Parts per billion
org/100mL: Organisms per 100 millilitres
MPN/100mL: Most Probable Number of organisms per 100 milliltres
mg/L:milligrams per litre
ppm: Parts per million
%:Percentage
NTU: Nephelometric Turbidity Units

TERMS

Dry:	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR:	Limit Of Reporting.
SPIKE:	Addition of the analyte to the sample and reported as percentage recovery.
RPD:	Relative Percent Difference between two Duplicate pieces of analysis.
LCS:	Laboratory Control Sample - reported as percent recovery.
CRM:	Certified Reference Material - reported as percent recovery.
Method Blank:	In the case of solid samples these are performed on laboratory certified clean sands.
	In the case of water samples these are performed on de-ionised water.
Surr - Surrogate:	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate:	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate:	A second piece of analysis from a sample outside of the client's batch of samples but run within the laboratory batch of analysis.
Batch SPIKE:	Spike recovery reported on a sample from outside of the client's batch of samples but run within the laboratory batch of analysis.
USEPA:	U.S Environmental Protection Agency
APHA:	American Public Health Association
ASLP:	Australian Standard Leaching Procedure (AS4439.3)
TCLP:	Toxicity Characteristic Leaching Procedure
COC:	Chain Of Custody
SRA:	Sample Receipt Advice
CP:	Client Parent - QC was performed on samples pertaining to this report
NCP:	Non-Client Parent - QC was performed on samples not pertaining to this report, however QC is representative of the sequence or batch that client samples were analysed within

QC - ACCEPTANCE CRITERIA

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries : Recoveries must lie between 50-150% - Phenols 20-130%.

QC DATA GENERAL COMMENTS

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxophene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxophene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Arochlor 1260 in Matrix Spikes and LCS's.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample>
10. Duplicate RPD's are calculated from raw analytical data thus it is possible to have two sets of data below the LOR with a positive RPD - eg: LOR 0.1, Result A = <0.1 (raw data is 0.02) & Result B = <0.1 (raw data is 0.03) resulting in a RPD of 40% calculated from the raw data.

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions TRH C6-C36 - MGT 100A							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
Method Blank							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Nitrate (as N)	mg/L	< 0.02			0.02	Pass	
Total Dissolved Solids	mg/L	< 10			10	Pass	
Method Blank							
NEPM 5B Metals : Metals M22 filtered USEPA 6010/6020 Heavy Metals & USEPA 7470/71 Mercury							
Thallium (filtered)	mg/L	< 0.001			0.001	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Antimony (filtered)	mg/L	< 0.005			0.005	Pass	
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Beryllium (filtered)	mg/L	< 0.001			0.001	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Cobalt (filtered)	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Molybdenum (filtered)	mg/L	< 0.005			0.005	Pass	
Selenium (filtered)	mg/L	< 0.001			0.001	Pass	
Tin (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.001			0.001	Pass	
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Boron (filtered)	mg/L	< 0.05			0.05	Pass	
Manganese (filtered)	mg/L	< 0.005			0.005	Pass	
Vanadium (filtered)	mg/L	< 0.005			0.005	Pass	
Barium (filtered)	mg/L	< 0.02			0.02	Pass	
Aluminium (filtered)	mg/L	< 0.05			0.05	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions TRH C6-C36 - MGT 100A							
TRH C6-C9	%	92			70-130	Pass	
LCS - % Recovery							
Ammonia (as N)	%	96			70-130	Pass	
Nitrate (as N)	%	115			70-130	Pass	
LCS - % Recovery							
NEPM 5B Metals : Metals M22 filtered USEPA 6010/6020 Heavy Metals & USEPA 7470/71 Mercury							
Thallium (filtered)	%	94			80-120	Pass	
Lead (filtered)	%	93			80-120	Pass	
Mercury (filtered)	%	85			70-130	Pass	
Nickel (filtered)	%	95			80-120	Pass	
Arsenic (filtered)	%	94			80-120	Pass	
Cadmium (filtered)	%	99			80-120	Pass	
Chromium (filtered)	%	97			80-120	Pass	
Cobalt (filtered)	%	99			80-120	Pass	
Copper (filtered)	%	88			80-120	Pass	
Selenium (filtered)	%	99			80-120	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Zinc (filtered)	%	96			80-120	Pass	
Iron (filtered)	%	98			80-120	Pass	
Boron (filtered)	%	94			80-120	Pass	
Manganese (filtered)	%	100			80-120	Pass	
Aluminium (filtered)	%	80			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
				Result 1					
Ammonia (as N)	M12-Se18100	NCP	%	88			70-130	Pass	
Nitrate (as N)	M12-Se18100	NCP	%	120			70-130	Pass	
Spike - % Recovery									
NEPM 5B Metals : Metals M22 filtered				Result 1					
Thallium (filtered)	M12-Se18997	NCP	%	86			75-125	Pass	
Lead (filtered)	M12-Se18997	NCP	%	87			75-125	Pass	
Mercury (filtered)	M12-Se17567	NCP	%	86			70-130	Pass	
Nickel (filtered)	M12-Se18997	NCP	%	89			75-125	Pass	
Antimony (filtered)	A12-Se16099	NCP	%	97			75-125	Pass	
Arsenic (filtered)	M12-Se18997	NCP	%	76			75-125	Pass	
Beryllium (filtered)	M12-Se18997	NCP	%	98			75-125	Pass	
Cadmium (filtered)	M12-Se18997	NCP	%	100			75-125	Pass	
Chromium (filtered)	M12-Se18997	NCP	%	83			75-125	Pass	
Cobalt (filtered)	M12-Se18997	NCP	%	93			75-125	Pass	
Copper (filtered)	M12-Se18997	NCP	%	80			75-125	Pass	
Molybdenum (filtered)	M12-Se18997	NCP	%	83			75-125	Pass	
Selenium (filtered)	M12-Se18997	NCP	%	77			75-125	Pass	
Tin (filtered)	M12-Se18997	NCP	%	82			75-125	Pass	
Zinc (filtered)	M12-Se18997	NCP	%	90			75-125	Pass	
Boron (filtered)	M12-Se18997	NCP	%	84			75-125	Pass	
Manganese (filtered)	M12-Se18997	NCP	%	89			75-125	Pass	
Vanadium (filtered)	M12-Se18997	NCP	%	89			75-125	Pass	
Barium (filtered)	M12-Se18997	NCP	%	95			75-125	Pass	
Aluminium (filtered)	M12-Se18997	NCP	%	81			75-125	Pass	
Silver (filtered)	M12-Se20129	NCP	%	100			75-125	Pass	
Spike - % Recovery									
NEPM 5B Metals : Metals M22 filtered				Result 1					
Iron (filtered)	M12-Se20482	NCP	%	80			75-125	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	M12-Se19641	NCP	%	124			70-130	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M12-Se18035	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Nitrate (as N)	M12-Se18035	NCP	mg/L	1.3	1.3	3.0	30%	Pass	
Total Dissolved Solids	M12-Se20139	NCP	mg/L	7700	7400	4.0	30%	Pass	
Duplicate									
NEPM 5B Metals : Metals M22 filtered				Result 1	Result 2	RPD			
Thallium (filtered)	M12-Se18997	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Lead (filtered)	M12-Se18997	NCP	mg/L	0.0012	0.0012	<1	30%	Pass	
Mercury (filtered)	M12-Se17567	NCP	mg/L	< 0.0001	< 0.0001	96	30%	Fail	Q15
Nickel (filtered)	M12-Se18997	NCP	mg/L	0.0034	0.0034	<1	30%	Pass	
Antimony (filtered)	M12-Se18997	NCP	mg/L	< 0.005	< 0.005	8.0	30%	Pass	
Arsenic (filtered)	M12-Se18997	NCP	mg/L	0.035	0.035	<1	30%	Pass	
Beryllium (filtered)	M12-Se18997	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
NEPM 5B Metals : Metals M22 filtered				Result 1	Result 2	RPD			
Cadmium (filtered)	M12-Se18997	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	M12-Se18997	NCP	mg/L	0.0095	0.0092	3.0	30%	Pass	
Cobalt (filtered)	M12-Se18997	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper (filtered)	M12-Se18997	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Molybdenum (filtered)	M12-Se18997	NCP	mg/L	< 0.005	< 0.005	18	30%	Pass	
Selenium (filtered)	M12-Se18997	NCP	mg/L	< 0.001	< 0.001	100	30%	Fail	Q15
Tin (filtered)	M12-Se18997	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc (filtered)	M12-Se18997	NCP	mg/L	0.026	0.024	7.0	30%	Pass	
Boron (filtered)	M12-Se18997	NCP	mg/L	< 0.05	< 0.05	5.0	30%	Pass	
Manganese (filtered)	M12-Se18997	NCP	mg/L	0.030	0.030	3.0	30%	Pass	
Vanadium (filtered)	M12-Se18997	NCP	mg/L	0.012	0.011	3.0	30%	Pass	
Barium (filtered)	M12-Se18997	NCP	mg/L	0.041	0.040	3.0	30%	Pass	
Aluminium (filtered)	M12-Se18997	NCP	mg/L	< 0.05	< 0.05	4.0	30%	Pass	
Silver (filtered)	M12-Se18997	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
NEPM 5B Metals : Metals M22 filtered				Result 1	Result 2	RPD			
Iron (filtered)	M12-Se19298	NCP	mg/L	0.44	0.45	2.0	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M12-Se17957	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Organic samples had Teflon liners	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
Q15	The RPD reported passes mgt-LabMark's Acceptance Criteria as stipulated in SOP 05. Refer to Glossary Page of this report for further details

Authorised By

Natalie Krasselt	Client Services
Carroll Lee	Senior Analyst-Volatile (VIC)
Emily Rosenberg	Senior Analyst-Metal (VIC)
Mary Makarios	Senior Analyst-Inorganic (VIC)

Glenn Jackson
Laboratory Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Uncertainty data is available on request

Data Quality Review
Groundwater Contamination Assessment, Fiskville, Vic

This appendix reviews the Quality Assurance (QA) and Quality Control (QC) documentation. Quality assurance encompasses the actions, procedures, checks and decisions undertaken to ensure sample integrity and representativeness, and the reliability and accuracy of analysis results. The QA documentation should also include an indication of the Data Quality Objectives sought in relation to each significant action, test or process involved in the assessment.

QC activities measure the effectiveness of the QA procedures by undertaking testing, and then comparing results to previously established objectives. QC work will include the internal laboratory testing as well as results of QC samples submitted by the Assessor such as trip blanks and duplicates. The quality of the information and/or data is deemed satisfactory when the QC results demonstrate that agreed objectives have been met.

A review of the QA/QC was undertaken as part of the data validation exercise. The findings are summarised below.

