APPENDIX A

(Borehole Logs and Geotechnical Explanatory Notes)

Jeffery and Katauskas Pty Ltd
CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No. **106** 1/2

BOREHOLE LOG

Client: CROWN GROUP

Project: PROPOSED REDEVELOPMENT

Location: EASTLAKES SHOPPING CENTRE, CNR EVANS AND BARBER AVE, EASTLAKES

Job No. 25302V
Date: 20-10-11
Method: SPIRAL AUGER JK350
Logged/Checked by: D.F./MJ
R.L. Surface: ≈ 18.8m
Datum: AHD

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
						0		-	ASHPHALTIC CONCRETE: 50mm.t/ FILL: Gravelly sand, fine to medium grained, grey and dark brown, fine to coarse grained igneous gravel, trace of silt.	M	-	-	APPEARS WELL COMPACTED
					Nc = 13, 14, 15	1		SM	FILL: silty sand, fine to medium grained, brown and light brown. SILTY SAND: fine to medium grained, light brown.	M	MD-D	-	RESIDUAL
					Nc = 9, 17, 21	2					D-VD		
					Nc = 20, 21, 25	3				W			
					Nc = 10, 14, 18	4							
						5							
					Nc = 15, 24	6							
						7							

Jeffery and Katauskas Pty Ltd
CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No. **106** 2/2

BOREHOLE LOG

Client: CROWN GROUP

Project: PROPOSED REDEVELOPMENT

Location: EASTLAKES SHOPPING CENTRE, CNR EVANS AND BARBER AVE, EASTLAKES

Job No. 25302V **Method:** SPIRAL AUGER JK350 **R.L. Surface:** ≈ 18.8m

Date: 20-10-11 **Datum:** AHD

Logged/Checked by: D.F./

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
					Nc = 31/100 mm	8		SM	SILTY SAND: fine to medium grianed, light brown.	W	D-VD		
					REFUSAL	9							
						10			END OF BOREHOLE AT 10.0m				
						11							
						12							
						13							
						14							

Jeffery and Katauskas Pty Ltd
CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No. **107** 1/1

BOREHOLE LOG

Client: CROWN GROUP

Project: PROPOSED REDEVELOPMENT

Location: EASTLAKES SHOPPING CENTRE, CNR EVANS AND BARBER AVE, EASTLAKES

Job No. 25302V **Method:** SPIRAL AUGER JK350 **R.L. Surface:** ≈ 19.3m

Date: 20-10-11 **Datum:** AHD

Logged/Checked by: D.F./ 4

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE -TION					N>22 12,10/ 50mm REFUSAL	0		-	ASHPHALTIC CONCRETE: 50mm.t/ FILL: Gravelly sand roadbase, fine to medium grained, grey and dark brown, fine to coarse grained igneous gravel, trace of silt.	D	-	-	APPEARS MODERATELY COMPACTED
										M			
						1			FILL: Silty sand, fine to meidum grained, light brown and brown. FILL: Silty sand, fine to medium grained, with brick, concrete fragments, plastic conduit, copper wire, metal. END OF BOREHOLE AT 1.0m					
						2							
						3							
						4							
						5							
						6							
						7							

Jeffery and Katauskas Pty Ltd
CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No. **107A** 1/1

BOREHOLE LOG

Client: CROWN GROUP

Project: PROPOSED REDEVELOPMENT

Location: EASTLAKES SHOPPING CENTRE, CNR EVANS AND BARBER AVE, EASTLAKES

Job No. 25302V **Method:** SPIRAL AUGER JK350 **R.L. Surface:** ≈ 19.3m

Date: 20-10-11 **Datum:** AHD

Logged/Checked by: D.F./ ?

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
						0		-	ASHPHALTIC CONCRETE: 50mm.t FILL: Gravelly sand, roadbase, fine to medium grained, fine to coarse grained igneous gravel.	M	-	-	APPEARS MODERATELY COMPACTED
					SPT 10/50mm REFUSAL	1			FILL: Silty sand, fine to medium grained, brown and light brown, with brick, concrete fragments.				
					N = 12 6,6,6	2		SM	SILTY SAND: fine to medium grained, light brown.	M	MD-D	-	RESIDUAL
					Nc = 7 16 14	3							
						4			END OF BOREHOLE AT 4.0m				
						5							
						6							
						7							

Jeffery and Katauskas Pty Ltd
CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No. **108** 1/2

BOREHOLE LOG

Client: CROWN GROUP

Project: PROPOSED REDEVELOPMENT

Location: EASTLAKES SHOPPING CENTRE, CNR EVANS AND BARBER AVE, EASTLAKES

Job No. 25302V
Date: 20-10-11
Method: SPIRAL AUGER JK350
Logged/Checked by: D.F./
R.L. Surface: ≈ 16.5m
Datum: AHD

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
						0		-	ASHPHALTIC CONCRETE: 50mm.t FILL: Gravelly sand, roadbase, fine to medium grained, dark grey, fine to medium grained igneous gravel.	M	MD-D	-	APPEARS MODERATLY TO WELL COMPACTED
					N = 33 12,17,16	1			FILL: Silty sand, fine to medium grained, light grey. As above, but dark brown and brown.				
					N = 11 6,6,5	2		SM	SILTY SAND: fine to medium grained, light brown.	- W	MD-D	-	RESIDUAL
					Nc = 8 10 15 Nc = 17	3							
					Nc = 5 16 16	4					D-VD		
					Nc = 20/100mm R	5							
						6							
						7							

Jeffery and Katauskas Pty Ltd
CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No. **108** 2/2

BOREHOLE LOG

Client: CROWN GROUP

Project: PROPOSED REDEVELOPMENT

Location: EASTLAKES SHOPPING CENTRE, CNR EVANS AND BARBER AVE, EASTLAKES

Job No. 25302V
Date: 20-10-11
Method: SPIRAL AUGER JK350
Logged/Checked by: D.F./
R.L. Surface: ≈ 16.5m
Datum: AHD

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
					Nc = 20/ 100mm R	8		SM	SILTY SAND: fine to medium grained, light brown.	W	D-VD		
						9							
						10			END OF BOREHOLE AT 10.0m				
						11							
						12							
						13							
						14							

Jeffery and Katauskas Pty Ltd
CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No. **109** 1/2

BOREHOLE LOG

Client: CROWN GROUP

Project: PROPOSED REDEVELOPMENT

Location: EASTLAKES SHOPPING CENTRE, CNR EVANS AND BARBER AVE, EASTLAKES

Job No. 25302V **Method:** SPIRAL AUGER JK350 **R.L. Surface:** ≈ 16.5m

Date: 21-10-11 **Datum:** AHD

Logged/Checked by: D.F./

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
						0		-	ASHPHALTIC CONCRETE:	M	-	-	APPEARS WELL COMPACTED
									FILL: Gravelly sand, fine yo medium grained, brown, with fine to coarse grained, igneous, sandstone, concrete gravel, trace of silt.	M	MD	-	
					N = 18 6,10,8				FILL: Silty sand, fine to medium grained, light grey.				POSSIBLY FILL
						1		SM	SILTY SAND: fine to coarse grained, orange brown.				
▼					N = 9 3,4,5				As above, but light grey.	W			
						2					MD		
					Nc = 8 12 19	3					D-VD		
						4			As above, but light grey, light brown and brown.				
					Nc = 20/80 mm R	5							
					Nc = 22/70 mm R	6							
						7							

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Borehole No. **109** 2/2

BOREHOLE LOG

Client: CROWN GROUP

Project: PROPOSED REDEVELOPMENT

Location: EASTLAKES SHOPPING CENTRE, CNR EVANS AND BARBER AVE, EASTLAKES

Job No. 25302V **Method:** SPIRAL AUGER JK350 **R.L. Surface:** ≈ 16.5m

Date: 21-10-11 **Datum:** AHD

Logged/Checked by: D.F./

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
					Nc = 22/50 mm R	8		SM	SILTY SAND: fine to coarse grained, light grey, light brown and brown.	W	D-VD		
						9							
						10							
									END OF BOREHOLE AT 10.5m				Machine slotted monitoring well installed to 4.5m depth. Backfilled with filter sand and sealed with bentonite.
						11							
						12							
						13							
						14							

Jeffery and Katauskas Pty Ltd
CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No. **110** 1/2

BOREHOLE LOG

Client: CROWN GROUP

Project: PROPOSED REDEVELOPMENT

Location: EASTLAKES SHOPPING CENTRE, CNR EVANS AND BARBER AVE, EASTLAKES

Job No. 25302V **Method:** SPIRAL AUGER JK350 **R.L. Surface:** ≈ 17.5m

Date: 21-10-11 **Datum:** AHD

Logged/Checked by: D.F./

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
						0		-	ASHPHALTIC CONCRETE: 50mm.t	D	MD	-	APPEARS WELL COMPACTED
					N = 18 10,9,9				FILL: Silty sand, fine to medium grained, dark brown with fine to coarse grained igneous gravel.				
						1			FILL: Silty sand, fine grained light grey and brown.				
									As above, but light grey only.				
									as above, but orange brown.				
					Nc = 6 8 7	2		SM	SILTY SAND: fine to medium grained, light grey and brown.	W	D-VD	-	RESIDUAL
▼					Nc = 15 20	3				W	D-VD		
					Nc = 6 12 22	5							
					Nc = 6 28	6							
						7							

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CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No. **110** 2/2

BOREHOLE LOG

Client: CROWN GROUP

Project: PROPOSED REDEVELOPMENT

Location: EASTLAKES SHOPPING CENTRE, CNR EVANS AND BARBER AVE, EASTLAKES

Job No. 25302V
Date: 21-10-11
Method: SPIRAL AUGER JK350
Logged/Checked by: D.F./
R.L. Surface: ≈ 17.5m
Datum: AHD

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
						8		SM	SILTY SAND: fine to medium grained, light grey and brown.	W	D-VD		
						9							
						10							
						10			END OF BOREHOLE AT 10.5m				MACHINE SLOTTED MONITORING WELL INSTALLED TO 5.0m DEPTH, BACKFILLED WITH FILTER SAND AND SEALED WITH BENTONITE
						11							
						12							
						13							
						14							

Jeffery and Katauskas Pty Ltd

CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

ABN 17 003 550 801

REPORT EXPLANATION NOTES

INTRODUCTION

These notes have been provided to amplify the geotechnical report in regard to classification methods, field procedures and certain matters relating to the Comments and Recommendations section. Not all notes are necessarily relevant to all reports.

The ground is a product of continuing natural and man-made processes and therefore exhibits a variety of characteristics and properties which vary from place to place and can change with time. Geotechnical engineering involves gathering and assimilating limited facts about these characteristics and properties in order to understand or predict the behaviour of the ground on a particular site under certain conditions. This report may contain such facts obtained by inspection, excavation, probing, sampling, testing or other means of investigation. If so, they are directly relevant only to the ground at the place where and time when the investigation was carried out.

DESCRIPTION AND CLASSIFICATION METHODS

The methods of description and classification of soils and rocks used in this report are based on Australian Standard 1726, the SAA Site Investigation Code. In general, descriptions cover the following properties – soil or rock type, colour, structure, strength or density, and inclusions. Identification and classification of soil and rock involves judgement and the Company infers accuracy only to the extent that is common in current geotechnical practice.

