APPENDIX J

Preliminary Contamination Assessment

Douglas Partners
Geotechnics / Environment / Groundwater

Integrated Practical Solutions

Report on
Preliminary Contamination Assessment

Proposed Redevelopment
Wagga Wagga Base Hospital
Edward Street, Wagga Wagga NSW

Prepared for
Health Infrastructure

Project 72320.01
May 2011

Douglas Partners
Geotechnics / Environment / Groundwater

Document History

Document details

Project No.	72320.01	Document No.	1
Document title	Report on Preliminary Contamination Assessment		
Site address	Edward Street, Wagga Wagga		
Report prepared for	Health Infrastructure		
File name	P:\72320.01 WAGGA WAGGA, Base Hospital Phase 1 RA\Docs\72320.01 PCAv1.doc		

Document status and review

Revision	Prepared by	Reviewed by	Date issued
0	R Alviar	Paul Gorman	25 May 2011

Distribution of copies

Revision	Electronic	Paper	Issued to
0	1	0	Mr Mark Baker, Health Infrastructure
0	1	3	Mr Frank Tong, Capital Insight Pty Ltd

The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

	Signature	Date
Author		25 May 2011
Reviewer		25 May 2011

NCS INTERNATIONAL CERTIFIED QUALITY MANAGEMENT SYSTEM

Douglas Partners Pty Ltd
ABN 75 053 980 117
www.douglaspartners.com.au
96 Hermitage Road
West Ryde NSW 2114
PO Box 472
West Ryde NSW 1685
Phone (02) 9809 0666
Fax (02) 9809 4095

Executive Summary

This report presents the results of a Preliminary Contamination Assessment undertaken for a proposed redevelopment at Wagga Wagga Base Hospital, located on Edward Street, Wagga Wagga (referred to as the 'Site'). The investigation was commissioned in an email dated 2 March, 2011, by Mr Frank Tong of Capital Insight Pty Ltd and was undertaken in accordance with Douglas Partners' proposal dated 16 February, 2011.

This assessment has been conducted in conjuction with a geotechnical investigation and was undertaken to evaluate the likely potential for contamination at the Site. The assessment involves a desktop study of the historical land uses of the property and a "walkover" Site inspection with the objective of identifying potentially contaminating activities that could have taken place within the Site and on adjoining properties. Environmental sampling was undertaken from eight of the ten geotechnical boreholes. Two of the Boreholes (101 & 106) were converted into groundwater piezometers for groundwater sampling purposes. Details of the field and laboratory work are given in this report whilst the geotechnical investigation was reported separately.

The Site is currently occupied by a number of separate buildings, some of which date back to the early 1900s. The main hospital building located within the central part of the Site is eight storeys in height. The original three storey hospital building located adjacent to the main building (adjacent to the lawn area that fronts Edward Street) is still operational. A number of smaller brick buildings ranging in height from between one and three storeys are located throughout the site and are currently used as university buildings, hospital nursing quarters, engineering/ maintenance buildings and hospital specialist buildings. A relatively newly constructed theatre building (CSB building) is located to the south-west of the main building and is between two and three storeys in height.

It is understood that the proposed redevelopment of the Site will include the demolition of all buildings except the CSB building (the newly constructed theatre building), Harvey House (UNSW medical building) and the Hydrotherapy Pool building. The proposed new main building will vary between two and eight storeys in height and will spread out across the Site as shown on Drawing 1, Appendix B. The preliminary conceptual design also includes a service tunnel under the new building constructed to a depth equivalent to approximately one basement level.

A review of the historical aerial photographs, the baseline archaeological assessment report, site walkover survey and field observations indicate that the greater majority of the Site was developed into a hospital in the early 1900s. No historical records were available for review prior to the site being developed into a hospital. However, the baseline archeological assessment report indicated that the Site was unoccupied prior to the construction of the hospital. The information gathered suggested potential contamination associated with:

- Hazardous building materials (asbestos, lead based paints);
- An old boiler and laundry house;
- A workshop area (and former area);
- Imported filling; and
- Migration of contaminants on groundwater from a nearby Caltex service station.

Intrusive site investigation undertaken in conjuction with the geotechnical investigation identified fill materials in Test Bores 101, 105, 107 and 108. The fill materials were underlained by silty clay. No discernible odour or oily staining were observed during the fieldwork. Screening of all samples collected indicate PID reading of <1 ppm.

The results of the soil analysis indicated that concentrations of heavy metals, TPH, BTEX, PAH, OCP, OPP, PCB, VOC and total phenols in the samples analysed were either below the laboratory PQL or the adopted Site Assessment Criteria (SAC). With regard to asbestos, whilst no asbestos was detected in the soil samples analysed, not all previous locations of old buildings were sampled. In this regard, the potential presence of asbestos contamination cannot be discounted.

On the basis of the field observations and total concentrations of targeted analytes, the identified filling is assigned a preliminary waste classification of General Solid Waste (non-putrescible), whilst the underlying natural clays are assigned a preliminary classification of Virgin Excavated Natural Material (VENM). The classifications are subject to *ex situ* confirmation.

No groundwater contamination issues were identified in the two groundwater monitoring wells that were installed and sampled.

No significant contamination issues have been identified through the scope of works undertaken in completing this assessment. As such, it is considered that the Site is, in general, environmentally suitable for the proposed redevelopment. However, given the limited nature of the assessment, the extent of works proposed, and the areas of potential contamination identified, it is recommended that further assessment of the Site be undertaken prior to construction. As the existing buildings (proposed for demolition) present a potential source of contamination (i.e. asbestos and lead) it would be advisable to undertake additional investigations upon completion of demolition.

Prior to demolition a hazardous materials assessment should be undertakent to identify any building hazards (e.g. asbestos and lead based paints) requiring particular management / disposal. Should such materials be identified then the removal works will require the engagement of appropriately licenced contractors.

Table of Contents

Table of Contents

Page

Report on Preliminary Contamination Assessment
Proposed Wagga Wagga Base Hospital Redevelopment
Edward Street, Wagga Wagga NSW

1. Introduction

This report presents the results of a Preliminary Contamination Assessment undertaken for a proposed addition of new buildings at Wagga Wagga Base Hospital located on Edward Street, Wagga Wagga (referred to as the Site). The investigation was commissioned in an email dated 2 March, 2011, by Mr Frank Tong of Capital Insight Pty Ltd and was undertaken in accordance with Douglas Partners' proposal dated 16 February, 2011.

This assessment has been conducted in conjuction with a geotechnical investigation and was undertaken to evaluate the likely potential for contamination at the Site. The assessment was requested as part of the development application process. The assessment involved a desktop study of the historical land uses of the property, a "walkover" Site inspection with the objective of identifying potentially contaminating activities that could have taken place within the Site and on adjoining properties, and limited environmental sampling and testing.

Environmental sampling was undertaken in conjuction with the geotechnical investigation from eight of the ten (10) geotechnical targeted boreholes. Two of the boreholes were converted into groundwater piezometers for groundwater sampling purposes.

Details of the field and laboratory work are given in this report whilst the geotechnical investigation has been reported separately.

2. Scope of Work

The scope of work for the assessment is summarised below:-

- Acquire and review historic aerial photos to identify land uses and changes in the land that may indicate potential for contamination;
- Review of the Contaminated Land Register for Notices issued under the *Contaminated Land Management Act* 1997 for any listed properties in the vicinity of the subject Site;
- Review of any site history information that may be made available from the client;
- Acquire information from WorkCover NSW regarding any past registrations for storing dangerous goods;
- Review of site and regional geological, topographical and acid sulphate soil maps;
- Conduct a site inspection to identify current site features and any visually apparent indicators of potential contamination (e.g. fly tipping, filling, unusual staining, underground tanks);

- Obtain samples of soil/ fill from 8 boreholes in conjuction with the geotechnical investigation at depths based upon subsurface conditions and signs of contamination. Collect additional 5-10% replicates for QA/QC requirements;
- Screen all soil samples collected with a photo-ionisation detector (PID) to detect the presence or likely absence of volatile organic compounds;
- Conduct laboratory analysis on selected soil and sediment samples (including replicate QA/QC sample) at a NATA accredited laboratory for a combination of the following potential contaminants:-
  - Heavy metals - As, Cd, Cr, Cu, Pb, Hg, Ni, Zn - (16 samples);
  - Total Petroleum Hydrocarbons (TPH) – (11 samples);
  - Benzene, Toluene, Ethylbenzene and Xylene (BTEX) – (11 samples);
  - Polycyclic Aromatic Hydrocarbons (PAH) – (16 samples);
  - Phenols – (9 samples);
  - Polychlorinated Biphenyls (PCB) – (9 samples);
  - Organochlorine pesticides (OCP) – (9 samples);
  - Organophosphate pesticides (OPP) – (9 sampes);
  - Volatile Organic Compounds (VOC) – (3 samples); and
  - Asbestos – (4 samples).
- Purge and recover groundwater samples from two monitoring wells installed as part of the geotechnical investigation;
- Conduct laboratory analysis on the groundwater samples, including Heavy Metals, TPH, BTEX, PAH, OCP, OPP, PCB, Phenols, VOC and Hardness;
- Provision of this Preliminary Contamination Assessment report including a preliminary waste classification assessment will be provided as part of the report.

3. Site Identification and Description

3.1 Site Identification

The site identification information is summarised as follows:

Item	Details
Site Owner	Wagga Wagga Base Hospital / Health Administration of NSW Health
Site Address	Corner Edward and Docker Street, Wagga Wagga, NSW
Lot & DP Number	DP 659184, Lots 1-2 DP 456751, Lot 1 DP668972, Lots 27-31 DP 7850, Lots 1-4 DP 13345 Section A, Lots 2-3 & 12-15 DP 13345 Section B, Lots 1-6 DP 13345 Section C.
Local Government Authority	Wagga Wagga City Council
Current land use	Commercial (hospital)
Approximate Site Area	5.7 hectares
Site Plan & Locality Map	A site plan and locality map in Drawing 1, Appendix B.

3.2 Site Description

The Site is an existing hospital approximately rectangular in shape with area totalling approximately 57,000 m^2. It has an approximate 220 m northern frontage to Edward Street and a length of approximately 270 m along Docker Street on the western boundary. The eastern boundary is irregular and typically fronts neighbouring residential boundaries and hospital support buildings. Rawson Avenue borders the Site along the southern boundary (refer to Drawing 1, in Appendix B).

4. Site History

A review of site history information was conducted based on historical aerial photos, a WorkCover NSW Dangerous Goods database search, and a search for regulatory Notices (issued under *Contaminated Land Management* (CLM) *Act* 1997 and *Protection of the Environment Operations* (POEO)) *Act* 1997. Historical title deeds search was not undertaken as part of this preliminary contamination assessment.

4.1 Historical Aerial Photographs

Selected historical aerial photographs for eight years (1944, 1953, 1971, 1980, 1985, 1990, 2001 & 2010) were reviewed to establish the changes to the physical features of the Site over the years. The Wagga Wagga Base Hospital – Baseline Archaeological Assessment report by Archaeological and

Management Solutions Pty Ltd, dated January 2011 was also used as reference for identifying buildings on Site. The photos are included in Appendix C and relevant features are described below.

1944

The 1944 aerial photograph shows that the Site has been developed with the majority of the hospital's buildings were already existing. The notable feature of the Site is the presence of residential buildings along the east, across Lewis Drive. The surrounding land use appears to be residential in nature.

1953

The 1953 aerial photograph shows that no discernible changes occurred since the 1944 aerial photo other than the increase in residential buildings to the north and south-west of the site.

1971

The 1971 aerial photograph shows that the site has been redeveloped to include several building extentions including the east wing of the main hospital, nurses home extention, and new buildings to the south.

No significant changes to the surrounding land use is observed since the 1953 aerial photograph. The current location of the Caltex service station along the corner of Edward and Docker Street to the west of the Site appears to have a similar building orientation However, this location appears to have been redeveloped in the 1971 aerial photograph.

1980

Whilst the 1980 aerial photograph is not clear, it appears that there is no significant change that occurred on site since the 1971 aerial photograph. Similarly, the surrounding land use appears to have not undergone any significant development.

1985

Some residential areas adjacent to Lewis Drive appear to have been demolished. Several buildings can now be seen south of the site. These buildings are noted to have been used as workshop, laundy and boiler house. No significant changes to the surrounding land use is observed since the 1980 aerial photograph.

1990

More residential buildings adjacent to Lewis Drive have been demolished and converted into car parks. New buildings to the south west and to the south east appear to have been constructed between 1985 and 1990.

The location of the current Caltex service station off site appears to have been redeveloped since the 1985 aerial photograph.

2001

A few more residential buildings adjacent to Lewis Drive appear to have been demolished since the 1990 aerial photograph. A new building located at the centre of the site has been constructed between 1990 and 2001.

2010

No significant change to the site has occurred since the 2001 aerial photograph with the exception of the construction of a building in front of Robinson House located west of the main hospital building.

4.2 NSW WorkCover Dangerous Goods Database

A search of the NSW WorkCover dangerous goods database indicated that there were no registered dangerous goods storage depots at the subject site other than liquid oxygen. WorkCover search documentation is attached in Appendix D.

4.3 Statutory Notices

The NSW Office of Environment and Heritage (OEH) Register of Notices issued under the *Contaminated Land Management Act*, 1997, was searched on 25 March, 2011. The search of the OEH database indicated that two environmental protection licences have been issued by the OEH within 500 m from the Site. These two lisences relate to the hazardous and/or industrial and/or Group A waste generated by Wagga Wagga Base Hospital and Calvary Hospital. According to the OEH website, both licenses were no longer in force.

No Notices or Orders issued by the OEH with respect to the subject Site.

5. Site Condition and Surrounding Environment

5.1 Current and Future Land Use

The Site is currently occupied by a number of separate buildings, some of which date back to the early 1800s. The main hospital building located within the central part of the Site is eight storeys in height and is understood to have been constructed around the 1960s. The original three storey hospital building located adjacent to the main building (adjacent to the lawn area that fronts Edward Street) is still operational. A number of smaller brick buildings ranging in height from between one and three storeys are located throughout the site and are currently used as university buildings (Harvey House), hospital nursing quarters, engineering/ maintenance buildings and hospital specialist buildings. A relatively newly constructed theatre building (CSB building) is located to the south-west of the main building and is between two and three storeys in height. Open asphalt and gravel car parks are located along the eastern side of the site.

It is understood that the proposed redevelopment of the site comprises three stages of construction activities including the demolition of all buildings except the CSB building (the newly constructed theatre building), Harvey House (UNSW medical building) and the Hydrotherapy Pool building. The proposed new main building will vary between two and eight storeys in height and will spread out across the Site.

The preliminary conceptual design also includes a service tunnel under the new building constructed to a depth equivalent to approximately one basement level. Open spaced car parking will be located on ground level only towards the north-eastern corner and south-western corners of the Site.

The proposed layout advised at the time of preparing this report is shown on Drawing 1, Appendix B.

5.2 Topography and Drainage

The local topography indicates that the Site falls gently to the north with a cross fall of approximately 2 m over a total distance of 270 m (DP, Report on Geotechnical Investigation, Project 72320.00 dated May 2011; DP, 2011). The stormwater runoff is expected to flow into street drains.

5.3 Surrounding Land Use

The surrounding site uses include:

- North - Residential areas across Edward Street;
- South - Residential areas across Rawson Avenue;
- East - Residential areas and asphalt/gravel car parks; and
- West - Residential areas and Caltex service station across Docker Street, corner Edward Street.

6. Geology and Hydrology

Reference to the Wagga Wagga 1:250 000 Geological Series Sheet (SI 55-15) indicates that the northern half of the Site is underlain by unconsolidated sand, silt, clay and gravel (floodplain sediments) and includes high-level Tertiary aged terrace sediments of the Murray Valley comprising gravel, sand, silt and clay. The southern half of the Site is shown to be underlain by the Wagga Marginal Base Formation comprising shale, slate, quartzite, sandstone and subgreywacke.

The field work confirmed the presence of alluvial clays, sands and gravelly sand extending to over 25 m depth (DP, 2011).

A groundwater bore search from the NSW Office of Water [previously Department of Water and Energy, now part of the now part of the Department of Primary Industries] database was conducted. At least 42 groundwater bores were identified within a 500 m radius of the Site. Work summaries from the nearest sourrounding bores indicated that the authorised and intended purposes of the

groundwater bores were for dewatering, monitoring, recreational and domestic purposes. The domestic bore is located approximately and 650 m north east, down-hydraulic-gradient of the Site. The work summaries of the selected registered bores near the Site are included in Appendix E.

The Site is generally slopes down from north to north east. Regional groundwater and surface water is expected to generally flow in the north-east direction towards Murrumbidgee River. Groundwater was observed at 6.3 m below ground level (bgl) equivalent to 169.5 m RL.

7. Site Inspection and Fieldwork Observations

A Site walkover was carried out by an experience geotechnical engineer from DP on 5 April, 2011. Based on the site walkover, the following observations were made.

- An old boiler house was noted to have been built near Borehole 108 (Photo 1, Appendix F). No stressed vegetation was found in the grassed areas outside the building footprints. A new boiler house is located adjacent to the current laundry building.
- A Caltex service station was observed approximately 30m to the northwest off-site, across Docker Street (Photo 2). Borehole 106 (Photo 3) was placed down-gradient of Caltex service station. No stressed vegetation was observed near borehole 106.
- An oxygen tank was observed to be present on site (Photo 4).

No indicators of potential underground storage tanks were noted on site.

Field screening of all soil samples collected for laboratory analysisis indicate a Photo-Ionisation-Detector reading of <1 ppm. No hydrocarbon odour or staining was observe in any of the soil samples collected.

8. Areas and Contaminants of Potential Concern

A review of the historical aerial photographs, the baseline archaeological assessment report, site walkover survey and field observations indicate that the majority of the Site was developed into a hospital in the early 1900s. No historical records were available for review prior to the site being developed into a hospital. However, the baseline archeological assessment report indicated that the Site was unoccupied prior to the construction of the hospital.

A portion of the Site, particularly the eastern boundary (accross Lewis Drive) has been used for residential purposes since the 1940s. Some of these residential properties have been demolished between 1980s to 2001. Demolition of theses structures may cause near surface soil impacts from Asbestos Containing Materials (ACM) and lead-based paint. Pesticides and insecticides may have also been used on the former residential areas as termite treatments, particularly within the building footprint.

The former Rawson House, the old boiler and laundry house were structures built in the early 1900s. These structures have been since demolished and therefore the area may have also been impacted

by ACM and/or lead-based paints. It is likely that the old boiler may have used gas or coal fuel in the past. Also, maintenance of this facility may cause incidental spillage of petroleum based chemicals including TPH, BTEX and PAH.

The location of the former and current workshop may have used petroleum-based products (e.g. hydraulic oils, solvents, etc.). Spillage and/or inappropriate disposal of these products may cause contamination of the subsurface soil by TPH, BTEX, and other VOCs. These potential chemical contaminants may also be present within the oxygen depot as a result of maintenance.

A Caltex service station is located approximatedly 30 m northwest of the Site. Migration of any groundwater contamination posed by the service station may have the potential to impact the groundwater beneath the Site. Potential contaminants of concern include TPH, BTEX, lead, PAH and phenols.

The site is likely to have been filled in part prior to a during development. Some filling may have originated off-site. At this stage the source of any filling that may be on site is not known. Therefore a potential for contamination of filling exists.

9. Sampling Analysis and Quality Plan

9.1 Data Quality Objectives

The scope of the Preliminary Contamination Assessment works has been devised generally in accordance with the seven step data quality objective (DQO) process, as defined in Australian Standard *Guide to the investigation and sampling of sites with potentially contaminated soil Part 1: Non-volatile and semi-volatile compounds (AS 4482.1 – 2005)*. The DQO process is outlined as follows:

(a) State the Problem

The site is required to be rendered suitable for commercial / hospital land use. The purpose of this investigation is to assess the preliminary nature and extent of the site contamination issues, and to establish whether the site is suitable or can be rendered suitable for its intended land use. This will be achieved by obtaining data to characterize the soil with respect to the identified contaminants of potential concern in Section 8.

(b) Identify the Decision

The suitability of the Site for the proposed land use will be assessed on the basis of the current soil and groundwater investigations. The soil analytical data is to be compared to the Site Assessment Criteria (SAC) for a ‘commercial’ landuse (refer to Section 10 for more details).

(c) Identify Inputs to the Decision

The primary inputs that will be utilized to assess the suitability of the Site are:

- available information regarding previous and current activities undertaken on the Site and the surrounding area (if any);
- The local geology, topography and hydrology;
- Potential contaminants;
- Published guidelines for assessing soil and groundwater quality; and
- Field observations/measurements and analytical results from the limited number of soil and groundwater samples.

(d) Define the Boundary of the Assessment

The boundary of the assessment is defined by the boundary of the subject Site i.e., the Wagga Wagga Base Hospital as identified in Section 3.1. The Site comprises an irregularly shaped parcel of land with an approximate land area of 5.7 ha.

(e) Develop a Decision Rule

The analytical results will be assessed against relevant published guideline criteria as discussed in Section 10.

(f) Specify Acceptable Limits on Decision Errors

In order to ensure the quality of the soil and groundwater data, appropriate and adequate quality assurance and quality control (QA/QC) measures and evaluations will be incorporated into the sampling and testing regime.

DP will achieve the required sampling accuracy and precision through the analysis of 5% field duplicate/replicate samples. The potential for cross contamination and loss of volatiles will be assessed using trip blanks and trip spikes.

Appropriate sampling procedures will be undertaken to ensure that cross contamination does not occur and will follow DP's Standard Operating Procedures Manual. This specifies that:-

- Standard operating procedures are followed;
- Site safety plans are developed prior to commencement of works;
- Duplicate or replicate field samples are collected and analysed;
- Samples are stored under secure, temperature controlled conditions;
- Chain-of-custody documentation is employed for the handling, transport and delivery of samples to the selected laboratory; and that
- Contaminated soil, fill or groundwater originating from the site area is disposed in accordance with relevant regulatory guidelines.

A field and laboratory QA/QC regime, comprising the collection and analysis of replicate samples will be implemented to meet the requirements associated with the following data quality indicators (DQIs).

- conformance with specified holding times;
- accuracy of spiked samples within the laboratory's acceptable range (typically 70-130% for inorganic contaminants and greater for some organic contaminants);
- field and laboratory duplicate and replicate samples will have a precision average of +/- 30% relative percent difference (RPD) for inorganic analytes and +/- 50% RPD for organic analytes; and
- field replicates will be collected at a frequency of at least 10% of all samples (comprising 5% intra-laboratory replicates and 5% inter-laboratory replicates).

The results of field and laboratory QA/QC including RPD and other QA/QC analysis are shown in Appendix I, with the full laboratory reports included in Appendix H.

(g) Optimise the Design for Obtaining Data

The above information (steps 1 to 6) was used to optimise the sampling, analysis and quality plan for the contamination assessment of the site. Discussed in the proceeding sections are the sampling pattern, density, location and depth requirements to meet the objectives of the Preliminary Contamination Assessment.

9.2 Sampling Pattern

Due to the size, presence of existing structures and operational nature of the Site, a judgemental (targeted) sampling pattern based on the geotechnical investigation purposes was adotped. The judgemental sampling pattern allowed for some of the sampling points to be selected based on information gathered in the site history information and site inspection prior to field work. The judgemental sample locations selected included areas where an elevated potential for contamination existed, such as:

- The location of the previous laundry and boiler house (near borehole 108);
- The location of the former Rawson House (around borehole 105);
- The down-gradient location of the off-site Caltex service station (borehole 106);
- Selected locations within the former residential areas across Lewis Drive (boreholes 102, 103 & 104); and
- The location of the Schofield Centre building (borehole 101).

It is noted that the location and number of the boreholes were agreed with Capital Insight Pty Ltd and were designed prior to the preparation of this Sampling Analysis and Quality Plan. Other areas of environmental concern as identified in Section 8 may have not been captured. Moreover, the sampling regime does not comply with the NSW EPA's *Sampling Design Guidelines* (1995) and is therefore considered as preliminary in nature.

9.3 Sampling Density

Based on the size of the site (5.7 ha) and in accordance with the NSW EPA Contaminated Sites *Sampling Design Guidelines*, 1995, a minimum of 81 systematic sample points are recommended for site characterisation. However, given the preliminary nature of the assessment, eight judgemental sample locations were adopted, including two locations for groundwater sampling.

9.4 Sample Location

Sample locations are indicated in Drawing 1 in Appendix B. A total of ten geotechnical borehole locations were placed over the site. However, only eight out of the ten locations were included in this assessment.

9.5 Sample Depth

Samples were collected at multiple depths within fill and 0.5m into natural material to allow for the evaluation of various types of strata. Sample depths generally ranged between 0 – 2.4 m below ground level (bgl), refer to logs provided in Appendix G.

9.6 Analytical Scheme

The analytical scheme was designed to be preliminary in nature and around the inferred potential for contamination and is summarised in Table 1. Generally the samples analysed were selected to provide information on the characterisation of the fill, fly tipped material and natural soils.

Table 1: Analytical Scheme

Sample Location	8 HM	PAH	TPH / BTEX	Phenols	OCP/OPP/ PCB	VOC	Asbestos	Rationale
101	✓	✓	✓	✓	✓	✓	✓	Characterisation of soil within the Schofield Centre.
102, 103 & 104	✓	✓	✓	✓	✓		✓	Characterisation of soil within former residential areas across Lewis Drive.
105	✓	✓	✓	✓	✓		✓	Characterisation of filling and the subsurface natural soil in the former Rawson House.
106	✓	✓	✓	✓	✓	✓	✓	Characterisation of soil down-hydraulic-gradient of the off-site Caltex service station.
107 & 108	✓	✓	✓	✓	✓		✓	Characterisation of filling and the subsurface natural soil in the former laundry and boiler house.

Notes:

8 HM	8 heavy metals including arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc
PAH	Polycyclic Aromatic Hydrocarbons (PAH)
TPH/BTEX	Total Petroleum Hydrocarbons (TRH) and benzene, toluene, ethyl benzene, and total xylenes (BTEX)
Phenols	As total phenols
PCB	Polychlorinated biphenyls
OPP	Organophosphate pesticides
OCP	Organochlorine pesticides
Asbestos	Asbestos (selected samples only)
VOC	Volatile organic compounds

9.7 Sample Collection

A total of 10 geotechnical boreholes (BH101, BH102, BH103, BH104, BH105, BH106, BH107, BH107A, BH108 and BH109) were drilled at the Site for purpose of geotechnical investigation. The boreholes were drilled to depths of 2.4 m to 26.95 m with a truck-mounted Scout drilling rig using spiral auger and rotary washboring techniques within the soil. Bore BH107 was discontinued and relocated (BH107A) approximately 1 m to the west after premature refusal at a depth of 2.4 m.

Environmental samples were collected from all boreholes except borehole 109. Disturbed soil samples were taken from the cuttings returned by the auger blade and used for identification and classification purposes. Soil samples were logged on site by a senior engineering geologist.

Slotted PVC standpipes were installed in bores BH101 and BH106 to allow for sampling of the groundwater and measurement of the groundwater level during the investigation period. The bores were set out relative to existing surface features (e.g. buildings and boundaries) by tape measurement

and the reduced surface levels (RLs) at each test location (to AHD) were interpolated from the site survey plan (untitled) provided.