QA/QC Aspects	Evidence & Evaluation
QA Documentation	
Project Quality Plan/ Workplan and Data Quality Objectives	A Workplan and Health & Safety Plan were prepared prior to the ground-water contamination assessment. The groundwater investigation was carried out in accordance with the scope and objectives outlined in the report. A quality control program was implemented during the assessment and the quality assurance procedures used have been reiterated in the assessment report. In addition, a health and safety plan was prepared for this project. The Data Quality Objectives were expressed in terms of the purpose of the assessment and the relevant assessment criteria.
Data Representativeness	
Holding Times	Holding times for groundwater samples were generally in conformance with Appendix A in EPA Publication IWRG701. The groundwater samples were collected on 20 September 2012 and dispatched to the laboratories on 21 September 2012. None of the samples exceeded the required holding times.
Background samples	No off-site groundwater samples were collected. However, bores GW101 to GW104, and GW108, were installed as background bores and samples were collected from bores GW101, GW103 and GW108 as part of the investigation. Bores GW102 and GW104 were dry.
Verification of field procedures	Groundwater monitoring was carried out in accordance with EPA guidelines for groundwater sampling (EPA Publication 669) and Cardno Lane Piper field procedures. Disposable bailers were used to sample the groundwater.
Data Precision & Accuracy	
QC Testing – Blind Duplicates (Primary Laboratory)	• Acceptance Criteria: RPD < 50% • Groundwater Samples Analysed: 10 • Split Duplicate Samples Analysed: 2 • Split Duplicate Analyte Pairs: 56 • Number of Analyte Pairs Exceeding Criteria: 6

QA/QC Aspects	Evidence & Evaluation
	• Percentage of Analyte Pairs Exceeding Criteria: 10.7% • The RPD exceedences included nitrate, total nitrogen, antimony and lithium in one sample, and TDS and lithium in the second sample. The level of exceedence is not high for any of the analytes, and the majority of the analyte concentrations (excluding TDS) do not represent particular issues with respect to potential contamination. RPD calculations were not calculated for 21 of the analyte pairs as both analyte concentrations were less than the limit of reporting. The RPD calculations are presented in Table B-2 (Appendix B) of the report.
QC Testing – Split Duplicates (Secondary Laboratory)	• Acceptance Criteria: RPD < 50% • Groundwater Samples Analysed: 10 • Split Duplicate Samples Analysed: 2 • Split Duplicate Analyte Pairs: 50 • Number of Analyte Pairs Exceeding Criteria: 5 • Percentage of Analyte Pairs Exceeding Criteria: 10% • The RPD exceedences included ammonia, nitrate and copper in one sample, and TDS and iron in the second sample. The level of exceedence is high for ammonia (179% RPD), but not for nitrate, TDS and metals (67 to 77%). The reason for the ammonia RPD exceedence cannot be explained at this stage, and will be checked in future monitoring rounds. RPD calculations were not calculated for 20 of the analyte pairs as both analyte concentrations were less than the limit of reporting. The RPD calculations are presented in Table B-2 (Appendix B) of the report.
Trip Blanks	Two trip blanks were collected for the primary samples and one trip blank was collected for the secondary laboratory samples. All trip blanks were tested for light fraction TPH and reported TPH C_6-C_9 concentrations below the laboratory limit of reporting (LOR).
Laboratory Internal QC	Evidence of internal QC testing is present and complete in the laboratory reports. Both ALS (Primary) and mgt-LabMark (Secondary) performed internal QC with adequate testing and satisfactory results for the matrix spikes, method blanks and laboratory duplicates.
Laboratory Method Detection Limit	Laboratory reports indicate the method detection limits were lower than the respective assessment criteria with the exception of silver in groundwater. The LOR for silver was either 5 µg/L, which is above the adopted criteria of 0.05 µg/L. Given that all bores reported silver concentrations below the LOR, this is unlikely to significantly affect the outcome of the groundwater assessment.
NATA endorsement of laboratory reports	Laboratory reports were stamped with the NATA endorsement stamp and signature.
Calibration of Field Equipment	Equipment (water quality meter) was calibrated by the supplier prior to use. The equipment calibration certificate is provided in Appendix G.
Decontamination and Equipment Blanks	One rinsate blank sample was collected (off the water level interface probe) and tested for metals. All metals were reported below the laboratory LORs.
Data Comparability	
Standard Procedures	Fieldwork procedures are detailed in the groundwater contamination assessment report and are in general accordance with applicable standards and guidelines and industry best practice.
Qualified Personnel	Staff members involved in managing and reviewing the project are confirmed

QA/QC Aspects	Evidence & Evaluation
	as suitably qualified, trained and experienced personnel.
Sample Integrity	Field Chain of Custody (COC) documentation is presented in Appendix E. The COCs were completed with full and demonstrable delivery of samples. Laboratory holding times were not exceeded.
Data Completeness	
Validity of Data Set	This data quality review does not indicate any significant systematic errors in the data collection process and therefore the data set used as the basis for the groundwater assessment is considered valid and complete.

Appendix F
10 Pages

Title Information

Basic Property Report

Planning Property Report

Certificate of Title

Title Plan

Extract of EPA Priority Site Register

Property Report from **www.land.vic.gov.au** on 10 July 2012 01:55 PM

Address: 4549 GEELONG-BALLAN ROAD FISKVILLE 3342
Lot and Plan Number: This site has 4 parcels. See table below.
Standard Parcel Identifier (SPI): See table below.
Local Government (Council): MOORABOOL **Council Property Number:** 124720
Directory Reference: VicRoads 77 E4

This property is in a designated bushfire prone area.
Special bushfire construction requirements apply.

Further information about the building control system and building in bushfire prone areas can be found on the Building Commission website www.buildingcommission.com.au

Parcel Details

Lot/Plan or Crown Description	SPI
Lot 1 TP845669	1\TP845669
Lot 2 TP845669	2\TP845669
Lot 3 TP845669	3\TP845669
Lot 4 TP845669	4\TP845669

State Electorates

Legislative Council: WESTERN VICTORIA (2005)
Legislative Assembly: BALLARAT EAST (2001)

Utilities

Regional Urban Water Business: Central Highlands Water
Rural Water Business: Southern Rural Water
Melbourne Water: inside drainage boundary
Power Distributor: POWERCOR (Information about choosing an electricity retailer)

Planning Zone Summary

Planning Zone: FARMING ZONE (FZ)
SCHEDULE TO THE FARMING ZONE
Planning Overlays: DESIGN AND DEVELOPMENT OVERLAY (DDO)
DESIGN AND DEVELOPMENT OVERLAY - SCHEDULE 2 (DDO2)
ENVIRONMENTAL SIGNIFICANCE OVERLAY (ESO)
ENVIRONMENTAL SIGNIFICANCE OVERLAY - SCHEDULE 1 (ESO1)
Heritage Register: VHR H2277 - AUSTRALIAN BEAM WIRELESS TRANSMITTING STATION

Land .vic.gov.au

Planning scheme data last updated on 6 July 2012.

A **planning scheme** sets out policies and requirements for the use, development and protection of land. This report provides information about the zone and overlay provisions that apply to the selected land. Information about the State, local, particular and general provisions of the local planning scheme that may affect the use of this land can be obtained by contacting the local council or by visiting Planning Schemes Online

This report is NOT a **Planning Certificate** issued pursuant to Section 199 of the Planning & Environment Act 1987. It does not include information about exhibited planning scheme amendments, or zonings that may abut the land. To obtain a Planning Certificate go to Titles and Property Certificates

For details of surrounding properties, use this service to get the Reports for properties of interest

To view planning zones, overlay and heritage information in an interactive format visit Planning Maps Online

For other information about planning in Victoria visit www.dpcd.vic.gov.au/planning

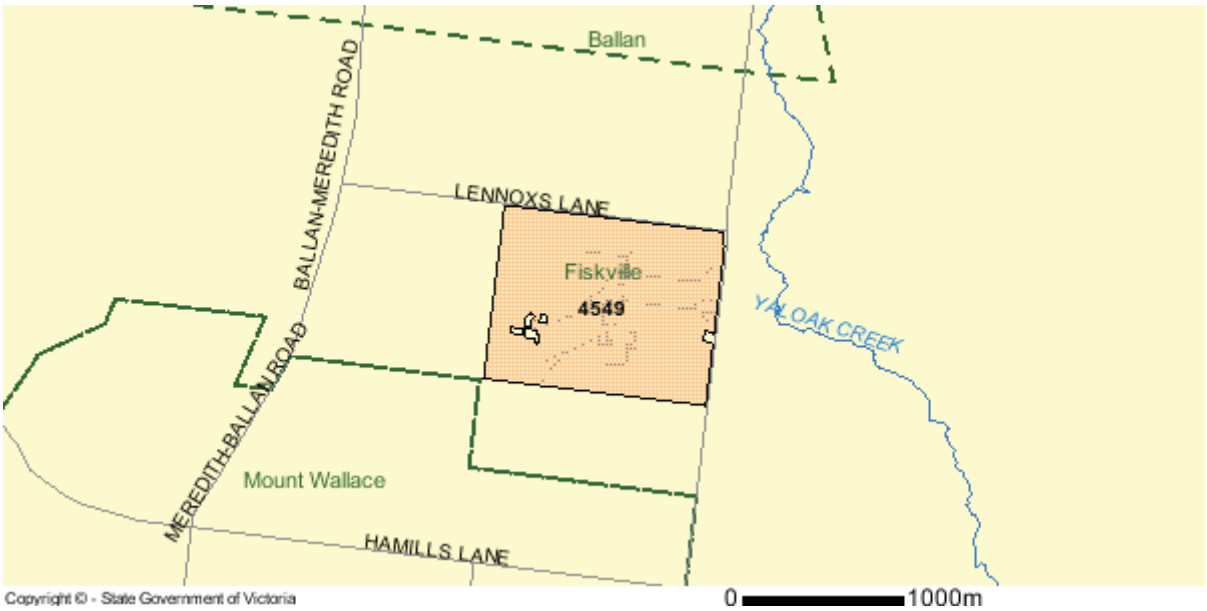
Heritage Register data last updated on 29 June 2012.

This report is NOT a **Heritage Certificate** issued pursuant to Section 50 of the Heritage Act 1995. It does not show places which may be under consideration for inclusion in the Victorian Heritage Register.

For more information on the **Victorian Heritage Register** go to Victorian Heritage Database

Other information about the heritage status of this property, how to obtain a Heritage Certificate, and any heritage approvals that may be required, may be obtained from Heritage Victoria

Area Map



Planning Property Report

From **www.dpcd.vic.gov.au/planning** on 16 November 2012 03:16 PM

Address: 4549 GEELONG-BALLAN ROAD FISKVILLE 3342
Lot and Plan Number: Lot 1 TP845669
This property has a total of 4 parcels.
For full parcel details get the free Basic Property report at Property Reports
Local Government (Council): MOORABOOL **Council Property Number:** 124720
Directory Reference: VicRoads 77 E4

Planning Zone

FARMING ZONE (FZ)
SCHEDULE TO THE FARMING ZONE

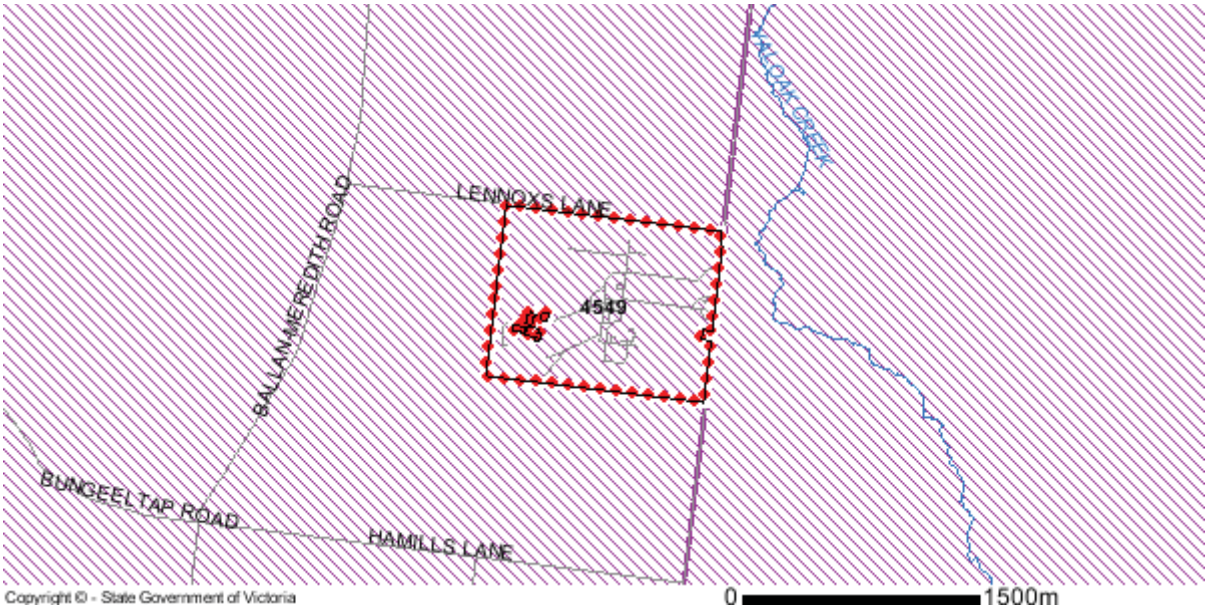
Note: labels for zones may appear outside the actual zone - please compare the labels with the legend.