Soil types are described according to the predominating particle size and behaviour as set out in the attached Unified Soil Classification Table qualified by the grading of other particles present (eg sandy clay) as set out below:

Soil Classification	Particle Size
Clay	less than 0.002mm
Silt	0.002 to 0.06mm
Sand	0.06 to 2mm
Gravel	2 to 60mm

Non-cohesive soils are classified on the basis of relative density, generally from the results of Standard Penetration Test (SPT) as below:

Relative Density	SPT 'N' Value (blows/300mm)
Very loose	less than 4
Loose	4 – 10
Medium dense	10 – 30
Dense	30 – 50
Very Dense	greater than 50

Cohesive soils are classified on the basis of strength (consistency) either by use of hand penetrometer, laboratory testing or engineering examination. The strength terms are defined as follows.

Classification	Unconfined Compressive Strength kPa
Very Soft	less than 25
Soft	25 – 50
Firm	50 – 100
Stiff	100 – 200
Very Stiff	200 – 400
Hard	Greater than 400
Friable	Strength not attainable – soil crumbles

Rock types are classified by their geological names, together with descriptive terms regarding weathering, strength, defects, etc. Where relevant, further information regarding rock classification is given in the text of the report. In the Sydney Basin, 'Shale' is used to describe thinly bedded to laminated siltstone.

SAMPLING

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

Disturbed samples taken during drilling provide information on plasticity, grain size, colour, moisture content, minor constituents and, depending upon the degree of disturbance, some information on strength and structure. Bulk samples are similar but of greater volume required for some test procedures.

Undisturbed samples are taken by pushing a thin-walled sample tube, usually 50mm diameter (known as a U50), into the soil and withdrawing it with a sample of the soil contained in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Details of the type and method of sampling used are given on the attached logs.

INVESTIGATION METHODS

The following is a brief summary of investigation methods currently adopted by the Company and some comments on their use and application. All except test pits, hand auger drilling and portable dynamic cone penetrometers require the use of a mechanical drilling rig which is commonly mounted on a truck chassis.

Test Pits: These are normally excavated with a backhoe or a tracked excavator, allowing close examination of the insitu soils if it is safe to descend into the pit. The depth of penetration is limited to about 3m for a backhoe and up to 6m for an excavator. Limitations of test pits are the problems associated with disturbance and difficulty of reinstatement and the consequent effects on close-by structures. Care must be taken if construction is to be carried out near test pit locations to either properly recompact the backfill during construction or to design and construct the structure so as not to be adversely affected by poorly compacted backfill at the test pit location.

Hand Auger Drilling: A borehole of 50mm to 100mm diameter is advanced by manually operated equipment. Premature refusal of the hand augers can occur on a variety of materials such as hard clay, gravel or ironstone, and does not necessarily indicate rock level.

Continuous Spiral Flight Augers: The borehole is advanced using 75mm to 115mm diameter continuous spiral flight augers, which are withdrawn at intervals to allow sampling and insitu testing. This is a relatively economical means of drilling in clays and in sands above the water table. Samples are returned to the surface by the flights or may be collected after withdrawal of the auger flights, but they can be very disturbed and layers may become mixed. Information from the auger sampling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively lower reliability due to mixing or softening of samples by groundwater, or uncertainties as to the original depth of the samples. Augering below the groundwater table is of even lesser reliability than augering above the water table.

Rock Augering: Use can be made of a Tungsten Carbide (TC) bit for auger drilling into rock to indicate rock quality and continuity by variation in drilling resistance and from examination of recovered rock fragments. This method of investigation is quick and relatively inexpensive but provides only an indication of the likely rock strength and predicted values may be in error by a strength order. Where rock strengths may have a significant impact on construction feasibility or costs, then further investigation by means of cored boreholes may be warranted.

Wash Boring: The borehole is usually advanced by a rotary bit, with water 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 "feel" and rate of penetration.

Mud Stabilised Drilling: Either Wash Boring or Continuous Core Drilling can use drilling mud as a circulating fluid to stabilise the borehole. The term 'mud' encompasses a range of products ranging from bentonite to polymers such as Revert or Biogel. The mud tends to mask the cuttings and reliable identification is only possible from intermittent intact sampling (eg from SPT and U50 samples) or from rock coring, etc.

Continuous Core Drilling: A continuous core sample is obtained using a diamond tipped core barrel. Provided full core recovery is achieved (which is not always possible in very low strength rocks and granular soils), this technique provides a very reliable (but relatively expensive) method of investigation. In rocks, an NMLC triple tube core barrel, which gives a core of about 50mm diameter, is usually used with water flush. The length of core recovered is compared to the length drilled and any length not recovered is shown as CORE LOSS. The location of losses are determined on site by the supervising engineer; where the location is uncertain, the loss is placed at the top end of the drill run.

Standard Penetration Tests: Standard Penetration Tests (SPT) are used mainly in non-cohesive soils, but can also be used in cohesive soils as a means of indicating density or strength 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 F3.1.

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

The test results are reported in the following form:

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

  N = 13
  4, 6, 7

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

  N>30
  15, 30/40mm

The results of the test can be related empirically to the engineering properties of the soil.

Occasionally, the drop hammer is used to drive 50mm diameter thin walled sample tubes (U50) in clays. In such circumstances, the test results are shown on the borehole logs in brackets.

A modification to the SPT test is where the same driving system is used with a solid 60° tipped steel cone of the same diameter as the SPT hollow sampler. The solid cone can be continuously driven for some distance in soft clays or loose sands, or may be used where damage would otherwise occur to the SPT. The results of this Solid Cone Penetration Test (SCPT) are shown as "N_c" on the borehole logs, together with the number of blows per 150mm penetration.

Static Cone Penetrometer Testing and Interpretation: Cone penetrometer testing (sometimes referred to as a Dutch Cone) described in this report has been carried out using an Electronic Friction Cone Penetrometer (EFCP). The test is described in Australian Standard 1289, Test F5.1.

In the tests, a 35mm diameter rod with a conical tip is pushed continuously into the soil, the reaction being provided by a specially designed truck or rig which is fitted with an hydraulic ram system. Measurements are made of the end bearing resistance on the cone and the frictional resistance on a separate 134mm long sleeve, immediately behind the cone. Transducers in the tip of the assembly are electrically connected by wires passing through the centre of the push rods to an amplifier and recorder unit mounted on the control truck.

As penetration occurs (at a rate of approximately 20mm per second) the information is output as incremental digital records every 10mm. The results given in this report have been plotted from the digital data.

The information provided on the charts comprise:

- Cone resistance – the actual end bearing force divided by the cross sectional area of the cone – expressed in MPa.
- Sleeve friction – the frictional force on the sleeve divided by the surface area – expressed in kPa.
- Friction ratio – the ratio of sleeve friction to cone resistance, expressed as a percentage.

The ratios of the sleeve resistance to cone resistance will vary with the type of soil encountered, with higher relative friction in clays than in sands. Friction ratios of 1% to 2% are commonly encountered in sands and occasionally very soft clays, rising to 4% to 10% in stiff clays and peats. Soil descriptions based on cone resistance and friction ratios are only inferred and must not be considered as exact.

Correlations between EFCP and SPT values can be developed for both sands and clays but may be site specific.

Interpretation of EFCP values can be made to empirically derive modulus or compressibility values to allow calculation of foundation settlements.

Stratification can be inferred from the cone and friction traces and from experience and information from nearby boreholes etc. Where shown, this information is presented for general guidance, but must be regarded as interpretive. The test method provides a continuous profile of engineering properties but, where precise information on soil classification is required, direct drilling and sampling may be preferable.

Portable Dynamic Cone Penetrometers: Portable Dynamic Cone Penetrometer (DCP) tests are carried out by driving a rod into the ground with a sliding hammer and counting the blows for successive 100mm increments of penetration.

Two relatively similar tests are used:

- Cone penetrometer (commonly known as the Scala Penetrometer) – a 16mm rod with a 20mm diameter cone end is driven with a 9kg hammer dropping 510mm (AS1289, Test F3.2). The 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.
- Perth sand penetrometer – a 16mm diameter flat ended rod is driven with a 9kg hammer, dropping 600mm (AS1289, Test F3.3). This test was developed for testing the density of sands (originating in Perth) and is mainly used in granular soils and filling.

LOGS

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

The attached explanatory notes define the terms and symbols used in preparation of the logs.

Interpretation of the information shown on the logs, and its application to design and construction, should therefore take into account the spacing of boreholes or test pits, the method of drilling or excavation, the frequency of sampling and testing and the possibility of other than "straight line" variations between the boreholes or test pits. Subsurface conditions between boreholes or test pits may vary significantly from conditions encountered at the borehole or test pit locations.

GROUNDWATER

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

- Although groundwater may be present, in low permeability soils it may enter the hole slowly or perhaps not at all during the time it 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 and may not be the same at the time of construction.
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must be washed out of the hole or 'reverted' chemically if water observations are to be made.

More reliable measurements can be made by installing standpipes which are read after stabilising at intervals ranging from several days to 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 perched water tables or surface water.

FILL

The presence of fill materials can often be determined only by the inclusion of foreign objects (eg bricks, steel etc) or by distinctly unusual colour, texture or fabric. Identification of the extent of fill materials will also depend on investigation methods and frequency. Where natural soils similar to those at the site are used for fill, it may be difficult with limited testing and sampling to reliably determine the extent of the fill.

The presence of fill materials is usually regarded with caution as the possible variation in density, strength and material type is much greater than with natural soil deposits. Consequently, there is an increased risk of adverse engineering characteristics or behaviour. If the volume and quality of fill is of importance to a project, then frequent test pit excavations are preferable to boreholes.

LABORATORY TESTING

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

ENGINEERING REPORTS

Engineering reports are prepared by qualified personnel and are based on the information obtained and on current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal (eg. a three storey building) the information and interpretation may not be relevant if the design proposal is changed (eg to a twenty storey building). If this happens, the company 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 aspects and recommendations or suggestions for design and construction. However, the Company cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions – the potential for this will be partially dependent on borehole spacing and sampling frequency as well as investigation technique.
- Changes in policy or interpretation of policy by statutory authorities.
- The actions of persons or contractors responding to commercial pressures.

If these occur, the company will be pleased to assist with investigation or advice to resolve any problems occurring.

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, the company requests that it immediately be notified. Most problems are much more readily resolved when conditions are exposed that at some later stage, well after the event.

REPRODUCTION OF INFORMATION FOR CONTRACTUAL PURPOSES

Attention is drawn to the document *'Guidelines for the Provision of Geotechnical Information in Tender Documents'*, published by the Institution of Engineers, Australia. Where information obtained from this investigation is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. The company would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Copyright in all documents (such as drawings, borehole or test pit logs, reports and specifications) provided by the Company shall remain the property of Jeffery and Katauskas Pty Ltd. Subject to the payment of all fees due, the Client alone shall have a licence to use the documents provided for the sole purpose of completing the project to which they relate. License to use the documents may be revoked without notice if the Client is in breach of any objection to make a payment to us.

REVIEW OF DESIGN

Where major civil or structural developments are proposed or where only a limited investigation has been completed or where the geotechnical conditions/ constraints are quite complex, it is prudent to have a joint design review which involves a senior geotechnical engineer.

SITE INSPECTION

The company will always be pleased to provide engineering inspection services for geotechnical aspects of work to which this report is related.

Requirements could range from:

i) a site visit to confirm that conditions exposed are no worse than those interpreted, to

ii) a visit to assist the contractor or other site personnel in identifying various soil/rock types such as appropriate footing or pier founding depths, or

iii) full time engineering presence on site.