9.8 Sampling Procedure

Environmental sampling was conducted according to standard operating procedures described in the DP *Field Procedures Manual*. In summary, all sampling data was recorded on DP Chain-of-Custody sheets, and the general sampling procedure comprised:

- the use of stainless steel sampling equipment for the collection of soil samples;
- washing of all sampling equipment in a 3% solution of phosphate free detergent (Decon 90) then rinsing with distilled water prior to each sample being collected;
- transfer of the sample into new glass jars or acidified glass bottles, sealed with a teflon lined lid;
- labelling of the sample containers with individual and unique identification including Project No. Sample No. and depth;
- placement of the containers into a chilled, enclosed and secure container for transport to the laboratory; and
- use of chain of custody documentation to ensure that sample tracking and custody can be cross-checked at any point in the transfer of samples from the field to hand-over to the laboratory.

10. Site Assessment Criteria

10.1 Soil

Soil contaminant threshold concentrations for commercial sites are sourced from the NSW EPA *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme* (2006) and *Guidelines for Assessing Service Station Sites* (1994).

The adopted SAC are given in Table 2 for the contaminants of potential concern. The threshold concentrations adopted for the Site includes Health-based Investigation Levels (HIL) for commercial / industrial land uses.

It is noted that the HIL provided in the NSW EPA *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme* (2006) were adopted from the National Environmental Protection Council's (NEPC) *National Environmental Protection (Assessment of Site Contamination) Measure* (NEPM), Schedule B(1) Guideline on the Investigation Levels for Soil and Groundwater (1999). The SAC for soils are included in Table 2 below.

Table 2: Site Assessment Criteria for Soils

Analyte	Site Assessment Criteria	
	Health-based Investigation Levels [a] (mg/kg)	HIL Maximum Allowable Concentration [b] (mg/kg)
As	500	1250
Cd	100	250
Cr (III)	60%	150%
Cu	5000	12500
Pb	1500	3750
Hg	75	187.5
Ni	3000	7500
Zn	35000	87500
C_6-C_9	65 [c]	NE
C_{10}-C_{14}	1000 [c]	NE
C_{15}-C_{28}		
C_{29}-C_{36}		
Benzene	1 [c]	NE
Ethylbenzene	50 [c]	NE
Toluene	130 [c]	NE
Xylene	25 [c]	NE
PAH (total)	100	250
Benzo(a)pyrene	5	12.5
DDT + DDD + DDE	1000	2500
Heptachlor	50	125
Aldrin + Dieldrin	50	120
Chlordane	250	625
Phenol	42,500	106,250
PCB	20	50
Asbestos	None Detected in surface soils [d]	NE

Notes

a. NSW EPA *Contaminated Sites Guidelines for the NSW Site Auditor Scheme* (2006) Health Investigation Levels Column 1

b. A concentration of 2.5 times the HIL is considered a potential "hot spot"

c. NSW EPA *Guidelines for Assessing Service Station Sites*, 1994. Threshold concentrations for sensitive sites, (for TPH and BTEX), for all landuses.

d. NSW EPA Auditor Advice.

NE Not established

10.2 Groundwater

According to the DECC's (now OEH's) "*Guidelines for the Assessment and Management of Groundwater Contamination*" (2007), the preliminary assessment of groundwater contamination must be based on the assumption that drinking water is a potential beneficial use if the site fits any of the following criteria:

1. The aquifer beneath the site is included in the Department of Natural Resources (DNR, now part of the now part of the Department of Primary Industries) list of major aquifers of drinking water quality.

2. There are identified users of groundwater from the aquifer as a potable water source.

If neither of the previous conditions identify groundwater as a potential drinking water supply then groundwater indicators should be used to demonstrate whether the aquifer is suitable, or otherwise, for use as a drinking water source. The OEH has indicated that groundwater with Total Dissolved Solids (TDS) concentrations below 2000 mg/L should be considered suitable for use as a drinking water supply, and protected as such, unless it can be demonstrated that other site-specific factors, such as low yield, render such use unlikely (DECC 2007).

The aquifer beneath the site is listed by DNR as a protected aquifer as an actual or potential drinking water supply. The salinity of the groundwater on site is <2,000 mg/L and therefore may be suitable for domestic purposes. There are no licensed groundwater bores used for drinking purposes on site. The nearest registered domestic drinking water bore is located 650 m north east of the site.

Given the aquifer is considered potentially suitable for drinking water use, the adopted groundwater assessment criteria at the site are based on the *Australian Drinking Water Guidelines* (NHMRC, 2004) and the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC, 2000) using 95% protection level for moderately disturbed ecosystems (freshwater). Selection of the groundwater investigation level (GIL) for a fresh water ecosystem was based on the proximity of the site to a sensitive surrounding surface water receptor (i.e. the Murrumbidgee River).

In the case of total petroleum hydrocarbons (TPH), in view of the absence of OEH endorsed guidelines, the *Airport (Environment Protection) Regulations' (1997), Schedule 2 Water Pollution Accepted Limits*: Table 1.03 – Accepted limits of contamination, have been applied as screening criteria.

Adopted site assessment criteria for groundwater are summarised in Table 3.

Table 3: Groundwater Assessment Criteria (µg/L)

Analytes	Trigger values for Fresh Water[1, 3]	Trigger Value for Drinking Water [2, 3]	Airport Regulations (1997) [4]	Adopted Groundwater Investigation Level (GIL)
Organics				
TPH (C_6-C_9)	NE	NE	150	150 [5]
TPH (C_{10}-C_{36})	NE	NE	600	600 [5]
Benzene	950	1	300	1
Toluene	180 (LR)	800	300	800
Ethylbenzene	80 (LR)	300	140	300
o - Xylene	350	600	NE	600
m - Xylene	75 (LR)			
p - Xlyene	200 (LR)			
Chloroform	370 (LR)	200	NE	200
Benzo(a)pyrene	0.2 (LR)	0.01	NE	0.01
Anthracene	0.01 (LR)	NE	NE	0.01
Phenanthrene	0.6 (LR)	NE	NE	0.6
Fluoranthene	1 (LR)	NE	NE	1.0

Analytes	Trigger values for Fresh Water[1, 3]	Trigger Value for Drinking Water [2, 3]	Airport Regulations (1997) [4]	Adopted Groundwater Investigation Level (GIL)
Naphthalene	16	NE	NE	16
Total phenolics	320	2	50	2
Aldrin	0.001 (LR)	0.3	NE	0.3
Chlordane	0.08 (LR)	1	NE	1
DDE	0.03 (LR)	NE	NE	0.03
DDT	0.01 (LR)	20	NE	20
Dieldrin	0.01 (LR)	0.3	NE	0.3
Endosulfan	0.2 (LR)	30	NE	30
Endrin	0.02 (LR)	NE	NE	0.02
Heptachlor	0.09 (LR)	0.3	NE	0.3
Azinphos-methyl	0.02 (LR)	3	NE	3
Chlorpyrifos	0.01 (LR)	10	NE	10
Diazinon	0.01 (LR)	3	NE	3
Dimethoate	0.15 (LR)	50	NE	50
Fenitrothion	0.02 (LR)	10	NE	10
Malathion	0.05 (LR)	NE	NE	0.05
Aroclor 1242	0.6 (LR)	NE	NE	0.6
Aroclor 1254	0.03 (LR)	NE	NE	0.03
Heavy Metals				
Arsenic (total)	13	7	50	7
Cadmium	0.2	2	0.2	2
Chromium	1	50	10	50
Copper	1.4	2000	2	2000
Lead	3.4	10	1.0	10
Mercury (inorganic)	0.6	1	0.1	1
Nickel	11	20	15	20
Zinc	8	NE	5	8

Notes:

[1] ANZECC and ARMCANZ (2000) National Water Quality Management Strategy - Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Trigger values under the 95% protection level - fresh water.

[2] NHMRC (2004) National Water Quality Management Strategy – Australian Drinking Water Guidelines.

[3] NSW DECC Contaminated Sites Guidelines on Duty to Report contamination under the Contaminated Land Management Act 1997 (2009).

[4] Airport (Environment Protection) Regulations (1997), Schedule 2 Water Pollution Accepted Limits: Table 1.03

[5] In the absence of established threshold concentrations for TPH compounds in groundwater, the Airport Regulations (1997) was used as screening criteria.

LR Low reliability trigger value as defined in ANZECC/ARMCANZ 2000

NE = Not Established

B = Bioaccumulative

10.3 Waste Classification Criteria

Filling and Topsoil

The preliminary *in situ* waste classification for filling and topsoil materials was determined in accordance with the six step process outlined in the Department of Environment and Climate Change (DECC; now OEH) *Waste Classification Guidelines* April 2008 (revised July 2009), as follows:

1. Is it a special waste?
2. Is it a liquid waste?
3. Is the waste "pre-classified"?
4. Does the waste have hazardous waste characteristics?
5. Chemical Assessment
6. Is the waste putrescibles?

It should be noted that it is possible that the filling and topsoil materials could be classified in the future as Excavated Natural Material (ENM) in accordance with the *Protection of the Environment Operations (Waste) Regulation 2005, General Exemption Under Part 6, Clause 51 and 51A, The Excavated Natural Material Exemption (ENM),* 2008. Under the general exemption, ENM is defined as naturally occurring rock and soil (including but not limited to materials such as sandstone, shale, clay and soil) that has:

- been excavated from the ground, and
- contains at least 98% (by weight) natural material, and
- does not meet the definition of Virgin Excavated Natural Material in the Act.

ENM may be applied to land as engineering fill or used in earthworks provided the contaminant concentrations in the material is within the threshold concentrations prescribed in the general exemption. For large volumes of this type of material, there is potentially a significant cost saving in not having to dispose the material at a licensed landfill.

However, the ENM guidelines require a strict sampling and testing regime that would need to be implemented to achieve such a classification. The preliminary works undertaken under this current assessment do not meet the regime required.

Residual Soil and Bedrock

The *Protection of the Environment Operations Act* 1997, the *Protection of the Environment Operations Amendment (Scheduled Activities and Waste) Regulation* 2008, and the *Waste Classification Guidelines* April 2009, define virgin excavated natural materials (VENM) such as clay, gravel, sand, soil and rock, as materials that:

- Are not mixed with any other waste;
- Have been excavated from areas that are not contaminated as a result of industrial, commercial, mining or agricultural activities;

- Do not contain sulphidic ores or soils;
- Consist of excavated natural materials that meet such criteria as may be approved by the EPA.

The abovementioned criteria have been adopted in determining the preliminary assignment of the VENM classification to the natural soils and bedrock to be excavated from the Site as part of the proposed development.

In order to assign re-usability options to the VENM classified materials, the following publications with background concentration ranges for Australian soils have been referenced:

- NEPC (1999). *National Environmental Protection (Assessment of Site Contamination) Measure*, Schedule B(1) Guidelines on the Investigation Levels for Soil and Groundwater, Background Ranges.
- Australian and New Zealand Environment and Conservation Council/National Health and Medical Research Council (ANZECC/NHMRC): *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites* (1992), Environmental Soil Quality Guidelines Column A Background (ANZECC A).

With regard to the organic contaminants with no published background concentration ranges, the respective practical quantitation limits of the analytes were used as the evaluation threshold.

11. Results of Soil and Groundwater Investigation

A summary of the laboratory results are included in Tables 4 to 9 (for soils and groundwater respectively). NATA laboratory reports are included in Appendix H. The reported VOC concentrations have not been listed, however all concentrations were found to be below the laboratory reporting limits except toluene and chloroform in groundwater.

Table 4: Results of Laboratory Analysis for Soil in mg/kg, unless otherwise stated (Heavy Metals & Asbestos)

Sample ID / Depth (m)	F – filling N – natural	Heavy Metals								Asbestos
		As	Cd	Cr	Cu	Pb	Hg	Ni	Zn	
BH101/0.1-0.2	F	8	<0.5	17	25	64	0.4	12	120	-
BH101/0.5-0.6	N	8	<0.5	29	18	13	<0.1	13	25	-
BH102/0.4-0.5	N	7	<0.5	26	21	22	0.1	13	61	-
BH102/2-2.2	N	8	<0.5	28	17	12	<0.1	12	24	-
BH103/0.5-0.6	N	9	<0.5	28	18	14	<0.1	19	40	-
BH104/0.3-0.4	N	9	<0.5	28	18	13	<0.1	15	28	-
BH105/0.2-0.3	F	<4	<0.5	16	11	12	<0.1	10	36	NAF
BH105/0.8-0.9	F	4	<0.5	19	28	46	1.1	11	67	-
BH106/0.1-0.2	F	6	<0.5	21	14	44	0.1	13	59	NAF
BH106/1.75-2.0	N	6	<0.5	33	17	14	<0.1	22	44	-
BH107/1.9-2.0	F	9	<0.5	22	15	14	<0.1	14	29	-
BH107/2.2-2.4	F	6	<0.5	14	8	13	<0.1	9	23	-
BH107A/1.5-1.6	N	6	<0.5	26	14	12	<0.1	11	23	-
BH108/0.1-0.2	F	<4	<0.5	13	7	7	<0.1	9	20	NAF
BH108/2-2.2	N	7	<0.5	29	17	15	<0.1	14	25	-
BD1/290311	N	5	<0.5	19	18	37	0.4	12	89	NAF
Soil Investigation Levels										
Health-based Investigation Levels		500	100	400	5000	1500	75	3000	35000	NAG^
Maximum values of Specific Contaminant Concentration for Waste Classification without TCLP										
General Solid Waste		500	100	1900	NE	1500	50	1050	NE	NE
Restricted Solid Waste		2000	400	7600	NE	6000	200	4200	NE	NE
Provisional Background Concentration										
NEPC (1999)		1-50	1	5-1000	2-100	2-200	0.03	2-500	10-300	NE
ANZECC (1992)		0.2-30	0.04-2	0.5-110	1-190	<2-200	0.001-0.1	2-400	2-180	NE

Notes:
- not analysed
^ No asbestos present in soil at the surface (Correspondence from NSW EPA Director of Contaminated Sites to Accredited Site Auditors).
NAF No asbestos found at the reporting limit
NAG No Asbestos on Ground
NE Not established
PQL Practical Quantitation Limit (PQL)
BD1 is a replicate sample of BH102/0.4-0.5 (labelled as BH109/0.1-0.3 in the COC & Laboratory analysis).
TCLP Toxicity Characteristic Leaching Procedure.

Table 5: Results of Laboratory Analysis for Soil in mg/kg (TPH, BTEX & PAH)

Sample ID / Depth (m)	F – filling N – natural	TPH		Benzene	Toluene	Ethylbenzene	Xylene	PAH	
		C_6-C_9	C_{10}-C_{36}					Total	Benzo(a)pyrene
BH101/0.1-0.2	F	<25	<250	<0.5	<0.5	<1	<3	2.54	0.24
BH101/2-2.2	N	<25	<250	<0.5	<0.5	<1	<3	<PQL	<0.05
BH102/0.4-0.5	N	<25	<250	<0.5	<0.5	<1	<3	0.79	0.09
BH102/2-2.2	N	<25	<250	<0.5	<0.5	<1	<3	<PQL	<0.05
BH103/0.5-0.6	N	<25	<250	<0.5	<0.5	<1	<3	<PQL	<0.05
BH104/0.3-0.4	N	<25	<250	<0.5	<0.5	<1	<3	<PQL	<0.05
BH105/0.2-0.3	F	<25	<250	<0.5	<0.5	<1	<3	<PQL	<0.05
BH105/0.8-0.9	F	-	-	-	-	-	-	<PQL	<0.05
BH106/0.1-0.2	F	<25	<250	<0.5	<0.5	<1	<3	<PQL	<0.05
BH106/1.75-2.0	N	-	-			-	-	<PQL	<0.05
BH107/1.9-2.0	F	<25	<250	<0.5	<0.5	<1	<3	<PQL	<0.05
BH107/2.2-2.4	F	-	-	-	-	-	-	<PQL	<0.05
BH107A/1.5-1.6	N	-	-	-	-	-	-	<PQL	<0.05
BH108/0.1-0.2	F	<25	<250	<0.5	<0.5	<1	<3	<PQL	<0.05
BH108/2-2.2	N	-	-	-	-	-	-	<PQL	<0.05
BD1/290311	N	<25	<250	<0.5	<0.5	<1	<3	<PQL	<0.05
Soil Investigation Levels									
Health-based Investigation Levels		65	1000	1	50	130	25	100	5
Maximum values of Specific Contaminant Concentration for Waste Classification without TCLP									
General Solid Waste		650	10000	18	518	1080	1800	200	0.8
Restricted Solid Waste		2600	40000	72	2073	4320	7200	800	3.2
Provisional Background Concentration									
NEPC (1999)		NE	NE	NE	NE	NE	NE	NE	NE
ANZECC (1992)		NE	NE	0.05-1	0.1-1	NE	NE	0.95-5	NE

Notes:
- not analysed
^ No asbestos present in soil at the surface (Correspondence from NSW EPA Director of Contaminated Sites to Accredited Site Auditors).
NE Not established
PQL Practical Quantitation Limit (PQL)
BD1 is a replicate sample of BH102/0.4-0.5 (labelled as BH109/0.1-0.3 in the COC & Laboratory analysis).
TCLP Toxicity Characteristic Leaching Procedure.

Table 6: Results of Laboratory Analysis for Soil (OCP, OPP, PCB & Total phenols)

Sample ID / Depth (m)	F – filling N – natural	OCP	OPP	PCB	Phenols
BH101/0.1-0.2	F	<0.1	<0.1	<0.1	<5
BH102/0.4-0.5	N	<0.1	<0.1	<0.1	<5
BH103/0.5-0.6	N	<0.1	<0.1	<0.1	<5
BH104/0.3-0.4	N	<0.1	<0.1	<0.1	<5
BH105/0.2-0.3	F	<0.1	<0.1	<0.1	<5
BH106/0.1-0.2	F	<0.1	<0.1	<0.1	<5
BH107/1.9-2.0	F	<0.1	<0.1	<0.1	<5
BH108/0.1-0.2	F	<0.1	<0.1	<0.1	<5
BD1/290311	N	<0.1	<0.1	<0.1	<5
Soil Investigation Levels					
Health-based Investigation Levels		50/250/ 1000/50*	NE	20	42500
Maximum values of Specific Contaminant Concentration for Waste Classification without TCLP					
General Solid Waste		<50 for total OCP	NE	200	518
Restricted Solid Waste		NE	NE	800	2073
Provisional Background Concentration					
NEPC (1999)		NE	NE	NE	NE
ANZECC (1992)		0.001-0.97	NE	0.02-0.1	NE

Notes:
- not analysed
* given in order Aldrin+Dieldrin/Chlordane/ DDD+DDE+DDT/Heptachlor
NE Not established
BD1 is a replicate sample of BH102/0.4-0.5 (labelled as BH109/0.1-0.3 in the COC & Laboratory analysis).
TCLP Toxicity Characteristic Leaching Procedure.

Table 7: Results of Laboratory Analysis for Groundwater (Heavy Metals, TPH & Hardness, in µg/L unless otherwise stated)

Sample ID	Heavy Metals								TPH		Hardness ^
	As	Cd	Cr	Cu	Pb	Hg	Ni	Zn	C_6-C_9	C_{10}-C_{36}	
GW101	1	0.2	<1	<1	<1	<0.4	2	4	<10	<250	230
GW106	<1	0.5	<1	**6**	2	<0.4	4	44	27	200	120
BD1/070411	1	0.2	<1	<1	<1	<0.4	<1	2	<10	<250	-
Groundwater Investigation Level											
Trigger value for drinking water	7	2	50	2000	10	1	20	NE	65^^	1000^^	NE
Trigger value for freshwater	13	0.2	1	1.4	3.4	0.6	11	8	65^^	1000^^	NE

Notes:

- Not analysed
^ in mg / L
^^ Provisional guideline
Italics Guideline value < laboratory practical quantitation limit (PQL)
Bold Exceeded the applicable GILs
BD1 Field replicate sample of GW101
NE Not established

Table 8: Results of Laboratory Analysis for Groundwater (BTEX, PAH and B(a)P), in µg/L

Sample ID	Benzene	Toluene	Ethylbenzene	Xylene	Naphthalene	B(a)P	Total PAH
GW101	<1	<1	<1	<3	<1	*<1*	<PQL
GW106	<1	3	<1	<3	<1	*<1*	<PQL
BD1/070411	<1	<1	<1	<3	<1	*<1*	<PQL
Groundwater Investigation Level							
Trigger value for drinking water	1	800	300	600	NE	*0.01*	NE
Trigger value for freshwater	950	180	80	350/75/200	16	*0.2*	NE

Notes:

Italics Guideline value < laboratory practical quantitation limit (PQL)

- Not analysed

^ in mg / L

BD1 Field replicate sample of GW101

B(a)P Benzo(a)pyrene

NE Not established

PQL Practical Quantitation Limit

Table 9: Results of Laboratory Analysis for Groundwater (OCP, OPP, PCB, Phenols & Chloroform), in µg/L

Sample ID	OCP	OPP	PCB	Phenols	Chloroform
GW101	*<0.2*	*<0.2*	<2	<0.5	<1
GW106	*<0.2*	*<0.2*	<2	<0.05	16
BD1/070411	*<0.2*	*<0.2*	<2	<0.5	-
Groundwater Investigation Level					
Trigger value for drinking water	0.3/1/NE/20/0.3/30/ NE/0.3^	3/10/3/50/10NE^^	NE	2	200
Trigger value for freshwater	*0.001/ 0.08/0.03/0.01/ 0.01/0.2/0.02/0.09^*	*0.02/ 0.01/0.01/ 0.15/0.02/0.05^^*	0.03/0.6^^^	320	270

Notes:

Italics Guideline value < laboratory practical quantitation limit (PQL)

- Not analysed

^ given in order aldrin, chlordane, DDE, DDT, dieldrin, endosulfan, endrin, heptachlor

^^ given in order azinphos-methyl, chlorpyrifos, diazinon, dimethoate, fenitrothion, malathion

^^^ given in order arochlor 1242; arochlor 1254

BD1 Field replicate sample of GW101

PQL Practical Quantitation Limit; 0.0010 µg/L for OCP; 0.010 for OPP; 0.010 for PCB;

12. Discussion of Results

12.1 Soils

The results of the soil analysis indicate that concentrations of heavy metals, TPH, BTEX, PAH, OCP, OPP, PCB, VOC and total phenols in the samples analysed were either below the laboratory PQL or the adopted HIL.

With regard to asbestos, whilst no asbestos was detected in the soil samples analysed, not all previous locations of old buildings were sampled. In this regard, the potential presence of asbestos contamination cannot be discounted.

12.2 Groundwater

The results of the groundwater analysis indicate that the concentrations of heavy metals, TPH, BTEX, PAH, OCP, OPP, PCB, VOC and total phenols in the samples analysed were either below the laboratory PQL or the adopted GIL with the exception of copper in monitoring well 106 at 6 µg/L exceeding the ANZECC 2000 guideline for the protection fresh water ecosystems at 1.4 µg/L. Background soil copper concentrations are elevated and are likely to be associated with the GIL exceedance. The concentration, however, is not uncommon in urban environments and is therefore not considered to be significant.

The laboratory PQL for OPP and OCP were higher than the trigger values for the protection of freshwater ecosytems and therefore no comparison was made for these particular analytes. However, the concentration of OPP and OCP in soil were below the laboratory PQL indicating that OCP and OPP concentrations in groundwater is unlikely to be present at concentration above the adopted trigger values for the protection of freshwater ecosystems.

12.3 Provisional Waste Classification

On the basis of the field observations and total concentrations of targeted analytes, the dark brown sandy filling and roadbase at Boreholes 101, 105, 107 and 108 are provisionally classified as General Solid Waste (non-putrescible). Material with this classification can be disposed to an OEH (incorporating EPA) licensed waste facility that is able to legally accept general solid waste, on the provision that the material is not cross contaminated with any other material not covered in the assessment, including any asbestos debris.

On the basis of the on site observations and the analytical results, it is considered that the orange brown/brown silty clay with some ironstone gravels and trace sand is classifiable as VENM according to NSW DECC's *Waste Classification Guidelines* 2009, provided that the VENM material is not mixed / cross-contaminated with other filling /anthropogenic material such as building rubble (e.g. asbestos, bricks, etc.).

In view of the preliminary nature of the current assessment and the limited sampling regime adopted, the provisional waste classification only provides an indication of the likely waste classification of the material to be excavated. Once excavated, the materials should be stockpiled at a designated area for

inspection and verification to finalise the waste classification in accordance with the DECC *Waste Classification Guidelines* (2008).

13. Conclusion and Recommendations

The current Preliminary Contamination Assessment was conducted to assess the potential for contamination of the site based on past and present site usage and the likely nature of any contamination.

No significant contamination issues have been identified through the scope of works undertaken in completing this assessment. As such, it is considered that the Site is, in general, environmentally suitable for the proposed redevelopment. However, given the limited nature of the assessment, the extent of works proposed, and the areas of potential contamination identified, it is recommended that further assessment of the Site be undertaken prior to construction. As the existing buildings (proposed for demolition) present a potential source of contamination (i.e. asbestos and lead) it would be advisable to undertake additional investigations upon completion of demolition.

Prior to demolition a hazardous materials assessment should be undertakent to identify any building hazards (e.g. asbestos and lead based paints) requiring particular management / disposal. Should such materials be identified then the removal works will require the engagement of appropriately licenced contractors.

14. Limitations

Douglas Partners (DP) has prepared this report for a project at Wagga Wagga Base Hospital, Edward Street, Wagga Wagga, NSW in accordance with DP's proposal dated 16 February 2011 and acceptance received from Mr Frank Tong of Capital Insight Pty Ltd on 2 March 2011. The report is provided for the exclusive use of Capital Insight for this project only and for the purpose(s) described in the report. It should not be used for other projects or by a third party. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions only at the specific sampling or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of anthropogenic influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be limited by undetected variations in ground conditions between sampling locations. The advice may also be limited by budget constraints imposed by others or by Site accessibility.

This report must be read in conjunction with all of the attached notes and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations

or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion given in this report.