Zones Legend

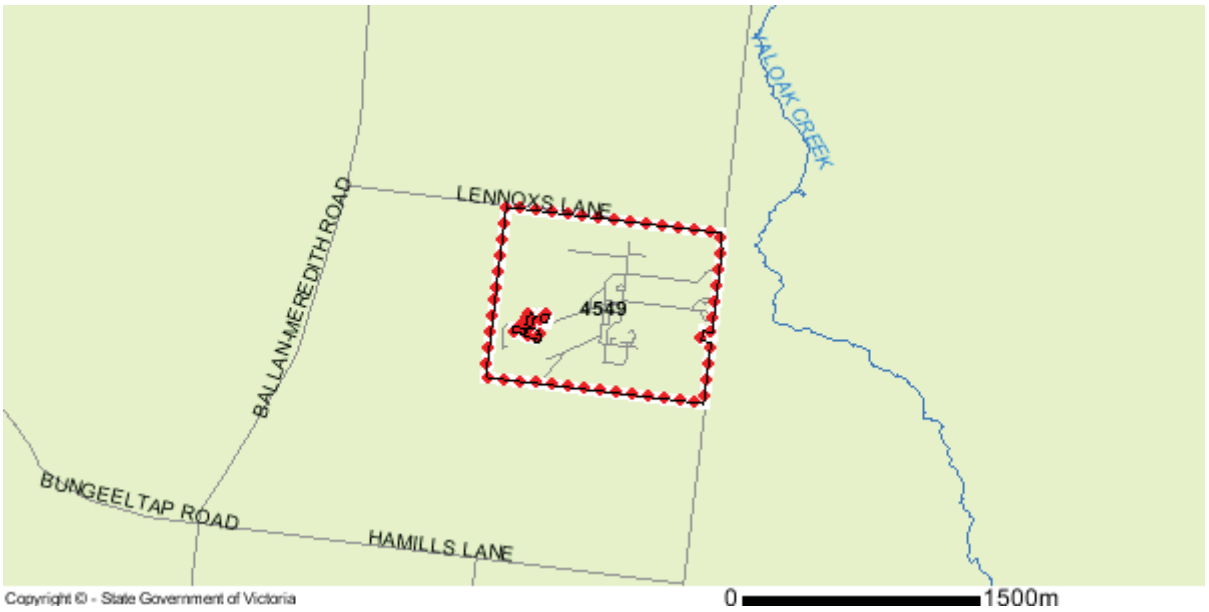
- ACZ - Activity Centre
- B1Z - Business 1
- B2Z - Business 2
- B3Z - Business 3
- B4Z - Business 4
- B5Z - Business 5
- CA - Commonwealth Land
- CCZ - Capital City
- CDZ - Comprehensive Development
- DZ - Dockland
- ERZ - Environmental Rural
- FZ - Farming
- GWAZ - Green Wedge A
- GWZ - Green Wedge
- IN1Z - Industrial 1
- IN2Z - Industrial 2
- IN3Z - Industrial 3
- LDRZ - Low Density Residential
- MUZ - Mixed Use
- PCRZ - Public Conservation & Resource
- PDZ - Priority Development
- PPRZ - Public Park & Recreation
- PUZ1 - Public Use - Service & Utility
- PUZ2 - Public Use - Education
- PUZ3 - Public Use - Health Community
- PUZ4 - Public Use - Transport
- PUZ5 - Public Use - Cemetery/Crematorium
- PUZ6 - Public Use - Local Government
- PUZ7 - Public Use - Other Public Use
- R1Z - Residential 1
- R2Z - Residential 2
- R3Z - Residential 3
- RAZ - Rural Activity
- RCZ - Rural Conservation
- RDZ1 - Road - Category 1
- RDZ2 - Road - Category 2
- RLZ - Rural Living
- RUZ - Rural
- SUZ - Special Use
- TZ - Township
- UFZ - Urban Floodway
- UGZ - Urban Growth
- Urban Growth Boundary

Planning Overlays

DESIGN AND DEVELOPMENT OVERLAY (DDO)
DESIGN AND DEVELOPMENT OVERLAY - SCHEDULE 2 (DDO2)



ENVIRONMENTAL SIGNIFICANCE OVERLAY (ESO)
ENVIRONMENTAL SIGNIFICANCE OVERLAY - SCHEDULE 1 (ESO1)



Planning Overlays Legend

Note: due to overlaps some colours on the maps may not match those in the legend.

Heritage Register

This property is affected by an entry on the Victorian Heritage Register.

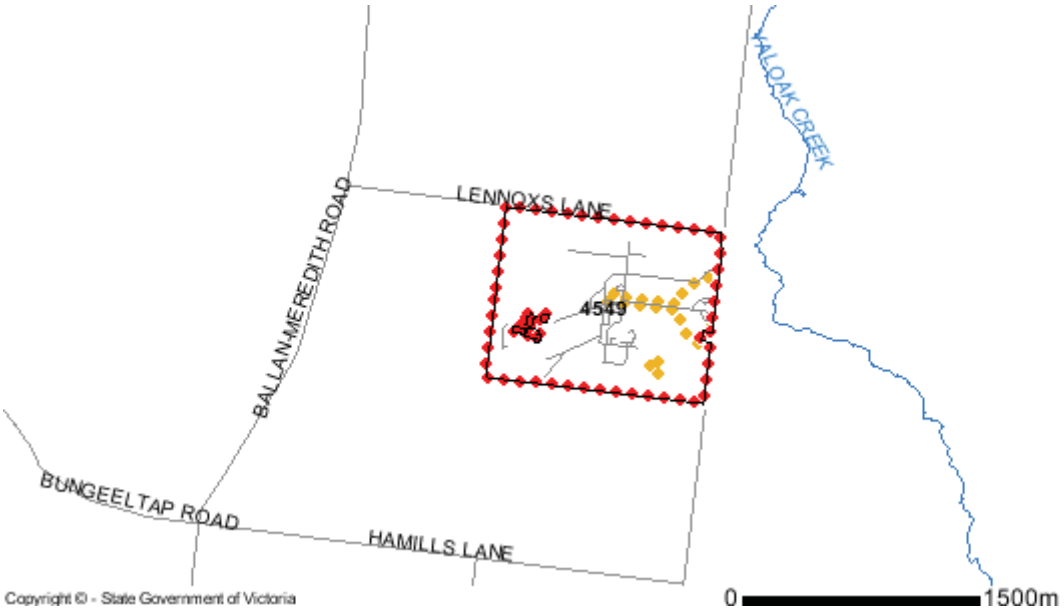
View information about VHR Number H2277 - AUSTRALIAN BEAM WIRELESS TRANSMITTING STATION

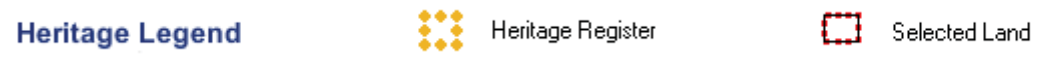
Heritage Register data last updated on 15 November 2012.

This report is NOT a **Heritage Certificate** issued pursuant to Section 50 of the Heritage Act 1995.
It does not show places which may be under consideration for inclusion in the Victorian Heritage Register.

For more information on the **Victorian Heritage Register** go to Victorian Heritage Database

Other information about the heritage status of this property, how to obtain a Heritage Certificate, and any heritage approvals that may be required, may be obtained from Heritage Victoria





Further Planning Information

Planning scheme data last updated on 15 November 2012.

A **planning scheme** sets out policies and requirements for the use, development and protection of land. This report provides information about the zone and overlay provisions that apply to the selected land. Information about the State, local, particular and general provisions of the local planning scheme that may affect the use of this land can be obtained by contacting the local council or by visiting Planning Schemes Online

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VOLUME 09503 FOLIO 693

Security no : 124042757743V
Produced 09/08/2012 12:55 pm

LAND DESCRIPTION

Lots 1,2,3 and 4 on Title Plan 845669K (formerly known as part of Crown Allotment 2 Section 16, Crown Allotments 3 and 8 Section 16, part of Crown Allotment 9 Section 16 Parish of Yaloak).
PARENT TITLE Volume 03538 Folio 516
Created by instrument K206778 21/12/1982

REGISTERED PROPRIETOR

Estate Fee Simple
Sole Proprietor
COUNTRY FIRE AUTHORITY
K206778 21/12/1982

ENCUMBRANCES, CAVEATS AND NOTICES

Any encumbrances created by Section 98 Transfer of Land Act 1958 or Section 24 Subdivision Act 1988 and any other encumbrances shown or entered on the plan set out under DIAGRAM LOCATION below.

DIAGRAM LOCATION

SEE TP845669K FOR FURTHER DETAILS AND BOUNDARIES

ACTIVITY IN THE LAST 125 DAYS

NIL

DOCUMENT END

Imaged Document Cover Sheet

The document following this cover sheet is an imaged document supplied by LANDATA®, Land Victoria.

Document Type	**plan**
Document Identification	**TP845669K**
Number of Pages (excluding this cover sheet)	**1**
Document Assembled	**09/08/2012 13:00**

TITLE PLAN

EDITION 1

TP 845669K

LOCATION OF LAND

Parish: YALOAK
Township: -
Section: 16
Crown Allotment: 3, 8, 2 (PT) & 9 (PT)
Crown Portion: -

Last Plan Reference: -
Derived From: VOL. 9503 FOL. 693
Depth Limitation: NIL

Notations

ANY REFERENCE TO MAP IN THE TEXT MEANS THE DIAGRAM SHOWN ON THIS TITLE PLAN

Description of Land/Easement Information

THIS PLAN HAS BEEN PREPARED BY LAND REGISTRY, LAND VICTORIA FOR TITLE DIAGRAM PURPOSES

COMPILED: Date: 17/11/2005
VERIFIED: A. DALLAS
Assistant Registar of Titles

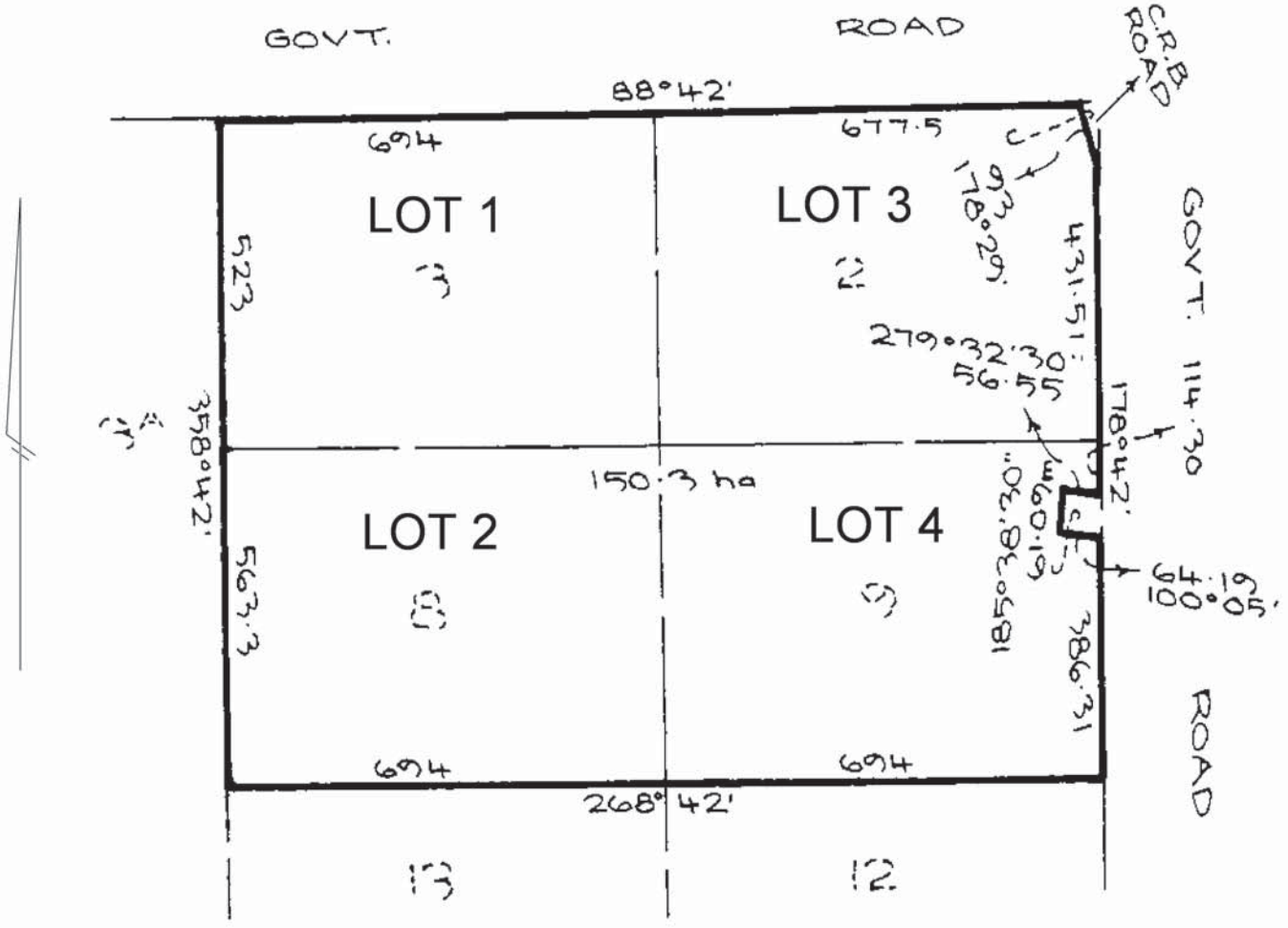

TABLE OF PARCEL IDENTIFIERS
WARNING: Where multiple parcels are referred to or shown on this Title Plan this does not imply separately disposable parcels under Section 8A of the Sale of Land Act 1962
LOT 1 = C.A.3 SECTION 16 LOT 2 = C.A.8 SECTION 16 LOT 3 = C.A.2 (PT) SECTION 16 LOT 4 = C.A.9 (PT) SECTION 16