Jeffery and Katauskas Pty Ltd
CONSULTING GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

GRAPHIC LOG SYMBOLS FOR SOILS AND ROCKS

SOIL


FILL


TOPSOIL


CLAY (CL, CH)


SILT (ML, MH)


SAND (SP, SW)


GRAVEL (GP, GW)


SANDY CLAY (CL, CH)


SILTY CLAY (CL, CH)


CLAYEY SAND (SC)


SILTY SAND (SM)


GRAVELLY CLAY (CL, CH)


CLAYEY GRAVEL (GC)


SANDY SILT (ML)


PEAT AND ORGANIC SOILS

ROCK


CONGLOMERATE


SANDSTONE


SHALE


SILTSTONE, MUDSTONE, CLAYSTONE


LIMESTONE


PHYLLITE, SCHIST


TUFF


GRANITE, GABBRO


DOLERITE, DIORITE


BASALT, ANDESITE


QUARTZITE

DEFECTS AND INCLUSIONS


CLAY SEAM


SHEARED OR CRUSHED SEAM


BRECCIATED OR SHATTERED SEAM/ZONE


IRONSTONE GRAVEL


ORGANIC MATERIAL

OTHER MATERIALS


CONCRETE


BITUMINOUS CONCRETE, COAL


COLLUVIUM

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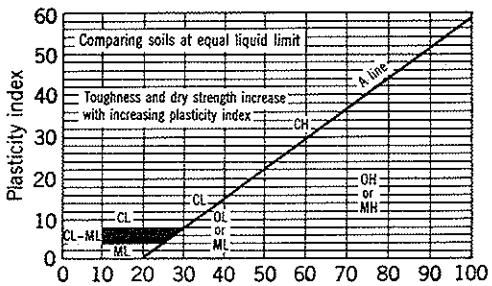
CONSULTING GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

UNIFIED SOIL CLASSIFICATION TABLE

Field Identification Procedures (Excluding particles larger than 75 μm and basing fractions on estimated weights)						Group Symbols [a]	Typical Names	Information Required for Describing Soils	Laboratory Classification Criteria
Coarse-grained soils: More than half of material is *larger* than 75 μm sieve size[b] (The 75 μm sieve size is about the smallest particle visible to naked eye)	Gravels: More than half of coarse fraction is larger than 4 mm sieve size	Clean gravels (little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes			*GW*	Well graded gravels, gravel-sand mixtures, little or no fines	Give typical name; indicate approximate percentages of sand and gravel; maximum size; angularity, surface condition, and hardness of the coarse grains; local or geologic name and other pertinent descriptive information; and symbols in parentheses For undisturbed soils add information on stratification, degree of compactness, cementation, moisture conditions and drainage characteristics Example: *Silty sand*, gravelly; about 20% hard, angular gravel particles 12 mm maximum size; rounded and subangular sand grains coarse to fine, about 15% non-plastic fines with low dry strength; well compacted and moist in place; alluvial sand; (*SM*)	Use grain size curve in identifying the fractions as given under field identification Determine percentages of gravel and sand from grain size curve Depending on percentage of fines (fraction smaller than 75 μm sieve size) coarse grained soils are classified as follows: Less than 5% *GW, GP, SW, SP* More than 12% *GM, GC, SM, SC* 5% to 12% *Borderline* cases requiring use of dual symbols $C_U = \frac{D_{60}}{D_{10}}$ Greater than 4 $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3 Not meeting all gradation requirements for *GW* Atterberg limits below "A" line, or *PI* less than 4 — Above "A" line with *PI* between 4 and 7 are *borderline* cases requiring use of dual symbols Atterberg limits above "A" line, with *PI* greater than 7
			Predominantly one size or a range of sizes with some intermediate sizes missing			*GP*	Poorly graded gravels, gravel-sand mixtures, little or no fines		
		Gravels with fines (appreciable amount of fines)	Nonplastic fines (for identification procedures see *ML* below)			*GM*	Silty gravels, poorly graded gravel-sand-silt mixtures		
			Plastic fines (for identification procedures, see *CL* below)			*GC*	Clayey gravels, poorly graded gravel-sand-clay mixtures		
	Sands: More than half of coarse fraction is smaller than 4 mm sieve size	Clean sands (little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate particle sizes			*SW*	Well graded sands, gravelly sands, little or no fines		$C_U = \frac{D_{60}}{D_{10}}$ Greater than 6 $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3 Not meeting all gradation requirements for *SW* Atterberg limits below "A" line or *PI* less than 5 — Above "A" line with *PI* between 4 and 7 are *borderline* cases requiring use of dual symbols Atterberg limits below "A" line with *PI* greater than 7
			Predominantly one size or a range of sizes with some intermediate sizes missing			*SP*	Poorly graded sands, gravelly sands, little or no fines		
		Sands with fines (appreciable amount of fines)	Nonplastic fines (for identification procedures, see *ML* below)			*SM*	Silty sands, poorly graded sand-silt mixtures		
			Plastic fines (for identification procedures, see *CL* below)			*SC*	Clayey sands, poorly graded sand-clay mixtures		
Fine-grained soils: More than half of material is *smaller* than 75 μm sieve size	Identification Procedures on Fraction Smaller than 380 μm Sieve Size								
	Silts and clays: liquid limit less than 50		Dry Strength (crushing characteristics)	Dilatancy (reaction to shaking)	Toughness (consistency near plastic limit)				
			None to slight	Quick to slow	None	*ML*	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity	Give typical name; indicate degree and character of plasticity, amount and maximum size of coarse grains; colour in wet condition, odour if any, local or geologic name, and other pertinent descriptive information, and symbol in parentheses For undisturbed soils add information on structure, stratification, consistency in undisturbed and remoulded states, moisture and drainage conditions Example: *Clayey silt*, brown; slightly plastic; small percentage of fine sand; numerous vertical root holes; firm and dry in place; loess; (*ML*)	
			Medium to high	None to very slow	Medium	*CL*	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays		
			Slight to medium	Slow	Slight	*OL*	Organic silts and organic silt-clays of low plasticity		
	Silts and clays: liquid limit greater than 50		Slight to medium	Slow to none	Slight to medium	*MH*	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts		
			High to very high	None	High	*CH*	Inorganic clays of high plasticity, fat clays		
			Medium to high	None to very slow	Slight to medium	*OH*	Organic clays of medium to high plasticity		
Highly Organic Soils			Readily identified by colour, odour, spongy feel and frequently by fibrous texture			*Pt*	Peat and other highly organic soils		



Plasticity chart
for laboratory classification of fine grained soils

NOTE: 1) Soils possessing characteristics of two groups are designated by combinations of group symbols (e.g. GW-GC, well graded gravel-sand mixture with clay fines).

2) Soils with liquid limits of the order of 35 to 50 may be visually classified as being of medium plasticity.

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ABN 17 003 550 801

LOG SYMBOLS

LOG COLUMN	SYMBOL	DEFINITION
Groundwater Record		Standing water level. Time delay following completion of drilling may be shown.
		Extent of borehole collapse shortly after drilling.
		Groundwater seepage into borehole or excavation noted during drilling or excavation.
Samples	ES	Soil sample taken over depth indicated, for environmental analysis.
	U50	Undisturbed 50mm diameter tube sample taken over depth indicated.
	DB	Bulk disturbed sample taken over depth indicated.
	DS	Small disturbed bag sample taken over depth indicated.
	ASB	Soil sample taken over depth indicated, for asbestos screening.
	ASS	Soil sample taken over depth indicated, for acid sulfate soil analysis.
	SAL	Soil sample taken over depth indicated, for salinity analysis.
Field Tests	N = 17 4, 7, 10	Standard Penetration Test (SPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration. 'R' as noted below.
	N_c = 5 7 3R	Solid Cone Penetration Test (SCPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration for 60 degree solid cone driven by SPT hammer. 'R' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	VNS = 25	Vane shear reading in kPa of Undrained Shear Strength.
	PID = 100	Photoionisation detector reading in ppm (Soil sample headspace test).
Moisture Condition (Cohesive Soils)	MC > PL	Moisture content estimated to be greater than plastic limit.
	MC ≈ PL	Moisture content estimated to be approximately equal to plastic limit.
	MC < PL	Moisture content estimated to be less than plastic limit.
(Cohesionless Soils)	D	DRY - runs freely through fingers.
	M	MOIST - does not run freely but no free water visible on soil surface.
	W	WET - free water visible on soil surface.
Strength (Consistency) Cohesive Soils	VS	VERY SOFT - Unconfined compressive strength less than 25kPa
	S	SOFT - Unconfined compressive strength 25-50kPa
	F	FIRM - Unconfined compressive strength 50-100kPa
	St	STIFF - Unconfined compressive strength 100-200kPa
	VSt	VERY STIFF - Unconfined compressive strength 200-400kPa
	H	HARD - Unconfined compressive strength greater than 400kPa
	( )	Bracketed symbol indicates estimated consistency based on tactile examination or other tests.
Density Index/ Relative Density (Cohesionless Soils)		**Density Index (I_D) Range (%)** / **SPT 'N' Value Range (Blows/300mm)**
	VL	Very Loose: <15 / 0-4
	L	Loose: 15-35 / 4-10
	MD	Medium Dense: 35-65 / 10-30
	D	Dense: 65-85 / 30-50
	VD	Very Dense: >85 / >50
	( )	Bracketed symbol indicates estimated density based on ease of drilling or other tests.
Hand Penetrometer Readings	300 250	Numbers indicate individual test results in kPa on representative undisturbed material unless noted otherwise.
Remarks	'V' bit	Hardened steel 'V' shaped bit.
	'TC' bit	Tungsten carbide wing bit.
	T 60	Penetration of auger string in mm under static load of rig applied by drill head hydraulics without rotation of augers.

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ABN 17 003 550 801

LOG SYMBOLS

ROCK MATERIAL WEATHERING CLASSIFICATION

TERM	SYMBOL	DEFINITION
Residual Soil	RS	Soil developed on extremely weathered rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the soil has not been significantly transported.
Extremely weathered rock	XW	Rock is weathered to such an extent that it has "soil" properties, ie it either disintegrates or can be remoulded, in water.
Distinctly weathered rock	DW	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by ironstaining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Slightly weathered rock	SW	Rock is slightly discoloured but shows little or no change of strength from fresh rock.
Fresh rock	FR	Rock shows no sign of decomposition or staining.

ROCK STRENGTH

Rock strength is defined by the Point Load Strength Index (Is 50) and refers to the strength of the rock substance in the direction normal to the bedding. The test procedure is described by the International Journal of Rock Mechanics, Mining, Science and Geomechanics. Abstract Volume 22, No 2, 1985.

TERM	SYMBOL	Is (50) MPa	FIELD GUIDE
Extremely Low:	EL	0.03	Easily remoulded by hand to a material with soil properties.
Very Low:	VL	0.1	May be crumbled in the hand. Sandstone is "sugary" and friable.
Low:	L	0.3	A piece of core 150mm long x 50mm dia. may be broken by hand and easily scored with a knife. Sharp edges of core may be friable and break during handling.
Medium Strength:	M	1	A piece of core 150mm long x 50mm dia. can be broken by hand with difficulty. Readily scored with knife.
High:	H	3	A piece of core 150mm long x 50mm dia. core cannot be broken by hand, can be slightly scratched or scored with knife; rock rings under hammer.
Very High:	VH	10	A piece of core 150mm long x 50mm dia. may be broken with hand-held pick after more than one blow. Cannot be scratched with pen knife; rock rings under hammer.
Extremely High:	EH		A piece of core 150mm long x 50mm dia. is very difficult to break with hand-held hammer. Rings when struck with a hammer.