Douglas Partners Pty Ltd

Appendix A

About this Report

About this Report

Douglas Partners

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Copyright

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

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

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

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

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

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

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

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

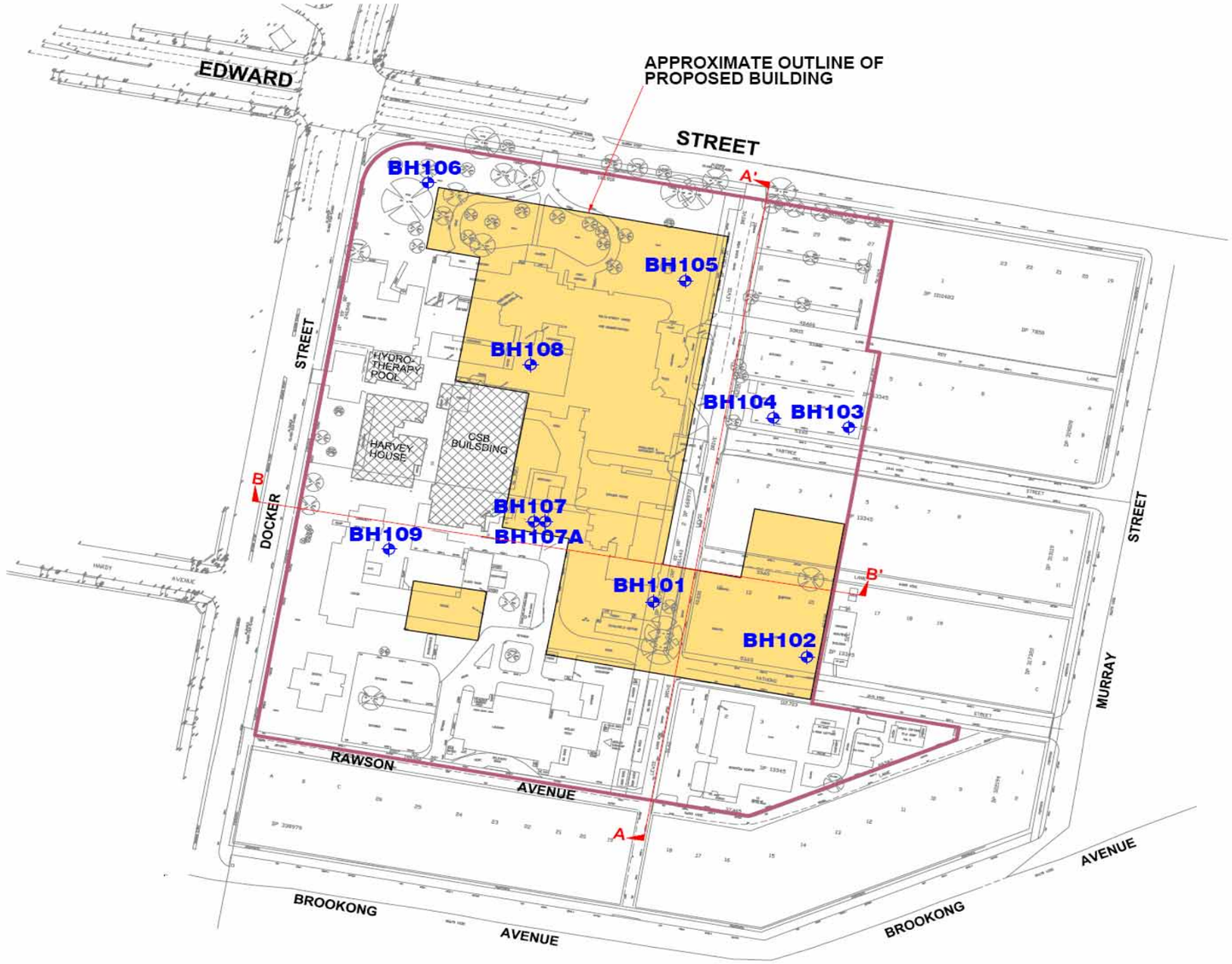
Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

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

Appendix B

Site Drawings



Locality Plan

0 10 20 30 40 60 80 100 150 200m

1:2000 @ A3

LEGEND

- Borehole Location
- Approximate Site Boundary
- Existing Building to Remain

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	Health Infrastructure		
OFFICE:	Sydney	DRAWN BY:	RA
SCALE:	As shown	DATE:	23.05.11

TITLE: **Site Plan and Locality Map**
Proposed Wagga Wagga Base Hospital Redevelopment
Edward Street, Wagga Wagga

N
MGA

PROJECT No:	72320.01
DRAWING No:	1
REVISION:	A

Appendix C

Aerial Photographs

Plate 1: 1944

Plate 2: 1953

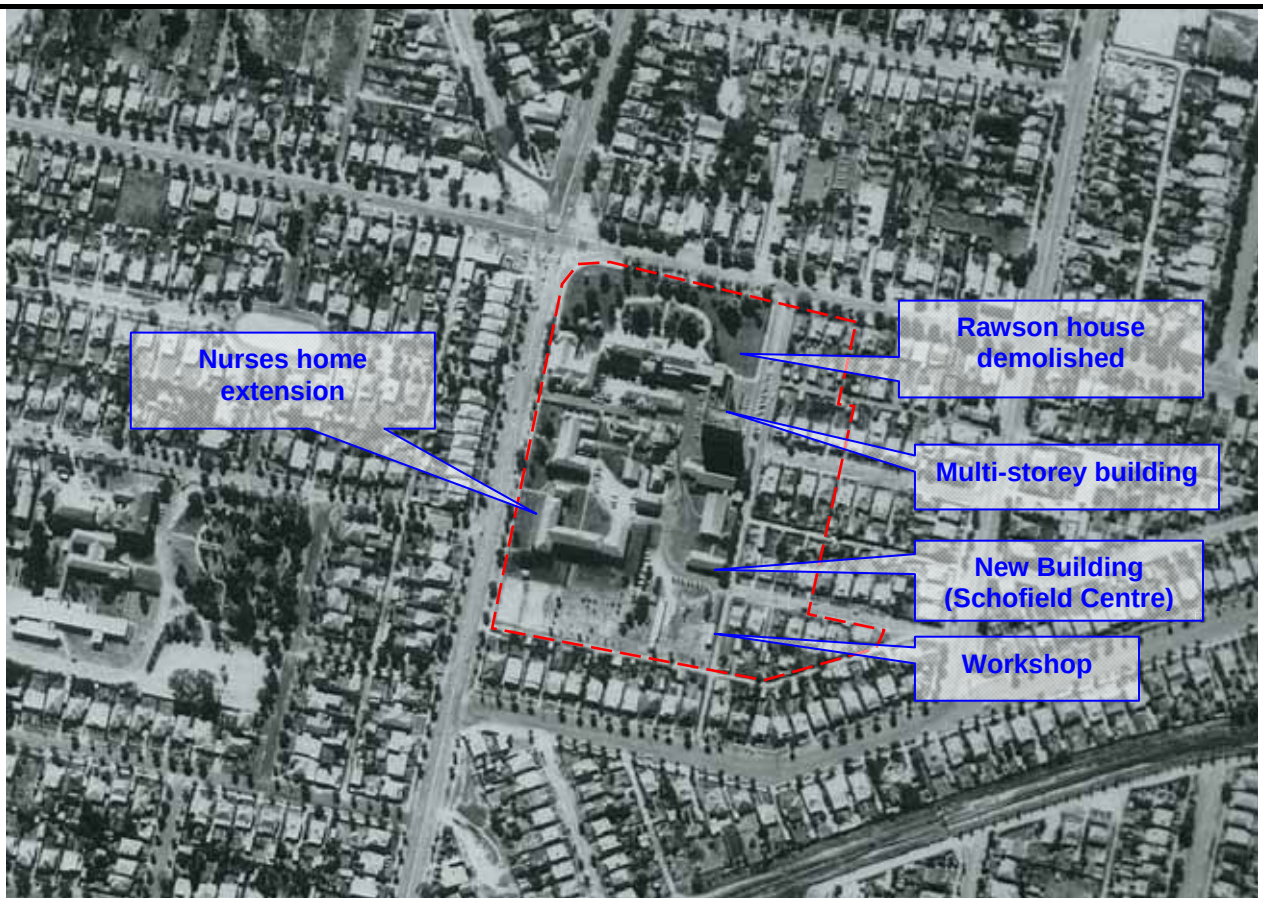


Plate 3: **1971**

Plate 4: 1980

Plate 5: 1985

Plate 6: 1990

Plate 7: 2001

Plate 8: 2010

Appendix D

WorkCover Search

WORKCOVER
NEW SOUTH WALES

5 APR 2011

Our Ref: D11/041684
Your Ref: Rene Alvier

04 April 2011

Attention: Rene Alvier
Douglas Partners Pty Ltd
96 Hermitage Road
West Ryde NSW 2114

Dear Mr Alvier,

RE SITE: Wagga Wagga Base Hospital Edward Street Wagga Wagga

I refer to your site search request received by WorkCover NSW on 30 March 2011 requesting information on licences to keep dangerous goods for the above site.

Enclosed are copies of the documents that WorkCover NSW holds on Dangerous Goods Licences 35/022029 relating to the storage of dangerous goods at the above-mentioned premises, as listed on the Stored Chemical Information Database (SCID).

If you have any further queries please contact the Dangerous Goods Licensing Team on (02) 4321 5500.

Yours Sincerely

Diana Hayes
Senior Licensing Officer
Dangerous Goods Notification Team

NOTIFICATION INQUIRIES

Ms / Mrs / Other (please specify) _____ Family name Taylor.

Other names William

Business phone number 0428 427 388 Business fax number 02 69 69 5744.

Address paul.taylor@gssahs.health.nsw.gov.au.

Number or Acknowledgement Number (if known)

29

er (if known)

—

angerous goods are to be kept

Street

Corners Edwards and Docker Streets

ocality Wagga Wagga Postcode 2650

Nearest cross Street

Docker Street.

Lot and DP if no street number

Is the site staffed? If yes state number of employees 200 approx.

Site staffing: Hours per day 24 Days per week 7.

Site Emergency Contact

Phone number 0269386141. **Name** Peter Lloyd

Nature of site (eg petrol station, warehouse etc)

Base Hospital.

Nature of primary business activity

Health Care.

ABN Number (if any)

Website details (if any)

What is the ANSZIC code most applicable to your business? (see guide for list of codes and further information)

Code 861 Description Hospitals.

Attach a site sketch(s) of the premises. Refer to the Guide GDG01 for information on the requirements for the site sketch.

Attach a legible photocopy page from a local Street Directory or other map showing the locality of the premises. Mark the location of the premises with an X.

NOTIFICATION OF DANGEROUS GOODS ON PREMISES FORM

FDG01

List the dangerous goods that will be stored and/or processed on these premises (refer to Guide GDG01). Copy this page and attach additional sheets if there is insufficient space.

Depot No	Type of storage location or process	Class	Maximum Storage Capacity (L, kg)
1	Above Glound Vessel	2.2	15,000 L.

UN Number	Proper Shipping Name	Class	PG (I, II, III)	Product or Common Name	HazChem Code	Typical Qty	Unit eg L, kg
1073	Liquid Oxygen,	2.2.		Liquid Oxygen.	2SE	12000	L.

Depot No	Type of storage location or process	Class	Maximum Storage Capacity (L, kg)

UN Number	Proper Shipping Name	Class	PG (I, II, III)	Product or Common Name	HazChem Code	Typical Qty	Unit eg L, kg

Depot No	Type of storage location or process	Class	Maximum Storage Capacity (L, kg)

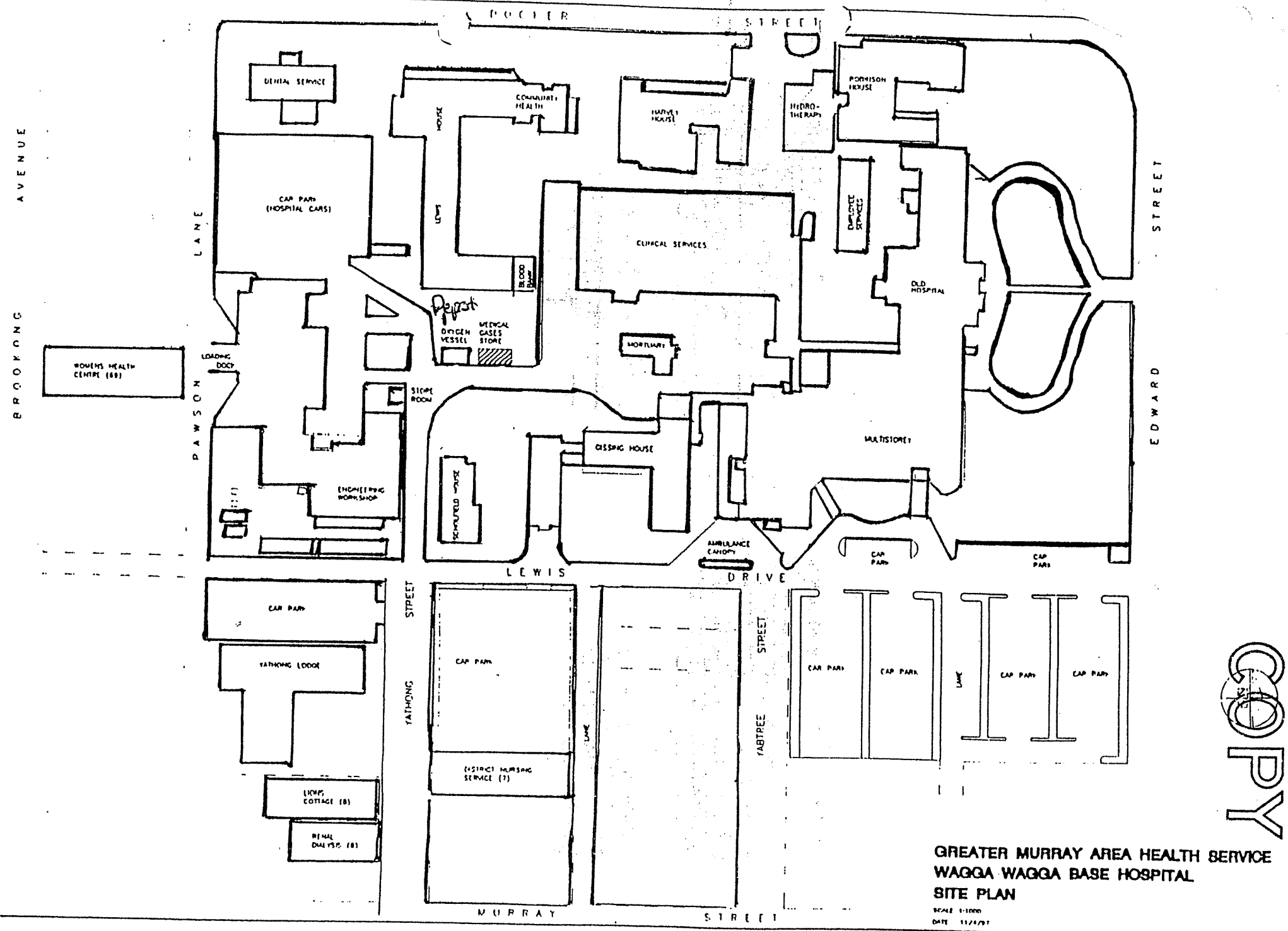
UN Number	Proper Shipping Name	Class	PG (I, II, III)	Product or Common Name	HazChem Code	Typical Qty	Unit eg L, kg

Depot No	Type of storage location or process	Class	Maximum Storage Capacity (L, kg)

UN Number	Proper Shipping Name	Class	PG (I, II, III)	Product or Common Name	HazChem Code	Typical Qty	Unit eg L, kg

Depot No	Type of storage location or process	Class	Maximum Storage Capacity (L, kg)

UN Number	Proper Shipping Name	Class	PG (I, II, III)	Product or Common Name	HazChem Code	Typical Qty	Unit eg L, kg



COPY

GREATER MURRAY AREA HEALTH SERVICE
WAGGA WAGGA BASE HOSPITAL
SITE PLAN

SCALE 1:1000
DATE 11/1/97

BOX 499

WorkCover New South Wales, 400 Kent Street, Sydney 2000. Tel: 9370 5000 Fax: 9370 5999 ALL MAIL TO G.P.O. BOX 5364 SYDNEY 2001

Licence No. 35/022029

APPLICATION FOR RENEWAL

OF LICENCE TO KEEP DANGEROUS GOODS

WORKCOVER NEW SOUTH WALES

ISSUED UNDER AND SUBJECT TO THE PROVISIONS OF THE DANGEROUS GOODS ACT, 1975 AND REGULATION THEREUNDER

DECLARATION: Please renew licence number 35/022029 to 31/10/2001 . I confirm that all the licence details shown below are correct (amend if necessary).

Paul Morrow ..... Paul Morrow ..... 11/9/00 .....

(Signature) *(Please print name)* *(Date signed)*

for: WAGGA WAGGA BASE HOSPITAL

*THIS **SIGNED** DECLARATION SHOULD BE **RETURNED TO:** **(please do not fax)***

WorkCover New South Wales
Dangerous Goods Licensing Section
GPO BOX 5364
SYDNEY 2001

Enquiries: ph (02) 9370 5187
fax (02) 9370 6104

Details of licence on 4 September 2000

Licence Number 35/022029 **Expiry Date** 31/10/2000

Licensee WAGGA WAGGA BASE HOSPITAL

Postal Address: BOX 159 P O WAGGA WAGGA NSW 2650

Licensee Contact PAUL MORROW Ph. 069 386664 Fax. 069 386 506

Premises Licensed to Keep Dangerous Goods
WAGGA WAGGA BASE HOSPITAL
EDWARD ST & DOCKER ST WAGGA WAGGA 2650

Nature of Site HOSPITALS (EXCEPT PSYCHIATRIC HOSPITALS)

Major Supplier of Dangerous Goods BOC

Emergency Contact for this Site PAUL MORROW Ph. 069 386664

Site staffing 24 HRS 7 DAYS

Details of Depots

Depot No.	Depot Type	Goods Stored in Depot	Qty
OXY1	ABOVE-GROUND TANK	Class 2.2	15000 L
		UN 1073 OXYGEN, REFRIGERATED LIQUID	12000 L

RECEIVED
SERVICE CENTRE
15 SEP 2000
WORKCOVER
NEW SOUTH WALES

Form DG10

WorkCover New South Wales. 400 Kent Street. Sydney 2000. Telephone (02) 9370 5000 ALL MAIL TO LOCKED BAG 10 CLARENCE STREET SYDNEY 2000

Reference

WORKCOVER
NEW SOUTH WALES

APPLICATION FOR RENEWAL
OF LICENCE TO KEEP DANGEROUS GOODS

ISSUED UNDER AND SUBJECT TO THE PROVISIONS OF THE DANGEROUS GOODS ACT, 1975 AND REGULATION THEREUNDER

DECLARATION: *Please renew licence number 35/022029 to 1997. I confirm that all the licence details shown below are correct (amend if necessary).*

Stephen Butt ..... STEPHEN BUTT 26.9.96

(Signature) *(Please print name)* *(Date signed)*

for: WAGGA WAGGA BASE HOSPITAL

*THIS **SIGNED** DECLARATION SHOULD BE **RETURNED TO:***

WorkCover New South Wales
Dangerous Goods Licensing Section (Level 3)
Locked Bag 10
P O CLARENCE STREET 2000 1996

RECEIVED
30 SEP 1996
SCIENTIFIC SERVICES
BRANCH

Details of licence on 23 September 1996

Licence Number 35/022029 **Expiry Date** 01/11/96

Licensee WAGGA WAGGA BASE HOSPITAL

Postal Address BOX 159 P O, WAGGA WAGGA 2650
Licensee Contact Stephen Butt Ph. 069 386672 Fax. 069 ~~217711~~ 386506
Premises Licensed to Keep Dangerous Goods
EDWARD ST & DOCKER ST
WAGGA WAGGA 2650

Nature of Site HOSPITALS (EXCEPT PSYCHIATRIC HOSPITALS) **Major Supplier of Dangerous Goods** B O C

Emergency Contact for this Site Stephen Butt ph. 069 386666

Site staffing 24 HRS 7 DAYS

Details of Depots

Depot No.	Depot Type	Goods Stored in Depot	Qty
OXY1	ABOVE-GROUND TANK	Class 2.2	15000 L
		UN 1073 OXYGEN, REFRIGERATED L	12000 L

DATE
-8 OCT 1996
RECEIVED

APPLICATION FOR LICENCE (or AMENDMENT or TRANSFER of LICENCE) FOR THE KEEPING OF DANGEROUS GOODS

Application is hereby made for— *a licence (or amendment of the licence) *the transfer of the licence described below. for the keeping of dangerous goods in or on the premises

(*delete whichever is not required)

FEE: $10.00 per Depot for new licence. $10.00 for amendment or transfer.

Name of Applicant in full (see over)	
Trading name or occupier's name (if any)	WAGGA WAGGA BASE HOSPITAL.
Postal address	P.O.BOX 159. WAGGA WAGGA.NSW. Postcode 2650.
Address of the premises including street number (if any)	EDWARD ST. WAGGA WAGGA.NSW. Postcode 2650.
Nature of premises (see over)	HOSPITAL.
Telephone number of applicant	STD Code 069 Number 215755.

9754 10/087-2 03A

Particulars of type of depots and maximum quantities of dangerous goods to be kept at any one time.

Depot number	Type of depot (see over)	Storage capacity	Dangerous goods: Product being stored	C & C Office use only
1	ABOVEGROUND TANK.	7,000 l	LIQUID OXYGEN.	00 001 040 0 / 1 040 7
2				
3				
4				
5				
6			4B	
7				
8				
9				
10				
11				
12				

DEPARTMENT OF INDUSTRIAL RELATIONS 632/85 - 3 JUL 1985 WAGGA WAGGA

INSPECTORS FIELD COLLECTION 51 RECEIPT No. 15362 DATE 27/7/82 AMOUNT $10.00

Has site plan been approved? Yes ~~NO~~ If yes, no plans required. ~~If no, a location site plan.~~

Have premises previously been licensed? Yes ~~NO~~ If yes, state name of previous occupier. AS ABOVE.

Name of company supplying flammable liquid (if any) C.I.G. (VIC.)

Signature of applicant X ..... Date X 7.7.82

For external explosives magazine(s), please fill in side 2.

FOR OFFICE USE ONLY

CERTIFICATE OF INSPECTION

I, R.J. LANCASTER being an Inspector under the Dangerous Goods Act, 1975, do hereby certify that the premises described above do comply with the requirements of the Dangerous Goods Act, 1975, and the Dangerous Goods Regulation with regard to their situation and construction for the keeping of dangerous goods of the nature and in the quantity specified.

Signature of Inspector ..... R.J. Lancaster Date 27/7/82

APPLICATION FOR LICENCE (or AMENDMENT or TRANSFER of LICENCE) FOR THE KEEPING OF DANGEROUS GOODS

Application is hereby made for— *a licence (or amendment of the licence) *the transfer of the licence for the keeping of dangerous goods in or on the premises described below.

(*delete whichever is not required)

FEE: $10.00 per Depot

23 NOV 1978

7448 29/11/78 038

Name of Applicant in full (see over)	Surname WAGGA WAGGA BASE HOSPITAL Given Names
Trading name or occupier's name (if any)	Wagga Wagga Base Hospital
Postal address	P.O. Box 159 Wagga Wagga Postcode 2650
Telephone number of applicant	STD Code 069 Number 21-2062
Address of the premises in or on which the depot or depots are situated (including street number, if any)	Edward Street, Wagga Wagga NSW 2650 Postcode 2650
Nature of premises (see over)	Public Hospital

PLEASE ATTACH SITE PLAN

Particulars of type of depots and maximum quantities of dangerous goods to be kept at any one time.

Depot number	Type of depot (see over)	Storage capacity	Dangerous goods: Product being stored	C & C Office use only
1	Above Ground Tank	2520 lts.	Liquid oxygen DD	1-040-33
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

Dept. of Labour & Industry
WAGGA WAGGA
4 DEC 1978
78/787

Name of company supplying flammable liquid (if any) Commonwealth Industrial Gases (Vic)

Have premises previously been licensed? No

If known, state name of previous occupier N/A Licence No. N/A

Signature of applicant FOR WAGGA WAGGA BASE HOSPITAL Date 1.11.197

Chief Executive Officer

For external explosives magazine(s), please fill in side 2.

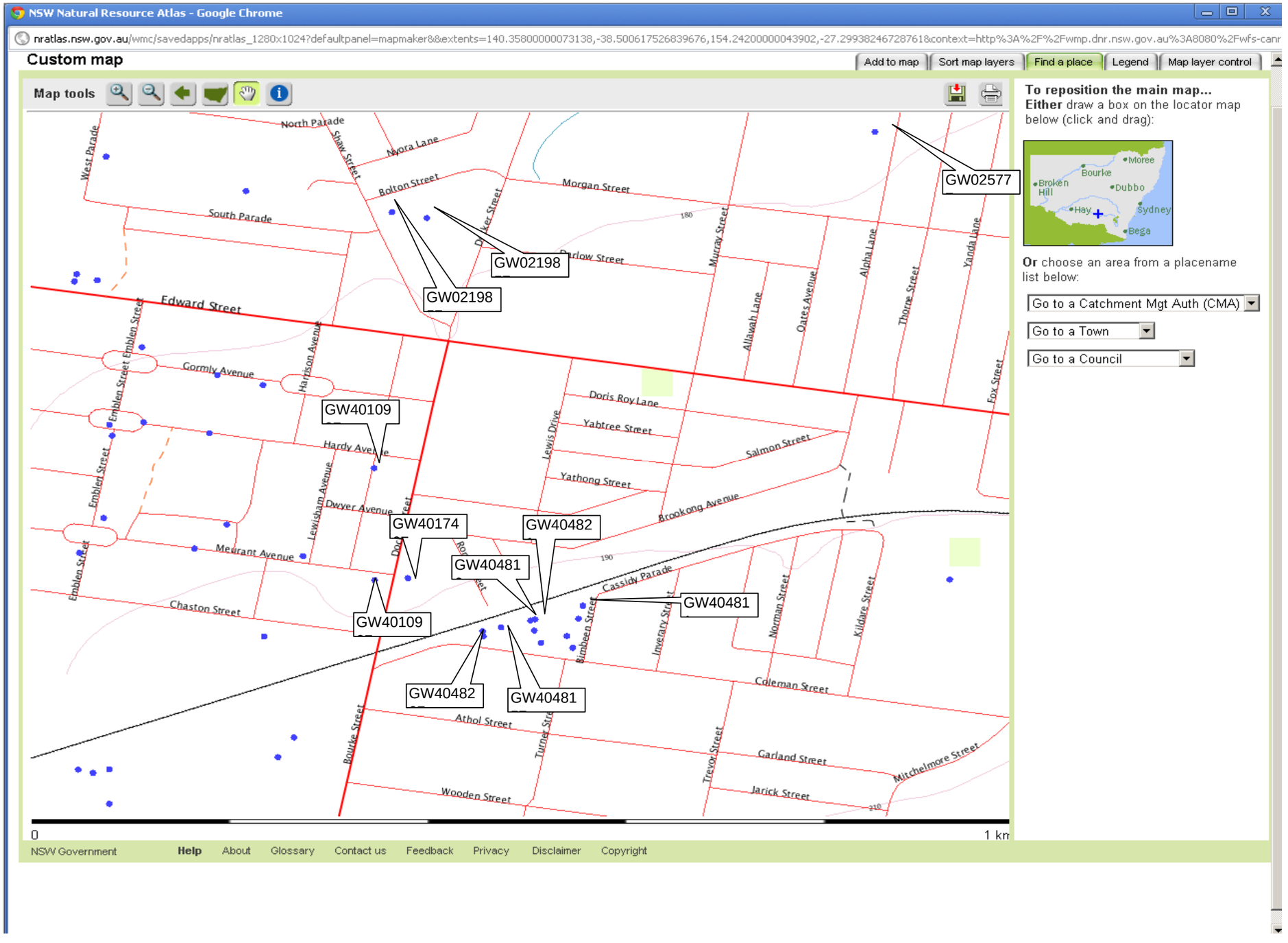
FOR OFFICE USE ONLY

CERTIFICATE OF INSPECTION

I, R. S. LANCASTER being an Inspector under the Dangerous Goods Ac 1975, do hereby certify that the premises described above do comply with the requirements of the Dangerous Goods Ac

Appendix E

Groundwater Bore Data



Douglas Partners Geotechnics / Environment / Groundwater	CLIENT:	Health Infrastructure		TITLE:	**Licensed Groundwater Bores** **Proposed Wagga Wagga Base Hospital Redevelopment** **Edward Street, Wagga Wagga**	N MGA	PROJECT No: 72320.01
	OFFICE:	Sydney	DRAWN BY: RA				DRAWING No: 2
	SCALE:	As shown	DATE: 23.05.11				REVISION: A

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Monday, May 23, 2011

Print Report

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

Work Requested -- GW025777

Works Details (top)

GROUNDWATER NUMBER	GW025777
LIC-NUM	40BL016235
AUTHORISED-PURPOSES	DOMESTIC
INTENDED-PURPOSES	GENERAL USE
WORK-TYPE	Well
WORK-STATUS	Supply Obtained
CONSTRUCTION-METHOD	(Unknown)
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	1965-04-01
FINAL-DEPTH (metres)	9.10
DRILLED-DEPTH (metres)	9.10
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	N/A
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	40 - MURRUMBIDGEE
RIVER-BASIN	410 - MURRUMBIDGEE RIVER
AREA-DISTRICT	
CMA-MAP	8327-1N
GRID-ZONE	55/2
SCALE	1:25,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6114284.00
EASTING	533044.00
LATITUDE	35 6' 49"

LONGITUDE	147 21' 45"
GS-MAP	0079B1
AMG-ZONE	55
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A (top)

COUNTY	WYNYARD
PARISH	SOUTH WAGGA WAGGA
PORTION-LOT-DP	SEC 77

Licensed (top)

COUNTY	WYNYARD
PARISH	SOUTH WAGGA WAGGA
PORTION-LOT-DP	4 757249

Construction (top)

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

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1	1	Casing	Concrete Cylnder	-0.60	-0.60	914			(Unknown)

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
4.60	9.20	4.60	Unconsolidated	3.00					(Unknown)

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	4.57	4.57	Loam Black River		
4.57	9.14	4.57	Gravel River Water Bearing		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Monday, May 23, 2011

Print Report

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

Work Requested -- GW021985

Works Details (top)

GROUNDWATER NUMBER	GW021985
LIC-NUM	40BL014286
AUTHORISED-PURPOSES	RECREATION (GROUNDWATER)
INTENDED-PURPOSES	RECREATION (GROUNDWATER)
WORK-TYPE	Well
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	(Unknown)
OWNER-TYPE	Local Govt
COMMENCE-DATE	
COMPLETION-DATE	1964-08-01
FINAL-DEPTH (metres)	14.60
DRILLED-DEPTH (metres)	14.60
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	N/A
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	40 - MURRUMBIDGEE
RIVER-BASIN	410 - MURRUMBIDGEE RIVER
AREA-DISTRICT	
CMA-MAP	8327-1N
GRID-ZONE	55/2
SCALE	1:25,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6114133.00
EASTING	532436.00
LATITUDE	35 6' 54"

LONGITUDE	147 21' 21"
GS-MAP	0079B1
AMG-ZONE	55
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A (top)

COUNTY	WYNYARD
PARISH	SOUTH WAGGA WAGGA
PORTION-LOT-DP	209

Licensed (top)

COUNTY	WYNYARD
PARISH	SOUTH WAGGA WAGGA
PORTION-LOT-DP	PT 1 757249

Construction (top)

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

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1	1	Casing	Concrete Cylnder	-0.90	-0.90	864			(Unknown)

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
5.50	14.60	9.10	Unconsolidated	5.50		12.63			(Unknown)

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	5.49	5.49	Clay Black Loamy		
5.49	7.92	2.43	Sand Fine Water Supply		
7.92	14.63	6.71	Gravel River Water Supply		

should be sought in interpreting and using this data.