LENGTHS ARE IN METRES	Metres = 0.3048 Feet Metres = 0.201168 x Links	Sheet 1 of 1 sheets

Extract of EPA Priority Site Register

PROPERTY INQUIRY DETAILS:

STREET ADDRESS: 4549 GEELONG-BALLAN ROAD
SUBURB: FISKVILLE
MUNICIPALITY: SHIRE OF MOORABOOL
MAP REFERENCES: Vicroads Eighth Edition, State Directory, Map 77 Reference E5
Vicroads Eighth Edition, State Directory, Map 77 Reference E4

DATE OF SEARCH: 9th August 2012

PRIORITY SITES REGISTER REPORT:

A search of the Priority Sites Register for the above map references, corresponding to the address given above, has indicated that this site is not listed on, and is not in the vicinity of a site listed on the Priority Sites Register at the above date.

IMPORTANT INFORMATION ABOUT THE PRIORITY SITES REGISTER:

You should be aware that the Priority Sites Register lists only those sites for which EPA has requirements for active management of land and groundwater contamination. Appropriate clean up and management of these sites is an EPA priority, and as such, EPA has issued either a:

Clean Up Notice pursuant to section 62A, or a
Pollution Abatement Notice pursuant to section 31A or 31B

of the Environment Protection Act 1970 on the occupier of the site to require active management of these sites.

The Priority Sites Register does not list all sites known to be contaminated in Victoria. A site should not be presumed to be free of contamination just because it does not appear on the Priority Sites Register.

Persons intending to enter into property transactions should be aware that many properties may have been contaminated by past land uses and EPA may not be aware of the presence of contamination. EPA has published information advising of potential contaminating land uses. Municipal planning authorities hold information about previous land uses, and it is advisable that such sources of information also be consulted.

For sites listed on the Priority Sites Register, a copy of the relevant Notice, detailing the reasons for issue of the Notice, and management requirements, is available on request from EPA for $8 per Notice.

For more information relating to the Priority Sites Register, refer to EPA contaminated site information bulletin: Priority Sites Register & Contaminated Land Audit Site Listing (EPA Publication 735). For a copy of this publication, copies of relevant Notices, or for more information relating to sites listed on the Priority Sites Register, please contact EPA as given below:

EPA Information Centre
Herald & Weekly Times Tower
40 City Road, Southbank 3006
Tel: (03)9695 2700 Fax:(03)9695 2710

[Extract of Priority Sites Register] # 13190463 - 13190463125546 '212163.2-DJL'

Appendix G
21 Pages

Fieldwork Record Sheets

Groundwater Sampling Field Records
Water Quality Meter Calibration Certificate
EPA Waste Transfer Certificates

Cardno LanePiper

Groundwater Sampling Field Record

Site / Project: FISKVILLE GROUNDWATER CONTAMINATION ASSESSMENT		Bore ID Number: BH3
Client: CFA		Job No. 212163-2
Person Sampling: MARCUS BOYD		Initials: MBB

Bore / Site Details

Bore Condition / Locked? GOOD / LOCKED	Type Protect. Cap / Cover: Mauvent / PVC cap	Bore Depth (bgl): 21.00 (bTOC)
Inner casing/screen type & diameter: uPVC 50mm	Screen interval (bgl): 15-21	SWL (bgl) 20.625-0.428=19.837 (bTOC) 20.625
WL Measurement Point: TOP OF CASING	RL of measurement point (mAHD): —	SWL Date/Time: 20/09/12
Other Observations on Bore/Site		

Bore Purge Data

Purge method: bailer	Bore Volume (L): —	Purge Date: 20/9/12
Purge rate (L/min): ~0.128L/min	Total Purge volume (L): ~~0.823~~	LNAPL / PSH Thickness (mm) None / .....mm

Purge Field Physiochemical Measurements:

	Reading 1	Reading 2	Reading 3	Reading 4	Reading 5	Reading 6	Reading 7	Reading 8
Start Time:	2:15pm	2:29	2:32					
				Bailed well ~~dry~~ to low level,				
DO (mg/L) ±10% (or ±0.2 if DO<2 mg/L)			67.0	below practical for bailer				
EC (µS/Cm) ±3%			6647					
pH ±0.1			7.0					
Eh (mV) ±10mV			129.6					
Temp (°C)			15.7					
SWL (m) after	20.625	20.865	20.865					
Purged Volume (L)	0	1.5	0.8					
Cum. Volume (L)	0	1.5	2.3					
Water Colour	—	light brown	brown					
Turbidity ±10%	—	moderate	increasing					
Other Observations / Notes	—	No odour present.	→					

Sample Container & Preservation Data

Number of sample container: (Include QC samples)	1	2	3	4	5
Container Volume					
Container Type					
Filtration					
Preservation					

Sample Number (for Lab ID): BH3_200912

QC Dup Sample No.: —

Cardno LanePiper

Groundwater Sampling Field Record

Site / Project: FISKVILLE GROUNDWATER CONTAMINATION ASSESSMENT		Bore ID Number: BH4
Client: CFA		Job No. 212163-2
Person Sampling: MARCUS BOYD		Initials: MBB

Bore / Site Details

Bore Condition / Locked? GOOD / LOCKED	Type Protect. Cap / Cover: Monument / ~~Steel~~ PVC cap	Bore Depth (bgl): 20 m (bTOC) —
Inner casing/screen type & diameter: uPVC 50mm	Screen interval (bgl): 14-20	SWL (bgl) 19.855 - 0.448 = 19.407 (bTOC) 19.855m
WL Measurement Point TOP OF CASING	RL of measurement point (mAHD) —	SWL Date/Time 20/09/12
Other Observations on Bore/Site		

Bore Purge Data

Purge method: Bailer	Bore Volume (L): —	Purge Date: 20/9/12
Purge rate (L/min): ~0.172L/min	Total Purge volume (L): 2.75	LNAPL / PSH Thickness (mm) None ..... mm

Purge Field Physiochemical Measurements:

	Reading 1	Reading 2	Reading 3	Reading 4	Reading 5	Reading 6	Reading 7	Reading 8
Start Time:	11:10	11:26						
			Little water in well					
DO (mg/L) ±10% (or ±0.2 if DO<2 mg/L)		85.4	GW quality parameters					
EC (µS/Cm) ±3%		491.6	not taken any further.					
pH ±0.1		7.91						
Eh (mV) ±10mV		98.6						
Temp (°C)		15.0						
SWL (m) after	20.160	20.175						
Purged Volume (L)	2	0.75						
Cum. Volume (L)	2	2.75						
Water Colour	brown	brown						
Turbidity ±10%	high	high						
Other Observations / Notes	V=0 O=0	V=0 O=0						

Sample Container & Preservation Data

Number of sample container: (Include QC samples)	1	2	3	4	5
Container Volume					
Container Type					
Filtration					
Preservation					

Sample Number (for Lab ID): BH4-200912

QC Dup Sample No.: —

Cardno LanePiper

Groundwater Sampling Field Record

Site / Project: FISKVILLE GROUNDWATER CONTAMINATION ASSESSMENT		Bore ID Number: BH5
Client: CFA		Job No. 212163-2
Person Sampling: MARCUS BOYD		Initials: MBB

Bore / Site Details

Bore Condition / Locked? GOOD / LOCKED	Type Protect. Cap / Cover: Monument / PVC cap	Bore Depth (bgl): 20m (bTOC) —
Inner casing/screen type & diameter: uPVC 50mm	Screen interval (bgl): 15-20	SWL (bgl) 1.310-0.683 = 0.627 (bTOC) 1.310m
WL Measurement Point: Top of Casing	RL of measurement point (mAHD): —	SWL Date/Time: 20/09/12
Other Observations on Bore/Site		

Bore Purge Data

Purge method: Bailer	Bore Volume (L): —	Purge Date: 20/9/12
Purge rate (L/min): ~0.179L/min	Total Purge volume (L): 2.5	LNAPL / PSH Thickness (mm) None / .....mm

Purge Field Physiochemical Measurements:

	Reading1	Reading 2	Reading 3	Reading 4	Reading 5	Reading 6	Reading 7	Reading 8
Start Time:	11:38	11:50	11:52					
DO (mg/L) ±10% (or ±0.2 if DO<2 mg/L)			3.46					
EC (µS/Cm) ±3%			2970					
pH ±0.1		Lost lead	7.13					
Eh (mV) ±10mV		Lost lead	-28.0					
Temp (°C)			12.5					
SWL (m) after	1.310	1.92	2.0					
Purged Volume (L)	0	~1.2	0.5					
Cum. Volume (L)	0	1.2	2.5					
Water Colour		brown	brown-dark brown					
Turbidity ±10%		high	high					
Other Observations / Notes		V=0 O=0	V=0 O=0					

Sample Container & Preservation Data

Number of sample container: (Include QC samples)	1	2	3	4	5
Container Volume					
Container Type					
Filtration					
Preservation					

Sample Number (for Lab ID): BH5_200912

QC Dup Sample No.: —

Cardno LanePiper

Groundwater Sampling Field Record

Site / Project: FISKVILLE GROUNDWATER CONTAMINATION ASSESSMENT		Bore ID Number: GW101
Client: CFA		Job No. 212163-2
Person Sampling: MARCUS BOYD		Initials: MBB

Bore / Site Details

Bore Condition / Locked? GOOD / LOCKED	Type Protect. Cap / Cover: Monument / ex-cap	Bore Depth (bgl): (bTOC)
Inner casing/screen type & diameter: uPVC 50mm	Screen interval (bgl): 12-18	SWL (bgl) 10.095 ~~9.995~~ 9.912 (bTOC) 10.095m ~~(SU 0.7mm)~~ (0.683 SU)
WL Measurement Point: TOP OF CASING	RL of measurement point (mAHD): —	SWL Date/Time: 20/09/12
Other Observations on Bore/Site		

Bore Purge Data

Purge method: Bailer	Bore Volume (L): 8	Purge Date: 20/9/12
Purge rate (L/min): ≈0.83L/min	Total Purge volume (L): 5	LNAPL / PSH Thickness (mm) (None) .....mm

Purge Field Physiochemical Measurements:

	Reading1	Reading 2	Reading 3	Reading 4	Reading 5	Reading 6	Reading 7	Reading 8
Start Time:	10:28	10:21	10:25	10:45	10:57			
						→ Sampled		
DO (mg/L) ±10% (or ±0.2 if DO<2 mg/L)	36%	41.7	43.0		43.9			
EC (µS/Cm) ±3%	3104	2859	2977		2578			
pH ±0.1	6.91	6.92	6.93		6.95			
Eh (mV) ±10mV	54.9	47.6	47.8		47.1			
Temp (°C)	15.5	15.9	16.0		16.3			
SWL (m) after	10.68	10.85	11.05	11.09	11.20			
Purged Volume (L)	3	1	1	2	1			
Cum. Volume (L)	3	4	5	7	8			
Water Colour	Clear	"	"	"	Minor brown			
Turbidity ±10%	0	"	"	"	~5%			
Other Observations / Notes	V=0, O=0 Clear No odour	"	"	"	Minor SS, light brown ~~Clear~~ V=0, O=0			