ABBREVIATIONS USED IN DEFECT DESCRIPTION

ABBREVIATION	DESCRIPTION	NOTES
Be	Bedding Plane Parting	Defect orientations measured relative to the normal to the long core axis (ie relative to horizontal for vertical holes)
CS	Clay Seam	
J	Joint	
P	Planar	
Un	Undulating	
S	Smooth	
R	Rough	
IS	Ironstained	
XWS	Extremely Weathered Seam	
Cr	Crushed Seam	
60t	Thickness of defect in millimetres	

APPENDIX B

(Laboratory Reports and Chain of Custody Documents)

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 64045

Client:
Environmental Investigation Services
PO Box 976
North Ryde BC
NSW 1670

Attention: Cameron Hollands

Sample log in details:

Your Reference:	**E25302K, Eastlakes**		
No. of samples:	2 waters		
Date samples received / completed instructions received	27/10/11	/	27/10/11

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:	3/11/11	/	3/11/11
Date of Preliminary Report:	Not Issued		

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Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:

Tania Notaras
Manager

Giovanni Agosti
Technical Manager

VOCs in water Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	64045-1 MW10 26/10/2011 WATER	64045-2 DUP1 26/10/2011 WATER
Date extracted	-	28/10/2011	28/10/2011
Date analysed	-	29/10/2011	29/10/2011
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	<1
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	<1
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
1,2,3-trichloropropane	µg/L	<1	<1

VOCs in water Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	64045-1 MW10 26/10/2011 WATER	64045-2 DUP1 26/10/2011 WATER
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	%	95	113
Surrogate toluene-d8	%	98	103
Surrogate 4-BFB	%	88	111

vTRH & BTEX in Water		
Our Reference:	UNITS	64045-1
Your Reference	----------	MW10
Date Sampled	----------	26/10/2011
Type of sample		WATER
Date extracted	-	28/10/11
Date analysed	-	31/10/11
TRHC6 - C9	µg/L	<10
Benzene	µg/L	<1
Toluene	µg/L	<1
Ethylbenzene	µg/L	<1
m+p-xylene	µg/L	<2
o-xylene	µg/L	<1
Surrogate Dibromofluoromethane	%	95
Surrogate toluene-d8	%	98
Surrogate 4-BFB	%	88

sTRH in Water (C10-C36)		
Our Reference:	UNITS	64045-1
Your Reference	----------	MW10
Date Sampled	----------	26/10/2011
Type of sample		WATER
Date extracted	-	28/10/11
Date analysed	-	31/10/11
$TRHC_{10}$ - C_{14}	µg/L	<50
$TRHC_{15}$ - C_{28}	µg/L	<100
$TRHC_{29}$ - C_{36}	µg/L	<100
Surrogate o-Terphenyl	%	94

HM in water - dissolved		
Our Reference:	UNITS	64045-1
Your Reference	----------	MW10
Date Sampled	----------	26/10/2011
Type of sample		WATER
Date prepared	-	28/10/2011
Date analysed	-	28/10/2011
Arsenic-Dissolved	µg/L	<1
Cadmium-Dissolved	µg/L	0.1
Chromium-Dissolved	µg/L	<1
Copper-Dissolved	µg/L	<1
Lead-Dissolved	µg/L	<1
Mercury-Dissolved	µg/L	<0.1
Nickel-Dissolved	µg/L	<1
Zinc-Dissolved	µg/L	<1

Miscellaneous Inorganics		
Our Reference:	UNITS	64045-1
Your Reference	----------	MW10
Date Sampled	----------	26/10/2011
Type of sample		WATER
Date prepared	-	28/10/2011
Date analysed	-	28/10/2011
pH	pH Units	6.6
Electrical Conductivity	µS/cm	250
Oil & Grease (LLE)	mg/L	<5

Method ID	Methodology Summary
Org-013	Water samples are analysed directly by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID.
Metals-022 ICP-MS	Determination of various metals by ICP-MS.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA 21st ED, 4500-H+.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell and dedicated meter, in accordance with APHA 21st ED 2510 and Rayment & Higginson.
Inorg-003	Oil & Grease - determine gravimetrically following extraction with Hexane, in accordance with APHA 21st ED, 5220-B.

QUALITY CONTROL VOCs in water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			28/10/2011	[NT]	[NT]	LCS-W1	28/10/2011
Date analysed	-			29/10/2011	[NT]	[NT]	LCS-W1	29/10/2011
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	116%
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	116%
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	96%
1,1,1-trichloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	117%
1,1-dichloropropene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Cyclohexane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Carbon tetrachloride	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Dibromomethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2-dichloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Trichloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	106%
Bromodichloromethane	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	107%
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	109%
1,2-dibromoethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Tetrachloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	109%
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]

Client Reference: E25302K, Eastlakes

QUALITY CONTROL VOCs in water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
1,2,3-trichloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Isopropylbenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Bromobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
n-propyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
2-chlorotoluene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
4-chlorotoluene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,3,5-trimethyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Tert-butyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2,4-trimethyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,3-dichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Sec-butyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,4-dichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
4-isopropyl toluene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2-dichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
n-butyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2-dibromo-3-chloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2,4-trichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Hexachlorobutadiene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2,3-trichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Surrogate Dibromofluoromethane	%		Org-013	100	[NT]	[NT]	LCS-W1	100%
Surrogate toluene-d8	%		Org-013	99	[NT]	[NT]	LCS-W1	103%
Surrogate 4-BFB	%		Org-013	110	[NT]	[NT]	LCS-W1	102%

Client Reference: E25302K, Eastlakes

QUALITY CONTROL vTRH & BTEX in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			28/10/11	[NT]	[NT]	LCS-W1	28/10/11
Date analysed	-			31/10/11	[NT]	[NT]	LCS-W1	31/10/11
$TRHC_6$ - C_9	µg/L	10	Org-016	<10	[NT]	[NT]	LCS-W1	108%
Benzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	105%
Toluene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	106%
Ethylbenzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	109%
m+p-xylene	µg/L	2	Org-016	<2	[NT]	[NT]	LCS-W1	110%
o-xylene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	111%
Surrogate Dibromofluoromethane	%		Org-016	109	[NT]	[NT]	LCS-W1	118%
Surrogate toluene-d8	%		Org-016	102	[NT]	[NT]	LCS-W1	98%
Surrogate 4-BFB	%		Org-016	88	[NT]	[NT]	LCS-W1	106%
QUALITY CONTROL sTRH in Water (C10-C36)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			28/10/11	[NT]	[NT]	LCS-W1	28/10/11
Date analysed	-			28/10/11	[NT]	[NT]	LCS-W1	28/10/11
$TRHC_{10}$ - C_{14}	µg/L	50	Org-003	<50	[NT]	[NT]	LCS-W1	68%
$TRHC_{15}$ - C_{28}	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W1	110%
$TRHC_{29}$ - C_{36}	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W1	85%
Surrogate o-Terphenyl	%		Org-003	95	[NT]	[NT]	LCS-W1	101%
QUALITY CONTROL HM in water - dissolved	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			28/10/2011	[NT]	[NT]	LCS-W1	28/10/2011
Date analysed	-			28/10/2011	[NT]	[NT]	LCS-W1	28/10/2011
Arsenic-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	91%
Cadmium-Dissolved	µg/L	0.1	Metals-022 ICP-MS	<0.1	[NT]	[NT]	LCS-W1	91%
Chromium-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	89%
Copper-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	94%
Lead-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	93%
Mercury-Dissolved	µg/L	0.1	Metals-021 CV-AAS	<0.1	[NT]	[NT]	LCS-W1	96%
Nickel-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	90%
Zinc-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	89%

QUALITY CONTROL Miscellaneous Inorganics	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			28/10/2011	[NT]	[NT]	LCS-W1	28/10/2011
Date analysed	-			28/10/2011	[NT]	[NT]	LCS-W1	28/10/2011
pH	pH Units		Inorg-001	[NT]	[NT]	[NT]	LCS-W1	101%
Electrical Conductivity	µS/cm	1	Inorg-002	<1	[NT]	[NT]	LCS-W1	102%
Oil & Grease (LLE)	mg/L	5	Inorg-003	<5	[NT]	[NT]	LCS-W1	89%

Report Comments:

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

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

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

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

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

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

Laboratory Acceptance Criteria

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

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

TO:
Envirolab Services Pty Ltd
12 Ashley St, Chatswood 2067

Phone: (02) 9910 6200
Fax: (02) 9910 6201

Attention: Aileen

Date Results Required:

SAMPLE AND CHAIN OF CUSTODY FORM

EIS Job Number: E 25302 K

Sheet 1 / 3

FROM:
Environmental Investigation Services

Rear 115 Wicks Road
Macquarie Park NSW 2113

Phone: (02) 9888 5000
Fax: (02) 9888 5004

Contact:

Project: Proposed Shopping Centre Re-development
Location: Eastlakes
Sampler: C. H.

Sample Preservation:
In esky on ice

	Date Sampled	Time Sampled	Location	Sample/ Borehole Number	Sample Container	PID (ppm/ Odour)	Sample Description	Tests Required: Combo 3	Heavy metals	TPH/BTEX	VOCs	PAHs	pH / EC	Oil & grease			Comments/Detection Limits Required
1	26/10/11	AM	—	MW 110	1L Amber Bottle 3 BTEX Vials ~~HDPE Plastic Bottle~~	—	groundwater		X	X	X		X	X			* please filter water for heavy metal analysis.
2	"	"	"	—	Dup 1	3 x BTEX vials	—	"				X						

ENVIROLAB
Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 64045
Date Received: 27/10/11
Time Received: 2:45pm
Received by: ZL
Temp: Cool/Ambient
Cooling: Ice/Gelpack
Security: Intact/Broken/None

Relinquished By:	Date:	Received By:	Remarks:
Cameron Hollands	Date: 27/10/11 Time: AM	ZL 27/10/11 2:45pm	All analysis PQLs to ANZECC (2000) Detection Limits Please
Relinquished By:	Date: Time:	Received By:	* heavy metals at low level

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 64046

Client:
Environmental Investigation Services
PO Box 976
North Ryde BC
NSW 1670

Attention: Cameron Hollands

Sample log in details:

Your Reference:	**E25302K, Eastlakes**
No. of samples:	4 soils
Date samples received / completed instructions received	27/10/11 / 27/10/11

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:	3/11/11 / 3/11/11
Date of Preliminary Report:	Not Issued

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Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:

M. Mansfield
Matt Mansfield
Approved Signatory

NATA

sPOCAS Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ---------- 	64046-1 BH106 3.8-4.0 26/10/2011 SOIL	64046-2 BH110 2.8-3.0 26/10/2011 SOIL	64046-3 BH108 1-1.3 26/10/2011 SOIL	64046-4 BH109 1.5-1.95 26/10/2011 SOIL
Date prepared	-	01/11/11	01/11/11	01/11/11	01/11/11
Date analysed	-	01/11/11	01/11/11	01/11/11	01/11/11
pH $_{kcl}$	pH units	5.9	6.0	5.0	5.5
TAA pH 6.5	moles H^+/t	<5	<5	<5	<5
s-TAA pH 6.5	%w/w S	<0.01	<0.01	<0.01	<0.01
pH $_{Ox}$	pH units	5.4	5.3	3.4	5.1
TPA pH6.5	moles H^+/t	<5	<5	<5	<5
s-TPA pH 6.5	%w/w S	<0.01	<0.01	<0.01	<0.01
TSA pH 6.5	moles H^+/t	<5	<5	<5	<5
s-TSA pH 6.5	%w/w S	<0.01	<0.01	<0.01	<0.01
ANCE	% $CaCO_3$	<0.05	<0.05	<0.05	<0.05
a-ANCE	moles H^+/t	<5	<5	<5	<5
s-ANCE	%w/w S	<0.05	<0.05	<0.05	<0.05
SKCl	%w/w S	<0.005	<0.005	<0.005	<0.005
SP	%w/w	<0.005	<0.005	<0.005	<0.005
SPOS	%w/w	<0.005	<0.005	<0.005	<0.005
a-SPOS	moles H^+/t	<5	<5	<5	<5
CaKCl	%w/w	0.005	0.005	<0.005	0.01
CaP	%w/w	0.006	0.005	<0.005	0.01
CaA	%w/w	<0.005	<0.005	<0.005	<0.005
MgKCl	%w/w	<0.005	<0.005	<0.005	<0.005
MgP	%w/w	<0.005	<0.005	<0.005	<0.005
MgA	%w/w	<0.005	<0.005	<0.005	<0.005
a-Net Acidity	moles H^+/t	<10	<10	<10	<10
Liming rate	kg $CaCO_3$/t	<0.75	<0.75	<0.75	<0.75
a-Net Acidity without ANCE	moles H^+/t	NA	NA	NA	NA
Liming rate without ANCE	kg $CaCO_3$/t	NA	NA	NA	NA

Method ID	Methodology Summary
Inorg-064	sPOCAS determined using titrimetric and ICP-AES techniques. Based on Acid Sulfate Soils Laboratory Methods Guidelines, Version 2.1 - June 2004.