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Monday, May 23, 2011

Print Report

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

Work Requested -- GW021985

Works Details (top)

GROUNDWATER NUMBER	GW021985
LIC-NUM	40BL014286
AUTHORISED-PURPOSES	RECREATION (GROUNDWATER)
INTENDED-PURPOSES	RECREATION (GROUNDWATER)
WORK-TYPE	Well
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	(Unknown)
OWNER-TYPE	Local Govt
COMMENCE-DATE	
COMPLETION-DATE	1964-08-01
FINAL-DEPTH (metres)	14.60
DRILLED-DEPTH (metres)	14.60
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	N/A
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	40 - MURRUMBIDGEE
RIVER-BASIN	410 - MURRUMBIDGEE RIVER
AREA-DISTRICT	
CMA-MAP	8327-1N
GRID-ZONE	55/2
SCALE	1:25,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6114133.00
EASTING	532436.00
LATITUDE	35 6' 54"

LONGITUDE	147 21' 21"
GS-MAP	0079B1
AMG-ZONE	55
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A (top)

COUNTY	WYNYARD
PARISH	SOUTH WAGGA WAGGA
PORTION-LOT-DP	209

Licensed (top)

COUNTY	WYNYARD
PARISH	SOUTH WAGGA WAGGA
PORTION-LOT-DP	PT 1 757249

Construction (top)

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

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1	1	Casing	Concrete Cylnder	-0.90	-0.90	864			(Unknown)

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
5.50	14.60	9.10	Unconsolidated	5.50		12.63			(Unknown)

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	5.49	5.49	Clay Black Loamy		
5.49	7.92	2.43	Sand Fine Water Supply		
7.92	14.63	6.71	Gravel River Water Supply		

should be sought in interpreting and using this data.

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Monday, May 23, 2011

Print Report

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

Work Requested -- GW401093

Works Details (top)

GROUNDWATER NUMBER	GW401093
LIC-NUM	40BL187033
AUTHORISED-PURPOSES	DEWATERING (GROUNDWATER)
INTENDED-PURPOSES	DEWATERING (GROUNDWATER)
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	Rotary
OWNER-TYPE	
COMMENCE-DATE	
COMPLETION-DATE	1998-07-29
FINAL-DEPTH (metres)	45.00
DRILLED-DEPTH (metres)	45.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	N A
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	40 - MURRUMBIDGEE
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6113685.00
EASTING	532363.00
LATITUDE	35 7' 9"

LONGITUDE	147 21' 19"
GS-MAP	
AMG-ZONE	55
COORD-SOURCE	Map Interpretation
REMARK	

Form-A (top)

COUNTY	WYNYARD
PARISH	SOUTH WAGGA WAGGA
PORTION-LOT-DP	ADJ LOT54 DP15274

Licensed (top)

COUNTY	WYNYARD
PARISH	SOUTH WAGGA WAGGA
PORTION-LOT-DP	54 15274

Construction (top)

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

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	45.00	228			Rotary
1	1	Casing	PVC Class 12	0.00	27.00	160.3	142.7		C: 0-10m; Glued; Cap
1	1	Opening	Screen	27.00	45.00	160.3			(Unknown); PVC Class 12; A: 1mm; Glued
1		Annulus	Waterworn/Rounded	10.00	45.00				(Unknown); GS: 3-5mm; Q: 1m³

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
27.00	45.00	18.00		1.20		1.00	45.00		1320.00

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	2.00	2.00	SILTY CLAY, BROWN		

2.00	3.00	1.00	SILTY SANDY CLAY, SAND 5%, FINE, DARK BROWN
3.00	5.00	2.00	CLAYEY SILT, BROWN TO DARK
5.00	6.00	1.00	CLAY, LOAM. LIGHT BROWN
6.00	9.00	3.00	SANDY CLAY, FINE TO MEDIUM SAND
9.00	10.00	1.00	SAND, MEDIUM TO COARSE, BROWN TO RED
10.00	12.00	2.00	WEATHERED SILTSTONE, SOME SAND 5%, BROWN
12.00	14.00	2.00	WEATHERED SILTSTONE WITH MEDIUM TO COARSE SAND, 10%, IRON OXIDIZED
14.00	19.00	5.00	WEATHERED SILTSTONE, FE OXIDIZED, WELL LAYERED, MOTTLING
19.00	20.00	1.00	WEATHERED SILTSTONEWITH SAND, FE OXIDIZED, WELL LAYERED, MOTTLING
20.00	25.00	5.00	WEATHERED SILTSTONE, IRON OXIDIZED, WELL LAYERED, QUARTZ VEINING EVIDENT
25.00	29.00	4.00	SHALE, SLIGHTLY WEATHERED, GOOD CLEAVAGE, LIGHT BROWN
29.00	37.00	8.00	SHALE, LIGHT GREY/GREEN, SLIGHTLY WEATHERED, WELL CLEAVED,FIRM,QUARTZ VEINING EVIDENT 10%
37.00	41.00	4.00	SHALE, DARK GREY TO BLACK, WELL DEVELOPED CLEAVAGE
41.00	45.00	4.00	QUARTZ, MILKY TO CLEAR, VEINING, SOME DARK GREY SHALE

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Monday, May 23, 2011

Print Report

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

Work Requested -- GW401740

Works Details (top)

GROUNDWATER NUMBER	GW401740
LIC-NUM	40BL187026
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	(Unknown)
OWNER-TYPE	
COMMENCE-DATE	
COMPLETION-DATE	1998-09-10
FINAL-DEPTH (metres)	5.50
DRILLED-DEPTH (metres)	5.50
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	N A
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	40 - MURRUMBIDGEE
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6113488.00
EASTING	532408.00
LATITUDE	35 7' 15"

LONGITUDE	147 21' 20"
GS-MAP	
AMG-ZONE	55
COORD-SOURCE	
REMARK	

Form-A (top)

COUNTY	WYNYARD
PARISH	SOUTH WAGGA WAGGA
PORTION-LOT-DP	OFF MEURANT AVE

Licensed (top)

COUNTY	WYNYARD
PARISH	SOUTH WAGGA WAGGA
PORTION-LOT-DP	CNR BOURKE, CULLEN CNR EDWARD, CHASTON

Construction (top)

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

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	5.50				(Unknown)

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	0.25	0.25	TOPSOIL,D/ BROWN		
0.25	0.50	0.25	SILTY CLAY, D/BROWN		
0.50	1.00	0.50	CLAY, ORANGE		
1.00	2.00	1.00	SANDY CLAY, ORANGE		
2.00	5.00	3.00	CLAY, ORANGE YELLOW		
5.00	5.50	0.50	SANDY CLAY, ORANGE YELLOW		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Monday, May 23, 2011

Print Report

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

Work Requested -- GW401092

Works Details (top)

GROUNDWATER NUMBER	GW401092
LIC-NUM	40BL187032
AUTHORISED-PURPOSES	DEWATERING (GROUNDWATER)
INTENDED-PURPOSES	DEWATERING (GROUNDWATER)
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	Down Hole Hammer
OWNER-TYPE	
COMMENCE-DATE	
COMPLETION-DATE	1998-07-06
FINAL-DEPTH (metres)	72.00
DRILLED-DEPTH (metres)	72.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	N A
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	1.87
SALINITY	1548.00
YIELD	

Site Details (top)

REGION	40 - MURRUMBIDGEE
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6113485.00
EASTING	532363.00
LATITUDE	35 7' 15"

LONGITUDE	147 21' 19"
GS-MAP	
AMG-ZONE	55
COORD-SOURCE	Map Interpretation
REMARK	

Form-A (top)

COUNTY	WYNYARD
PARISH	SOUTH WAGGA WAGGA
PORTION-LOT-DP	ADJ LOT30 DP15274

Licensed (top)

COUNTY	WYNYARD
PARISH	SOUTH WAGGA WAGGA
PORTION-LOT-DP	30 15274

Construction (top)

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

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	72.00	228			Down Hole Hammer
1	1	Casing	PVC Class 12	0.00	48.00	160.3	142.7		C: 0-10m; Glued; Cap
1	1	Opening	Screen	48.00	54.00	160.3			(Unknown); PVC Class 12; A: 1mm; Glued
1	1	Opening	Screen	60.00	72.00	160.3			(Unknown); PVC Class 12; A: 1mm; Glued
1		Annulus	Waterworn/Rounded	10.00	72.00				(Unknown); GS: 3-5mm; Q: 1.25m³

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
48.00	54.00	6.00				1.60	72.00		1548.00

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	3.00	3.00	SILTY CLAY, LIGHT BROWN		
3.00	4.00	1.00	SANDY CLAY, FINE, SAND 60%		
4.00	5.00	1.00	FINE SANDY CLAY, TOP OF REGOLITH		
5.00	6.00	1.00	WEATHERED SILTSTONE, IRON OXIDE, LIGHT GREY LAYERING		
6.00	7.00	1.00	WEATHERED SILTSTONE, LIGHT GREY		
7.00	8.00	1.00	WEATHERED SILTSTONE, CLEAVAGE, IRON OXIDE STAINING		
8.00	9.00	1.00	WEATHERED SILTSTONE, IRON STAINING, LIGHT GREY, IRON OXIDE RED		
9.00	10.00	1.00	WEATHERED SILTSTONE, LAYERING LIGHT GREY		
10.00	11.00	1.00	WEATHERED SILTSTONE, IRON OXIDE PREDOMINANT		
11.00	12.00	1.00	WEATHERED SILTSTONE, OXIDISED, LAYERING		
12.00	13.00	1.00	WEATHERED SILTSTONE, IRON DOMINANT		
13.00	14.00	1.00	WEATHERED SILTSTONE, GOOD CLEAVAGE, IRON OXIDE, LIGHT GREY		
14.00	15.00	1.00	WEATHERED SILTSTONE, LAYERING, SOME QUARTZ VEINING, RED		
15.00	16.00	1.00	WEATHERED SILTSTONE, CLEAVAGE, VERY CLAY DOMINANT		
16.00	17.00	1.00	WEATHERED SILTSTONE, RED, VERY FIRM		
17.00	18.00	1.00	WELL WEATHERED SILTSTONE, YELLOW IRON OXIDE STAINING, MOIST		
18.00	19.00	1.00	SILTSTONE,GREY, SLIGHTLY WEATHERED		
19.00	20.00	1.00	SILTSTONE, GREY, VERY FINE GRAINED, IRON OXIDE STAINED		
20.00	22.00	2.00	WEATHERED SILTSTONE, VERY FINE GRAINED, IRON STAINING		
22.00	23.00	1.00	SILTSTONE, VERY FINE GRAINED		
23.00	24.00	1.00	SHALE, WEATHERED, GOOD CLEAVAGE, BLACK		
24.00	25.00	1.00	SHALE, GOOD CLEAVAGE, BLACK, SLIGHTLY WEATHERED		
25.00	27.00	2.00	SHALE, DARK GREY, IRON OXIDE STAINING, PARTLY WEATHERED		
27.00	28.00	1.00	SHALE, WEATHERED, GREY, OXIDE MOTTLING		
28.00	29.00	1.00	WEATHERED SILTSTONE, DARK GREY MOTTLING		
29.00	30.00	1.00	WEATHERED SILTSTONE, GREY SLIGHT YELLOW STAINING, VERY FINE GRAINED		
30.00	31.00	1.00	WEATHERED SILTSTONE, VERY FINE GRAINED, DARK GREY		
31.00	32.00	1.00	SHALE, SLIGHTLY WEATHERED, WELL CLEAVED, IRON OXIDE STAINING, FIRM		
32.00	33.00	1.00	SHALE, FIRM, SLIGHTLY WEATHERED		
33.00	34.00	1.00	SHALE, FIRM IRON OXIDE STAINING		
34.00	35.00	1.00	SHALE, BLACK FIRM, IRON STAINING		
35.00	36.00	1.00	SHALE, SLIGHTLY WEATHERED BROWN		
36.00	37.00	1.00	SILTSTONE, FIRM GREY/GREEN, FINELY LAYERED		
37.00	38.00	1.00	SHALE, WEATHERED, MOIST, VERY OXIDIZED WBZ		

38.00	43.00	5.00	SHALE, BLACK, SLIGHTLY WEATHERED WBZ
43.00	45.00	2.00	WEATHERED SHALE, SLATE
45.00	72.00	27.00	BLACK SHALE, WELL CLEAVED, SOME QUARTZ VEINING

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Monday, May 23, 2011

Print Report

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

Work Requested -- GW404822

Works Details (top)

GROUNDWATER NUMBER	GW404822
LIC-NUM	40BL192019
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	Man obs - sporadic 1 to 5 years - water quality.
CONSTRUCTION-METHOD	Auger - Solid Flight
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2008-09-03
FINAL-DEPTH (metres)	21.00
DRILLED-DEPTH (metres)	21.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	FORMER MOBIL DEPOT
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	20.00
SALINITY	
YIELD	

Site Details (top)

REGION	40 - MURRUMBIDGEE
RIVER-BASIN	410 - MURRUMBIDGEE RIVER
AREA-DISTRICT	
CMA-MAP	8327-1N
GRID-ZONE	55/2
SCALE	1:25,000
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6113393.00
EASTING	532509.00
LATITUDE	35 7' 18"

LONGITUDE	147 21' 24"
GS-MAP	
AMG-ZONE	55
COORD-SOURCE	GIS - Geographic Information System
REMARK	

Form-A (top)

COUNTY	WYNYARD
PARISH	SOUTH WAGGA WAGGA
PORTION-LOT-DP	1//75580

Licensed (top)

COUNTY	WYNYARD
PARISH	SOUTH WAGGA WAGGA
PORTION-LOT-DP	1 75580

Construction (top)

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

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	21.00	100			Auger - Solid Flight
1	1	Casing	PVC Class 18	0.00	15.00	50	49		(Unknown)
1	1	Opening	Screen	14.00	21.00	50			PVC Class 18; (Unknown)

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	1.00	1.00	FILL		
1.00	3.00	2.00	CLAY		
3.00	21.00	18.00	SHALE		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Monday, May 23, 2011

Print Report

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

Work Requested -- GW404815

Works Details (top)

GROUNDWATER NUMBER	GW404815
LIC-NUM	40BL192019
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	Man obs - sporadic 1 to 5 years - water quality.
CONSTRUCTION-METHOD	Auger - Solid Flight
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2008-09-04
FINAL-DEPTH (metres)	21.00
DRILLED-DEPTH (metres)	21.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	FORMER MOBIL DEPOT
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	16.80
SALINITY	
YIELD	

Site Details (top)

REGION	40 - MURRUMBIDGEE
RIVER-BASIN	410 - MURRUMBIDGEE RIVER
AREA-DISTRICT	
CMA-MAP	8327-1N
GRID-ZONE	55/2
SCALE	1:25,000
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6113400.00
EASTING	532534.00
LATITUDE	35 7' 18"

LONGITUDE	147 21' 25"
GS-MAP	
AMG-ZONE	55
COORD-SOURCE	GIS - Geographic Information System
REMARK	

Form-A (top)

COUNTY	WYNYARD
PARISH	SOUTH WAGGA WAGGA
PORTION-LOT-DP	1//75580

Licensed (top)

COUNTY	WYNYARD
PARISH	SOUTH WAGGA WAGGA
PORTION-LOT-DP	1 75580

Construction (top)

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

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	21.00	100			Auger - Solid Flight
1	1	Casing	PVC Class 18	0.00	15.00	50	49		(Unknown)
1	1	Opening	Screen	15.00	21.00	50			PVC Class 18; (Unknown)

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	1.00	1.00	FILL		
1.00	3.00	2.00	CLAY		
3.00	21.00	18.00	SHALE		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Monday, May 23, 2011

Print Report

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

Work Requested -- GW404816

Works Details (top)

GROUNDWATER NUMBER	GW404816
LIC-NUM	40BL192019
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	Man obs - sporadic 1 to 5 years - water quality.
CONSTRUCTION-METHOD	Auger
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2005-06-15
FINAL-DEPTH (metres)	19.50
DRILLED-DEPTH (metres)	19.50
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	FORMER MOBIL DEPOT
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	17.00
SALINITY	
YIELD	

Site Details (top)

REGION	40 - MURRUMBIDGEE
RIVER-BASIN	410 - MURRUMBIDGEE RIVER
AREA-DISTRICT	
CMA-MAP	8327-1N
GRID-ZONE	55/2
SCALE	1:25,000
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6113412.00
EASTING	532574.00
LATITUDE	35 7' 18"

LONGITUDE	147 21' 27"
GS-MAP	
AMG-ZONE	55
COORD-SOURCE	GIS - Geographic Information System
REMARK	

Form-A (top)

COUNTY	WYNYARD
PARISH	SOUTH WAGGA WAGGA
PORTION-LOT-DP	1//75580

Licensed (top)

COUNTY	WYNYARD
PARISH	SOUTH WAGGA WAGGA
PORTION-LOT-DP	1 75580

Construction (top)

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

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	19.50	120			Auger
1	1	Casing	PVC Class 18	0.00	11.00	50	49		(Unknown)
1	1	Opening	Screen	10.50	19.50	50			PVC Class 18; (Unknown)

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	19.50	19.50		SILT	

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Monday, May 23, 2011

Print Report

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

Work Requested -- GW404821

Works Details (top)

GROUNDWATER NUMBER	GW404821
LIC-NUM	40BL192019
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	Man obs - sporadic 1 to 5 years - water quality.
CONSTRUCTION-METHOD	Auger - Solid Flight
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2008-09-04
FINAL-DEPTH (metres)	26.00
DRILLED-DEPTH (metres)	20.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	FORMER MOBIL DEPOT
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	14.60
SALINITY	
YIELD	

Site Details (top)

REGION	40 - MURRUMBIDGEE
RIVER-BASIN	410 - MURRUMBIDGEE RIVER
AREA-DISTRICT	
CMA-MAP	8327-1N
GRID-ZONE	55/2
SCALE	1:25,000
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6113414.00
EASTING	532580.00
LATITUDE	35 7' 18"

LONGITUDE	147 21' 27"
GS-MAP	
AMG-ZONE	55
COORD-SOURCE	GIS - Geographic Information System
REMARK	

Form-A (top)

COUNTY	WYNYARD
PARISH	SOUTH WAGGA WAGGA
PORTION-LOT-DP	1//75580

Licensed (top)

COUNTY	WYNYARD
PARISH	SOUTH WAGGA WAGGA
PORTION-LOT-DP	1 75580

Construction (top)

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

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	26.00	100			Auger - Solid Flight
1	1	Casing	PVC Class 18	0.00	15.00	50	49		(Unknown)
1	1	Opening	Screen	14.00	20.00	50			PVC Class 18; (Unknown)

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	1.00	1.00	FILL		
1.00	4.00	3.00	CLAY		
4.00	20.00	16.00	SHALE		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Monday, May 23, 2011

Print Report

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

Work Requested -- GW404811

Works Details (top)

GROUNDWATER NUMBER	GW404811
LIC-NUM	40BL192019
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	Manual observations - 6 monthly to annually - water quality
CONSTRUCTION-METHOD	Auger
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2005-05-31
FINAL-DEPTH (metres)	20.00
DRILLED-DEPTH (metres)	20.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	FORMER MOBIL DEPOT
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	14.90
SALINITY	
YIELD	

Site Details (top)

REGION	40 - MURRUMBIDGEE
RIVER-BASIN	410 - MURRUMBIDGEE RIVER
AREA-DISTRICT	
CMA-MAP	8327-1N
GRID-ZONE	55/2
SCALE	1:25,000
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6113438.00
EASTING	532645.00
LATITUDE	35 7' 17"

LONGITUDE	147 21' 30"
GS-MAP	
AMG-ZONE	55
COORD-SOURCE	GIS - Geographic Information System
REMARK	

Form-A (top)

COUNTY	WYNYARD
PARISH	SOUTH WAGGA WAGGA
PORTION-LOT-DP	1//84636

Licensed (top)

COUNTY	WYNYARD
PARISH	SOUTH WAGGA WAGGA
PORTION-LOT-DP	1 75580

Construction (top)

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

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	20.00	120			Auger
1	1	Casing	PVC Class 18	0.00	11.50	50	49		(Unknown)
1	1	Opening	Screen	9.50	11.00	.5			PVC Class 18; (Unknown)

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	2.50	2.50	SILT		
2.50	3.50	1.00	SILT		
3.50	8.00	4.50	CLAY		
8.00	20.00	12.00	SILT		

Appendix F

Site Photographs

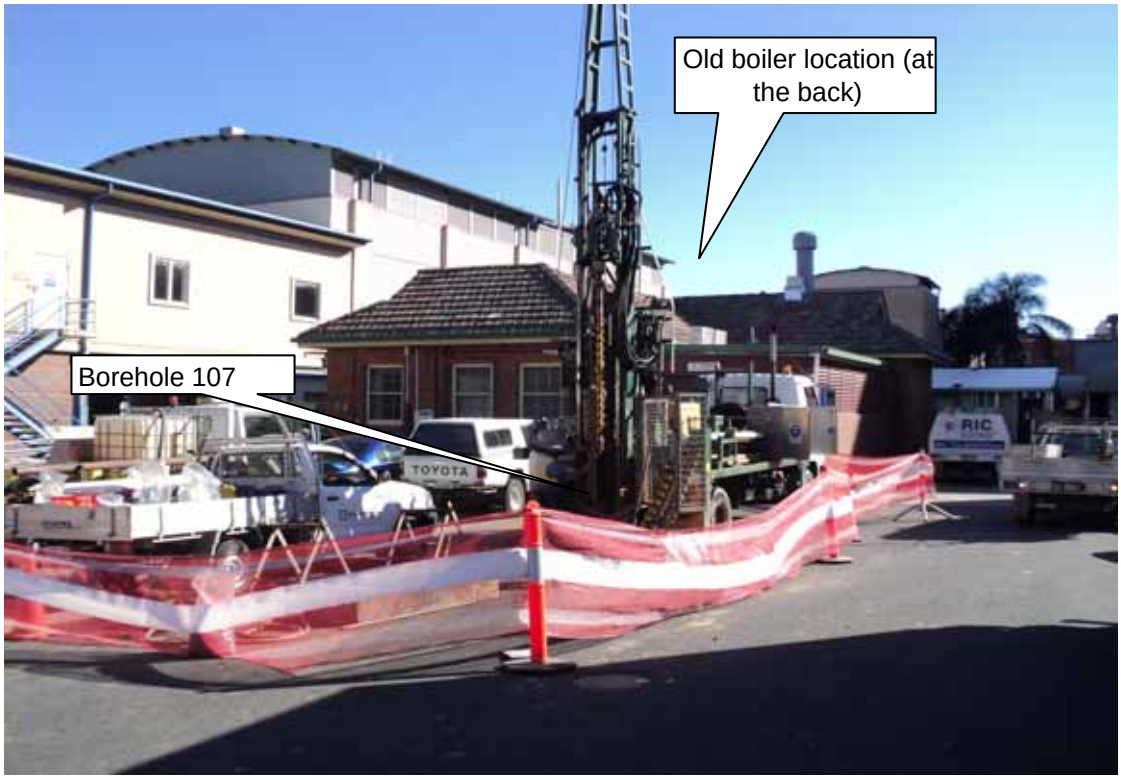


Photo 1 - Borehole 107

Photo 2 - Caltex Service Station

Douglas Partners Geotechnics / Environment / Groundwater	Site Photographs	PROJECT: 72320.01
	Preliminary Contamination Assessment	PLATE No: 1
	Wagga Wagga Base Hospital	REV: A
	CLIENT: Health Infrastructure	DATE: 24.05.11

Photo 3 - Borehole 106

Photo 4 - Liquid Oxygen Depot

Douglas Partners Geotechnics / Environment / Groundwater	Site Photographs	PROJECT: 72320.01
	Preliminary Contamination Assessment	PLATE No: 2
	Wagga Wagga Base Hospital	REV: A
	CLIENT: Health Infrastructure	DATE: 24.05.11

Appendix G

Borehole Log Results

Sampling

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

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

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

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

  4,6,7
  N=13

- In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:

  15, 30/40 mm

The results of the SPT tests can be related empirically to the engineering properties of the soils.