Sample Container & Preservation Data

Number of sample container: (Include QC samples)	1	2	3	4	5
Container Volume					
Container Type					
Filtration					
Preservation					

Sample Number (for Lab ID): GW101-200912

QC Dup Sample No.: —

Cardno LanePiper

Groundwater Sampling Field Record

Site / Project: FISKVILLE GROUNDWATER CONTAMINATION ASSESSMENT		Bore ID Number: GW102
Client: CFA		Job No. 212163-2
Person Sampling: MARCUS BOYD		Initials: MBB

Bore / Site Details

Bore Condition / Locked? GOOD / LOCKED	Type Protect. Cap / Cover: Monument / excap	Bore Depth (bgl): ~~24~~ 23.5 (bTOC)
Inner casing/screen type & diameter: uPVC 50mm	Screen interval (bgl): 17.5 - 23.5	SWL (bgl) — (bTOC) —
WL Measurement Point TOP OF CASING	RL of measurement point (mAHD) —	SWL Date/Time 20/09/12
Other Observations on Bore/Site		

Bore Purge Data

Purge method: —	Bore Volume (L): —	Purge Date: 20/9/12
Purge rate (L/min): —	Total Purge volume (L): —	LNAPL / PSH Thickness (mm) (None) / .....mm

Purge Field Physiochemical Measurements:

	Reading 1	Reading 2	Reading 3	Reading 4	Reading 5	Reading 6	Reading 7	Reading 8
Start Time:	12:11							
DO (mg/L) ±10% (or ±0.2 if DO<2 mg/L)	well was dry, water level meter							
EC (µS/Cm) ±3%	encountered 60-80mm of moist							
pH ±0.1	Sandy silt/silty sand, brown							
Eh (mV) ±10mV								
Temp (°C)								
SWL (m) after								
Purged Volume (L)								
Cum. Volume (L)								
Water Colour								
Turbidity ±10%								
Other Observations / Notes								

Sample Container & Preservation Data

Number of sample container: (Include QC samples)	1	2	3	4	5
Container Volume					
Container Type					
Filtration					
Preservation					

Sample Number (for Lab ID): None taken, dry well.

QC Dup Sample No.: —

Cardno LanePiper

Groundwater Sampling Field Record

Site / Project: FISKVILLE GROUNDWATER CONTAMINATION ASSESSMENT		Bore ID Number: GW103
Client: CFA		Job No. 212163-2
Person Sampling: MARCUS BOYD		Initials: MBB

Bore / Site Details

Bore Condition / Locked? GOOD / LOCKED	Type Protect. Cap / Cover: Monument / encap	Bore Depth (bgl): 29m (bTOC)
Inner casing/screen type & diameter: uPVC 50mm	Screen interval (bgl): 23-29	SWL (bgl) 29.050-0.552 = 28.498 (bTOC) 29.050
WL Measurement Point TOP OF CASING	RL of measurement point (mAHD) —	SWL Date/Time 20/09/12
Other Observations on Bore/Site		

0419 0419

Bore Purge Data

Purge method: Bailer	Bore Volume (L): —	Purge Date: 20/9/12
Purge rate (L/min): ≈ 0.07L/min	Total Purge volume (L): 1.5	LNAPL / PSH Thickness (mm) (None) .....mm

Purge Field Physiochemical Measurements:

	Reading1	Reading 2	Reading 3	Reading 4	Reading 5	Reading 6	Reading 7	Reading 8
Start Time:	1:41	2pm						
DO (mg/L) ±10% (or 10x if DO<2 mg/L)			Dried well dry, just enough for sampling, high SS were not filtered for metals.					
EC (µS/Cm) ±3%								
pH ±0.1		Sampled						
Eh (mV) ±10mV								
Temp (°C)								
SWL (m) after	29.050	29.30						
Purged Volume (L)	0	1.5						
Cum. Volume (L)	0	1.5						
Water Colour	—	brown						
Turbidity ±10%	—	high						
Other Observations / Notes	—	high SS						

Sample Container & Preservation Data

Number of sample container: (Include QC samples)	1	2	3	4	5
Container Volume					
Container Type					
Filtration					
Preservation					

Sample Number (for Lab ID): GW103_20092012

QC Dup Sample No.: —

Cardno LanePiper

Groundwater Sampling Field Record

Site / Project: FISKVILLE GROUNDWATER CONTAMINATION ASSESSMENT		**Bore ID Number:** GW104
Client: CFA		Job No. 212163-2
Person Sampling: MARCUS BOYD		Initials: MBB

Bore / Site Details

Bore Condition / Locked? GOOD / LOCKED	Type Protect. Cap / Cover: Monument / ex-cap	Bore Depth (bgl): 26 (bTOC) —
Inner casing/screen type & diameter: uPVC 50mm	Screen interval (bgl): 16-26	SWL (bgl) (bTOC) —
WL Measurement Point TOP OF CASING	RL of measurement point (mAHD) —	SWL Date/Time 20/09/12
Other Observations on Bore/Site		

Bore Purge Data

Purge method: —	Bore Volume (L): —	Purge Date: —
Purge rate (L/min): —	Total Purge volume (L): —	LNAPL / PSH Thickness (mm) *None* / .....mm —

Purge Field Physiochemical Measurements:

	Reading1	Reading 2	Reading 3	Reading 4	Reading 5	Reading 6	Reading 7	Reading 8
Start Time:	Dry							
	Brown-red mud							
DO (mg/L) ±10% (or ±0.2 if DO<2 mg/L)								
EC (µS/Cm) ±3%								
pH ±0.1								
Eh (mV) ±10mV								
Temp (°C)								
SWL (m) after								
Purged Volume (L)								
Cum. Volume (L)								
Water Colour								
Turbidity ±10%								
Other Observations / Notes								

Sample Container & Preservation Data

Number of sample container: (Include QC samples)	1	2	3	4	5
Container Volume					
Container Type					
Filtration					
Preservation					

Sample Number (for Lab ID): ~~GW104-20091~~ —

QC Dup Sample No.: —

Cardno LanePiper

Groundwater Sampling Field Record

Site / Project: FISKVILLE GROUNDWATER CONTAMINATION ASSESSMENT		Bore ID Number: GW105
Client: CFA		Job No. 212163-2
Person Sampling: MARCUS BOYD		Initials: MBB

Bore / Site Details

Bore Condition / Locked? GOOD / LOCKED	Type Protect. Cap / Cover: Gatic / Screw cap	Bore Depth (bgl): 26 (bTOC)
Inner casing/screen type & diameter: uPVC 50mm	Screen interval (bgl): 17-26	SWL (bgl) — (bTOC) —
WL Measurement Point: TOP OF CASING	RL of measurement point (mAHD) —	SWL Date/Time 20/09/12
Other Observations on Bore/Site		

Bore Purge Data

Purge method: —	Bore Volume (L): —	Purge Date: —
Purge rate (L/min): —	Total Purge volume (L): —	LNAPL / PSH Thickness (mm) None / .....mm —

Purge Field Physiochemical Measurements:

	Reading 1	Reading 2	Reading 3	Reading 4	Reading 5	Reading 6	Reading 7	Reading 8
Start Time:	0955 hrs							
DO (mg/L) ±10% (or ±0.2 if DO<2 mg/L)	Red-brown mud in bottom							
EC (µS/Cm) ±3%	Dry							
pH ±0.1								
Eh (mV) ±10mV								
Temp (°C)								
SWL (m) after								
Purged Volume (L)								
Cum. Volume (L)								
Water Colour								
Turbidity ±10%								
Other Observations / Notes								

Sample Container & Preservation Data

Number of sample container: (Include QC samples)	1	2	3	4	5
Container Volume					
Container Type					
Filtration					
Preservation					

Sample Number (for Lab ID): —

QC Dup Sample No.: —

Cardno LanePiper

Groundwater Sampling Field Record

Site / Project: FISKVILLE GROUNDWATER CONTAMINATION ASSESSMENT		Bore ID Number: GW106
Client: CFA		Job No. 212163-2
Person Sampling: MARCUS BOYD		Initials: MBB

Bore / Site Details

Bore Condition / Locked? GOOD / LOCKED	Type Protect. Cap / Cover: Gattic/ex-cap	Bore Depth (bgl): 24.5 (bTOC) —
Inner casing/screen type & diameter: uPVC 50mm	Screen interval (bgl): 18.5-24.5	SWL (bgl) — (bTOC) 28.075m
WL Measurement Point Top of Casing	RL of measurement point (mAHD) —	SWL Date/Time 20/09/12
Other Observations on Bore/Site		

Bore Purge Data

Purge method: Bailer	Bore Volume (L): —	Purge Date: 20/9/12
Purge rate (L/min): ~0.033L/min	Total Purge volume (L): ≈0.75L	LNAPL / PSH Thickness (mm) None / .....mm

Purge Field Physiochemical Measurements:

	Reading 1	Reading 2	Reading 3	Reading 4	Reading 5	Reading 6	Reading 7	Reading 8
Start Time:	4.05	4:28						
DO (mg/L) ±10% (or ±0.2 if DO<2mg/L)		Sampled at 4:30						
EC (µS/Cm) ±3%								
pH ±0.1								
Eh (mV) ±10mV								
Temp (°C)								
SWL (m) after	28.075	Dry						
Purged Volume (L)		≈0.75						
Cum. Volume (L)		≈0.75						
Water Colour		brown,						
Turbidity ±10%		very high						
Other Observations / Notes		near sludge V=0 O=0						

Sample Container & Preservation Data

Number of sample container: (Include QC samples)	1	2	3	4	5
Container Volume					
Container Type					
Filtration					
Preservation					

Sample Number (for Lab ID): GW106 - 200912

QC Dup Sample No.: —

Cardno LanePiper

Groundwater Sampling Field Record

Site / Project: FISKVILLE GROUNDWATER CONTAMINATION ASSESSMENT		Bore ID Number: GW107
Client: CFA		Job No. 212163.2
Person Sampling: MARCUS BOYD		Initials: MBB

Bore / Site Details

Bore Condition / Locked? GOOD / LOCKED	Type Protect. Cap / Cover: Gattic/ex-cap	Bore Depth (bgl): 2.7 (bTOC) —
Inner casing/screen type & diameter: uPVC 50mm	Screen interval (bgl): 0.2 - 2.7	SWL (bgl) — (bTOC) 0.120m
WL Measurement Point TOP OF CASING	RL of measurement point (mAHD) —	SWL Date/Time 20/09/12
Other Observations on Bore/Site		

Bore Purge Data

Purge method: Bailer	Bore Volume (L): —	Purge Date: 20/9/12
Purge rate (L/min): 1.625L/min	Total Purge volume (L): 13+	LNAPL / PSH Thickness (mm) (None) .....mm

Purge Field Physiochemical Measurements:

	Reading 1	Reading 2	Reading 3	Reading 4	Reading 5	Reading 6	Reading 7	Reading 8
Start Time:	3:26	3:27	3:28	3:30	3:32	3:34		
							→ Sampled	
DO (mg/L) ±10% (or ±0.2 if DO<2 mg/L)		17.3%	14.5	8.2	7.1	6.7		
EC (µS/Cm) ±3%		1099	975	970	726	797		
pH ±0.1		7.37	7.25	7.21	7.21	7.21		
Eh (mV) ±10mV		-120.9	-80.9	-75.7	-73.5	-73.5		
Temp (°C)		11.6	11.7	11.5	11.5	11.5		
SWL (m) after	0.120	0.145	0.170	0.195	0.20	0.245		
Purged Volume (L)	0	2	2	3	3	5		
Cum. Volume (L)	0	2	4	7	10	13		
Water Colour		light brown	—	—	—	→		
Turbidity ±10%	~~Low-Mod~~	low-mod	—	—	—	→		
Other Observations / Notes		V=0 O=0	—	—	—	→		

Sample Container & Preservation Data

Number of sample container: (Include QC samples)	1	2	3	4	5
Container Volume					
Container Type					
Filtration					
Preservation					