Client Reference: E25302K, Eastlakes

QUALITY CONTROL sPOCAS	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			01/11/11	[NT]	[NT]	LCS	01/11/11
Date analysed	-			01/11/11	[NT]	[NT]	LCS	01/11/11
pH kcl	pH units		Inorg-064	[NT]	[NT]	[NT]	LCS	103%
TAA pH 6.5	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	LCS	76%
s-TAA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	LCS	74%
pH ox	pH units		Inorg-064	[NT]	[NT]	[NT]	LCS	98%
TPA pH 6.5	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	LCS	107%
s-TPA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	LCS	107%
TSA pH 6.5	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	LCS	110%
s-TSA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	LCS	110%
ANCE	% $CaCO_3$	0.05	Inorg-064	<0.05	[NT]	[NT]	[NR]	[NR]
a-ANCE	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	[NR]	[NR]
s-ANCE	%w/w S	0.05	Inorg-064	<0.05	[NT]	[NT]	[NR]	[NR]
SKCl	%w/w S	0.005	Inorg-064	<0.005	[NT]	[NT]	LCS	107%
SP	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	LCS	95%
SPOS	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	LCS	92%
a-SPOS	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	LCS	92%
CaKCl	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	LCS	95%
CaP	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	LCS	77%
CaA	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NR]	[NR]
MgKCl	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	LCS	103%
MgP	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	LCS	110%
MgA	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NR]	[NR]
SRAS	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NR]	[NR]
SHCl	%w/w S	0.005	Inorg-064	<0.005	[NT]	[NT]	[NR]	[NR]
SNAS	%w/w S	0.005	Inorg-064	<0.005	[NT]	[NT]	[NR]	[NR]
a-SNAS	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	[NR]	[NR]
s-SNAS	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NR]	[NR]
a-Net Acidity	moles H^+/t	10	Inorg-064	<10	[NT]	[NT]	LCS	89%
Liming rate	kg $CaCO_3$ /t	0.75	Inorg-064	<0.75	[NT]	[NT]	LCS	89%

Client Reference: E25302K, Eastlakes

QUALITY CONTROL sPOCAS	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
a-Net Acidity without ANCE	moles H^+/t	10	Inorg-064	<10	[NT]	[NT]	[NR]	[NR]
Liming rate without ANCE	kg $CaCO_3$/t	0.75	Inorg-064	<0.75	[NT]	[NT]	[NR]	[NR]

Report Comments:

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

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

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

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

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

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

Laboratory Acceptance Criteria

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

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

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

SAMPLE RECEIPT ADVICE

Client:

Environmental Investigation Services
PO Box 976
North Ryde BC NSW 1670

ph: 02 9888 5000
Fax: 02 9888 5001

Attention: Cameron Hollands

Sample log in details:

Your reference:	**E25302K, Eastlakes**
Envirolab Reference:	**64046**
Date received:	27/10/11
Date results expected to be reported:	**3/11/11**

Samples received in appropriate condition for analysis:	YES
No. of samples provided	4 soils
Turnaround time requested:	Standard
Temperature on receipt	Cool
Cooling Method:	Ice Pack

Comments:

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

Contact details:

Please direct any queries to Aileen Hie or Jacinta Hurst
ph: 02 9910 6200 fax: 02 9910 6201
email: ahie@envirolabservices.com.au or jhurst@envirolabservices.com.au

TO:
Envirolab Services Pty Ltd
12 Ashley Street, Chatswood 2067

Phone: (02) 9910 6200
Fax: (02) 9910 6201

Attention: Aileen

Date Results Required: Standard TAT

SAMPLE AND CHAIN OF CUSTODY FORM

EIS Job Number: E 25302 K

Sheet 2 / 3

FROM:
Environmental Investigation Services

Rear 115 Wicks Road
Macquarie Park NSW 2113

Phone: (02) 9888 5000
Fax: (02) 9888 5004

Contact:

Project: Proposed Shopping Centre Re-development
Location: Eastlakes
Sampler: C. H / D.F.

Tests Required: sPOCAS

Sample Preservation:
In esky on ice

	Date Sampled	Time Sampled	Location	Sample/ Borehole Number	Depth (m)	Sample Container	PID (ppm/ Odour)	Sample Description	sPOCAS	Comments/Detection Limits Required
1	26/10/11	–	–	BH106	3.8 – 4.0	Plastic Bag	–	Sand	X	
2				BH110	2.8 – 3.0	Plastic Bag	–	" " –	X	
3				BH108	1 – 1.3	Plastic Bag	–	" "	X	
4				BH109	1.5 – 1.95	Plastic Bag		" "	X*	
						Plastic Bag				
						Plastic Bag				

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 5200

Job No: 44046
Date Received: 27/10/11
Time Received: 2:55pm
Received by: ZL
Temp: Cool / Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Relinquished By:	Date:	Received By:
Cameron Hollands	27/10/11	ZL
	Time: AM	27/10/11
Relinquished By:	Date:	Received By:
	Time:	

Remarks:

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 64047

Client:
Environmental Investigation Services
PO Box 976
North Ryde BC
NSW 1670

Attention: Cameron Hollands

Sample log in details:

Your Reference:	**E25302K, Eastlakes**
No. of samples:	20 Soils, 1 Water
Date samples received / completed instructions received	27/10/11 / 27/10/11

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:	3/11/11 / 3/11/11
Date of Preliminary Report:	Not issued

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Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:

Nancy Zhang
Chemist

Rhian Morgan
Reporting Supervisor

Hinoko Miyazaki
Chemist

Paul Ching
Approved Signatory

NATA
ACCREDITED FOR TECHNICAL COMPETENCE

vTRH & BTEX in Soil						
Our Reference:	UNITS	64047-4	64047-5	64047-7	64047-10	64047-11
Your Reference	----------	BH106	BH106	BH107	BH108	BH108
Depth	----------	0.3-0.5	0.8-1.0	0.3-0.5	1.3-1.5	1.8-2.0
Date Sampled		26/10/2011	26/10/2011	26/10/2011	26/10/2011	26/10/2011
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	31/10/2011	31/10/2011	31/10/2011	31/10/2011	31/10/2011
Date analysed	-	01/11/2011	01/11/2011	01/11/2011	01/11/2011	01/11/2011
vTRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
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	%	95	105	85	109	119

vTRH & BTEX in Soil				
Our Reference:	UNITS	64047-13	64047-16	64047-18
Your Reference	----------	BH109	BH109	BH110
Depth	----------	0.1-0.2	1.9-2.0	0.3-0.5
Date Sampled		26/10/2011	26/10/2011	26/10/2011
Type of sample		Soil	Soil	Soil
Date extracted	-	31/10/2011	31/10/2011	31/10/2011
Date analysed	-	01/11/2011	01/11/2011	01/11/2011
vTRH C_6 - C_9	mg/kg	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	84	90	101

sTRH in Soil (C10-C36)						
Our Reference:	UNITS	64047-4	64047-5	64047-7	64047-10	64047-11
Your Reference	----------	BH106	BH106	BH107	BH108	BH108
Depth	----------	0.3-0.5	0.8-1.0	0.3-0.5	1.3-1.5	1.8-2.0
Date Sampled		26/10/2011	26/10/2011	26/10/2011	26/10/2011	26/10/2011
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	31/10/2011	31/10/2011	31/10/2011	31/10/2011	31/10/2011
Date analysed	-	01/11/2011	01/11/2011	01/11/2011	01/11/2011	01/11/2011
$TRHC_{10}$ - 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	%	82	79	82	83	85

sTRH in Soil (C10-C36)				
Our Reference:	UNITS	64047-13	64047-16	64047-18
Your Reference	----------	BH109	BH109	BH110
Depth	----------	0.1-0.2	1.9-2.0	0.3-0.5
Date Sampled		26/10/2011	26/10/2011	26/10/2011
Type of sample		Soil	Soil	Soil
Date extracted	-	31/10/2011	31/10/2011	31/10/2011
Date analysed	-	01/11/2011	01/11/2011	01/11/2011
$TRHC_{10}$ - C_{14}	mg/kg	<50	<50	<50
$TRHC_{15}$ - C_{28}	mg/kg	150	<100	<100
$TRHC_{29}$ - C_{36}	mg/kg	250	<100	<100
Surrogate o-Terphenyl	%	89	86	82

PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	64047-1 Dup 01 - 26/10/2011 Soil	64047-4 BH106 0.3-0.5 26/10/2011 Soil	64047-5 BH106 0.8-1.0 26/10/2011 Soil	64047-7 BH107 0.3-0.5 26/10/2011 Soil	64047-10 BH108 1.3-1.5 26/10/2011 Soil
Date extracted	-	31/10/2011	31/10/2011	31/10/2011	31/10/2011	31/10/2011
Date analysed	-	02/11/2011	02/11/2011	02/11/2011	02/11/2011	02/11/2011
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	0.9	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	0.2	<0.1
Fluoranthene	mg/kg	<0.1	0.1	<0.1	1.3	0.2
Pyrene	mg/kg	<0.1	0.2	<0.1	1.2	0.2
Benzo(a)anthracene	mg/kg	<0.1	0.1	<0.1	0.4	0.1
Chrysene	mg/kg	<0.1	0.1	<0.1	0.5	0.1
Benzo(b+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	0.9	0.3
Benzo(a)pyrene	mg/kg	<0.05	0.12	<0.05	0.67	0.18
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-d14	%	116	120	116	120	124

PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	64047-11 BH108 1.8-2.0 26/10/2011 Soil	64047-13 BH109 0.1-0.2 26/10/2011 Soil	64047-16 BH109 1.9-2.0 26/10/2011 Soil	64047-18 BH110 0.3-0.5 26/10/2011 Soil
Date extracted	-	31/10/2011	31/10/2011	31/10/2011	31/10/2011
Date analysed	-	02/11/2011	02/11/2011	02/11/2011	02/11/2011
Naphthalene	mg/kg	<0.1	0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	0.3	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	0.3	<0.1	<0.1
Fluorene	mg/kg	<0.1	0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	1.8	<0.1	<0.1
Anthracene	mg/kg	<0.1	0.6	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	5.4	<0.1	<0.1
Pyrene	mg/kg	<0.1	5.3	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	2.3	<0.1	<0.1
Chrysene	mg/kg	<0.1	2.2	<0.1	<0.1
Benzo(b+k)fluoranthene	mg/kg	<0.2	4.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	3.0	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	1.7	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	0.3	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	1.5	<0.1	<0.1
Surrogate p-Terphenyl-d14	%	116	121	126	128