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

Symbols & Abbreviations

Douglas Partners

Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

Drilling or Excavation Methods

C	Core Drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

Water

▷	Water seep
▽	Water level

Sampling and Testing

A	Auger sample
B	Bulk sample
D	Disturbed sample
E	Environmental sample
U_{50}	Undisturbed tube sample (50mm)
W	Water sample
pp	pocket penetrometer (kPa)
PID	Photo ionisation detector
PL	Point load strength Is(50) MPa
S	Standard Penetration Test
V	Shear vane (kPa)

Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

Defect Type

B	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

h	horizontal
v	vertical
sh	sub-horizontal
sv	sub-vertical

Coating or Infilling Term

cln	clean
co	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

Coating Descriptor

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

Symbols & Abbreviations

Graphic Symbols for Soil and Rock

General


Asphalt


Road base


Concrete


Filling

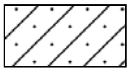
Soils


Topsoil

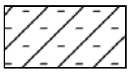

Peat


Clay

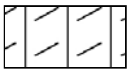

Silty clay

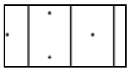

Sandy clay

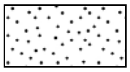

Gravelly clay

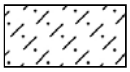

Shaly clay

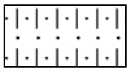

Silt


Clayey silt


Sandy silt


Sand

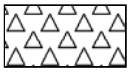

Clayey sand


Silty sand


Gravel


Sandy gravel


Cobbles, boulders

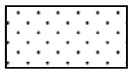

Talus

Sedimentary Rocks

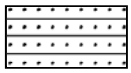

Boulder conglomerate

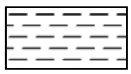

Conglomerate


Conglomeratic sandstone

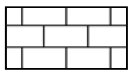

Sandstone


Siltstone


Laminite

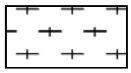

Mudstone, claystone, shale

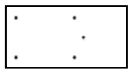

Coal


Limestone

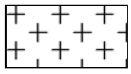
Metamorphic Rocks

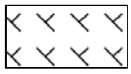

Slate, phyllite, schist

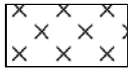

Gneiss

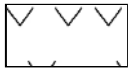

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Wagga Wagga Base Hospital Redevelopment
LOCATION: Edward Street, Wagga Wagga

SURFACE LEVEL: 183.0 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 101
PROJECT No: 72320.00
DATE: 28/3/2011
SHEET 1 OF 3

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
183	0.2	FILLING (TOPSOIL) - dark brown, sandy silt filling with rootlets, dry		E	0.1				Gatic cover
					0.2				Quick-set concrete
	0.5	SILTY CLAY - stiff to very stiff, brown silty clay with a trace of sand		D	0.3				
				E	0.5				Bentonite
		SILTY CLAY - hard, red brown silty clay, dry			0.6				
182	1				1.0				
				S			20,22,20 N = 42		
					1.45				
181	2	2.0 SILTY CLAY - very stiff, orange brown silty clay, dry		E	2.0				
					2.2				
					2.5				
				S			10,13,17 N = 30		
180	3				2.95				
179	4	4.0 SILTY CLAY - hard, orange brown silty clay with some sub-rounded ironstone gravel, dry		S	4.0		16,22,20/100mm refusal		
					4.4				
		4.5-4.7m: rounded quartz gravel							
178	5								
				S	5.5		13,24,20/100mm refusal		
177	6				5.9				
176	7	7.0 GRAVELLY SILTY CLAY - hard, orange brown, gravelly (sub-rounded ironstone and quartz gravel) silty clay, dry		S	7.0		26,28,20/100mm refusal	31-03-11	
					7.4				
175	8	8.0 SILTY CLAY - hard, orange brown, silty clay with a trace of ironstone gravel, moist							
					8.5				
				S			10,16,17 N = 33		
174	9				8.95				
	10.0				10.0				

RIG: Scout **DRILLER:** JS **LOGGED:** PGH **CASING:** HQ to 8.8m

TYPE OF BORING: Solid flight auger (TC-bit) to 8.50m; Rotary (water) to 26.95m

WATER OBSERVATIONS: No free groundwater observed.Standpipe pumped dry on 30/3/11&4/4/11.Water level at 6.6m on 31/3/11& 6.7m on 5&7/4/11

REMARKS: Standpipe piezometer installed: Solid 0.0-6.0m; Slotted 6.0-26.95m; Bentonite plug 0.3-1.0m; Quick-set concrete 0.0-0.3m with Gatic cover

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Wagga Wagga Base Hospital Redevelopment
LOCATION: Edward Street, Wagga Wagga

SURFACE LEVEL: 183.0 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 101
PROJECT No: 72320.00
DATE: 28/3/2011
SHEET 2 OF 3

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
173		SILTY CLAY - very stiff, orange brown, silty clay with some schist gravel, moist		S	10.45		10,10,12 N = 22		
172	11								11
				S	11.5 11.8		12,24 refusal (bouncing)		
171	12	11.7m: ironstone gravel band (~100mm thick)							12
170	13 13.0	SILTY CLAY - hard, grey silty clay, moist		S	13.0 13.45		13,21,23 N = 44		13
169	14								14 Backfilled with gravel
	14.54	SILTY CLAY - very stiff, red brown, silty clay with some ironstone gravel, moist		S	14.5 14.95		7,9,13 N = 22		
168	15								15
167	16 16.0	GRAVELLY SILTY CLAY - hard, red brown, gravelly (rounded quartz, schist and ironstone gravels) silty clay, moist		S	16.0 16.45		9,15,23 N = 38		16 Machine slotted PVC screen
166	17								17
				S	17.5 17.95		17,25/130mm refusal		
165	18								18
164	19 19.0	SILTY CLAY - very stiff, red brown silty clay, moist		S	19.0 19.45		7,10,14 N = 24		19

RIG: Scout **DRILLER:** JS **LOGGED:** PGH **CASING:** HQ to 8.8m

TYPE OF BORING: Solid flight auger (TC-bit) to 8.50m; Rotary (water) to 26.95m

WATER OBSERVATIONS: No free groundwater observed.Standpipe pumped dry on 30/3/11&4/4/11.Water level at 6.6m on 31/3/11& 6.7m on 5&7/4/11

REMARKS: Standpipe piezometer installed: Solid 0.0-6.0m; Slotted 6.0-26.95m; Bentonite plug 0.3-1.0m; Quick-set concrete 0.0-0.3m with Gatic cover

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Wagga Wagga Base Hospital Redevelopment
LOCATION: Edward Street, Wagga Wagga

SURFACE LEVEL: 183.0 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 101
PROJECT No: 72320.00
DATE: 28/3/2011
SHEET 3 OF 3

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
163	20.3	SILTY CLAY - very stiff, red brown silty clay, moist *(continued)*							
		SILTY CLAY - very stiff, red brown silty clay with some ironstone gravel, moist			20.5				
162	21			S			7,10,14 N = 24		
					20.95				
161	22								
160	23								
					23.5				
159	24			S			7,10,18 N = 28		
					23.95				
158	25								
157	26								
					26.5				
156	27 26.95			S			10,12,20 N = 32		End cap
		Bore discontinued at 26.95m - target depth achieved			26.95				
155	28								
154	29								

RIG: Scout **DRILLER:** JS **LOGGED:** PGH **CASING:** HQ to 8.8m

TYPE OF BORING: Solid flight auger (TC-bit) to 8.50m; Rotary (water) to 26.95m

WATER OBSERVATIONS: No free groundwater observed.Standpipe pumped dry on 30/3/11&4/4/11.Water level at 6.6m on 31/3/11& 6.7m on 5&7/4/11

REMARKS: Standpipe piezometer installed: Solid 0.0-6.0m; Slotted 6.0-26.95m; Bentonite plug 0.3-1.0m; Quick-set concrete 0.0-0.3m with Gatic cover

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Wagga Wagga Base Hospital Redevelopment
LOCATION: Edward Street, Wagga Wagga

SURFACE LEVEL: 183.8 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 102
PROJECT No: 72320.00
DATE: 29 - 30/3/2011
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
183	0.1	FILLING (ROADBASE) - grey, sandy gravel (blue metal), dry		A	0.1				
		SILTY CLAY - very stiff, orange brown, silty clay with some ironstone gravel and a trace of sand, dry		E*	0.4 0.5				
	1			S	1.0 1.45		5,8,18 N = 26		
182	2			E	2.0 2.2				
	2.5	SILTY CLAY - hard, orange brown silty clay, dry		S	2.5 2.95		10,15,25 N = 40		
181	3								
180	4			S	4.0 4.45		15,25/130mm refusal		
179	5								
				S	5.5		18,22,20 N = 42		
178	6				5.95				
				A	6.0 6.2				
177	7	7.0 SILTY CLAY - hard, orange brown, silty clay with some sub-rounded schist gravel and a trace of ironstone gravel, dry		S	7.0 7.45		9,13,16 N = 29		
176	8								
	8.5	SILTY CLAY - hard, orange brown, silty clay with a trace of ironstone gravel, dry		S	8.5 8.95		9,19,16 N = 35		
175	9								
174					10.0				

RIG: Scout **DRILLER:** JS **LOGGED:** PGH **CASING:** HQ to 3.0m

TYPE OF BORING: Solid flight auger (TC-bit) to 8.50m; Rotary (water) to 16.0m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Dry on completion of auger drilling. *Denotes field replicate sample BD1/29.3.11 collected

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Wagga Wagga Base Hospital Redevelopment
LOCATION: Edward Street, Wagga Wagga

SURFACE LEVEL: 183.8 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 102
PROJECT No: 72320.00
DATE: 29 - 30/3/2011
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
173	11	SILTY CLAY - hard, orange brown, silty clay with a trace of ironstone gravel, dry *(continued)*		S	10.45		8,23,25 N = 48		
172	11.5 12	SILTY CLAY - very stiff, red brown, silty clay with a trace of quartz and ironstone gravel, moist		S	11.5 11.95		6,8,12 N = 20		
171	13 13.0	SILTY CLAY - hard, red and grey, silty clay with some ironstone gravel, moist		S	13.0 13.45		8,16,26 N = 42		
170	14								
169	15			S	14.5 14.95		10,20,28 N = 48		
168	16			S	16.0		9,18,23 N = 41		
	16.45	Bore discontinued at 16.45m - target depth achieved			16.45				
167	17								
166	18								
165	19								
164									

RIG: Scout **DRILLER:** JS **LOGGED:** PGH **CASING:** HQ to 3.0m

TYPE OF BORING: Solid flight auger (TC-bit) to 8.50m; Rotary (water) to 16.0m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Dry on completion of auger drilling. *Denotes field replicate sample BD1/29.3.11 collected

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Wagga Wagga Base Hospital Redevelopment
LOCATION: Edward Street, Wagga Wagga

SURFACE LEVEL: 182.5 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 103
PROJECT No: 72320.00
DATE: 30/3/2011
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
182	0.04	ASPHALT - 40mm thick							
	0.2	ROADBASE - grey, angular blue metal gravel, 160mm thick		A	0.1				
		SILTY CLAY - hard, orange brown, silty clay with a trace of ironstone gravel, dry		A	0.2				
				B	0.5				
				E	0.6				
	1			S	1.0		8,17,33 N = 50		1
181					1.45				
	2			E	2.0				2
		2.25m: grading to very stiff and moist			2.2				
	2.3	SILTY CLAY - very stiff, orange brown silty clay with some ironstone gravel, moist		S	2.5		5,8,14 N = 22		
180	3	2.85-3.0m: sub-rounded quartz gravel (to 10mm)		A	2.9				3
					2.95				
					3.0				
179	3.5	SILTY CLAY - very stiff, orange brown, silty clay with a trace of ironstone gravel, moist							
	4			S	4.0		5,8,10 N = 18		4
178					4.45				
	5								5
177				S	5.5		7,11,16 N = 27		
	6				5.95				6
176									
	7				7.0				7
	7.0	SILTY CLAY - very stiff, orange brown, silty clay with a trace of sand, moist		S			5,10,10 N = 20		
175					7.45				
	8								8
174	8.5	SILTY CLAY - stiff to very stiff, orange brown, silty clay with a trace of sand, moist		S	8.5		5,6,10 N = 16		
	8.95	Bore discontinued at 8.95m - target depth achieved			8.95				9
173									

RIG: Scout **DRILLER:** JS **LOGGED:** PGH **CASING:** Uncased

TYPE OF BORING: Solid flight auger (TC-bit) to 8.50m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Hole backfilled on 31/3/11. Dry on completion and the following day

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Wagga Wagga Base Hospital Redevelopment
LOCATION: Edward Street, Wagga Wagga

SURFACE LEVEL: 182.2 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 104
PROJECT No: 72320.00
DATE: 31/3/2011
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
182	0.04	ASPHALT - 40mm thick							
	0.2	ROADBASE - blue grey, angular basalt gravel, dry		E	0.3				
		SILTY CLAY - hard, orange brown, silty clay with a trace of ironstone gravel, dry			0.4				
181	1			S	1.0		9,17,20 N = 37		
					1.45				
				E	1.6				
					1.7				
180	2	2.0m: grading to very stiff							
				S	2.5		10,10,22 N = 32		
179	3				2.95				
178	4	4.0 SILTY CLAY - very stiff, orange brown silty clay, dry		S	4.0		6,8,15 N = 23		
		4.5m: becoming brown			4.45				
177	5								
				S	5.5		6,6,12 N = 18		
176	6				5.95				
175	7	7.0 SILTY CLAY - very stiff, orange brown, silty clay with a trace of ironstone gravel, dry		S	7.0		7,9,11 N = 20		
					7.45				
174	8								
	8.5	SILTY CLAY - stiff to very stiff, orange brown silty clay, moist		S	8.5		5,7,9 N = 16		
173	9				8.95				
	10.0				10.0				

RIG: Scout **DRILLER:** JS **LOGGED:** PGH **CASING:** Uncased

TYPE OF BORING: Solid flight auger (TC-bit) to 14.50m

WATER OBSERVATIONS: Free groundwater observed on hole completion at 14.95m on 31/3/11 and at 12.75m on 1/4/11

REMARKS: Hole backfilled on 1/4/11

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Wagga Wagga Base Hospital Redevelopment
LOCATION: Edward Street, Wagga Wagga

SURFACE LEVEL: 182.2 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 104
PROJECT No: 72320.00
DATE: 31/3/2011
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
172		SILTY CLAY - very stiff, mottled grey and orange brown, silty clay with some sand, moist		S	10.45		3,8,10 N = 18		
171	11				11.5				11
	11.65	SAND - dense, orange brown, medium to coarse grained sand, moist		S	11.95		6,15,17 N = 32		
170	12								12
	13 13.0				13.0				13
169	13.2	SANDY CLAY - very stiff, brown, sandy (medium grained) sand, moist		S			11,13,14 N = 27		
		SAND - medium dense, orange brown, medium to coarse grained sand with a trace of clay, moist			13.45				
168	14								14
				S	14.5		4,8,13 N = 21	▼	
	15 14.95	Bore discontinued at 14.95m			14.95			31-03-11	15
167									
	16								16
166									
	17								17
165									
	18								18
164									
	19								19
163									

RIG: Scout **DRILLER:** JS **LOGGED:** PGH **CASING:** Uncased

TYPE OF BORING: Solid flight auger (TC-bit) to 14.50m

WATER OBSERVATIONS: Free groundwater observed on hole completion at 14.95m on 31/3/11 and at 12.75m on 1/4/11

REMARKS: Hole backfilled on 1/4/11

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Wagga Wagga Base Hospital Redevelopment
LOCATION: Edward Street, Wagga Wagga

SURFACE LEVEL: 181.5 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 105
PROJECT No: 72320.00
DATE: 31/3/2011
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
181	0.15	FILLING (TOPSOIL) - poorly compacted, brown, sandy silt filling with some grass rootlets, dry		E	0.2				
		FILLING - poorly compacted, orange brown, silty clay filling with some building rubble (concrete, tile) and quartz gravel, dry			0.3				
				E	0.8				
	1				0.9				1
	1.2	SILTY CLAY - very stiff, orange brown, silty clay with a trace of ironstone gravel, dry		S	1.2		2,11,18 N = 29		
180					1.65				
	2			E	2.0				2
					2.2				
179	2.5	SILTY CLAY - hard, orange brown silty clay, dry		S	2.5		13,18,22 N = 40		
	3				2.95				3
178									
	4				4.0				4
	4.0	SILTY CLAY - very stiff to hard, orange brown silty clay		S			9,12,20 N = 32		
177					4.45				
	5								5
176	5.5	SILTY CLAY - very stiff, brown silty clay, dry		S	5.5		7,9,12 N = 21		
	6	6.0m: becoming moist			5.95				6
175									
	7			S	7.0		6,8,12 N = 20		7
174					7.45				
	8								8
173				S	8.5		7,10,14 N = 24		
	9				8.95				9
172									
	10.0				10.0				

RIG: Scout **DRILLER:** JS **LOGGED:** PGH **CASING:** Uncased

TYPE OF BORING: Solid flight auger (TC-bit) to 10.0m

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Wagga Wagga Base Hospital Redevelopment
LOCATION: Edward Street, Wagga Wagga

SURFACE LEVEL: 181.5 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 105
PROJECT No: 72320.00
DATE: 31/3/2011
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
171	10.45	SAND - medium dense, orange brown, medium to coarse grained sand with a trace of clay, moist		S	10.45		8,9,11 N = 20 (no sample recovered)		
		Bore discontinued at 10.45m - target depth achieved							
	11								
170									
	12								
169									
	13								
168									
	14								
167									
	15								
166									
	16								
165									
	17								
164									
	18								
163									
	19								
162									

RIG: Scout **DRILLER:** JS **LOGGED:** PGH **CASING:** Uncased
TYPE OF BORING: Solid flight auger (TC-bit) to 10.0m
WATER OBSERVATIONS: No free groundwater observed
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Wagga Wagga Base Hospital Redevelopment
LOCATION: Edward Street, Wagga Wagga

SURFACE LEVEL: 182.6 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 106
PROJECT No: 72320.00
DATE: 5/4/2011
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
182	0.2	FILLING (TOPSOIL) - poorly compacted, brown, silty clay filling with some sand		E*	0.1				Gatic cover Concrete
	0.4	SILTY CLAY - hard, orange brown silty clay, dry		B	0.2 0.3				
		SILTY CLAY - hard, orange brown, silty clay with a trace of ironstone gravel, dry							Bentonite
181	1			S	1.3		7,22,20 N = 42		
				E	1.75				
180	2	2.0m: very stiff			2.0				
				S	2.5		16,29,25 N = 54		
179	3				2.95				
178	4	SILTY CLAY - stiff, mottled orange brown and grey, silty clay with a trace of ironstone gravel and sand, moist		S	4.0 4.45		4,4,5 N = 9		
177	5								
	5.5	SILTY CLAY - very stiff, brown silty clay, moist		S	5.5 5.95		5,8,12 N = 20		
176	6								
175	7	SILTY CLAY - hard, brown, silty clay with a trace of sand, dry		S	7.0 7.45		10,13,21 N = 34		
174	8								Backfilled with gravel
				S	8.5 8.95		8,16,19 N = 35		
173	9								
					10.0				

RIG: Scout **DRILLER:** JS **LOGGED:** PGH **CASING:** HQ to 15.0m

TYPE OF BORING: Pot holing to 1.2m; Solid flight auger to 14.50m; Rotary (water) to 15.50m

WATER OBSERVATIONS: Free groundwater observed at 13.10m

REMARKS: *Denotes field replicate sample BD2/5.4.11 collected. Standpipe piezometer installed: solid 0.0-6.0m; Slotted 6.0-15.5m; Bentonite plug 0.3-1.0m; Quick-set concrete 0.0-0.3m with gatic cover

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Wagga Wagga Base Hospital Redevelopment
LOCATION: Edward Street, Wagga Wagga

SURFACE LEVEL: 182.6 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 106
PROJECT No: 72320.00
DATE: 5/4/2011
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
172	10.35	SILTY CLAY - hard, brown, silty clay with a trace of sand, dry *(continued)*		S	10.45		14,23,25 N = 48		Machine slotted PVC screen
		SAND - dense, medium to coarse grained sand, dry							
171	11	10.95m: rounded quartz gravel		S	11.5 11.95		16,25,25 N = 50		
170	12			A	12.5				
169	13 13.1	SAND - dense, medium to coarse grained, brown sand with some clay and rounded quartz gravel (to 50mm diameter), saturated		S	13.0 13.45		12,12,19 N = 31	▼	
168	14 14.4	CLAYEY SAND - dense, medium to coarse grained, clayey sand with some rounded quartz gravel, wet		A S	14.4 14.5 14.95		10,15,25 N = 40 (no sample recovered)		
167	15 15.5	Bore discontinued at 15.5m - target depth achieved							End cap
166	16								
165	17								
164	18								
163	19								

RIG: Scout **DRILLER:** JS **LOGGED:** PGH **CASING:** HQ to 15.0m

TYPE OF BORING: Pot holing to 1.2m; Solid flight auger to 14.50m; Rotary (water) to 15.50m

WATER OBSERVATIONS: Free groundwater observed at 13.10m

REMARKS: *Denotes field replicate sample BD2/5.4.11 collected. Standpipe piezometer installed: solid 0.0-6.0m; Slotted 6.0-15.5m; Bentonite plug 0.3-1.0m; Quick-set concrete 0.0-0.3m with gatic cover

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Wagga Wagga Base Hospital Redevelopment
LOCATION: Edward Street, Wagga Wagga

SURFACE LEVEL: 182.3 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 107
PROJECT No: 72320.00
DATE: 6 - 7/4/2011
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
182	0.07	ASPHALT - 70mm thick							
	0.4	FILLING (ROADBASE) - angular blue metal gravel and sand							
		FILLING - poorly compacted, red brown, silty clay filling with granite gravel, slag and some sand, moist		S	1.35		3,3,2 N = 5		
181	1								1
				E	1.8 1.9				
	2				2.0				2
	2.2			A	2.2				
180	2.4	FILLING - poorly compacted, medium grained sand filling with some clay, moist		E	2.4				
		Bore discontinued at 2.4m - hole abandoned due to obstruction							
	3								3
179									
	4								4
178									
	5								5
177									
	6								6
176									
	7								7
175									
	8								8
174									
	9								9
173									

RIG: Scout **DRILLER:** JS **LOGGED:** PGH **CASING:** Uncased

TYPE OF BORING: Pot holing to 1.30m; Solid flight auger to 2.40m

WATER OBSERVATIONS: No free groundwater observed whilst auger drilling

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Wagga Wagga Base Hospital Redevelopment
LOCATION: Edward Street, Wagga Wagga

SURFACE LEVEL: 182.3 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 107A
PROJECT No: 72320.00
DATE: 7/4/2011
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
182	0.07	ASPHALT - 70mm thick							
	0.4	FILLING (ROADBASE) - brown, angular blue metal gravel filling with sand, dry		E	0.4 0.5				
		SILTY CLAY - apparently very stiff, red brown silty clay, dry							
181	1								1
	1.5	SILTY CLAY - very stiff, red brown, silty clay with some ironstone gravel, dry			1.5				
				S E	1.6 1.95		7,9,18 N = 27		
180	2								2
	2.5	SILTY CLAY - stiff, red brown, silty clay with a trace of ironstone gravel, dry			2.5				
				S	2.95		6,6,8 N = 14		
179	3								3
	4.0	SILTY CLAY - very stiff, red brown, silty clay with a trace of ironstone gravel, dry			4.0				
178	4			S	4.45		5,8,14 N = 22		4
	5								5
177					5.5				
	6			S	5.95		6,9,14 N = 23		6
176	7				7.0				7
				S	7.45		4,6,11 N = 17		
175	8								8
	8.5	SILTY CLAY - stiff to very stiff, red brown and grey, silty clay, moist			8.5				
174	9			S	8.95		6,7,9 N = 16		9
173	10.0				10.0				

RIG: Scout **DRILLER:** JS **LOGGED:** PGH **CASING:** Uncased

TYPE OF BORING: Pot holing to 1.2m; Solid flight auger (TC-bit) to 13.0m

WATER OBSERVATIONS: Free groundwater observed at 13.10m on SPT sampler

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Wagga Wagga Base Hospital Redevelopment
LOCATION: Edward Street, Wagga Wagga

SURFACE LEVEL: 182.3 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 107A
PROJECT No: 72320.00
DATE: 7/4/2011
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
172	11	SILTY CLAY - hard, red brown silty clay, moist		S	10.45		9,14,30 N = 44		
171	11.5	SILTY CLAY - stiff, mottled orange brown and grey, silty clay, moist 12.0m: gravel		S	11.5 11.95		5,6,7 N = 13		
170	12								
169	13 13.0	SILTY CLAY - hard, orange brown silty clay, moist		S	13.0		8,15,19 N = 34	▼	
	13.45	Bore discontinued at 13.45m			13.45				
168	14								
167	15								
166	16								
165	17								
164	18								
163	19								

RIG: Scout **DRILLER:** JS **LOGGED:** PGH **CASING:** Uncased

TYPE OF BORING: Pot holing to 1.2m; Solid flight auger (TC-bit) to 13.0m

WATER OBSERVATIONS: Free groundwater observed at 13.10m on SPT sampler

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Wagga Wagga Base Hospital Redevelopment
LOCATION: Edward Street, Wagga Wagga

SURFACE LEVEL: 181.8 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 108
PROJECT No: 72320.00
DATE: 6/4/2011
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
181	0.0	FILLING - poorly compacted, medium grained clayey sand filling, moist		A	0.1				
					0.2				
	0.4	SILTY CLAY - apparently hard, red brown silty clay, dry							
	1								1
	1.4	SILTY CLAY - hard, red brown silty clay, dry			1.4				
180				S			5,17,22 N = 39		
	2				1.85				2
				A	2.0				
					2.2				
		2.5m: with a trace of ironstone gravel			2.5				
179				S			10,13,25 N = 38		
	3				2.95				3
178									
	4				4.0				4
	4.0	SILTY CLAY - very stiff, brown silty clay, moist		S			5,9,13 N = 22		
					4.45				
177	5								5
					5.5				
				S			5,7,13 N = 20		
176	6				5.95				6
175									
	7				7.0				7
		7.0m: becoming grey brown		S			4,8,12 N = 20		
					7.45				
174	8								8
	8.5	SILTY CLAY - stiff, brown silty clay, moist			8.5				
173				S			5,6,8 N = 14		
	9				8.95				9
172									
	10.0				10.0				

RIG: Scout **DRILLER:** JS **LOGGED:** PGH **CASING:** Uncased

TYPE OF BORING: Pot holing to 1.2m; Solid flight auger (TC-bit) to 10.0m

WATER OBSERVATIONS: No free groundwater observed whilst auger drilling

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Wagga Wagga Base Hospital Redevelopment
LOCATION: Edward Street, Wagga Wagga

SURFACE LEVEL: 181.8 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 108
PROJECT No: 72320.00
DATE: 6/4/2011
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		SILTY CLAY - stiff, brown silty clay, moist *(continued)*		S			3,5,6 N = 11		
	10.45	Bore discontinued at 10.45m - target depth achieved			10.45				

RIG: Scout **DRILLER:** JS **LOGGED:** PGH **CASING:** Uncased

TYPE OF BORING: Pot holing to 1.2m; Solid flight auger (TC-bit) to 10.0m

WATER OBSERVATIONS: No free groundwater observed whilst auger drilling

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Wagga Wagga Base Hospital Redevelopment
LOCATION: Edward Street, Wagga Wagga

SURFACE LEVEL: 182.4 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 109
PROJECT No: 72320.00
DATE: 1 - 5/4/2011
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
182	0.4	FILLING (TOPSOIL) - poorly compacted, dark brown, silty clay filling (topsoil) with some sand, moist		E	0.1 0.2				
		SILTY CLAY - apparently stiff, orange brown silty clay, dry		B A	0.4 0.5 0.6				
181	1.0	SILTY CLAY - stiff, orange brown silty clay, dry		S	1.0 1.45		4,4,9 N = 13		
180	2.5			S	2.5 2.95		4,5,7 N = 12		
179	4.0	SILTY CLAY - very stiff, orange brown silty clay, dry		S	4.0 4.45		7,11,14 N = 25		
178		5.0m: trace of ironstone gravel							
177	5.5			S	5.5 5.95		7,10,12 N = 22		
176	7.0	SILTY CLAY - stiff, orange brown, silty clay with a trace of ironstone gravel, dry		S	7.0 7.45		4,7,8 N = 15		
175	8.5	SILTY CLAY - hard, red brown, silty clay with a trace of ironstone gravel, dry		S	8.5 8.95		10,12,21 N = 33		
174					10.0				
173									

RIG: Scout **DRILLER:** JS **LOGGED:** PGH **CASING:** Uncased
TYPE OF BORING: Solid flight auger (TC-bit) to 10.0m
WATER OBSERVATIONS: No free groundwater observed
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Wagga Wagga Base Hospital Redevelopment
LOCATION: Edward Street, Wagga Wagga

SURFACE LEVEL: 182.4 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 109
PROJECT No: 72320.00
DATE: 1 - 5/4/2011
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	10.15	10.10m: rounded quartz gravel		S	10.15		20 refusal		
		Bore discontinued at 10.15m - target depth achieved							

RIG: Scout **DRILLER:** JS **LOGGED:** PGH **CASING:** Uncased

TYPE OF BORING: Solid flight auger (TC-bit) to 10.0m

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

Appendix H

Laboratory Reports and Chain of Custody Documentation

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

CERTIFICATE OF ANALYSIS 55247

Client:
Douglas Partners
96 Hermitage Rd
West Ryde
NSW 2114

Attention: Paul Gorman

Sample log in details:

Your Reference:	**72320.01, Wagga Wagga**		
No. of samples:	4 soils		
Date samples received / completed instructions received	11/05/11	/	11/05/11

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

Report Details:

Date results requested by: / Issue Date:	18/05/11	/	12/05/11
Date of Preliminary Report:	Not Issued		

NATA accreditation number 2901. This document shall not be reproduced except in full.
This document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:

Alex Tam
Approved Signatory

Asbestos ID - soils					
Our Reference:	UNITS	55247-1	55247-2	55247-3	55247-4
Your Reference	----------	BH105/0.2-0.3	BH106/0.1-0.2	BH108/0.1-0.2	BH109/0.1-0.3
Type of sample	----------	Soil	Soil	Soil	Soil
Date analysed	-	12/05/2011	12/05/2011	12/05/2011	12/05/2011
Sample mass tested	g	Approx 35	Approx 35	Approx 35	Approx 35
Sample Description	-	Sandy Soil & Rock	Sandy Soil & Rock	Sandy Soil & Rock	Sandy Soil & Rock
Asbestos ID in soil	-	No asbestos found at reporting limit of 0.1g/kg	No asbestos found at reporting limit of 0.1g/kg	No asbestos found at reporting limit of 0.1g/kg	No asbestos found at reporting limit of 0.1g/kg
Trace Analysis	-	Respirable fibres not detected	Respirable fibres not detected	Respirable fibres not detected	Respirable fibres not detected

Method ID	Methodology Summary
AS4964-2004	Asbestos ID - Qualitative identification of asbestos type fibres in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques.