Sample Number (for Lab ID): GW107-200912

QC Dup Sample No.: QC01-200912 & QC02-200912

Cardno LanePiper

Groundwater Sampling Field Record

Site / Project: FISKVILLE GROUNDWATER CONTAMINATION ASSESSMENT		Bore ID Number: GW108
Client: CFA		Job No. 212163.2
Person Sampling: MARCUS BOYD		Initials: MBB

Bore / Site Details

Bore Condition / Locked?	Type Protect. Cap / Cover:	Bore Depth (bgl):
GOOD / LOCKED	Monument / ex-cap	(bTOC)
Inner casing/screen type & diameter: uPVC 50mm	Screen interval (bgl): 30-50	SWL (bgl) 40.935 0.735 = 40.2 (bTOC) 40.935
WL Measurement Point: TOP OF CASING	RL of measurement point (mAHD): —	SWL Date/Time: 20/09/12
Other Observations on Bore/Site		

Bore Purge Data

Purge method: Bailer	Bore Volume (L): —	Purge Date: 20/9/12
Purge rate (L/min): ~0.09L/min	Total Purge volume (L): 1.8L	LNAPL / PSH Thickness (mm) None / .....mm

Purge Field Physiochemical Measurements:

	Reading 1	Reading 2	Reading 3	Reading 4	Reading 5	Reading 6	Reading 7	Reading 8
Start Time:	6:14	6:35						
DO (mg/L) ±10% (or ±0.2 if DO<2 mg/L)								
EC (µS/Cm) ±3%		Sampled						
pH ±0.1								
Eh (mV) ±10mV								
Temp (°C)								
SWL (m) after	40.935	—						
Purged Volume (L)	—	1.8						
Cum. Volume (L)	—	1.8						
Water Colour		high turbidity						
Turbidity ±10%		light brown			Did not filter metals			
Other Observations / Notes		V=0 050						

Sample Container & Preservation Data

Number of sample container: (Include QC samples)	1	2	3	4	5
Container Volume					
Container Type					
Filtration					
Preservation					

Sample Number (for Lab ID): GW108-200912

QC Dup Sample No.: —

Cardno LanePiper

Groundwater Sampling Field Record

Site / Project: FISKVILLE GROUNDWATER CONTAMINATION ASSESSMENT		Bore ID Number: GW109
Client: CFA		Job No. 212163-2
Person Sampling: MARCUS BOYD		Initials: MBB

Bore / Site Details

Bore Condition / Locked? GOOD / LOCKED	Type Protect. Cap / Cover: Gattic / ex-cap	Bore Depth (bgl): 47 (bTOC) —
Inner casing/screen type & diameter: uPVC 50mm	Screen interval (bgl): 40 - 46	SWL (bgl) (bTOC) 46.705
WL Measurement Point TOP OF CASING	RL of measurement point (mAHD) —	SWL Date/Time 20/09/12
Other Observations on Bore/Site		

Bore Purge Data

Purge method: Bailer	Bore Volume (L): —	Purge Date: 20/9/12
Purge rate (L/min): —	Total Purge volume (L): —	LNAPL / PSH Thickness (mm) (None) .....mm

Purge Field Physiochemical Measurements:

	Reading 1	Reading 2	Reading 3	Reading 4	Reading 5	Reading 6	Reading 7	Reading 8
Start Time:	4.55pm	4.58						
		3 attempts with bailer, could not recover any GW.						
DO (mg/L) ±10% (or ±0.2 if DO<2 mg/L)								
EC (µS/Cm) ±3%								
pH ±0.1								
Eh (mV) ±10mV								
Temp (ºC)								
SWL (m) after	46.705							
Purged Volume (L)	0							
Cum. Volume (L)	0							
Water Colour								
Turbidity ±10%								
Other Observations / Notes								

Sample Container & Preservation Data

Number of sample container: (Include QC samples)	1	2	3	4	5
Container Volume					
Container Type					
Filtration					
Preservation					

Sample Number (for Lab ID): —

QC Dup Sample No.: —

Groundwater Sampling Field Record

Site / Project: FISKVILLE GROUNDWATER CONTAMINATION ASSESSMENT		Bore ID Number: GW110
Client: CFA		Job No. 212163-2
Person Sampling: MARCUS BOYD		Initials: MBB

Bore / Site Details

Bore Condition / Locked? GOOD / LOCKED	Type Protect. Cap / Cover: Gatic/ex-cap	Bore Depth (bgl): 2.9 (bTOC) —
Inner casing/screen type & diameter: uPVC 50mm	Screen interval (bgl): 0.3-2.9	SWL (bgl) ~~0.440~~ — (bTOC) 0.880
WL Measurement Point TOP OF CASING	RL of measurement point (mAHD) —	SWL Date/Time 20/09/12
Other Observations on Bore/Site		

Bore Purge Data

Purge method: Bailer	Bore Volume (L): —	Purge Date: 20/9/12
Purge rate (L/min):	Total Purge volume (L): 6+	LNAPL / PSH Thickness (mm) *None / .....mm*

Purge Field Physiochemical Measurements:

	Reading1	Reading 2	Reading 3	Reading 4	Reading 5	Reading 6	Reading 7	Reading 8
Start Time:	5.05	5.07	5.09	5.11	5.13			
						→ Sampled		
DO (mg/L) ±10% (or ±0.2 if DO<2 mg/L)		58.0	55.5	56.0	58.5			
EC (µS/Cm) ±3%		1087	726	713	718			
pH ±0.1		7.32	7.25	7.22	7.22			
Eh (mV) ±10mV		91.2	95.2	92.9	92.1			
Temp (°C)		12.1	12.1	12.1	12.1			
SWL (m) after	0.440	0.845	0.970	1.095	1.091			
Purged Volume (L)	0	3	1	1	1			
Cum. Volume (L)	0	3	4	5	6			
Water Colour	—	clear	"	"	"			
Turbidity ±10%	—	None	"	"	"			
Other Observations / Notes	—	V=0 O=0	"	"	"			

Sample Container & Preservation Data

Number of sample container: (Include QC samples)	1	2	3	4	5
Container Volume					
Container Type					
Filtration					
Preservation					

Sample Number (for Lab ID): GW110_200912

QC Dup Sample No.: QC05_200912 & QC04_200912

Cardno LanePiper

Groundwater Sampling Field Record

Site / Project: FISKVILLE GROUNDWATER CONTAMINATION ASSESSMENT		Bore ID Number: GW111
Client: CFA		Job No. 212163-2
Person Sampling: MARCUS BOYD		Initials: MBB

Bore / Site Details

Bore Condition / Locked? GOOD / LOCKED	Type Protect. Cap / Cover: Gatic/screw	Bore Depth (bgl): 5.5m (bTOC) —
Inner casing/screen type & diameter: uPVC 50mm	Screen interval (bgl): 0.3 - 4.5	SWL (bgl) — (bTOC) 3.985
WL Measurement Point TOP OF CASING	RL of measurement point (mAHD) —	SWL Date/Time 20/09/12
Other Observations on Bore/Site		

Bore Purge Data

Purge method: Bailer	Bore Volume (L): —	Purge Date: 20/9/12
Purge rate (L/min): ~0.095 L/min	Total Purge volume (L): 1.8	LNAPL / PSH Thickness (mm) (None) / .....mm

Purge Field Physiochemical Measurements:

	Reading 1	Reading 2	Reading 3	Reading 4	Reading 5	Reading 6	Reading 7	Reading 8
Start Time:	2:55	3:13						
			Bailed SWL to low level (reading)					
DO (mg/L) ±10% (or ±0.2 if DO<2 mg/L)								
EC (µS/Cm) ±3%		Sat'd						
pH ±0.1								
Eh (mV) ±10mV		Sat'd						
Temp (°C)								
SWL (m) after	3.985	4.350						
Purged Volume (L)	0	1.8						
Cum. Volume (L)	0	1.8						
Water Colour	—	light brown						
Turbidity ±10%	—	low						
Other Observations / Notes	—	VSO DSO PVC scraping's came up with water						

Sample Container & Preservation Data

Number of sample container: (Include QC samples)	1	2	3	4	5
Container Volume					
Container Type					
Filtration					
Preservation					

Sample Number (for Lab ID): GW111_200912

QC Dup Sample No.: —

476

HydroTerra

EQUIPMENT QUALITY REPORT
Water Quality Meter:

The following equipment has been issued as follows:

☑ Equipment is clean ☑ Impeller and probe check

Parameter	Calibration Results Standard	Result
Temperature	(^{0}C)	Factory Calibrated (^{0}C)
pH	7 Units	7.00 Units
pH span	4Units	3.99 Units
Conductivity	12880 µS/cm	12891 µS/cm
DO	0 % 100 %	0 % 100.2 %
Redox	240 mV	240 mV
Quick Cal	HI9828-0	

Date: 18/9/12

Calibrated by: Roslyn

Please check that the following items are received and all items are returned. Please clean equipment before retuning. **A minimum $20 service/repair charge applies to any unclean or damaged items.**

Item	HT Id No.	Sent	Returned
Water Quality Meter Hanna/Hydrolab/YSI	476	✓	
Manual	N/A	✓	
Probe Cluster	✓	✓	
In situ monitoring cage	N/A	✓	
Storage cup	N/A	✓	
Flow through Cell	N/A	✓	
Calibration cup and lid	N/A	✓	
Spare Batteries / Screwdriver	N/A	✓	
Test and Tag requested			

☑ Equipment voltage ☑ Pre-Delivery Calibration confirmation Test

Date: 18-9-12

Checked by: DM

HT JOB NO: 6737 CLIENTS REF: P/O No: 212163.2

RETURN DATE: / / CONDITION ON RETURN: _____

TIME:

NOTES: _____

2 Wingrove Street • Alphington • VIC• 3078 • Australia
Telephone: 03 9490 1422 • **Fax:** 03 9490 1452
Email: info@hydroterra.com.au **Internet:** www.hydroterra.com.au

ENVIRONMENT PROTECTION AUTHORITY
WASTE TRANSPORT CERTIFICATE

949368

EPA VICTORIA
Environmental Performance Unit
GPO BOX 4395
MELBOURNE 3001

PART A
To be completed by the Producer of the Waste.

1. Name of Waste Producer: CARDNO LAWFIPER C/O CFA
Address of Site of Waste Source: 4549 GORRING BALLAN RD FISKVILLE
VIC Postcode 3342
Name of Emergency Contact: BRATCHA SITE Phone 0398800100

2. Proposed Disposal/Treatment/Storage Site: THESA State VIC

3. Intended Disposal Route – Recycling ☐ Storage ☐ Landfill ☐ Incineration ☐ Energy Recovery ☐ Immobilisation ☐ Chem/Phys Treatment ☐ Biodegradation ☐ Other ☐

4. Description of Waste: DRILLING MUD

5. Waste Code No. (List 1): S N210 Hazard Category (List 2): Contaminants (List 3): Waste Origin (List 4): 7539
U.N. Number: 3077 Class: 9 Packing Group: III Bulk/No. of Packages: 18
Amount of Waste: 4600 kilograms or cubic metres or litres

I declare that to the best of my knowledge and belief the above information is true and correct.
Name and Position: MARCUS BOYD. ENV. ENG.
Signature ..... Date 20 09 17

PART B
To be completed by the Waste Transporter.

6. Name of Transporter: THESA
Address: 83 DEHEERTYS RD LAVERTON
Vehicle No. 1 Registration: WCG774 Transport Permit No.: EP 65074 Vehicle No. 2 Registration: Transport Permit No.: EP

I acknowledge receipt of the waste described in part A.
Name (in block letters): KERRY WOLF
Signature ..... Date 20 09 17

PART C
To be completed by the Depot Receiving Waste.

7. Name of Disposal/Treatment/Storage Facility: Licence No.
Address: Type of Treatment (List 5)

8. Amount of Waste: kilograms or cubic metres or litres

9. Are there any discrepancies between the wastes described above and the waste received?
YES ☐ NO ☐ Briefly note discrepancy: .....