Organochlorine Pesticides in soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	64047-4 BH106 0.3-0.5 26/10/2011 Soil	64047-5 BH106 0.8-1.0 26/10/2011 Soil	64047-7 BH107 0.3-0.5 26/10/2011 Soil	64047-10 BH108 1.3-1.5 26/10/2011 Soil	64047-11 BH108 1.8-2.0 26/10/2011 Soil
Date extracted	-	31/10/2011	31/10/2011	31/10/2011	31/10/2011	31/10/2011
Date analysed	-	03/11/2011	03/11/2011	03/11/2011	03/11/2011	03/11/2011
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	%	104	83	104	102	106

Organochlorine Pesticides in soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	64047-13 BH109 0.1-0.2 26/10/2011 Soil	64047-16 BH109 1.9-2.0 26/10/2011 Soil	64047-18 BH110 0.3-0.5 26/10/2011 Soil
Date extracted	-	31/10/2011	31/10/2011	31/10/2011
Date analysed	-	03/11/2011	03/11/2011	03/11/2011
HCB	mg/kg	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1
Surrogate TCLMX	%	103	106	109

Organophosphorus Pesticides Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	64047-4 BH106 0.3-0.5 26/10/2011 Soil	64047-5 BH106 0.8-1.0 26/10/2011 Soil	64047-7 BH107 0.3-0.5 26/10/2011 Soil	64047-10 BH108 1.3-1.5 26/10/2011 Soil	64047-11 BH108 1.8-2.0 26/10/2011 Soil
Date extracted	-	31/10/2011	31/10/2011	31/10/2011	31/10/2011	31/10/2011
Date analysed	-	03/11/2011	03/11/2011	03/11/2011	03/11/2011	03/11/2011
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	%	104	83	104	102	106

Organophosphorus Pesticides Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	64047-13 BH109 0.1-0.2 26/10/2011 Soil	64047-16 BH109 1.9-2.0 26/10/2011 Soil	64047-18 BH110 0.3-0.5 26/10/2011 Soil
Date extracted	-	31/10/2011	31/10/2011	31/10/2011
Date analysed	-	03/11/2011	03/11/2011	03/11/2011
Diazinon	mg/kg	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1
Surrogate TCLMX	%	103	106	109

PCBs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	64047-4 BH106 0.3-0.5 26/10/2011 Soil	64047-5 BH106 0.8-1.0 26/10/2011 Soil	64047-7 BH107 0.3-0.5 26/10/2011 Soil	64047-10 BH108 1.3-1.5 26/10/2011 Soil	64047-11 BH108 1.8-2.0 26/10/2011 Soil
Date extracted	-	31/10/2011	31/10/2011	31/10/2011	31/10/2011	31/10/2011
Date analysed	-	03/11/2011	03/11/2011	03/11/2011	03/11/2011	03/11/2011
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	%	104	83	104	102	106

PCBs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	64047-13 BH109 0.1-0.2 26/10/2011 Soil	64047-16 BH109 1.9-2.0 26/10/2011 Soil	64047-18 BH110 0.3-0.5 26/10/2011 Soil
Date extracted	-	31/10/2011	31/10/2011	31/10/2011
Date analysed	-	03/11/2011	03/11/2011	03/11/2011
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1
Arochlor 1221*	mg/kg	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1
Surrogate TCLMX	%	103	106	109

Acid Extractable metals in soil						
Our Reference:	UNITS	64047-1	64047-4	64047-5	64047-7	64047-10
Your Reference	----------	Dup 01	BH106	BH106	BH107	BH108
Depth	----------	-	0.3-0.5	0.8-1.0	0.3-0.5	1.3-1.5
Date Sampled		26/10/2011	26/10/2011	26/10/2011	26/10/2011	26/10/2011
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	31/10/2011	31/10/2011	31/10/2011	31/10/2011	31/10/2011
Date analysed	-	01/11/2011	01/11/2011	01/11/2011	01/11/2011	01/11/2011
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg	2	1	2	35	1
Copper	mg/kg	3	3	4	220	9
Lead	mg/kg	13	14	16	52	34
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	1	<1	<1	35	<1
Zinc	mg/kg	8	29	11	160	6

Acid Extractable metals in soil					
Our Reference:	UNITS	64047-11	64047-13	64047-16	64047-18
Your Reference	----------	BH108	BH109	BH109	BH110
Depth	----------	1.8-2.0	0.1-0.2	1.9-2.0	0.3-0.5
Date Sampled		26/10/2011	26/10/2011	26/10/2011	26/10/2011
Type of sample		Soil	Soil	Soil	Soil
Date digested	-	31/10/2011	31/10/2011	31/10/2011	31/10/2011
Date analysed	-	01/11/2011	01/11/2011	01/11/2011	01/11/2011
Arsenic	mg/kg	<4	<4	<4	<4
Cadmium	mg/kg	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg	2	9	2	9
Copper	mg/kg	<1	41	<1	12
Lead	mg/kg	1	76	1	1
Mercury	mg/kg	<0.1	0.3	<0.1	<0.1
Nickel	mg/kg	2	8	1	36
Zinc	mg/kg	13	82	1	16

Moisture						
Our Reference:	UNITS	64047-1	64047-4	64047-5	64047-7	64047-10
Your Reference	----------	Dup 01	BH106	BH106	BH107	BH108
Depth	----------	-	0.3-0.5	0.8-1.0	0.3-0.5	1.3-1.5
Date Sampled		26/10/2011	26/10/2011	26/10/2011	26/10/2011	26/10/2011
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	31/10/2011	31/10/2011	31/10/2011	31/10/2011	31/10/2011
Date analysed	-	1/11/2011	1/11/2011	1/11/2011	1/11/2011	1/11/2011
Moisture	%	1.8	1.9	4.4	5.3	4.8

Moisture					
Our Reference:	UNITS	64047-11	64047-13	64047-16	64047-18
Your Reference	----------	BH108	BH109	BH109	BH110
Depth	----------	1.8-2.0	0.1-0.2	1.9-2.0	0.3-0.5
Date Sampled		26/10/2011	26/10/2011	26/10/2011	26/10/2011
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	31/10/2011	31/10/2011	31/10/2011	31/10/2011
Date analysed	-	1/11/2011	1/11/2011	1/11/2011	1/11/2011
Moisture	%	12	8.1	18	1.9

Asbestos ID - soils						
Our Reference:	UNITS	64047-4	64047-5	64047-7	64047-10	64047-11
Your Reference	----------	BH106	BH106	BH107	BH108	BH108
Depth	----------	0.3-0.5	0.8-1.0	0.3-0.5	1.3-1.5	1.8-2.0
Date Sampled		26/10/2011	26/10/2011	26/10/2011	26/10/2011	26/10/2011
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	1/11/2011	1/11/2011	1/11/2011	1/11/2011	1/11/2011
Sample mass tested	g	Approx 40g	Approx 35g	Approx 25g	Approx 40g	Approx 20g
Sample Description	-	Brown sandy soil	Brown sandy soil	Brown sandy soil	Brown sandy soil	Beige sandy soil
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected

Asbestos ID - soils				
Our Reference:	UNITS	64047-13	64047-16	64047-18
Your Reference	----------	BH109	BH109	BH110
Depth	----------	0.1-0.2	1.9-2.0	0.3-0.5
Date Sampled		26/10/2011	26/10/2011	26/10/2011
Type of sample		Soil	Soil	Soil
Date analysed	-	1/11/2011	1/11/2011	1/11/2011
Sample mass tested	g	Approx 20g	Approx 25g	Approx 10g
Sample Description	-	Brown sandy soil & rocks	Yellow sandy soil	Grey sandy soil
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected

BTEX in Water		
Our Reference:	UNITS	64047-2
Your Reference	----------	R1
Depth	----------	-
Date Sampled		26/10/2011
Type of sample		Soil
Date extracted	-	28/10/2011
Date analysed	-	29/10/2011
Benzene	µg/L	<1
Toluene	µg/L	<1
Ethylbenzene	µg/L	<1
m+p-xylene	µg/L	<2
o-xylene	µg/L	<1
Surrogate Dibromofluoromethane	%	105
Surrogate toluene-d8	%	96
Surrogate 4-BFB	%	103

Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS.
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.
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.
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.