Report Comments:

Asbestos ID was analysed by Approved Identifier: Alex Tam
Asbestos ID was authorised by Approved Signatory: Alex Tam

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

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

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

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

Douglas Partners
Geotechnics · Environment · Groundwater

CHAIN OF CUSTODY

Project Name: Wagga Wagga .....
Project No: 72320.01..... Sampler: Peter Hartcliff..... .....
Project Mgr: Paul Gorman..... Phone: 02 9809 0666 .....
Email: rene.alviar@douglaspartners.com.au .....
Date Required: Normal TAT ..... Lab Quote No. .....

To: Envirolab Services
12 Ashley Street, Chatswood NSW 2068
Attn: Tania Notaras
Phone: 02 9910 6200 Fax: 02 9910 6201
Email: tnotaras@envirolabservices.com.au

Sample ID	Sample Depth (m)	Lab ID	Sampling Date	Sample Type S - soil W – water A - Air	Container type	Analytes: Asbestos ID							Notes
BH105/0.2-0.3	0.2-0.3	1	31.03	S	J	X							
BH106/0.1-0.2	0.1-0.2	2	05.04	S	J	X							
BH108/0.1-0.2	0.1-0.2	3	06.04	S	J	X							
BH109/0.1-0.3	0.1-0.3	4	05.04	S	J	X							

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: 9910 6200

Job No: 55247
Date received: 11-5-11
Time received: 2pm
Received by: ES
Temp: Cool/Ambient
Cooling: Ice/icepack
Security: Intact/Broken/None

Lab Report No. .....
Send Results to: Douglas Partners Address: 96 Hermitage Road, West Ryde 2114
Phone: (02) 9809 0666
Fax: (02) 9809 4095

Relinquished by: Rene Alviar Signed: Date & Time: Received By: E Shaw (ELS) Date & Time: 11-5-11, 2pm

Relinquished by: Signed: Date & Time: Received By: Date & Time:

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

CERTIFICATE OF ANALYSIS 54136

Client:
Douglas Partners
96 Hermitage Rd
West Ryde
NSW 2114

Attention: Rene Alviar

Sample log in details:

Your Reference:	**72320.01, Wagga Wagga**
No. of samples:	24 Soils, 3 Waters
Date samples received / completed instructions received	11/04/11 / 11/04/11

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

Report Details:

Date results requested by: / Issue Date:	18/04/11 / 18/04/11
Date of Preliminary Report:	Not Issued

NATA accreditation number 2901. This document shall not be reproduced except in full.
This document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:

Jacinta Hurst
Laboratory Manager

Nancy Zhang
Chemist

Rhian Morgan
Reporting Supervisor

Nick Sarlamis
Inorganics Supervisor

Giovanni Agosti
Technical Manager

Jeremy Faircloth
Chemist

VOCs in soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	54136-3 BH101/2-2.2 30/03/2011 Soil	54136-14 BH106/1.75-2.0 5/04/2011 Soil	54136-16 BH107/2.2-2.4 7/04/2011 Soil
Date extracted	-	12/04/2011	12/04/2011	12/04/2011
Date analysed	-	13/04/2011	13/04/2011	13/04/2011
Dichlorodifluoromethane	mg/kg	<1	<1	<1
Chloromethane	mg/kg	<1	<1	<1
Vinyl Chloride	mg/kg	<1	<1	<1
Bromomethane	mg/kg	<1	<1	<1
Chloroethane	mg/kg	<1	<1	<1
Trichlorofluoromethane	mg/kg	<1	<1	<1
1,1-Dichloroethene	mg/kg	<1	<1	<1
trans-1,2-dichloroethene	mg/kg	<1	<1	<1
1,1-dichloroethane	mg/kg	<1	<1	<1
cis-1,2-dichloroethene	mg/kg	<1	<1	<1
bromochloromethane	mg/kg	<1	<1	<1
chloroform	mg/kg	<1	<1	<1
2,2-dichloropropane	mg/kg	<1	<1	<1
1,2-dichloroethane	mg/kg	<1	<1	<1
1,1,1-trichloroethane	mg/kg	<1	<1	<1
1,1-dichloropropene	mg/kg	<1	<1	<1
Cyclohexane	mg/kg	<1	<1	<1
carbon tetrachloride	mg/kg	<1	<1	<1
Benzene	mg/kg	<0.5	<0.5	<0.5
dibromomethane	mg/kg	<1	<1	<1
1,2-dichloropropane	mg/kg	<1	<1	<1
trichloroethene	mg/kg	<1	<1	<1
bromodichloromethane	mg/kg	<1	<1	<1
trans-1,3-dichloropropene	mg/kg	<1	<1	<1
cis-1,3-dichloropropene	mg/kg	<1	<1	<1
1,1,2-trichloroethane	mg/kg	<1	<1	<1
Toluene	mg/kg	<0.5	<0.5	<0.5
1,3-dichloropropane	mg/kg	<1	<1	<1
dibromochloromethane	mg/kg	<1	<1	<1
1,2-dibromoethane	mg/kg	<1	<1	<1
tetrachloroethene	mg/kg	<1	<1	<1
1,1,1,2-tetrachloroethane	mg/kg	<1	<1	<1
chlorobenzene	mg/kg	<1	<1	<1
Ethylbenzene	mg/kg	<1	<1	<1
bromoform	mg/kg	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2
styrene	mg/kg	<1	<1	<1

VOCs in soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	54136-3 BH101/2-2.2 30/03/2011 Soil	54136-14 BH106/1.75-2.0 5/04/2011 Soil	54136-16 BH107/2.2-2.4 7/04/2011 Soil
1,1,2,2-tetrachloroethane	mg/kg	<1	<1	<1
o-Xylene	mg/kg	<1	<1	<1
1,2,3-trichloropropane	mg/kg	<1	<1	<1
isopropylbenzene	mg/kg	<1	<1	<1
bromobenzene	mg/kg	<1	<1	<1
n-propyl benzene	mg/kg	<1	<1	<1
2-chlorotoluene	mg/kg	<1	<1	<1
4-chlorotoluene	mg/kg	<1	<1	<1
1,3,5-trimethyl benzene	mg/kg	<1	<1	<1
tert-butyl benzene	mg/kg	<1	<1	<1
1,2,4-trimethyl benzene	mg/kg	<1	<1	<1
1,3-dichlorobenzene	mg/kg	<1	<1	<1
sec-butyl benzene	mg/kg	<1	<1	<1
1,4-dichlorobenzene	mg/kg	<1	<1	<1
4-isopropyl toluene	mg/kg	<1	<1	<1
1,2-dichlorobenzene	mg/kg	<1	<1	<1
n-butyl benzene	mg/kg	<1	<1	<1
1,2-dibromo-3-chloropropane	mg/kg	<1	<1	<1
1,2,4-trichlorobenzene	mg/kg	<1	<1	<1
hexachlorobutadiene	mg/kg	<1	<1	<1
1,2,3-trichlorobenzene	mg/kg	<1	<1	<1
Surrogate Dibromofluorometha	%	89	90	110
Surrogate aaa-Trifluorotoluene	%	109	106	111
Surrogate Toluene-d_8	%	97	96	92
Surrogate 4-Bromofluorobenzene	%	95	94	72

vTRH & BTEX in Soil						
Our Reference:	UNITS	54136-1	54136-3	54136-4	54136-5	54136-6
Your Reference	----------	BH101/0.1-0.2	BH101/2-2.2	BH102/0.4-0.5	BH102/2-2.2	BH103/0.5-0.6
Date Sampled	----------	30/03/2011	30/03/2011	29/03/2011	29/03/2011	30/03/2011
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011	12/04/2011
Date analysed	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011	12/04/2011
vTRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	84	109	87	87	86

vTRH & BTEX in Soil						
Our Reference:	UNITS	54136-8	54136-10	54136-13	54136-15	54136-19
Your Reference	----------	BH104/0.3-0.4	BH105/0.2-0.3	BH106/0.1-0.2	BH107/1.9-2.0	BH108/0.1-0.2
Date Sampled	----------	31/03/2011	31/03/2011	5/04/2011	7/04/2011	6/04/2011
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011	12/04/2011
Date analysed	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011	12/04/2011
vTRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	86	87	83	110	108

vTRH & BTEX in Soil		
Our Reference:	UNITS	54136-21
Your Reference	----------	BH109/0.1-0.3
Date Sampled	----------	5/04/2011
Type of sample		Soil
Date extracted	-	12/04/2011
Date analysed	-	12/04/2011
vTRH C_6 - C_9	mg/kg	<25
Benzene	mg/kg	<0.5
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
Surrogate aaa-Trifluorotoluene	%	107

sTRH in Soil (C10-C36)						
Our Reference:	UNITS	54136-1	54136-3	54136-4	54136-5	54136-6
Your Reference	----------	BH101/0.1-0.2	BH101/2-2.2	BH102/0.4-0.5	BH102/2-2.2	BH103/0.5-0.6
Date Sampled	----------	30/03/2011	30/03/2011	29/03/2011	29/03/2011	30/03/2011
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011	12/04/2011
Date analysed	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011	12/04/2011
$TRHC_{10} - C_{14}$	mg/kg	<50	<50	<50	<50	<50
$TRHC_{15} - C_{28}$	mg/kg	<100	<100	<100	<100	<100
$TRHC_{29} - C_{36}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	87	85	86	87	87

sTRH in Soil (C10-C36)						
Our Reference:	UNITS	54136-8	54136-10	54136-13	54136-15	54136-19
Your Reference	----------	BH104/0.3-0.4	BH105/0.2-0.3	BH106/0.1-0.2	BH107/1.9-2.0	BH108/0.1-0.2
Date Sampled	----------	31/03/2011	31/03/2011	5/04/2011	7/04/2011	6/04/2011
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011	12/04/2011
Date analysed	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011	12/04/2011
$TRHC_{10} - C_{14}$	mg/kg	<50	<50	<50	<50	<50
$TRHC_{15} - C_{28}$	mg/kg	<100	<100	<100	<100	<100
$TRHC_{29} - C_{36}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	87	87	88	88	82

sTRH in Soil (C10-C36)		
Our Reference:	UNITS	54136-21
Your Reference	----------	BH109/0.1-0.3
Date Sampled	----------	5/04/2011
Type of sample		Soil
Date extracted	-	12/04/2011
Date analysed	-	12/04/2011
$TRHC_{10} - C_{14}$	mg/kg	<50
$TRHC_{15} - C_{28}$	mg/kg	<100
$TRHC_{29} - C_{36}$	mg/kg	<100
Surrogate o-Terphenyl	%	89

PAHs in Soil						
Our Reference:	UNITS	54136-1	54136-3	54136-4	54136-5	54136-6
Your Reference	----------	BH101/0.1-0.2	BH101/2-2.2	BH102/0.4-0.5	BH102/2-2.2	BH103/0.5-0.6
Date Sampled	----------	30/03/2011	30/03/2011	29/03/2011	29/03/2011	30/03/2011
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011	12/04/2011
Date analysed	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011	12/04/2011
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.2	<0.1	0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.5	<0.1	0.2	<0.1	<0.1
Pyrene	mg/kg	0.5	<0.1	0.3	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.2	<0.1	0.1	<0.1	<0.1
Benzo(b+k)fluoranthene	mg/kg	0.4	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.24	<0.05	0.09	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Surrogate p-Terphenyl-d_{14}	%	87	93	89	89	89

PAHs in Soil						
Our Reference:	UNITS	54136-8	54136-10	54136-11	54136-13	54136-14
Your Reference	----------	BH104/0.3-0.4	BH105/0.2-0.3	BH105/0.8-0.9	BH106/0.1-0.2	BH106/1.75-2.0
Date Sampled	----------	31/03/2011	31/03/2011	31/03/2011	5/04/2011	5/04/2011
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011	12/04/2011
Date analysed	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011	12/04/2011
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	0.6	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	1.3	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	1.3	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	0.5	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	0.6	<0.1
Benzo(b+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	0.9	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	0.61	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	0.4	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	0.4	<0.1
Surrogate p-Terphenyl-d_{14}	%	88	85	92	87	90

PAHs in Soil						
Our Reference:	UNITS	54136-15	54136-16	54136-18	54136-19	54136-20
Your Reference	----------	BH107/1.9-2.0	BH107/2.2-2.4	BH107A/1.5-1.6	BH108/0.1-0.2	BH108/2-2.2
Date Sampled	----------	7/04/2011	7/04/2011	7/04/2011	6/04/2011	6/04/2011
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011	12/04/2011
Date analysed	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011	12/04/2011
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate p-Terphenyl-d_{14}	%	93	88	87	88	88

PAHs in Soil		
Our Reference:	UNITS	54136-21
Your Reference	----------	BH109/0.1-0.3
Date Sampled	----------	5/04/2011
Type of sample		Soil
Date extracted	-	12/04/2011
Date analysed	-	12/04/2011
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	<0.1
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	<0.1
Phenanthrene	mg/kg	0.1
Anthracene	mg/kg	<0.1
Fluoranthene	mg/kg	0.2
Pyrene	mg/kg	0.3
Benzo(a)anthracene	mg/kg	0.1
Chrysene	mg/kg	0.1
Benzo(b+k)fluoranthene	mg/kg	<0.2
Benzo(a)pyrene	mg/kg	0.09
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1
Surrogate p-Terphenyl-d_{14}	%	85

Organochlorine Pesticides in soil						
Our Reference:	UNITS	54136-1	54136-4	54136-6	54136-8	54136-10
Your Reference	----------	BH101/0.1-0.2	BH102/0.4-0.5	BH103/0.5-0.6	BH104/0.3-0.4	BH105/0.2-0.3
Date Sampled	----------	30/03/2011	29/03/2011	30/03/2011	31/03/2011	31/03/2011
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011	12/04/2011
Date analysed	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011	12/04/2011
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	91	95	94	93	97

Organochlorine Pesticides in soil					
Our Reference:	UNITS	54136-13	54136-15	54136-19	54136-21
Your Reference	----------	BH106/0.1-0.2	BH107/1.9-2.0	BH108/0.1-0.2	BH109/0.1-0.3
Date Sampled	----------	5/04/2011	7/04/2011	6/04/2011	5/04/2011
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011
Date analysed	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	89	94	93	83

Organophosphorus Pesticides						
Our Reference:	UNITS	54136-1	54136-4	54136-6	54136-8	54136-10
Your Reference	----------	BH101/0.1-0.2	BH102/0.4-0.5	BH103/0.5-0.6	BH104/0.3-0.4	BH105/0.2-0.3
Date Sampled	----------	30/03/2011	29/03/2011	30/03/2011	31/03/2011	31/03/2011
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011	12/04/2011
Date analysed	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011	12/04/2011
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	91	95	94	93	97

Organophosphorus Pesticides					
Our Reference:	UNITS	54136-13	54136-15	54136-19	54136-21
Your Reference	----------	BH106/0.1-0.2	BH107/1.9-2.0	BH108/0.1-0.2	BH109/0.1-0.3
Date Sampled	----------	5/04/2011	7/04/2011	6/04/2011	5/04/2011
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011
Date analysed	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	89	94	93	83

PCBs in Soil						
Our Reference:	UNITS	54136-1	54136-4	54136-6	54136-8	54136-10
Your Reference	----------	BH101/0.1-0.2	BH102/0.4-0.5	BH103/0.5-0.6	BH104/0.3-0.4	BH105/0.2-0.3
Date Sampled	----------	30/03/2011	29/03/2011	30/03/2011	31/03/2011	31/03/2011
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011	12/04/2011
Date analysed	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011	12/04/2011
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1221*	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	91	95	94	93	97

PCBs in Soil					
Our Reference:	UNITS	54136-13	54136-15	54136-19	54136-21
Your Reference	----------	BH106/0.1-0.2	BH107/1.9-2.0	BH108/0.1-0.2	BH109/0.1-0.3
Date Sampled	----------	5/04/2011	7/04/2011	6/04/2011	5/04/2011
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011
Date analysed	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1
Arochlor 1221*	mg/kg	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	89	94	93	83

Total Phenolics in Soil						
Our Reference:	UNITS	54136-1	54136-4	54136-6	54136-8	54136-10
Your Reference	----------	BH101/0.1-0.2	BH102/0.4-0.5	BH103/0.5-0.6	BH104/0.3-0.4	BH105/0.2-0.3
Date Sampled	----------	30/03/2011	29/03/2011	30/03/2011	31/03/2011	31/03/2011
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	13/04/2011	13/04/2011	13/04/2011	13/04/2011	13/04/2011
Date analysed	-	13/04/2011	13/04/2011	13/04/2011	13/04/2011	13/04/2011
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Total Phenolics in Soil					
Our Reference:	UNITS	54136-13	54136-15	54136-19	54136-21
Your Reference	----------	BH106/0.1-0.2	BH107/1.9-2.0	BH108/0.1-0.2	BH109/0.1-0.3
Date Sampled	----------	5/04/2011	7/04/2011	6/04/2011	5/04/2011
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	13/04/2011	13/04/2011	13/04/2011	13/04/2011
Date analysed	-	13/04/2011	13/04/2011	13/04/2011	13/04/2011
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5

Acid Extractable metals in soil						
Our Reference:	UNITS	54136-1	54136-3	54136-4	54136-5	54136-6
Your Reference	----------	BH101/0.1-0.2	BH101/2-2.2	BH102/0.4-0.5	BH102/2-2.2	BH103/0.5-0.6
Date Sampled	----------	30/03/2011	30/03/2011	29/03/2011	29/03/2011	30/03/2011
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011	12/04/2011
Date analysed	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011	12/04/2011
Arsenic	mg/kg	8	8	7	8	9
Cadmium	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg	17	29	26	28	28
Copper	mg/kg	25	18	21	17	18
Lead	mg/kg	64	13	22	12	14
Mercury	mg/kg	0.4	<0.1	0.1	<0.1	<0.1
Nickel	mg/kg	12	13	13	12	19
Zinc	mg/kg	120	25	61	24	40

Acid Extractable metals in soil						
Our Reference:	UNITS	54136-8	54136-10	54136-11	54136-13	54136-14
Your Reference	----------	BH104/0.3-0.4	BH105/0.2-0.3	BH105/0.8-0.9	BH106/0.1-0.2	BH106/1.75-2.0
Date Sampled	----------	31/03/2011	31/03/2011	31/03/2011	5/04/2011	5/04/2011
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011	12/04/2011
Date analysed	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011	12/04/2011
Arsenic	mg/kg	9	<4	4	6	6
Cadmium	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg	28	16	19	21	33
Copper	mg/kg	18	11	28	14	17
Lead	mg/kg	13	12	46	44	14
Mercury	mg/kg	<0.1	<0.1	1.1	0.1	<0.1
Nickel	mg/kg	15	10	11	13	22
Zinc	mg/kg	28	36	67	59	44

Acid Extractable metals in soil						
Our Reference:	UNITS	54136-15	54136-16	54136-18	54136-19	54136-20
Your Reference	----------	BH107/1.9-2.0	BH107/2.2-2.4	BH107A/1.5-1.6	BH108/0.1-0.2	BH108/2-2.2
Date Sampled	----------	7/04/2011	7/04/2011	7/04/2011	6/04/2011	6/04/2011
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011	12/04/2011
Date analysed	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011	12/04/2011
Arsenic	mg/kg	9	6	6	<4	7
Cadmium	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg	22	14	26	13	29
Copper	mg/kg	15	8	14	7	17
Lead	mg/kg	14	13	12	7	15
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	14	9	11	9	14
Zinc	mg/kg	29	23	23	20	25

Acid Extractable metals in soil		
Our Reference:	UNITS	54136-21
Your Reference	----------	BH109/0.1-0.3
Date Sampled	----------	5/04/2011
Type of sample		Soil
Date digested	-	12/04/2011
Date analysed	-	12/04/2011
Arsenic	mg/kg	5
Cadmium	mg/kg	<0.5
Chromium	mg/kg	19
Copper	mg/kg	18
Lead	mg/kg	37
Mercury	mg/kg	0.4
Nickel	mg/kg	12
Zinc	mg/kg	89

Moisture						
Our Reference:	UNITS	54136-1	54136-3	54136-4	54136-5	54136-6
Your Reference	----------	BH101/0.1-0.2	BH101/2-2.2	BH102/0.4-0.5	BH102/2-2.2	BH103/0.5-0.6
Date Sampled	----------	30/03/2011	30/03/2011	29/03/2011	29/03/2011	30/03/2011
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011	12/04/2011
Date analysed	-	13/04/2011	13/04/2011	13/04/2011	13/04/2011	13/04/2011
Moisture	%	20	17	10	11	11

Moisture						
Our Reference:	UNITS	54136-8	54136-10	54136-11	54136-13	54136-14
Your Reference	----------	BH104/0.3-0.4	BH105/0.2-0.3	BH105/0.8-0.9	BH106/0.1-0.2	BH106/1.75-2.0
Date Sampled	----------	31/03/2011	31/03/2011	31/03/2011	5/04/2011	5/04/2011
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011	12/04/2011
Date analysed	-	13/04/2011	13/04/2011	13/04/2011	13/04/2011	13/04/2011
Moisture	%	13	10	9.4	12	12

Moisture						
Our Reference:	UNITS	54136-15	54136-16	54136-18	54136-19	54136-20
Your Reference	----------	BH107/1.9-2.0	BH107/2.2-2.4	BH107A/1.5-1.6	BH108/0.1-0.2	BH108/2-2.2
Date Sampled	----------	7/04/2011	7/04/2011	7/04/2011	6/04/2011	6/04/2011
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	12/04/2011	12/04/2011	12/04/2011	12/04/2011	12/04/2011
Date analysed	-	13/04/2011	13/04/2011	13/04/2011	13/04/2011	13/04/2011
Moisture	%	12	8.8	13	9.9	15

Moisture		
Our Reference:	UNITS	54136-21
Your Reference	----------	BH109/0.1-0.3
Date Sampled	----------	5/04/2011
Type of sample		Soil
Date prepared	-	12/04/2011
Date analysed	-	13/04/2011
Moisture	%	21

VOCs in water Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	54136-25 GW101 7/04/2011 Water	54136-26 GW106 7/04/2011 Water
Date extracted	-	13/04/2011	13/04/2011
Date analysed	-	14/04/2011	14/04/2011
Dichlorodifluoromethane	µg/L	<10	<10
Chloromethane	µg/L	<10	<10
Vinyl Chloride	µg/L	<10	<10
Bromomethane	µg/L	<10	<10
Chloroethane	µg/L	<10	<10
Trichlorofluoromethane	µg/L	<10	<10
1,1-Dichloroethene	µg/L	<1	<1
Trans-1,2-dichloroethene	µg/L	<1	<1
1,1-dichloroethane	µg/L	<1	<1
Cis-1,2-dichloroethene	µg/L	<1	<1
Bromochloromethane	µg/L	<1	<1
Chloroform	µg/L	<1	16
2,2-dichloropropane	µg/L	<1	<1
1,2-dichloroethane	µg/L	<1	<1
1,1,1-trichloroethane	µg/L	<1	<1
1,1-dichloropropene	µg/L	<1	<1
Cyclohexane	µg/L	<1	<1
Carbon tetrachloride	µg/L	<1	<1
Benzene	µg/L	<1	<1
Dibromomethane	µg/L	<1	<1
1,2-dichloropropane	µg/L	<1	<1
Trichloroethene	µg/L	<1	<1
Bromodichloromethane	µg/L	<1	<1
trans-1,3-dichloropropene	µg/L	<1	<1
cis-1,3-dichloropropene	µg/L	<1	<1
1,1,2-trichloroethane	µg/L	<1	<1
Toluene	µg/L	<1	3
1,3-dichloropropane	µg/L	<1	<1
Dibromochloromethane	µg/L	<1	<1
1,2-dibromoethane	µg/L	<1	<1
Tetrachloroethene	µg/L	<1	<1
1,1,1,2-tetrachloroethane	µg/L	<1	<1
Chlorobenzene	µg/L	<1	<1
Ethylbenzene	µg/L	<1	<1
Bromoform	µg/L	<1	<1
m+p-xylene	µg/L	<2	<2
Styrene	µg/L	<1	<1
1,1,2,2-tetrachloroethane	µg/L	<1	<1
o-xylene	µg/L	<1	<1