10. Name and address of any other waste receiver to which the waste receiver intends that the waste be transported
.....

11. I hereby acknowledge acceptance of the waste described in part A.
Name
Signature ..... Date

PLEASE USE BLOCK LETTERS

COPY 2 — TO BE RETAINED BY THE PERSON/COMPANY WHO COMPLETED PART A

EPA-F012

COPY 2

CHEMSAL.
A Division of DoloMatrix Australia Ltd.
Please Remit to:
PO BOX 240,
ALTONA NORTH,
VICTORIA .. 3025

Enquiries: KARYN CHUAH
83 DOHERTYS RD, LAVERTON NORTH
VICTORIA .. 3026 .. AUSTRALIA
Phone: (03) 9369 4222 Fax: (03) 9369 4380
Mobile:

ACN: 091340920
ABN: 74091340920

WASTE COLLECTION DOCKET

DATE 18/09/2012

INT. REF WT/KC/279589

PAGE No. 1 of 1

SOLD TO ATT: GRETCHEN SITES
CARDNO LANEPIPER
JOB AT CFA TRAINING GROUND
4549 GEELONG-BALLAN RD
FISKVILLE
VIC 3342

Waste Origin 7829
CUSTOMER NUMBER 28788
ORDER NUMBER 212163.2
ORDER DATE Required 20/09/2012
YOUR ABN

- 7 hours

CLIENT FAX: 0398083511 TEL#: 0398880100 MOB#: 0450070849 02:54:23:PM 18/09/2012 WST RECD INV

CODE	ITEM DESCRIPTION	CLASS	POISON	HAZCHEM	UN#	PACK GRP.	RISK	ACTUAL QTY	QUANTITY	UNIT	DISP.	LOCATION	EPA	COLLECTED EPA DKT#
MANIFEST FOR WASTE DISPOSAL OF THE FOLLOWING PRODUCTS -														
H 79899	COLLECTION FEE-DEPOT TO DEPOT							1	1.000	HOURLY	00FR			
H 29513	DRILLING MUD	9		2X	3077	III		15x200	20.000	200 LT/KG	00LP	2-LFS	N210	
H 69189	EPA TRANSPORT CERTIFICATE CHARGE							1	1.000	EACH	00EP	1		
H 79805	LEVY FUEL	na	NA	NA	NA			7.5	0.075	LEVY	00FL	NA		
H 29247	CONTAMINATED WASTE	9			3077	III			0.000	200 LT/KG	00LP	2-LFS	N100	
H 61177	CONTAMINATED WATER	nh			30XY	III			0.000	200 LT/KG	00SW	2-T19	L150	
This area is for additional Items not Manifested														

##COLLECTION AUTHORISED ...../../..
##C H E M S A L Q U A L I T Y A U D I T
Authorisations:

ORIGINATOR (KC) ..... DATE 5/9/12
OPERATIONS (INIT) ..... DATE ../../..
TRANSPORT (INIT) ..... DATE ../../..
TIME IN ..... OUT .....
** ADDITIONAL ITEMS NOT ORIGINALLY MANIFESTED WILL ATTRACT EXTRA CHARGES.

######## INSTRUCTIONS:

DELIVER TO

COLLECT ON 20/09/12 - PM.
MARCUS BOYD WILL BE ON-SITE TO SIGN EPA. LEAVE EMPTY DRUMS.
MOBILE 0411 300 608
DIRECTORY REF - PAGE 0

SF268-3

Reorder Code SF268-1

ENVIRONMENT PROTECTION AUTHORITY
WASTE TRANSPORT CERTIFICATE

956977

EPA VICTORIA
Environmental Performance Unit
GPO BOX 4395
MELBOURNE 3001

PART A
To be completed by the Producer of the Waste.

1. Name of Waste Producer: C F A
Address of Site of Waste Source: 9598 Geelong-Ballan rd
Tarneit Postcode 3029
Name of Emergency Contact: LAUREN RYAN Phone 0437853223

2. Proposed Disposal/Treatment/Storage Site: DISPOSAL State VIC

3. Intended Disposal Route – Recycling ☐ Storage ☑ Landfill ☐ Incineration ☐ Energy Recovery ☐ Immobilisation ☐ Chem/Phys Treatment ☐ Biodegradation ☐ Other ☐

4. Description of Waste: Drilling Mud

5. Waste Code No. (List 1): S N210 Hazard Category (List 2): Contaminants (List 3): Waste Origin (List 4): 7829
U.N. Number: 3077 Class: 9. Packing Group: III Bulk/No. of Packages: 3
Amount of Waste: kilograms or 1 cubic metres or litres

I declare that to the best of my knowledge and belief the above information is true and correct.
Name and Position
Signature ..... LAUREN RYAN Date 12/1/12

PART B
To be completed by the Waste Transporter.

6. Name of Transporter: CHEMSAL
Address: 83 DOHERTYS RD LARERTON VIC
Vehicle No. 1 Registration: ZJ9407 Transport Permit No.: EP 71481 Vehicle No. 2 Registration: Transport Permit No.: EP
I acknowledge receipt of the waste described in part A.
Name (in block letters): MATTHEW BEZZINA
Signature ..... Date 12/1/12

PART C
To be completed by the Depot Receiving Waste.

7. Name of Disposal/Treatment/Storage Facility: Licence No.
Address: Type of Treatment (List 5)

8. Amount of Waste: kilograms or cubic metres or litres

9. Are there any discrepancies between the wastes described above and the waste received?
YES ☐ NO ☐ Briefly note discrepancy: .....

10. Name and address of any other waste receiver to which the waste receiver intends that the waste be transported
.....

11. I hereby acknowledge acceptance of the waste described in part A.
Name
Signature ..... Date

PLEASE USE BLOCK LETTERS

COPY 1 – TO BE FORWARDED TO EPA WITHIN SEVEN (7) DAYS WITH PART A & B COMPLETE BY THE PERSON/COMPANY WHO COMPLETED PART A

EPA-F012

COPY 1

ENVIRONMENT PROTECTION AUTHORITY
WASTE TRANSPORT CERTIFICATE

956978

EPA VICTORIA
Environmental Performance Unit
GPO BOX 4395
MELBOURNE 3001

PART A
To be completed by the Producer of the Waste.

1. Name of Waste Producer: CSA
Address of Site of Waste Source: 424 Geelong-Ballan rd
Postcode: 3342
Name of Emergency Contact: LAUREN RYAN
Phone: 0448 595 323

2. Proposed Disposal/Treatment/Storage Site: DISPOSAL
State: VIC

3. Intended Disposal Route – Recycling ☐ Storage ☐ Landfill ☐ Incineration ☐ Energy Recovery ☐ Immobilisation ☐ Chem/Phys Treatment ☑ Biodegradation ☐ Other ☐

4. Description of Waste: groundwater

5. Waste Code No. (List 1): L L100
Hazard Category (List 2):
Contaminants (List 3):
Waste Origin (List 4): 7829
U.N. Number: 3077
Class: 9 • H
Packing Group: III
Bulk/No. of Packages: 1
Amount of Waste: kilograms or cubic metres or 200 litres

I declare that to the best of my knowledge and belief the above information is true and correct.

Name and Position:

Signature: LAUREN RYAN Date: 12/1/12

PLEASE USE BLOCK LETTERS

PART B
To be completed by the Waste Transporter.

6. Name of Transporter: CHEMSAL
Address: 83 DOHERTYS RD LAVERTON NTH
Vehicle No. 1 Registration: ZSQ407 Transport Permit No.: EP 71481
Vehicle No. 2 Registration: Transport Permit No.: EP

I acknowledge receipt of the waste described in part A.

Name (in block letters): MATTHEW BEZZINA

Signature: Matthew Bezzina Date: 12/1/12

PART C
To be completed by the Depot Receiving Waste.

7. Name of Disposal/Treatment/Storage Facility:
Licence No.:
Address:
Type of Treatment (List 5):

8. Amount of Waste: kilograms or cubic metres or litres

9. Are there any discrepancies between the wastes described above and the waste received?
YES ☐ NO ☐ Briefly note discrepancy:.....

10. Name and address of any other waste receiver to which the waste receiver intends that the waste be transported
.....

11. I hereby acknowledge acceptance of the waste described in part A.
Name:
Signature..... Date:

EPA-F012

COPY 1 — TO BE FORWARDED TO EPA WITHIN SEVEN (7) DAYS WITH PART A & B COMPLETE BY THE PERSON/COMPANY WHO COMPLETED PART A

COPY 1

ENVIRONMENT PROTECTION AUTHORITY
WASTE TRANSPORT CERTIFICATE

956979

EPA VICTORIA
Environmental Performance Unit
GPO BOX 4395
MELBOURNE 3001

PART A
To be completed by the Producer of the Waste.

1. Name of Waste Producer: CFA
Address of Site of Waste Source: 4548 Geelong-Ballan rd
FISKVILLE Postcode 3342
Name of Emergency Contact: LAUREN RYAN Phone 0443435323

2. Proposed Disposal/Treatment/Storage Site: DISPOSAL State VIC

3. Intended Disposal Route – Recycling ☐ Storage ☑ Landfill ☐ Incineration ☐ Energy Recovery ☐ Immobilisation ☐ Chem/Phys Treatment ☐ Biodegradation ☐ Other ☐

4. Description of Waste: ~~EMPTY DRUM~~ CONTAMINATED WASTE

5. Waste Code No. (List 1): S N210 Hazard Category (List 2): Contaminants (List 3): Waste Origin (List 4): 7829
U.N. Number: 3077 Class: 9 Packing Group: III Bulk/No. of Packages: 1
Amount of Waste: 40 kilograms or cubic metres or litres

I declare that to the best of my knowledge and belief the above information is true and correct.
Name and Position:
Signature: Lauren Ryan (LAUREN RYAN) Date 12/1/12

PLEASE USE BLOCK LETTERS

PART B
To be completed by the Waste Transporter.

6. Name of Transporter: CHEMSAL
Address: 83 DONELTYS RD LARGETOWN TAS
Vehicle No. 1 Registration: ZJQ407 Transport Permit No.: EP 71481 Vehicle No. 2 Registration: Transport Permit No.: EP

I acknowledge receipt of the waste described in part A.
Name (in block letters): MATTHEW BEZZINA
Signature: Matthew Bezzina Date 12/1/12

PART C
To be completed by the Depot Receiving Waste.

7. Name of Disposal/Treatment/Storage Facility: Licence No.
Address: Type of Treatment (List 5)

8. Amount of Waste: kilograms or cubic metres or litres

9. Are there any discrepancies between the wastes described above and the waste received?
YES ☐ NO ☐ Briefly note discrepancy:.....

10. Name and address of any other waste receiver to which the waste receiver intends that the waste be transported
.....

11. I hereby acknowledge acceptance of the waste described in part A.
Name:
Signature..... Date

COPY 1 — TO BE FORWARDED TO EPA WITHIN SEVEN (7) DAYS WITH PART A & B COMPLETE BY THE PERSON/COMPANY WHO COMPLETED PART A

EPA-F012

COPY 1

CHEMSAL

A Division of DoloMatrix Australia Ltd.