QUALITY CONTROL vTRH & BTEX in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			31/10/2011	64047-4	31/10/2011 || 31/10/2011	LCS-4	31/10/2011
Date analysed	-			01/11/2011	64047-4	01/11/2011 || 01/11/2011	LCS-4	01/11/2011
vTRH C_6 - C_9	mg/kg	25	Org-016	<25	64047-4	<25 || <25	LCS-4	109%
Benzene	mg/kg	0.2	Org-016	<0.2	64047-4	<0.2 || <0.2	LCS-4	113%
Toluene	mg/kg	0.5	Org-016	<0.5	64047-4	<0.5 || <0.5	LCS-4	108%
Ethylbenzene	mg/kg	1	Org-016	<1	64047-4	<1 || <1	LCS-4	106%
m+p-xylene	mg/kg	2	Org-016	<2	64047-4	<2 || <2	LCS-4	108%
o-Xylene	mg/kg	1	Org-016	<1	64047-4	<1 || <1	LCS-4	109%
Surrogate aaa-Trifluorotoluene	%		Org-016	104	64047-4	95% || 95 || RPD: 0	LCS-4	101%
QUALITY CONTROL sTRH in Soil (C10-C36)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			31/10/2011	64047-4	31/10/2011 || 31/10/2011	LCS-4	31/10/2011
Date analysed	-			01/11/2011	64047-4	01/11/2011 || 01/11/2011	LCS-4	01/11/2011
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	64047-4	<50 || <50	LCS-4	85%
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	64047-4	<100 || <100	LCS-4	91%
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	64047-4	<100 || <100	LCS-4	91%
Surrogate o-Terphenyl	%		Org-003	83	64047-4	82 || 83 || RPD: 1	LCS-4	81%
QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			31/10/2011	64047-4	31/10/2011 || 31/10/2011	LCS-4	31/10/2011
Date analysed	-			02/11/2011	64047-4	02/11/2011 || 02/11/2011	LCS-4	02/11/2011
Naphthalene	mg/kg	0.1	Org-012 subset	<0.1	64047-4	<0.1 || <0.1	LCS-4	107%
Acenaphthylene	mg/kg	0.1	Org-012 subset	<0.1	64047-4	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	0.1	Org-012 subset	<0.1	64047-4	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	0.1	Org-012 subset	<0.1	64047-4	<0.1 || <0.1	LCS-4	111%
Phenanthrene	mg/kg	0.1	Org-012 subset	<0.1	64047-4	<0.1 || <0.1	LCS-4	110%
Anthracene	mg/kg	0.1	Org-012 subset	<0.1	64047-4	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	0.1	Org-012 subset	<0.1	64047-4	0.1 || <0.1	LCS-4	107%
Pyrene	mg/kg	0.1	Org-012 subset	<0.1	64047-4	0.2 || <0.1	LCS-4	108%
Benzo(a)anthracene	mg/kg	0.1	Org-012 subset	<0.1	64047-4	0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	0.1	Org-012 subset	<0.1	64047-4	0.1 || <0.1	LCS-4	119%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Benzo(b+k)fluoranthene	mg/kg	0.2	Org-012 subset	<0.2	64047-4	<0.2 || <0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	0.05	Org-012 subset	<0.05	64047-4	0.12 || 0.07 || RPD: 53	LCS-4	113%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012 subset	<0.1	64047-4	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012 subset	<0.1	64047-4	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012 subset	<0.1	64047-4	<0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%		Org-012 subset	115	64047-4	120 || 120 || RPD: 0	LCS-4	113%
QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			31/10/2011	64047-4	31/10/2011 || 31/10/2011	LCS-3	31/10/2011
Date analysed	-			03/11/2011	64047-4	03/11/2011 || 03/11/2011	LCS-3	03/11/2011
HCB	mg/kg	0.1	Org-005	<0.1	64047-4	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	64047-4	<0.1 || <0.1	LCS-3	99%
gamma-BHC	mg/kg	0.1	Org-005	<0.1	64047-4	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	0.1	Org-005	<0.1	64047-4	<0.1 || <0.1	LCS-3	106%
Heptachlor	mg/kg	0.1	Org-005	<0.1	64047-4	<0.1 || <0.1	LCS-3	97%
delta-BHC	mg/kg	0.1	Org-005	<0.1	64047-4	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	0.1	Org-005	<0.1	64047-4	<0.1 || <0.1	LCS-3	95%
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	64047-4	<0.1 || <0.1	LCS-3	98%
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	64047-4	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	64047-4	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	64047-4	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	0.1	Org-005	<0.1	64047-4	<0.1 || <0.1	LCS-3	103%
Dieldrin	mg/kg	0.1	Org-005	<0.1	64047-4	<0.1 || <0.1	LCS-3	100%
Endrin	mg/kg	0.1	Org-005	<0.1	64047-4	<0.1 || <0.1	LCS-3	98%
pp-DDD	mg/kg	0.1	Org-005	<0.1	64047-4	<0.1 || <0.1	LCS-3	115%
Endosulfan II	mg/kg	0.1	Org-005	<0.1	64047-4	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	0.1	Org-005	<0.1	64047-4	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	64047-4	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	64047-4	<0.1 || <0.1	LCS-3	100%
Methoxychlor	mg/kg	0.1	Org-005	<0.1	64047-4	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%		Org-005	102	64047-4	104 || 101 || RPD: 3	LCS-3	100%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			31/10/2011	64047-4	31/10/2011 || 31/10/2011	LCS-3	31/10/2011
Date analysed	-			03/11/2011	64047-4	03/11/2011 || 03/11/2011	LCS-3	03/11/2011
Diazinon	mg/kg	0.1	Org-008	<0.1	64047-4	<0.1 || <0.1	[NR]	[NR]
Dimethoate	mg/kg	0.1	Org-008	<0.1	64047-4	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	64047-4	<0.1 || <0.1	[NR]	[NR]
Ronnel	mg/kg	0.1	Org-008	<0.1	64047-4	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	64047-4	<0.1 || <0.1	LCS-3	93%
Fenitrothion	mg/kg	0.1	Org-008	<0.1	64047-4	<0.1 || <0.1	LCS-3	108%
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	64047-4	<0.1 || <0.1	[NR]	[NR]
Ethion	mg/kg	0.1	Org-008	<0.1	64047-4	<0.1 || <0.1	LCS-3	119%
Surrogate TCLMX	%		Org-008	102	64047-4	104 || 101 || RPD: 3	LCS-3	100%
QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			31/10/2011	64047-4	31/10/2011 || 31/10/2011	LCS-3	31/10/2011
Date analysed	-			03/11/2011	64047-4	03/11/2011 || 03/11/2011	LCS-3	03/11/2011
Arochlor 1016	mg/kg	0.1	Org-006	<0.1	64047-4	<0.1 || <0.1	[NR]	[NR]
Arochlor 1221*	mg/kg	0.1	Org-006	<0.1	64047-4	<0.1 || <0.1	[NR]	[NR]
Arochlor 1232	mg/kg	0.1	Org-006	<0.1	64047-4	<0.1 || <0.1	[NR]	[NR]
Arochlor 1242	mg/kg	0.1	Org-006	<0.1	64047-4	<0.1 || <0.1	[NR]	[NR]
Arochlor 1248	mg/kg	0.1	Org-006	<0.1	64047-4	<0.1 || <0.1	[NR]	[NR]
Arochlor 1254	mg/kg	0.1	Org-006	<0.1	64047-4	<0.1 || <0.1	LCS-3	100%
Arochlor 1260	mg/kg	0.1	Org-006	<0.1	64047-4	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%		Org-006	102	64047-4	104 || 101 || RPD: 3	LCS-3	139%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Date digested	-			31/10/2011	64047-4	31/10/2011 || 31/10/2011	LCS-2	31/10/2011
Date analysed	-			31/10/2011	64047-4	01/11/2011 || 01/11/2011	LCS-2	01/11/2011
Arsenic	mg/kg	4	Metals-020 ICP-AES	<4	64047-4	<4 || <4	LCS-2	106%
Cadmium	mg/kg	0.5	Metals-020 ICP-AES	<0.5	64047-4	<0.5 || <0.5	LCS-2	110%
Chromium	mg/kg	1	Metals-020 ICP-AES	<1	64047-4	1 || 2 || RPD: 67	LCS-2	110%
Copper	mg/kg	1	Metals-020 ICP-AES	<1	64047-4	3 || 4 || RPD: 29	LCS-2	108%
Lead	mg/kg	1	Metals-020 ICP-AES	<1	64047-4	14 || 16 || RPD: 13	LCS-2	104%
Mercury	mg/kg	0.1	Metals-021 CV-AAS	<0.1	64047-4	<0.1 || <0.1	LCS-2	109%

Client Reference: E25302K, Eastlakes

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Nickel	mg/kg	1	Metals-020 ICP-AES	<1	64047-4	<1 || 1	LCS-2	108%
Zinc	mg/kg	1	Metals-020 ICP-AES	<1	64047-4	29 || 29 || RPD: 0	LCS-2	105%

QUALITY CONTROL Moisture	UNITS	PQL	METHOD	Blank
Date prepared	-			31/10/2011
Date analysed	-			01/11/2011
Moisture	%	0.1	Inorg-008	[NT]

QUALITY CONTROL Asbestos ID - soils	UNITS	PQL	METHOD	Blank
Date analysed	-			[NT]

QUALITY CONTROL BTEX in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			28/10/2011	[NT]	[NT]	LCS-W1	28/10/2011
Date analysed	-			29/10/2011	[NT]	[NT]	LCS-W1	29/10/2011
Benzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	103%
Toluene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	110%
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	112%
o-xylene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	112%
Surrogate Dibromofluoromethane	%		Org-016	100	[NT]	[NT]	LCS-W1	99%
Surrogate toluene-d8	%		Org-016	99	[NT]	[NT]	LCS-W1	108%
Surrogate 4-BFB	%		Org-016	110	[NT]	[NT]	LCS-W1	101%

QUALITY CONTROL vTRH & BTEX in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	64047-7	31/10/2011
Date analysed	-	[NT]	[NT]	64047-7	01/11/2011
vTRH C6 - C9	mg/kg	[NT]	[NT]	64047-7	95%
Benzene	mg/kg	[NT]	[NT]	64047-7	98%
Toluene	mg/kg	[NT]	[NT]	64047-7	95%
Ethylbenzene	mg/kg	[NT]	[NT]	64047-7	92%
m+p-xylene	mg/kg	[NT]	[NT]	64047-7	95%
o-Xylene	mg/kg	[NT]	[NT]	64047-7	95%
Surrogate aaa-Trifluorotoluene	%	[NT]	[NT]	64047-7	102%

QUALITY CONTROL sTRH in Soil (C10-C36)	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	64047-7	31/10/2011
Date analysed	-	[NT]	[NT]	64047-7	01/11/2011
$TRHC_{10}$ - C_{14}	mg/kg	[NT]	[NT]	64047-7	84%
$TRHC_{15}$ - C_{28}	mg/kg	[NT]	[NT]	64047-7	89%
$TRHC_{29}$ - C_{36}	mg/kg	[NT]	[NT]	64047-7	86%
Surrogate o-Terphenyl	%	[NT]	[NT]	64047-7	77%
QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	64047-7	31/10/2011
Date analysed	-	[NT]	[NT]	64047-7	02/11/2011
Naphthalene	mg/kg	[NT]	[NT]	64047-7	99%
Acenaphthylene	mg/kg	[NT]	[NT]	[NR]	[NR]
Acenaphthene	mg/kg	[NT]	[NT]	[NR]	[NR]
Fluorene	mg/kg	[NT]	[NT]	64047-7	102%
Phenanthrene	mg/kg	[NT]	[NT]	64047-7	98%
Anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]
Fluoranthene	mg/kg	[NT]	[NT]	64047-7	99%
Pyrene	mg/kg	[NT]	[NT]	64047-7	97%
Benzo(a)anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]
Chrysene	mg/kg	[NT]	[NT]	64047-7	98%
Benzo(b+k)fluoranthene	mg/kg	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	mg/kg	[NT]	[NT]	64047-7	94%
Indeno(1,2,3-c,d)pyrene	mg/kg	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%	[NT]	[NT]	64047-7	108%

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QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	[NT]	[NT]	64047-7	31/10/2011
Date analysed	-	[NT]	[NT]	64047-7	01/11/2011
Arsenic	mg/kg	[NT]	[NT]	64047-7	100%
Cadmium	mg/kg	[NT]	[NT]	64047-7	93%
Chromium	mg/kg	[NT]	[NT]	64047-7	107%
Copper	mg/kg	[NT]	[NT]	64047-7	116%
Lead	mg/kg	[NT]	[NT]	64047-7	110%
Mercury	mg/kg	[NT]	[NT]	64047-7	119%
Nickel	mg/kg	[NT]	[NT]	64047-7	88%
Zinc	mg/kg	[NT]	[NT]	64047-7	#

Report Comments:

Acid Extractable Metals in Soil:# Percent recovery is not possible to report due to the high concentration of the element/s in the sample/s. However an acceptable recovery was obtained for the LCS.