VOCs in water Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	54136-25 GW101 7/04/2011 Water	54136-26 GW106 7/04/2011 Water
1,2,3-trichloropropane	µg/L	<1	<1
Isopropylbenzene	µg/L	<1	<1
Bromobenzene	µg/L	<1	<1
n-propyl benzene	µg/L	<1	<1
2-chlorotoluene	µg/L	<1	<1
4-chlorotoluene	µg/L	<1	<1
1,3,5-trimethyl benzene	µg/L	<1	<1
Tert-butyl benzene	µg/L	<1	<1
1,2,4-trimethyl benzene	µg/L	<1	<1
1,3-dichlorobenzene	µg/L	<1	<1
Sec-butyl benzene	µg/L	<1	<1
1,4-dichlorobenzene	µg/L	<1	<1
4-isopropyl toluene	µg/L	<1	<1
1,2-dichlorobenzene	µg/L	<1	<1
n-butyl benzene	µg/L	<1	<1
1,2-dibromo-3-chloropropane	µg/L	<1	<1
1,2,4-trichlorobenzene	µg/L	<1	<1
Hexachlorobutadiene	µg/L	<1	<1
1,2,3-trichlorobenzene	µg/L	<1	<1
Surrogate Dibromofluoromethane	%	103	100
Surrogate toluene-d8	%	101	103
Surrogate 4-BFB	%	107	105

vTRH & BTEX in Water				
Our Reference:	UNITS	54136-25	54136-26	54136-27
Your Reference	----------	GW101	GW106	BD1/070411
Date Sampled	----------	7/04/2011	7/04/2011	7/04/2011
Type of sample		Water	Water	Water
Date extracted	-	13/04/2011	13/04/2011	13/04/2011
Date analysed	-	14/04/2011	14/04/2011	14/04/2011
TRH C_6 - C_9	µg/L	<10	27	<10
Benzene	µg/L	<1	<1	<1
Toluene	µg/L	<1	3	<1
Ethylbenzene	µg/L	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2
o-xylene	µg/L	<1	<1	<1
Surrogate Dibromofluoromethane	%	103	100	106
Surrogate toluene-d8	%	101	103	100
Surrogate 4-BFB	%	107	105	98

sTRH in Water (C10-C36)				
Our Reference:	UNITS	54136-25	54136-26	54136-27
Your Reference	----------	GW101	GW106	BD1/070411
Date Sampled	----------	7/04/2011	7/04/2011	7/04/2011
Type of sample		Water	Water	Water
Date extracted	-	12/04/2011	12/04/2011	12/04/2011
Date analysed	-	12/04/2011	12/04/2011	12/04/2011
$TRHC_{10}$ - C_{14}	µg/L	<50	200	<50
$TRHC_{15}$ - C_{28}	µg/L	<100	<100	<100
$TRHC_{29}$ - C_{36}	µg/L	<100	<100	<100
Surrogate o-Terphenyl	%	81	98	89

PAHs in Water Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	54136-25 GW101 7/04/2011 Water	54136-26 GW106 7/04/2011 Water	54136-27 BD1/070411 7/04/2011 Water
Date extracted	-	12/04/2011	12/04/2011	12/04/2011
Date analysed	-	12/04/2011	12/04/2011	12/04/2011
Naphthalene	µg/L	<1	<1	<1
Acenaphthylene	µg/L	<1	<1	<1
Acenaphthene	µg/L	<1	<1	<1
Fluorene	µg/L	<1	<1	<1
Phenanthrene	µg/L	<1	<1	<1
Anthracene	µg/L	<1	<1	<1
Fluoranthene	µg/L	<1	<1	<1
Pyrene	µg/L	<1	<1	<1
Benzo(a)anthracene	µg/L	<1	<1	<1
Chrysene	µg/L	<1	<1	<1
Benzo(b+k)fluoranthene	µg/L	<2	<2	<2
Benzo(a)pyrene	µg/L	<1	<1	<1
Indeno(1,2,3-c,d)pyrene	µg/L	<1	<1	<1
Dibenzo(a,h)anthracene	µg/L	<1	<1	<1
Benzo(g,h,i)perylene	µg/L	<1	<1	<1
Surrogate p-Terphenyl-d_{14}	%	83	103	95

OCP in water				
Our Reference:	UNITS	54136-25	54136-26	54136-27
Your Reference	----------	GW101	GW106	BD1/070411
Date Sampled	----------	7/04/2011	7/04/2011	7/04/2011
Type of sample		Water	Water	Water
Date extracted	-	12/04/2011	12/04/2011	12/04/2011
Date analysed	-	13/04/2011	13/04/2011	13/04/2011
HCB	µg/L	<0.2	<0.2	<0.2
alpha-BHC	µg/L	<0.2	<0.2	<0.2
gamma-BHC	µg/L	<0.2	<0.2	<0.2
beta-BHC	µg/L	<0.2	<0.2	<0.2
Heptachlor	µg/L	<0.2	<0.2	<0.2
delta-BHC	µg/L	<0.2	<0.2	<0.2
Aldrin	µg/L	<0.2	<0.2	<0.2
Heptachlor Epoxide	µg/L	<0.2	<0.2	<0.2
gamma-Chlordane	µg/L	<0.2	<0.2	<0.2
alpha-Chlordane	µg/L	<0.2	<0.2	<0.2
Endosulfan I	µg/L	<0.2	<0.2	<0.2
pp-DDE	µg/L	<0.2	<0.2	<0.2
Dieldrin	µg/L	<0.2	<0.2	<0.2
Endrin	µg/L	<0.2	<0.2	<0.2
pp-DDD	µg/L	<0.2	<0.2	<0.2
Endosulfan II	µg/L	<0.2	<0.2	<0.2
pp-DDT	µg/L	<0.2	<0.2	<0.2
Endrin Aldehyde	µg/L	<0.2	<0.2	<0.2
Endosulfan Sulphate	µg/L	<0.2	<0.2	<0.2
Methoxychlor	µg/L	<0.2	<0.2	<0.2
Surrogate TCLMX	%	85	104	98

OP Pesticides in water				
Our Reference:	UNITS	54136-25	54136-26	54136-27
Your Reference	----------	GW101	GW106	BD1/070411
Date Sampled	----------	7/04/2011	7/04/2011	7/04/2011
Type of sample		Water	Water	Water
Date extracted	-	12/04/2011	12/04/2011	12/04/2011
Date analysed	-	13/04/2011	13/04/2011	13/04/2011
Diazinon	µg/L	<0.2	<0.2	<0.2
Dimethoate	µg/L	<0.2	<0.2	<0.2
Chlorpyriphos-methyl	µg/L	<0.2	<0.2	<0.2
Ronnel	µg/L	<0.2	<0.2	<0.2
Chlorpyriphos	µg/L	<0.2	<0.2	<0.2
Fenitrothion	µg/L	<0.2	<0.2	<0.2
Bromophos ethyl	µg/L	<0.2	<0.2	<0.2
Ethion	µg/L	<0.2	<0.2	<0.2
Surrogate TCLMX	%	85	104	98

PCBs in Water				
Our Reference:	UNITS	54136-25	54136-26	54136-27
Your Reference	----------	GW101	GW106	BD1/070411
Date Sampled	----------	7/04/2011	7/04/2011	7/04/2011
Type of sample		Water	Water	Water
Date extracted	-	12/04/2011	12/04/2011	12/04/2011
Date analysed	-	13/04/2011	13/04/2011	13/04/2011
Arochlor 1016	µg/L	<2	<2	<2
Arochlor 1221*	µg/L	<2	<2	<2
Arochlor 1232	µg/L	<2	<2	<2
Arochlor 1242	µg/L	<2	<2	<2
Arochlor 1248	µg/L	<2	<2	<2
Arochlor 1254	µg/L	<2	<2	<2
Arochlor 1260	µg/L	<2	<2	<2
Surrogate TCLMX	%	85	104	98

Total Phenolics in Water				
Our Reference:	UNITS	54136-25	54136-26	54136-27
Your Reference	----------	GW101	GW106	BD1/070411
Date Sampled	----------	7/04/2011	7/04/2011	7/04/2011
Type of sample		Water	Water	Water
Date extracted	-	13/4/2011	13/4/2011	13/4/2011
Date analysed	-	13/4/2011	13/4/2011	13/4/2011
Total Phenolics (as Phenol)	mg/L	<0.5	<0.05	<0.5

HM in water - dissolved				
Our Reference:	UNITS	54136-25	54136-26	54136-27
Your Reference	----------	GW101	GW106	BD1/070411
Date Sampled	----------	7/04/2011	7/04/2011	7/04/2011
Type of sample		Water	Water	Water
Date prepared	-	12/4/2011	12/4/2011	12/4/2011
Date analysed	-	13/4/2011	13/4/2011	13/4/2011
Arsenic-Dissolved	µg/L	1	<1	1
Cadmium-Dissolved	µg/L	0.2	0.5	0.2
Chromium-Dissolved	µg/L	<1	<1	<1
Copper-Dissolved	µg/L	<1	6	<1
Lead-Dissolved	µg/L	<1	2	<1
Mercury-Dissolved	µg/L	<0.4	<0.4	<0.4
Nickel-Dissolved	µg/L	2	4	<1
Zinc-Dissolved	µg/L	4	44	2

Miscellaneous Inorganics			
Our Reference:	UNITS	54136-25	54136-26
Your Reference	----------	GW101	GW106
Date Sampled	----------	7/04/2011	7/04/2011
Type of sample		Water	Water
Date prepared	-	12/04/2011	12/04/2011
Date analysed	-	12/04/2011	12/04/2011
Hardness	mgCaCO3 /L	230	120
Calcium - Dissolved	mg/L	43	24
Magnesium - Dissolved	mg/L	31	15

Method ID	Methodology Summary
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID.
Org-012 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-008	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Inorg-030	Total Phenolics - determined colorimetrically following disitillation, based upon APHA 21st ED 5530 D.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Inorg-008	Moisture content determined by heating at 105 deg C for a minimum of 4 hours.
Org-013	Water samples are analysed directly by purge and trap GC-MS.
Metals-022 ICP-MS	Determination of various metals by ICP-MS.

QUALITY CONTROL VOCs in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			12/04/2011	54136-14	12/04/2011 || 12/04/2011	LCS-1	12/04/2011
Date analysed	-			13/04/2011	54136-14	13/04/2011 || 13/04/2011	LCS-1	13/04/2011
Dichlorodifluoromethane	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
Chloromethane	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
Vinyl Chloride	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
Bromomethane	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
Chloroethane	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
Trichlorofluoromethane	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
1,1-Dichloroethene	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
trans-1,2-dichloroethene	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
1,1-dichloroethane	mg/kg	1	Org-014	<1	54136-14	<1 || <1	LCS-1	70%
cis-1,2-dichloroethene	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
bromochloromethane	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
chloroform	mg/kg	1	Org-014	<1	54136-14	<1 || <1	LCS-1	87%
2,2-dichloropropane	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
1,2-dichloroethane	mg/kg	1	Org-014	<1	54136-14	<1 || <1	LCS-1	81%
1,1,1-trichloroethane	mg/kg	1	Org-014	<1	54136-14	<1 || <1	LCS-1	68%
1,1-dichloropropene	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
Cyclohexane	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
carbon tetrachloride	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
Benzene	mg/kg	0.5	Org-014	<0.5	54136-14	<0.5 || <0.5	[NR]	[NR]
dibromomethane	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
1,2-dichloropropane	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
trichloroethene	mg/kg	1	Org-014	<1	54136-14	<1 || <1	LCS-1	71%
bromodichloromethane	mg/kg	1	Org-014	<1	54136-14	<1 || <1	LCS-1	87%
trans-1,3-dichloropropene	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
cis-1,3-dichloropropene	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
1,1,2-trichloroethane	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
Toluene	mg/kg	0.5	Org-014	<0.5	54136-14	<0.5 || <0.5	[NR]	[NR]
1,3-dichloropropane	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
dibromochloromethane	mg/kg	1	Org-014	<1	54136-14	<1 || <1	LCS-1	87%
1,2-dibromoethane	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
tetrachloroethene	mg/kg	1	Org-014	<1	54136-14	<1 || <1	LCS-1	66%
1,1,1,2-tetrachloroethane	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
chlorobenzene	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
Ethylbenzene	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
bromoform	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
m+p-xylene	mg/kg	2	Org-014	<2	54136-14	<2 || <2	[NR]	[NR]
styrene	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
1,1,2,2-tetrachloroethane	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]

QUALITY CONTROL VOCs in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
o-Xylene	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
1,2,3-trichloropropane	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
isopropylbenzene	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
bromobenzene	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
n-propyl benzene	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
2-chlorotoluene	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
4-chlorotoluene	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
1,3,5-trimethyl benzene	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
tert-butyl benzene	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
1,2,4-trimethyl benzene	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
1,3-dichlorobenzene	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
sec-butyl benzene	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
1,4-dichlorobenzene	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
4-isopropyl toluene	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
1,2-dichlorobenzene	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
n-butyl benzene	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
1,2-dibromo-3-chloropropane	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
1,2,4-trichlorobenzene	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
hexachlorobutadiene	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
1,2,3-trichlorobenzene	mg/kg	1	Org-014	<1	54136-14	<1 || <1	[NR]	[NR]
Surrogate Dibromofluorometha	%		Org-014	93	54136-14	90 || 80 || RPD: 12	LCS-1	99%
Surrogate aaa-Trifluorotoluene	%		Org-014	119	54136-14	106 || 114 || RPD: 7	LCS-1	115%
Surrogate Toluene-d_8	%		Org-014	98	54136-14	96 || 97 || RPD: 1	LCS-1	101%
Surrogate 4-Bromofluorobenzene	%		Org-014	93	54136-14	94 || 92 || RPD: 2	LCS-1	95%

QUALITY CONTROL vTRH & BTEX in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			12/04/2011	54136-1	12/04/2011 || 12/04/2011	LCS-2	12/04/2011
Date analysed	-			12/04/2011	54136-1	12/04/2011 || 12/04/2011	LCS-2	12/04/2011
vTRH C_6 - C_9	mg/kg	25	Org-016	<25	54136-1	<25 || <25	LCS-2	85%
Benzene	mg/kg	0.5	Org-016	<0.5	54136-1	<0.5 || <0.5	LCS-2	81%
Toluene	mg/kg	0.5	Org-016	<0.5	54136-1	<0.5 || <0.5	LCS-2	78%
Ethylbenzene	mg/kg	1	Org-016	<1	54136-1	<1 || <1	LCS-2	86%
m+p-xylene	mg/kg	2	Org-016	<2	54136-1	<2 || <2	LCS-2	90%
o-Xylene	mg/kg	1	Org-016	<1	54136-1	<1 || <1	LCS-2	90%
Surrogate aaa-Trifluorotoluene	%		Org-016	89	54136-1	84 || 85 || RPD: 1	LCS-2	87%

QUALITY CONTROL sTRH in Soil (C10-C36)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			12/04/2011	54136-1	12/04/2011 || 12/04/2011	LCS-2	12/04/2011
Date analysed	-			12/04/2011	54136-1	12/04/2011 || 12/04/2011	LCS-2	12/04/2011
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	54136-1	<50 || <50	LCS-2	88%
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	54136-1	<100 || <100	LCS-2	93%
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	54136-1	<100 || <100	LCS-2	89%
Surrogate o-Terphenyl	%		Org-003	82	54136-1	87 || 89 || RPD: 2	LCS-2	88%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			12/04/2011	54136-1	12/04/2011 || 12/04/2011	LCS-1	12/04/2011
Date analysed	-			12/04/2011	54136-1	12/04/2011 || 12/04/2011	LCS-1	12/04/2011
Naphthalene	mg/kg	0.1	Org-012 subset	<0.1	54136-1	<0.1 || <0.1	LCS-1	105%
Acenaphthylene	mg/kg	0.1	Org-012 subset	<0.1	54136-1	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	0.1	Org-012 subset	<0.1	54136-1	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	0.1	Org-012 subset	<0.1	54136-1	<0.1 || <0.1	LCS-1	107%
Phenanthrene	mg/kg	0.1	Org-012 subset	<0.1	54136-1	0.2 || 0.2 || RPD: 0	LCS-1	117%
Anthracene	mg/kg	0.1	Org-012 subset	<0.1	54136-1	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	0.1	Org-012 subset	<0.1	54136-1	0.5 || 0.5 || RPD: 0	LCS-1	120%
Pyrene	mg/kg	0.1	Org-012 subset	<0.1	54136-1	0.5 || 0.5 || RPD: 0	LCS-1	114%
Benzo(a)anthracene	mg/kg	0.1	Org-012 subset	<0.1	54136-1	0.2 || 0.2 || RPD: 0	[NR]	[NR]

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Chrysene	mg/kg	0.1	Org-012 subset	<0.1	54136-1	0.2 || 0.2 || RPD: 0	LCS-1	108%
Benzo(b+k)fluoranthene	mg/kg	0.2	Org-012 subset	<0.2	54136-1	0.4 || 0.4 || RPD: 0	[NR]	[NR]
Benzo(a)pyrene	mg/kg	0.05	Org-012 subset	<0.05	54136-1	0.24 || 0.23 || RPD: 4	LCS-1	106%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012 subset	<0.1	54136-1	0.2 || 0.1 || RPD: 67	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012 subset	<0.1	54136-1	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012 subset	<0.1	54136-1	0.1 || 0.1 || RPD: 0	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%		Org-012 subset	98	54136-1	87 || 90 || RPD: 3	LCS-1	101%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			12/04/2011	54136-1	12/04/2011 || 12/04/2011	LCS-1	12/04/2011
Date analysed	-			12/04/2011	54136-1	12/04/2011 || 12/04/2011	LCS-1	12/04/2011
HCB	mg/kg	0.1	Org-005	<0.1	54136-1	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	54136-1	<0.1 || <0.1	LCS-1	107%
gamma-BHC	mg/kg	0.1	Org-005	<0.1	54136-1	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	0.1	Org-005	<0.1	54136-1	<0.1 || <0.1	LCS-1	108%
Heptachlor	mg/kg	0.1	Org-005	<0.1	54136-1	<0.1 || <0.1	LCS-1	104%
delta-BHC	mg/kg	0.1	Org-005	<0.1	54136-1	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	0.1	Org-005	<0.1	54136-1	<0.1 || <0.1	LCS-1	100%
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	54136-1	<0.1 || <0.1	LCS-1	112%
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	54136-1	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	54136-1	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	54136-1	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	0.1	Org-005	<0.1	54136-1	<0.1 || <0.1	LCS-1	111%
Dieldrin	mg/kg	0.1	Org-005	<0.1	54136-1	<0.1 || <0.1	LCS-1	111%
Endrin	mg/kg	0.1	Org-005	<0.1	54136-1	<0.1 || <0.1	LCS-1	102%
pp-DDD	mg/kg	0.1	Org-005	<0.1	54136-1	<0.1 || <0.1	LCS-1	118%
Endosulfan II	mg/kg	0.1	Org-005	<0.1	54136-1	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	0.1	Org-005	<0.1	54136-1	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	54136-1	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	54136-1	<0.1 || <0.1	LCS-1	108%
Methoxychlor	mg/kg	0.1	Org-005	<0.1	54136-1	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%		Org-005	96	54136-1	91 || 93 || RPD: 2	LCS-1	107%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			12/04/2011	54136-1	12/04/2011 || 12/04/2011	LCS-1	12/04/2011
Date analysed	-			12/04/2011	54136-1	12/04/2011 || 12/04/2011	LCS-1	12/04/2011
Diazinon	mg/kg	0.1	Org-008	<0.1	54136-1	<0.1 || <0.1	[NR]	[NR]
Dimethoate	mg/kg	0.1	Org-008	<0.1	54136-1	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	54136-1	<0.1 || <0.1	[NR]	[NR]
Ronnel	mg/kg	0.1	Org-008	<0.1	54136-1	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	54136-1	<0.1 || <0.1	LCS-1	102%
Fenitrothion	mg/kg	0.1	Org-008	<0.1	54136-1	<0.1 || <0.1	LCS-1	90%
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	54136-1	<0.1 || <0.1	[NR]	[NR]
Ethion	mg/kg	0.1	Org-008	<0.1	54136-1	<0.1 || <0.1	LCS-1	87%
Surrogate TCLMX	%		Org-008	96	54136-1	91 || 93 || RPD: 2	LCS-1	63%

QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			12/04/2011	54136-1	12/04/2011 || 12/04/2011	LCS-1	12/04/2011
Date analysed	-			12/04/2011	54136-1	12/04/2011 || 12/04/2011	LCS-1	12/04/2011
Arochlor 1016	mg/kg	0.1	Org-006	<0.1	54136-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1221*	mg/kg	0.1	Org-006	<0.1	54136-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1232	mg/kg	0.1	Org-006	<0.1	54136-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1242	mg/kg	0.1	Org-006	<0.1	54136-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1248	mg/kg	0.1	Org-006	<0.1	54136-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1254	mg/kg	0.1	Org-006	<0.1	54136-1	<0.1 || <0.1	LCS-1	102%
Arochlor 1260	mg/kg	0.1	Org-006	<0.1	54136-1	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%		Org-006	96	54136-1	91 || 93 || RPD: 2	LCS-1	67%

QUALITY CONTROL Total Phenolics in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			13/04/2011	54136-1	13/04/2011 || 13/04/2011	LCS-1	13/04/2011
Date analysed	-			13/04/2011	54136-1	13/04/2011 || 13/04/2011	LCS-1	13/04/2011
Total Phenolics (as Phenol)	mg/kg	5	Inorg-030	<5	54136-1	<5 || <5	LCS-1	80%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Date digested	-			12/04/2011	54136-1	12/04/2011 || 12/04/2011	LCS-1	12/04/2011
Date analysed	-			12/04/2011	54136-1	12/04/2011 || 12/04/2011	LCS-1	12/04/2011
Arsenic	mg/kg	4	Metals-020 ICP-AES	<4	54136-1	8 || 8 || RPD: 0	LCS-1	107%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Cadmium	mg/kg	0.5	Metals-020 ICP-AES	<0.5	54136-1	<0.5 || <0.5	LCS-1	108%
Chromium	mg/kg	1	Metals-020 ICP-AES	<1	54136-1	17 || 17 || RPD: 0	LCS-1	105%
Copper	mg/kg	1	Metals-020 ICP-AES	<1	54136-1	25 || 23 || RPD: 8	LCS-1	104%
Lead	mg/kg	1	Metals-020 ICP-AES	<1	54136-1	64 || 59 || RPD: 8	LCS-1	103%
Mercury	mg/kg	0.1	Metals-021 CV-AAS	<0.1	54136-1	0.4 || 0.3 || RPD: 29	LCS-1	118%
Nickel	mg/kg	1	Metals-020 ICP-AES	<1	54136-1	12 || 12 || RPD: 0	LCS-1	106%
Zinc	mg/kg	1	Metals-020 ICP-AES	<1	54136-1	120 || 110 || RPD: 9	LCS-1	106%

QUALITY CONTROL Moisture	UNITS	PQL	METHOD	Blank
Date prepared	-			12/04/2011
Date analysed	-			13/04/2011
Moisture	%	0.1	Inorg-008	<0.1

QUALITY CONTROL VOCs in water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			13/04/2011	[NT]	[NT]	LCS-W1	13/04/2011
Date analysed	-			14/04/2011	[NT]	[NT]	LCS-W1	14/04/2011
Dichlorodifluoromethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NR]	[NR]
Chloromethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NR]	[NR]
Vinyl Chloride	µg/L	10	Org-013	<10	[NT]	[NT]	[NR]	[NR]
Bromomethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NR]	[NR]
Chloroethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NR]	[NR]
Trichlorofluoromethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NR]	[NR]
1,1-Dichloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Trans-1,2-dichloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,1-dichloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	106%
Cis-1,2-dichloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Bromochloromethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Chloroform	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	106%
2,2-dichloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2-dichloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	106%
1,1,1-trichloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	106%
1,1-dichloropropene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Cyclohexane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL VOCs in water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Carbon tetrachloride	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Dibromomethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2-dichloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Trichloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	124%
Bromodichloromethane	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	101%
trans-1,3-dichloropropene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
cis-1,3-dichloropropene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,1,2-trichloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Toluene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,3-dichloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Dibromochloromethane	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	98%
1,2-dibromoethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Tetrachloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	103%
1,1,1,2-tetrachloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Chlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Ethylbenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Bromoform	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
m+p-xylene	µg/L	2	Org-013	<2	[NT]	[NT]	[NR]	[NR]
Styrene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,1,2,2-tetrachloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
o-xylene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2,3-trichloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Isopropylbenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Bromobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
n-propyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
2-chlorotoluene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
4-chlorotoluene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,3,5-trimethyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Tert-butyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2,4-trimethyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,3-dichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Sec-butyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,4-dichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
4-isopropyl toluene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2-dichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
n-butyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2-dibromo-3-chloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2,4-trichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Hexachlorobutadiene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL VOCs in water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
1,2,3-trichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Surrogate Dibromofluoromethane	%		Org-013	93	[NT]	[NT]	LCS-W1	101%
Surrogate toluene-d8	%		Org-013	98	[NT]	[NT]	LCS-W1	104%
Surrogate 4-BFB	%		Org-013	93	[NT]	[NT]	LCS-W1	100%
QUALITY CONTROL vTRH & BTEX in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			13/04/2011	[NT]	[NT]	LCS-W1	13/04/2011
Date analysed	-			14/04/2011	[NT]	[NT]	LCS-W1	14/04/2011
TRHC$_{6}$ - C$_{9}$	µg/L	10	Org-016	<10	[NT]	[NT]	LCS-W1	107%
Benzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	104%
Toluene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	109%
Ethylbenzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	108%
m+p-xylene	µg/L	2	Org-016	<2	[NT]	[NT]	LCS-W1	107%
o-xylene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	109%
Surrogate Dibromofluoromethane	%		Org-016	103	[NT]	[NT]	LCS-W1	106%
Surrogate toluene-d8	%		Org-016	92	[NT]	[NT]	LCS-W1	101%
Surrogate 4-BFB	%		Org-016	100	[NT]	[NT]	LCS-W1	99%
QUALITY CONTROL sTRH in Water (C10-C36)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			12/04/2011	[NT]	[NT]	LCS-W2	12/04/2011
Date analysed	-			12/04/2011	[NT]	[NT]	LCS-W2	12/04/2011
TRHC$_{10}$ - C$_{14}$	µg/L	50	Org-003	<50	[NT]	[NT]	LCS-W2	69%
TRHC$_{15}$ - C$_{28}$	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W2	123%
TRHC$_{29}$ - C$_{36}$	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W2	88%
Surrogate o-Terphenyl	%		Org-003	85	[NT]	[NT]	LCS-W2	92%
QUALITY CONTROL PAHs in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			12/04/2011	[NT]	[NT]	LCS-W1	12/04/2011
Date analysed	-			12/04/2011	[NT]	[NT]	LCS-W1	12/04/2011
Naphthalene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	82%
Acenaphthylene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Acenaphthene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL PAHs in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Fluorene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	89%
Phenanthrene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	91%
Anthracene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Fluoranthene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	90%
Pyrene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	90%
Benzo(a)anthracene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Chrysene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	93%
Benzo(b+k)fluoranthene	µg/L	2	Org-012 subset	<2	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	86%
Indeno(1,2,3-c,d)pyrene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%		Org-012 subset	89	[NT]	[NT]	LCS-W1	99%
QUALITY CONTROL OCP in water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			12/04/2011	[NT]	[NT]	LCS-1	12/04/2011
Date analysed	-			13/04/2011	[NT]	[NT]	LCS-1	13/04/2011
HCB	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NR]	[NR]
alpha-BHC	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	LCS-1	101%
gamma-BHC	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NR]	[NR]
beta-BHC	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	LCS-1	102%
Heptachlor	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	LCS-1	99%
delta-BHC	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NR]	[NR]
Aldrin	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	LCS-1	100%
Heptachlor Epoxide	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	LCS-1	105%
gamma-Chlordane	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NR]	[NR]
alpha-Chlordane	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NR]	[NR]
Endosulfan I	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NR]	[NR]
pp-DDE	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	LCS-1	103%
Dieldrin	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	LCS-1	106%
Endrin	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	LCS-1	94%