Please Remit to:
PO BOX 240,
ALTONA NORTH,
VICTORIA .. 3025

Enquiries: NICOLE MAMONE
83 DOHERTYS RD, LAVERTON NORTH
VICTORIA .. 3026 .. AUSTRALIA
Phone: (03) 9369 4222 Fax: (03) 9369 4380
Mobile:

ACN: 091340920
ABN: 74091340920

WASTE COLLECTION DOCKET

DATE 07/11/2012

INT. REWT/NM/282111

PAGE No1 of 1

SOLD TO
ATT: LAUREN RYAN
CARDNO LANEPIPER
JOB AT CFA TRAINING GROUND
4549 GEELONG-BALLAN RD
FISKVILLE
VIC 3342

Waste Origin 7829
CUSTOMER NUMBER 28788
ORDER NUMBER LAUREN RYAN
ORDER DATE Required 12/11/2012
YOUR ABN

CLIENT FAX: 0398083511 TEL#: 0398316155 MOB#: 0448485323 03:20:32:PM 07/11/2012 WST RECD INV

CODE	ITEM DESCRIPTION	CLASS	POISON	HAZCHEM	UN#	PACK GRP.	RISK	ACTUAL QTY	QUANTITY	UNIT	DISP.	LOCATION	EPA	COLLECTED EPA DKT#
MANIFEST FOR WASTE DISPOSAL OF THE FOLLOWING PRODUCTS -														
H 79899	COLLECTION FEE-DEPOT TO DEPOT							1	3.000	HOURLY	00FR			
H 29247	CONTAMINATED WASTE	9			3077	III		1 X 200L	1.000	200 LT/KG	00LP	2-LFS	N100	
H 61177	CONTAMINATED WATER	nh			30XY	III		1 X 200L	1.000	200 LT/KG	005W	2-T19	L150	
H 29513	DRILLING MUD	9		2X	3077	III		3 X 200L	1.000	200 LT/KG	00LP	2-LFS	N210	
H 22341	DRUM 200LT CLEAN	nh						12 X 200L	1.000	COLLECT	00MT	1-WEST		
H 69189	EPA TRANSPORT CERTIFICATE CHARGE							1	1.000	EACH	00EP	1		
H 79905	LEVY FUEL	na	NA	NA	NA			1	0.075	LEVY	00FL	NA		
A 22758	ZZ NOTE :-	nh						1	1.000	EACH	00N	2		
	* COMBINATION OF 35 DRUMS TO BE COLLECTED - EMPTY & FULL													
This area is for additional Items not Manifested														

##COLLECTION AUTHORISED ...../../..
QUALITY AUDIT
Authorisations:

ORIGINATOR (NM) ..... DATE 7 / 11 / 12
OPERATIONS (INIT) ...NB... DATE .. / .. / ..
TRANSPORT (INIT) ...NB... DATE 12 / 11 / 12
TIME IN ..... OUT .....
** ADDITIONAL ITEMS NOT ORIGINALLY MANIFESTED WILL ATTRACT EXTRA CHARGES.

##DELIVERY INSTRUCTIONS:

SITE CONTACT: LAUREN RYAN
0448 485 323

DIRECTORY REF - PAGE 0

SF268-3

Appendix H
1 Page

Groundwater Database Search

Table I-1: Groundwater Database Search Results

Bore ID	Site ID	Easting 55	Northing 55	Date	Depth	Screen Upper	Screen Lower	Screen Interval	Type	Lithology	Distance from Site	Direction from Site
B53091	31877	247100	5828800	12-Mar-68	82.300				NKN	N	7.40	NW
B53094	31880	246500	5824950	26-Apr-83	40.0	37.000	38.000	1.000	ST	Y	7.43	W
B53380	32150	252537	5821360	31-Dec-39	55.160				IV	N	4.18	SSW
B53381	32151	252296	5821244	31-Dec-39	60.960				IV	N	4.35	SSW
B53382	32152	255155	5822663	23-Dec-78	33.000				IR	Y	2.36	S
B53383	32153	254900	5821100	17-May-82	56.380				DM	Y	3.94	S
B53384	32154	255400	5821600	19-May-82	50.3	45.000	50.000	5.000	DM	Y	3.47	S
B53385	32155	253800	5822750	9-Feb-83	91.440	18.290	60.960	42.670	ST	Y	2.43	S
B106570	75809	253888	5829028	31-Dec-39	21.3				IV	N	2.78	N
B106571	75810	254230	5824179	31-Dec-39	73.8				IV	N	1.03	S
B106573	75812	252300	5826050	2-Mar-83	61.000	2.000	61.000	59.000	IV	Y	1.70	W
B135442	94018	256200	5829300	15-Mar-98	76.000	55.000	76.000	21.000	DM/ST	Y	3.31	NNE
B302754	100340	248981	5824800	31-Dec-22	81.690				NG	N	4.96	W
B302811	100395	259863	5823066	31-Dec-19	46.3				NG	N	3.50	SE
B302812	100396	257123	5821962	2-Jun-83	6.500				NG	N	3.50	SE
B302813	100397	257123	5821962	22-Jul-83	41.500				NG	N	3.50	SE
B302814	100398	257222	5822145	11-Aug-83	15.350				NG	N	3.50	SE
B302815	100399	257166	5822125	1-Sep-83	30.000				NG	N	3.50	SE
B302816	100400	257222	5822145	16-Aug-83	6.300				NG	N	3.50	SE
B302817	100401	257204	5822116	23-Aug-83	16.250				NG	N	3.50	SE
B302818	100402	257204	5822116	29-Aug-83	6.3				NG	N	3.50	SE
B302819	100403	257144	5822097	2-Sep-83	16.8				NG	N	3.50	SE
BG8010825/01	140774	252129	5828624	28-Jun-04	60.0	0	0	0	DS	Y	3.09	NW
BS9019239/1	140177	256604.101	5828947.238	29-Mar-04	61	0	0	0	DS	Y	2.93	NNE

NKN = Not Known; ST = Stock; IV = Investigation; IR = Irrigation; DM = Domestic; NG = Non-groundwater; DS = Domestic and Stock

Appendix I
3 Pages

Information About Environmental Reports

About Site Environmental Assessment Reports

1. Introduction

This document explains the Environmental Site Assessment (ESA) process and the context that applies to the use of Environmental Reports issued by Cardno Lane Piper.

2. What is an ESA?

Environmental Site Assessments (ESA) are undertaken for a range of purposes, specific to the brief issued by the client in each case. The scope may include one or a combination of any of the following:

- A factual report of the condition of a portion of the site or one aspect of an entire site.
- Assessment of the contamination levels in soil to be removed from a site – a waste classification assessment.
- Validation of the success of remediation of a site or a portion of a site.
- Provision of a professional opinion about the suitability of a site for one or more uses, in terms of its contamination status.

The scope of any ESA needs to be defined at the outset.

An ESA is not an Environmental Audit. Such audits are undertaken in accordance with the provisions of regulations enacted in various states of Australia, and are referred to as Site Audits in some jurisdictions. Statutory audits provide certification by EPA accredited auditors that a site is suitable for one or more uses. An ESA may provide similar advice but cannot be used in place of an audit if the latter is required by regulation in any instance. However in some circumstances and jurisdictions an ESA is sufficient to provide "environmental sign-off" of a site.

An ESA may be undertaken for due diligence purposes, to establish whether the site has been impacted to the extent that some beneficial uses of the site may be precluded. Due diligence audits in many cases may be completed as non-statutory Audits, although in some jurisdictions they can also be statutory audits, if defined as such at the outset.

3. The ESA Process

The Client generally initiates the ESA process by specifying a brief which identifies the specific objectives of the assessment. If not, it is the consultants' duty to so specify the ESA

In the case of an ESA to provide an opinion about the suitability of the site for use, it would be conducted in accordance with NEPM (Site Assessment). Such ESA would not commence until a thorough site history assessment (Phase 1 Assessment: to identify the potential for significant contamination at a site) is conducted. However, where the history is unclear, a broad screening of chemical parameters can be used to test environmental media. This normally includes a broad range of organic and inorganic compounds and elements, often referred to as an Environmental Screen.

(In the case of an ESA for a purpose other than to provide an opinion about the suitability of the site for use, it is not always necessary to undertake a Phase 1 assessment.)

The ESA requires sampling of soil at representative locations across the site. A NATA accredited laboratory performs the analysis of soil. It is impractical for all of the soil to be assessed. The ESA is often based on a statistical method of grid or random sampling, augmented by targeted sampling at locations known or suspected to be contaminated. Guidance on sampling strategy and density is provided in Australian Standard AS4482.1–2005. However, some considerable degree of judgement is still required in the application of any sampling and testing strategy. For example the blanket application of the "hot spot" method presented in this standard is often inappropriate given its limitations.

The field program also investigates the likelihood of contamination below the site surface. Field investigations must sample and test fill as well as the natural soils. If contamination is found then it is common for further work to be undertaken to characterise, to the extent practical, its vertical and horizontal extent. However, where fill is encountered and testing shows it to be uncontaminated, it must be realised that the heterogeneous nature of the material might mean that not all pockets of contaminated material can be detected using normal sampling regimes.

EPA guidelines for auditors, that may be relevant for an ESA, indicate the need in all cases to consider the potential for groundwater contamination in any site. This does not mean all sites need to be drilled to sample groundwater, but it is most often the case. Most hydrogeological settings and groundwater conditions are complex and vary in space and time. The condition of groundwater is investigated to identify if any beneficial use or environmental value of groundwater is precluded due to contamination.

As previously stated for soil, all groundwater at the site cannot be tested. The environmental investigations are conducted in accordance with industry standards and guidelines (e.g. EPA Vic Pub 668). This provides a level of confidence that a sufficiently comprehensive assessment of the groundwater at the site is achieved.

Where an investigation shows that groundwater is polluted, consideration should be given to assessing the risks and the need for and practicality of any clean up.

4. Environmental Assessment Report

The ESA Report details the findings of the ESA. It provides summary information on the site definition, the reasons for the assessment and other relevant facts. It reviews the scope and quality of the site investigations, laboratory testing and data analyses undertaken. These reports also present a review of the contamination status of the site, the need for any further clean up, and an opinion on the suitability of the site for a range of beneficial uses and land uses such as “residential – low density”, “commercial” etc, as appropriate.

However, as noted above, some ESA have a narrow scope such as for classification of waste soil for removal from site, and do not make conclusions on suitability of site for use.

The ESA Report generally includes copies of other documents and reports, necessary to support the assessment findings, presented as appendices. These can contain more detailed information than the body of the ESA Report. Care should be taken to also read the appended documents and the ESA report in full.

Cardno Lane Piper generally issues reports in electronic form (e-Report) on CD ROM. ESA Reports are issued in this format as Adobe Acrobat™ PDF files. However, a paper copy of the executive summary of the ESA Report is generally issued to the client, and others as required by the brief or by regulation.

5. Limitations of Environmental Assessment Report

The ESA Report is prepared in a manner that can be easily read by a lay person with a legitimate interest in the contamination status of the site, such as the site owner or occupier, EPA and Local Planning Authority. The ESA report is not intended for use by other parties or for other purposes. Anyone who uses the assessment report for purposes other than specified in the report, does so at their own risk.

The site should only be used for one or more of the beneficial uses and land uses identified in the ESA as suitable.

The conditions and qualifications may apply to the suitability of the site for use, and it is the responsibility of the Client to be cognizant of and accept these in accepting the report. Cardno Lane Piper are only responsible for the issuing of the ESA report but accepts no liability for the costs incurred in the implementation of ESA findings.

The ESA provides a “snapshot” of the site conditions at the time of the site investigation. Consequently, the report may not be valid at a later time if there has been any change to the contamination status of the site in that time. Verification of the status of the site may be required in cases where a significant time has elapsed, or site conditions have changed since the assessment and audit.

The ESA is necessarily limited by constraints such as time, cost and available information; although normal professional practice at the time has been applied with all due care to prepare the report. A necessary requirement of this process is the horizontal and vertical interpolation of data from discrete locations. However, site conditions are generally not homogenous and some discrepancies will occur between the actual and predicted results at locations not directly sampled. There is a risk that contamination may occur at the site and not be identified by a competent investigation and assessment. The approach adopted in sampling (a combination of statistically based grid and judgmental sampling) seeks to reduce, but cannot eliminate, this risk.

Where unexpected occurrences of contamination arise, subsequent to the issue of the ESA Report, Cardno Lane Piper should be permitted to make an interpretation of these facts in relation to the ESA Report findings. Consequently, the Client should inform Cardno Lane Piper and seek their opinion. Cardno Lane Piper accepts no liability for costs incurred due to such unexpected

occurrences, given the inherent uncertainties in the assessment process.

Cardno Lane Piper uses information provided by other parties as the basis for the ESA, and reliance on this information is at the discretion of Cardno Lane Piper. However, however Cardno Lane Piper cannot guarantee any of the facts, findings or conclusions presented by other parties. Cardno Lane piper will not be liable for the use of information, provided by others that is subsequently found to be intentionally misleading.

The ESA Report is not and does not purport to be anything other than a contaminated land ESA. It is not a geotechnical report and bore logs reproduced are for interpretation of the likely distribution of contamination. They are not intended for geotechnical interpretations and may not be adequate for this purpose.

The ESA Report is not intended to be a comprehensive analysis of the presence and associated risk of asbestos in buildings and services. Where asbestos in buildings and services is known or likely, the report may only caution that an appropriately qualified person be engaged to undertake demolition to avoid contamination of the site.

Cardno Lane Piper Pty Ltd
1 July 2011