QUALITY CONTROL OCP in water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
pp-DDD	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	LCS-1	112%
Endosulfan II	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NR]	[NR]
pp-DDT	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NR]	[NR]
Endrin Aldehyde	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NR]	[NR]
Endosulfan Sulphate	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	LCS-1	100%
Methoxychlor	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%		Org-005	92	[NT]	[NT]	LCS-1	101%
QUALITY CONTROL OP Pesticides in water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			12/04/2011	[NT]	[NT]	LCS-1	12/04/2011
Date analysed	-			13/04/2011	[NT]	[NT]	LCS-1	13/04/2011
Diazinon	µg/L	0.2	Org-008	<0.2	[NT]	[NT]	[NR]	[NR]
Dimethoate	µg/L	0.2	Org-008	<0.2	[NT]	[NT]	[NR]	[NR]
Chlorpyriphos-methyl	µg/L	0.2	Org-008	<0.2	[NT]	[NT]	[NR]	[NR]
Ronnel	µg/L	0.2	Org-008	<0.2	[NT]	[NT]	[NR]	[NR]
Chlorpyriphos	µg/L	0.2	Org-008	<0.2	[NT]	[NT]	LCS-1	106%
Fenitrothion	µg/L	0.2	Org-008	<0.2	[NT]	[NT]	LCS-1	98%
Bromophos ethyl	µg/L	0.2	Org-008	<0.2	[NT]	[NT]	[NR]	[NR]
Ethion	µg/L	0.2	Org-008	<0.2	[NT]	[NT]	LCS-1	92%
Surrogate TCLMX	%		Org-008	92	[NT]	[NT]	LCS-1	101%
QUALITY CONTROL PCBs in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			12/04/2011	[NT]	[NT]	LCS-1	12/04/2011
Date analysed	-			13/04/2011	[NT]	[NT]	LCS-1	13/04/2011
Arochlor 1016	µg/L	2	Org-006	<2	[NT]	[NT]	[NR]	[NR]
Arochlor 1221*	µg/L	2	Org-006	<2	[NT]	[NT]	[NR]	[NR]
Arochlor 1232	µg/L	2	Org-006	<2	[NT]	[NT]	[NR]	[NR]
Arochlor 1242	µg/L	2	Org-006	<2	[NT]	[NT]	[NR]	[NR]
Arochlor 1248	µg/L	2	Org-006	<2	[NT]	[NT]	[NR]	[NR]
Arochlor 1254	µg/L	2	Org-006	<2	[NT]	[NT]	LCS-1	96%
Arochlor 1260	µg/L	2	Org-006	<2	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%		Org-006	92	[NT]	[NT]	LCS-1	107%

QUALITY CONTROL Total Phenolics in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			13/04/2011	[NT]	[NT]	LCS-W1	13/04/2011
Date analysed	-			13/04/2011	[NT]	[NT]	LCS-W1	13/04/2011
Total Phenolics (as Phenol)	mg/L	0.05	Inorg-030	<0.05	[NT]	[NT]	LCS-W1	80%
QUALITY CONTROL HM in water - dissolved	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			12/4/2011	[NT]	[NT]	LCS-W1	12/4/2011
Date analysed	-			13/4/2011	[NT]	[NT]	LCS-W1	13/4/2011
Arsenic-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	89%
Cadmium-Dissolved	µg/L	0.1	Metals-022 ICP-MS	<0.1	[NT]	[NT]	LCS-W1	89%
Chromium-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	87%
Copper-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	86%
Lead-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	95%
Mercury-Dissolved	µg/L	0.1	Metals-021 CV-AAS	<0.1	[NT]	[NT]	LCS-W1	108%
Nickel-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	85%
Zinc-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	91%

QUALITY CONTROL Miscellaneous Inorganics	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			12/04/2011	54136-25	12/04/2011 || 12/04/2011	LCS-1	12/04/2011
Date analysed	-			12/04/2011	54136-25	12/04/2011 || 12/04/2011	LCS-1	12/04/2011
Hardness	mgCaCO3/L	3		3.0	54136-25	230 || 230 || RPD: 0	[NR]	[NR]
Calcium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	54136-25	43 || 42 || RPD: 2	LCS-1	89%
Magnesium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	54136-25	31 || 31 || RPD: 0	LCS-1	86%

QUALITY CONTROL VOCs in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	54136-3	12/04/2011
Date analysed	-	[NT]	[NT]	54136-3	13/04/2011
Dichlorodifluoromethane	mg/kg	[NT]	[NT]	[NR]	[NR]
Chloromethane	mg/kg	[NT]	[NT]	[NR]	[NR]
Vinyl Chloride	mg/kg	[NT]	[NT]	[NR]	[NR]
Bromomethane	mg/kg	[NT]	[NT]	[NR]	[NR]
Chloroethane	mg/kg	[NT]	[NT]	[NR]	[NR]
Trichlorofluoromethane	mg/kg	[NT]	[NT]	[NR]	[NR]
1,1-Dichloroethene	mg/kg	[NT]	[NT]	[NR]	[NR]
trans-1,2-dichloroethene	mg/kg	[NT]	[NT]	[NR]	[NR]
1,1-dichloroethane	mg/kg	[NT]	[NT]	54136-3	65%
cis-1,2-dichloroethene	mg/kg	[NT]	[NT]	[NR]	[NR]
bromochloromethane	mg/kg	[NT]	[NT]	[NR]	[NR]
chloroform	mg/kg	[NT]	[NT]	54136-3	77%
2,2-dichloropropane	mg/kg	[NT]	[NT]	[NR]	[NR]
1,2-dichloroethane	mg/kg	[NT]	[NT]	54136-3	73%
1,1,1-trichloroethane	mg/kg	[NT]	[NT]	54136-3	60%
1,1-dichloropropene	mg/kg	[NT]	[NT]	[NR]	[NR]
Cyclohexane	mg/kg	[NT]	[NT]	[NR]	[NR]
carbon tetrachloride	mg/kg	[NT]	[NT]	[NR]	[NR]
Benzene	mg/kg	[NT]	[NT]	[NR]	[NR]
dibromomethane	mg/kg	[NT]	[NT]	[NR]	[NR]
1,2-dichloropropane	mg/kg	[NT]	[NT]	[NR]	[NR]
trichloroethene	mg/kg	[NT]	[NT]	54136-3	63%
bromodichloromethane	mg/kg	[NT]	[NT]	54136-3	76%
trans-1,3-dichloropropene	mg/kg	[NT]	[NT]	[NR]	[NR]
cis-1,3-dichloropropene	mg/kg	[NT]	[NT]	[NR]	[NR]
1,1,2-trichloroethane	mg/kg	[NT]	[NT]	[NR]	[NR]
Toluene	mg/kg	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL VOCs in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
1,3-dichloropropane	mg/kg	[NT]	[NT]	[NR]	[NR]
dibromochloromethane	mg/kg	[NT]	[NT]	54136-3	83%
1,2-dibromoethane	mg/kg	[NT]	[NT]	[NR]	[NR]
tetrachloroethene	mg/kg	[NT]	[NT]	54136-3	66%
1,1,1,2-tetrachloroethane	mg/kg	[NT]	[NT]	[NR]	[NR]
chlorobenzene	mg/kg	[NT]	[NT]	[NR]	[NR]
Ethylbenzene	mg/kg	[NT]	[NT]	[NR]	[NR]
bromoform	mg/kg	[NT]	[NT]	[NR]	[NR]
m+p-xylene	mg/kg	[NT]	[NT]	[NR]	[NR]
styrene	mg/kg	[NT]	[NT]	[NR]	[NR]
1,1,2,2-tetrachloroethane	mg/kg	[NT]	[NT]	[NR]	[NR]
o-Xylene	mg/kg	[NT]	[NT]	[NR]	[NR]
1,2,3-trichloropropane	mg/kg	[NT]	[NT]	[NR]	[NR]
isopropylbenzene	mg/kg	[NT]	[NT]	[NR]	[NR]
bromobenzene	mg/kg	[NT]	[NT]	[NR]	[NR]
n-propyl benzene	mg/kg	[NT]	[NT]	[NR]	[NR]
2-chlorotoluene	mg/kg	[NT]	[NT]	[NR]	[NR]
4-chlorotoluene	mg/kg	[NT]	[NT]	[NR]	[NR]
1,3,5-trimethyl benzene	mg/kg	[NT]	[NT]	[NR]	[NR]
tert-butyl benzene	mg/kg	[NT]	[NT]	[NR]	[NR]
1,2,4-trimethyl benzene	mg/kg	[NT]	[NT]	[NR]	[NR]
1,3-dichlorobenzene	mg/kg	[NT]	[NT]	[NR]	[NR]
sec-butyl benzene	mg/kg	[NT]	[NT]	[NR]	[NR]
1,4-dichlorobenzene	mg/kg	[NT]	[NT]	[NR]	[NR]
4-isopropyl toluene	mg/kg	[NT]	[NT]	[NR]	[NR]
1,2-dichlorobenzene	mg/kg	[NT]	[NT]	[NR]	[NR]
n-butyl benzene	mg/kg	[NT]	[NT]	[NR]	[NR]
1,2-dibromo-3-chloropropane	mg/kg	[NT]	[NT]	[NR]	[NR]
1,2,4-trichlorobenzene	mg/kg	[NT]	[NT]	[NR]	[NR]
hexachlorobutadiene	mg/kg	[NT]	[NT]	[NR]	[NR]
1,2,3-trichlorobenzene	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate Dibromofluorometha	%	[NT]	[NT]	54136-3	95%
Surrogate aaa-Trifluorotoluene	%	[NT]	[NT]	54136-3	123%
Surrogate Toluene-d_8	%	[NT]	[NT]	54136-3	110%
Surrogate 4-Bromofluorobenzene	%	[NT]	[NT]	54136-3	95%

QUALITY CONTROL vTRH & BTEX in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	54136-4	12/04/2011
Date analysed	-	[NT]	[NT]	54136-4	12/04/2011
vTRH C_6 - C_9	mg/kg	[NT]	[NT]	54136-4	84%
Benzene	mg/kg	[NT]	[NT]	54136-4	81%
Toluene	mg/kg	[NT]	[NT]	54136-4	76%
Ethylbenzene	mg/kg	[NT]	[NT]	54136-4	84%
m+p-xylene	mg/kg	[NT]	[NT]	54136-4	89%
o-Xylene	mg/kg	[NT]	[NT]	54136-4	87%
Surrogate aaa-Trifluorotoluene	%	[NT]	[NT]	54136-4	89%
QUALITY CONTROL sTRH in Soil (C10-C36)	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	54136-4	12/04/2011
Date analysed	-	[NT]	[NT]	54136-4	12/04/2011
TRH C_{10} - C_{14}	mg/kg	[NT]	[NT]	54136-4	89%
TRH C_{15} - C_{28}	mg/kg	[NT]	[NT]	54136-4	94%
TRH C_{29} - C_{36}	mg/kg	[NT]	[NT]	54136-4	90%
Surrogate o-Terphenyl	%	[NT]	[NT]	54136-4	87%
QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	54136-14	12/04/2011 || 12/04/2011	54136-4	12/04/2011
Date analysed	-	54136-14	12/04/2011 || 12/04/2011	54136-4	12/04/2011
Naphthalene	mg/kg	54136-14	<0.1 || <0.1	54136-4	104%
Acenaphthylene	mg/kg	54136-14	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	54136-14	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	54136-14	<0.1 || <0.1	54136-4	96%
Phenanthrene	mg/kg	54136-14	<0.1 || <0.1	54136-4	103%
Anthracene	mg/kg	54136-14	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	54136-14	<0.1 || <0.1	54136-4	105%
Pyrene	mg/kg	54136-14	<0.1 || <0.1	54136-4	99%
Benzo(a)anthracene	mg/kg	54136-14	<0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	54136-14	<0.1 || <0.1	54136-4	96%
Benzo(b+k)fluoranthene	mg/kg	54136-14	<0.2 || <0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	54136-14	<0.05 || <0.05	54136-4	96%
Indeno(1,2,3-c,d)pyrene	mg/kg	54136-14	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	54136-14	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	54136-14	<0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%	54136-14	90 || 91 || RPD: 1	54136-4	87%

QUALITY CONTROL Total Phenolics in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	54136-4	13/04/2011
Date analysed	-	[NT]	[NT]	54136-4	13/04/2011
Total Phenolics (as Phenol)	mg/kg	[NT]	[NT]	54136-4	75%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	54136-14	12/04/2011 || 12/04/2011	54136-4	12/04/2011
Date analysed	-	54136-14	12/04/2011 || 12/04/2011	54136-4	12/04/2011
Arsenic	mg/kg	54136-14	6 || 6 || RPD: 0	54136-4	100%
Cadmium	mg/kg	54136-14	<0.5 || <0.5	54136-4	101%
Chromium	mg/kg	54136-14	33 || 32 || RPD: 3	54136-4	102%
Copper	mg/kg	54136-14	17 || 17 || RPD: 0	54136-4	103%
Lead	mg/kg	54136-14	14 || 14 || RPD: 0	54136-4	93%
Mercury	mg/kg	54136-14	<0.1 || <0.1	54136-4	122%
Nickel	mg/kg	54136-14	22 || 22 || RPD: 0	54136-4	99%
Zinc	mg/kg	54136-14	44 || 44 || RPD: 0	54136-4	91%
QUALITY CONTROL HM in water - dissolved	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	[NT]	[NT]	54136-26	12/4/2011
Date analysed	-	[NT]	[NT]	54136-26	13/4/2011
Arsenic-Dissolved	µg/L	[NT]	[NT]	54136-26	91%
Cadmium-Dissolved	µg/L	[NT]	[NT]	54136-26	87%
Chromium-Dissolved	µg/L	[NT]	[NT]	54136-26	86%
Copper-Dissolved	µg/L	[NT]	[NT]	54136-26	80%
Lead-Dissolved	µg/L	[NT]	[NT]	54136-26	88%
Mercury-Dissolved	µg/L	[NT]	[NT]	54136-26	80%
Nickel-Dissolved	µg/L	[NT]	[NT]	54136-26	81%
Zinc-Dissolved	µg/L	[NT]	[NT]	54136-26	80%
QUALITY CONTROL Miscellaneous Inorganics	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	[NT]	[NT]	54136-26	12/04/2011
Date analysed	-	[NT]	[NT]	54136-26	12/04/2011
Hardness	mgCaCO3/L	[NT]	[NT]	[NR]	[NR]
Calcium - Dissolved	mg/L	[NT]	[NT]	54136-26	87%
Magnesium - Dissolved	mg/L	[NT]	[NT]	54136-26	94%

Report Comments:
Total Phenolics:PQL raised due to sample matrix.

Asbestos ID was analysed by Approved Identifier:	Not applicable for this job
Asbestos ID was authorised by Approved Signatory:	Not applicable for this job

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

Quality Control Definitions
Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

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

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

Douglas Partners
Geotechnics · Environment · Groundwater

CHAIN OF CUSTODY

Project Name: Wagga Wagga .....
Project No: 72320.01..... Sampler: Peter Hartcliff..... .....
Project Mgr: Paul Gorman..... Phone: 02 9809 0666 .....
Email: rene.alviar@douglaspartners.com.au .....
Date Required: Normal TAT ..... Lab Quote No. .....

To: Envirolab Services
12 Ashley Street, Chatswood NSW 2068
Attn: Tania Notaras
Phone: 02 9910 6200 Fax: 02 9910 6201
Email: tnotaras@envirolabservices.com.au

Sample ID	Sample Depth (m)	Lab ID	Sampling Date	Sample Type S - soil W – water A - Air	Container type	Analytes: Combination 8	Combination 3	8 Heavy Metals	PAH	VOC		Others	Notes
BH101/0.1-0.2	0.1-0.2	1	30.3	S	J	X							
BH101/0.5-0.6	0.5-0.6	2	30.3	S	J								
BH101/2-2.2	2-2.2	3	30.3	S	J		X			X			
BH102/0.4-0.5	0.4-0.5	4	29.03	S	J	X							
BH102/2-2.2	2-2.2	5	29.03	S	J		X						
BH103/0.5-0.6	0.5-0.6	6	30.03	S	J	X							
BH103/2-2.2	2-2.2	7	30.03	S	J								
BH104/0.3-0.4	0.3-0.4	8	31.03	S	J	X							
BH104/1.6-1.7	1.6-1.7	9	31.03	S	J								
BH105/0.2-0.3	0.2-0.3	10	31.03	S	J	X							
BH105/0.8-0.9	0.8-0.9	11	31.03	S	J			X	X				
BH105/2-2.2	2-2.2	12	31.03	S	J								

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: 9910 6200

Job No: 54136
Date received: 11/4/11
Time received: 5pm
Received by: Z-L
Temp: Cool/Ambient
Cooling: Icepack
Security: Intact/Broken/None

Lab Report No. .....
Send Results to: Douglas Partners Address: 96 Hermitage Road, West Ryde 2114
Phone: (02) 9809 0666
Fax: (02) 9809 4095

Relinquished by: RA	Signed:	Date & Time: 11.04.11	Received By: Z-L.	Date & Time: 11/4/11 5pm
Relinquished by:	Signed:	Date & Time:	Received By:	Date & Time:

Douglas Partners
Geotechnics · Environment · Groundwater

CHAIN OF CUSTODY

Project Name: Wagga Wagga .....
Project No: 72320.01..... Sampler: Peter Hartcliff.....
Project Mgr: Paul Gorman..... Phone: 02 9809 0666 .....
Email: rene.alviar@douglaspartners.com.au .....
Date Required: Normal TAT ..... Lab Quote No. .....

To: Envirolab Services
12 Ashley Street, Chatswood NSW 2068
Attn: Tania Notaras
Phone: 02 9910 6200 Fax: 02 9910 6201
Email: tnotaras@envirolabservices.com.au

Sample ID	Sample Depth (m)	Lab ID	Sampling Date	Sample Type S - soil W – water A - Air	Container type	Analytes: Combination 8	Combination 3	8 Heavy Metals	PAH	VOC		Others	Notes
BH106/0.1-0.2	0.1-0.2	13	05.04	S	J	X							
BH106/1.75-2.0	1.75-2.0	14	05.04	S	J			X	X	X			
BH107/1.9-2.0	1.9-2.0	15	07.04	S	J	X							
BH107/2.2-2.4	2.2-2.4	16	07.04	S	J			X	X				
BH107A/0.4-0.5	0.4-0.5	17	07.04	S	J								
BH107A/1.5-1.6	1.5-1.6	18	07.04	S	J			X	X				
BH108/0.1-0.2	0.1-0.2	19	06.04	S	J	X							
BH108/2-2.2	2-2.2	20	06.04	S	J			X	X				
BH109/0.1-0.3	0.1-0.3	21	05.04	S	J	X							
BH109/1.4-1.6	1.4-1.6	22	05.04	S	J								
BD1/290311	-	23	29.03	S	J								
BD2/050411	-	24	05.04	S	J								

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: 9910 6200
Job No: 54136
Date received:
Time received:
Received by:
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Lab Report No. .....
Send Results to: Douglas Partners Address: 96 Hermitage Road, West Ryde 2114
Phone: (02) 9809 0666
Fax: (02) 9809 4095

Relinquished by:	Signed:	Date & Time: 11.04.11	Received By:	Date & Time: 11/4/11 5pm
Relinquished by:	Signed:	Date & Time:	Received By:	Date & Time:

Douglas Partners
Geotechnics · Environment · Groundwater

CHAIN OF CUSTODY

Project No: 72320.01..... Sampler: Peter Hartcliff..... .....
Project Mgr: Paul Gorman..... Phone: 02 9809 0666 .....
Email: rene.alviar@douglaspartners.com.au .....
Date Required: Normal TAT ..... Lab Quote No. .....

12 Ashley Street, Chatswood NSW 2068
Attn: Tania Notaras
Phone: 02 9910 6200 Fax: 02 9910 6201
Email: tnotaras@envirolabservices.com.au

Sample ID	Sample Depth (m)	Lab ID	Sampling Date	Sample Type S - soil W – water A - Air	Container type	Analytes: Combination 8	Hardness	VOC				Others	Notes
GW101	-	25	07.04	W	G,V,P	X	X	X					
GW106	-	26	07.04	W	G,V,P	X	X	X					
BD1/070411	-	27	07.04	W	G,V,P	X							

Lab Report No. .....
Send Results to: Douglas Partners Address: 96 Hermitage Road, West Ryde 2114
Phone: (02) 9809 0666
Fax: (02) 9809 4095

Relinquished by:	Signed:	Date & Time: 11.04.11	Received By:	Date & Time: 11/4/11 6pm
Relinquished by:	Signed:	Date & Time:	Received By:	Date & Time:

Appendix I

Quality Assurance / Quality Control Procedures and Results

QA/QC PROCEDURES AND RESULTS

The field QC procedures for sampling as prescribed in Douglas Partners Field Procedures Manual were followed at all times during the validation assessment. Field sampling comprised replicate sampling, at a rate of approximately one replicate sample for every ten original samples, equipment rinsate sample and trip spike.

Field QA/QC

Rinsate Sample

Equipment rinsate samples are collected in order to assess the potential for cross contamination due to re-use of sampling equipment. All samples were collected using disposable sampling equipment, and therefore no rinsate sample was collected.

Trip Spike

According to the NSW EPA Guidelines for Consultants Reporting on Contaminated Sites (1997), laboratory prepared trip spikes are to be taken into the field, subjected to the same preservation methods as the field samples, then analysed, for the purposes of determining the losses in volatile organics incurred prior to reaching the laboratory.

The practicalities of trip spikes are currently being debated and a detailed procedure is yet to be finalised. Discussions with the laboratory indicated that trip spikes are generally prepared as aqueous solutions. The laboratory prepared an aqueous trip spike which were preserved in the standard manner and taken into the field unopened. The volatile organic recovery rates are shown below. At this stage, the laboratory has no standard acceptance limits in recovery rates as results from in-house laboratory controls often vary. Whilst no trip spike was collected for this site, PID screening of all soil samples collected indicate that any percentage loss for BTEX during the trip would be trivial.

Trip Blank

Laboratory prepared trip blanks were taken out to the field unopened, subjected to the same preservation methods as the field samples, then analysed, for the purposes of determining the transfer of contaminants into the blank sample incurred prior to reaching the laboratory. Whilst no trip blank was collected for this site, PID screening of all soil samples collected indicate that any cross contamination of volatiles would be trivial and would not affect the outcome of the assessment.

Relative Percentage Difference

A measure of the consistency of results for field samples is derived by the calculation of relative percentage differences (RPDs) for replicate samples. A RPD of $\pm$ 30% is generally considered acceptable for inorganic analytes by EPA, although in general a wider RPD range may be acceptable for organic analytes.

The comparative results of analysis between original and replicates are summarised in the tables below.

Table H1: Results of Intra-Laboratory RPD

Sample ID	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
BH102/0.4-0.5	7	<0.5	26	21	22	0.1	13	61
BD1/290311	7	<0.5	29	17	15	<0.1	14	25
Difference	0	0	3	4	7	0	1	36
%RPD	0	0	11	21	38	**0**	7	84
GW101	1	0.2	<1	<1	<1	<0.4	2	4
BD1/070411	1	0.2	<1	<1	<1	<0.4	<1	2
Difference	0	0	0	0	0	0	1	2
%RPD	0	0	0	0	0	**0**	67	67

Notes:
concentrations below PQL assumed to be zero for RPD calculation
shading indicates RPD greater than ± 30%

The calculated RPD values for the samples and their replicates were generally within the acceptable range of ± 30%. The calculated RPDs exceeding the acceptability range are not, however, considered to be of significant concern due to the generally low levels of metals detected (relative to the adopted guideline levels), the low actual differences in concentration in most of the cases, and the use of replicate samples instead of duplicates to minimise loss of volatiles. Moreover, most concentrations recorded were generally well within the relevant site assessment criteria and hence the findings are unlikely to affect the assessment results.

It is therefore considered that the results indicate an acceptable consistency between the samples and their replicates and indicate that suitable field sampling methodology was adopted and laboratory precision was achieved.

Sample Holding Times

Holding times for various analytes as provided by ELS are presented in the table below.

Table H2: Standard Holding Times

Analyte	Holding Time	
	Soil	Water
Non-organics		
heavy metals	6 months	6 months
asbestos	none	N/A
Organics		
TPH/ BTEX	14 days	7 days
PAH	14 days	7 days
Phenol	14 days	7 days
PCB	14 days	7 days
OCP/ OPP	14 days	7 days

A summary of extraction and sampling dates for each day of sampling is provided in the table below. As can be seen all analysis was conducted within the standard holding times.

Table H3: Actual Holding Times

Date Sampled	soil/ water	Laboratory	Date despatched	Date organic extraction commenced	Holding time (between sampling and organic extraction)	Date report issued
29/03/11	soil	ELS	11/04/11	12/04/11	1	18/04/11
07/04/11	water	ELS	11/04/11	12/04/11	4	18/04/11

Laboratory QA/QC Results

The analytical laboratory is certified by the National Association of Testing Authorities (NATA) and is required to conduct in-house QA/QC procedures. These are normally incorporated into every analytical run and include the following:-

Reagent Blank

A reagent blank sample is prepared and analysed at the beginning of every analytical run, following calibration of the analytical apparatus. The laboratory results for reagent blanks for soil and water analyses indicated concentrations of all analytes to be below respective laboratory practical quantitation (detection) limits. These results are included in the laboratory report in Appendix H.

Spike Recovery

This is a sample replicate prepared by adding a known amount of analyte prior to analysis, and then treated exactly the same as all other samples. The recovery result indicates the proportion of the known concentration of the analyte that is detected during analysis (laboratory accuracy). These results are included in the laboratory reports in Appendix H. Acceptable spike recoveries were reported indicating that the analytical results are not significantly affected by matrix interference.

Duplicates

These are additional portions of a sample which are analysed in exactly the same manner as all other samples. The duplicate sample results are included in the laboratory results in Appendix H.