Asbestos ID was analysed by Approved Identifier: Paul Ching
Asbestos ID was authorised by Approved Signatory: Paul Ching

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

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

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

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

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

Laboratory Acceptance Criteria

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

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

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

SAMPLE RECEIPT ADVICE

Client:

Environmental Investigation Services
PO Box 976
North Ryde BC NSW 1670

ph: 02 9888 5000
Fax: 02 9888 5001

Attention: Cameron Hollands

Sample log in details:

Your reference:	**E25302K, Eastlakes**
Envirolab Reference:	**64047**
Date received:	27/10/11
Date results expected to be reported:	**3/11/11**

Samples received in appropriate condition for analysis:	YES
No. of samples provided	20 Soils, 1 Water
Turnaround time requested:	Standard
Temperature on receipt	Cool
Cooling Method:	Ice Pack

Comments:

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

Contact details:

Please direct any queries to Aileen Hie or Jacinta Hurst
ph: 02 9910 6200 fax: 02 9910 6201
email: ahie@envirolabservices.com.au or jhurst@envirolabservices.com.au

SAMPLE AND CHAIN OF CUSTODY FORM

TO:
Envirolab Services Pty Ltd
12 Ashley Street
Chatswood NSW 2067
Phone: (02) 99106200
Fax: (02) 99106201

Attention: Aileen

EIS Job Number: E 25302K

Date Results Required: Standard TAT

Sheet 3 / 3

FROM:
Environmental Investigation Services
Rear 115 Wicks Road
Macquarie Park NSW 2113
Phone: (02) 9888 5000
Fax: (02) 9888 5004

Contact:

Project: Proposed Shopping Centre Re-development
Location: East Lakes
Sampler: C.H

Sample Preservation: In esky on ice

Tests Required

Date Sampled	Lab Ref:	Borehole/ Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 6	Combo 6a	Combo 13	8 Metals	TPH	BTEX	PAHs	OCP/OPP/ PCBs	Asbestos	TCLP 6 Metals	TCLP PAHs	
20/10/11	1	DUP01	—	Glass jar + ~~Asb Bag~~	0	—				X			X					
	2	RI	—	Glass jar + ~~Asb Bag~~	0							X						
	3	BH106	0.1 – 0.2	Glass jar + Asb Bag	0													
	4	" "	0.3 – 0.5	Glass jar + Asb Bag	0			X										
	5	" "	0.8 – 1.0	Glass jar + Asb Bag	0	Silty sand		X										
	6	BH107	0.1 – 0.2	Glass jar + Asb Bag	0.1	Fill												
	7	" "	0.3 – 0.5	Glass jar + Asb Bag	0	Fill		X										
	8	" "	0.8 – 1.0	Glass jar + Asb Bag	0	Fill												
	9	BH108	0.3 – 0.5	Glass jar + Asb Bag	0	Fill												
	10	" "	1.3 – 1.5	Glass jar + Asb Bag	0	" "		X										
	11	" "	1.8 – 2.0	Glass jar + Asb Bag	0	Silty sand		X										
	12	" "	2.8 – 3.0	Glass jar + Asb Bag	0.1	Silty sand												
	13	BH109	0.1 – 0.2	Glass jar + Asb Bag	0	Fill		X										
	14	" "	0.4 – 0.5	Glass jar + Asb Bag	0	Fill												
	15	" "	0.9 – 1.0	Glass jar + Asb Bag	0.2	Fill												
	16	" "	1.5 – 2.0	Glass jar + Asb Bag	0	Silty sand		X										
	17	BH110	0.1 – 0.2	Glass jar + Asb Bag	0													
	18		0.3 – 0.5	Glass jar + Asb Bag	0			X										
	19		0.8 – 1.0	Glass jar + Asb Bag	0													
	20		1.8 – 2.0	Glass jar + Asb Bag	0													
↓	21	↓	1.3 – 1.5	Glass jar + Asb Bag	0													
				Glass jar + Asb Bag														
				Glass jar + Asb Bag														
				Glass jar + Asb Bag														
				Glass jar + Asb Bag														

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 64047
Date Received: 27/10/11
Time Received: 2:30pm
Received by: ZL
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Remarks (comments/detection limits required):

Relinquished By:	Date:	Time:	Received By:	
Cameron Hollands	27/10/11 AM	27/10 2:30pm	ZL	

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 65939

Client:
Environmental Investigation Services
PO Box 976
North Ryde BC
NSW 1670

Attention: Cameron Hollands

Sample log in details:

Your Reference:	**E25302K, Eastlakes**
No. of samples:	2 Waters
Date samples received / completed instructions received	05/12/11 / 05/12/11

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:	12/12/11 / 12/12/11
Date of Preliminary Report:	Not issued

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

Results Approved By:

Nancy Zhang
Chemist

Hinoko Miyazaki
Chemist

Giovanni Agosti
Technical Manager

NATA
ACCREDITED FOR TECHNICAL COMPETENCE

vTRH & BTEX in Water Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	65939-1 BH109 2/12/2011 Water	65939-2 BH1 2/12/2011 Water
Date extracted	-	05/12/2011	05/12/2011
Date analysed	-	05/12/2011	05/12/2011
TRHC6 - C9	µg/L	<10	[NA]
Benzene	µg/L	<1	<20
Toluene	µg/L	<1	<20
Ethylbenzene	µg/L	<1	<20
m+p-xylene	µg/L	<2	<40
o-xylene	µg/L	<1	<20
Surrogate Dibromofluoromethane	%	94	92
Surrogate toluene-d8	%	101	100
Surrogate 4-BFB	%	100	100

sTRH in Water (C10-C36)		
Our Reference:	UNITS	65939-1
Your Reference	----------	BH109
Date Sampled	----------	2/12/2011
Type of sample		Water
Date extracted	-	06/12/2011
Date analysed	-	06/12/2011
$TRHC_{10}$ - C_{14}	µg/L	<50
$TRHC_{15}$ - C_{28}	µg/L	<100
$TRHC_{29}$ - C_{36}	µg/L	<100
Surrogate o-Terphenyl	%	87

PAHs in Water - Low Level		
Our Reference:	UNITS	65939-1
Your Reference	----------	BH109
Date Sampled	----------	2/12/2011
Type of sample		Water
Date extracted	-	06/12/2011
Date analysed	-	06/12/2011
Naphthalene	µg/L	<0.1
Acenaphthylene	µg/L	<0.1
Acenaphthene	µg/L	<0.1
Fluorene	µg/L	<0.1
Phenanthrene	µg/L	<0.1
Anthracene	µg/L	<0.1
Fluoranthene	µg/L	<0.1
Pyrene	µg/L	<0.1
Benzo(a)anthracene	µg/L	<0.1
Chrysene	µg/L	<0.1
Benzo(b+k)fluoranthene	µg/L	<0.2
Benzo(a)pyrene	µg/L	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	<0.1
Dibenzo(a,h)anthracene	µg/L	<0.1
Benzo(g,h,i)perylene	µg/L	<0.1
Surrogate p-Terphenyl-d_{14}	%	78

HM in water - dissolved		
Our Reference:	UNITS	65939-1
Your Reference	----------	BH109
Date Sampled	----------	2/12/2011
Type of sample		Water
Date prepared	-	6/12/2011
Date analysed	-	6/12/2011
Lead-Dissolved	µg/L	<1

Miscellaneous Inorganics		
Our Reference:	UNITS	65939-1
Your Reference	----------	BH109
Date Sampled	----------	2/12/2011
Type of sample		Water
Date prepared	-	06/12/2011
Date analysed	-	06/12/2011
Calcium - Dissolved	mg/L	26
Magnesium - Dissolved	mg/L	3.8
Hardness	mgCaCO3 /L	81

Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS.
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.
Metals-022 ICP-MS	Determination of various metals by ICP-MS.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.

Client Reference: E25302K, Eastlakes

QUALITY CONTROL vTRH & BTEX in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			05/12/2011	[NT]	[NT]	LCS-W1	05/12/2011
Date analysed	-			05/12/2011	[NT]	[NT]	LCS-W1	05/12/2011
TRHC6 - C9	µg/L	10	Org-016	<10	[NT]	[NT]	LCS-W1	91%
Benzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	90%
Toluene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	92%
Ethylbenzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	89%
m+p-xylene	µg/L	2	Org-016	<2	[NT]	[NT]	LCS-W1	92%
o-xylene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	91%
Surrogate Dibromofluoromethane	%		Org-016	93	[NT]	[NT]	LCS-W1	95%
Surrogate toluene-d8	%		Org-016	100	[NT]	[NT]	LCS-W1	101%
Surrogate 4-BFB	%		Org-016	103	[NT]	[NT]	LCS-W1	101%

QUALITY CONTROL sTRH in Water (C10-C36)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			06/12/2011	[NT]	[NT]	LCS-W1	06/12/2011
Date analysed	-			06/12/2011	[NT]	[NT]	LCS-W1	06/12/2011
TRHC10 - C14	µg/L	50	Org-003	<50	[NT]	[NT]	LCS-W1	94%
TRHC15 - C28	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W1	127%
TRHC29 - C36	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W1	117%
Surrogate o-Terphenyl	%		Org-003	103	[NT]	[NT]	LCS-W1	136%

QUALITY CONTROL PAHs in Water - Low Level	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			06/12/2011	[NT]	[NT]	LCS-W1	06/12/2011
Date analysed	-			06/12/2011	[NT]	[NT]	LCS-W1	06/12/2011
Naphthalene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-W1	68%
Acenaphthylene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Acenaphthene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Fluorene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-W1	69%
Phenanthrene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-W1	69%
Anthracene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Fluoranthene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-W1	72%
Pyrene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-W1	72%

Client Reference: E25302K, Eastlakes

QUALITY CONTROL PAHs in Water - Low Level	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Benzo(a)anthracene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Chrysene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-W1	75%
Benzo(b+k)fluoranthene	µg/L	0.2	Org-012 subset	<0.2	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-W1	83%
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%		Org-012 subset	76	[NT]	[NT]	LCS-W1	75%
QUALITY CONTROL HM in water - dissolved	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			6/12/2011	[NT]	[NT]	LCS-W1	6/12/2011
Date analysed	-			6/12/2011	[NT]	[NT]	LCS-W1	6/12/2011
Lead-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W1	88%
QUALITY CONTROL Miscellaneous Inorganics	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			06/12/2011	[NT]	[NT]	LCS-W1	06/12/2011
Date analysed	-			06/12/2011	[NT]	[NT]	LCS-W1	06/12/2011
Calcium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	LCS-W1	93%
Magnesium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	LCS-W1	99%
Hardness	mgCaCO3/L	3		3.0	[NT]	[NT]	[NR]	[NR]

Report Comments:

Total Recoverable Hydrocarbons/BTEX in water:PQL has been raised due to the sample matrix requiring dilution.

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.

Chatswood NSW 2067
Ph: (02) 9910 6200

SAMPLE AND CHAIN OF CUSTODY FORM

Job No: 65939
Date Received: 5/12/11
Time Received: 10:20
Received by: KB
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

TO:
Envirolab Services Pty Ltd
12 Ashley St, Chatswood 2067

Phone: (02) 9910 6200
Fax: (02) 9910 6201

Attention: Aileen

Date Results Required:

FROM:
Environmental Investigation Services

Rear 115 Wicks Road
Macquarie Park NSW 2113

Phone: (02) 9888 5000
Fax: (02) 9888 5004

Contact:

EIS Job Number: E 25302K

Sheet 1 / 1

Project: Shopping Centre Re-development
Location: East Lakes
Sampler: Cameron Hollands

Sample Preservation:
In esky on ice

	Date Sampled	Time Sampled	Location	Sample/ Borehole Number	Sample Container	PID (ppm/ Odour)	Sample Description	Tests Required: Combo 3	Heavy metals	TPH/BTEX	VOCs	PAHs (low level)	Hardness	BTEX	Lead		Comments/Detection Limits Required
1	2/12/11	AM	-	BH109	3x1L Amber Bottle 2x BTEX Vials HDPE Plastic Bottle	-	groundwater			X		X	X		X		
2	2/12/11	AM	-	BH1	2 x BTEX vials	-	" "							X			

Relinquished By: Cameron Hollands
Date: 5/12/11
Time: AM
Received By: K Bouzoglis 5/12/11 10:20

Relinquished By:
Date:
Time:
Received By:

Remarks:
All analysis PQLs to ANZECC (2000) Detection Limits Please

APPENDIX C

(Sampling Protocols and QA/QC Definitions)

SOIL AND GROUNDWATER SAMPLING PROTOCOLS

These protocols specify the basic procedures to be used when sampling soils or groundwater for environmental site assessments undertaken by EIS. The purpose of these protocols is to provide standard methods for: sampling, decontamination procedures for sampling equipment, sample preservation, sample storage and sample handling. Deviations from these procedures must be recorded.

Soil Sampling

a) Prepare a test pit/borehole log.

b) Layout sampling equipment on clean plastic sheeting to prevent direct contact with ground surface. The work area should be at a distance from the drill/rig excavator such that the drill rig/excavator can operate in a safe manner.

c) Ensure all sampling equipment has been decontaminated prior to use.

d) Remove any surface debris from the immediate area of the sampling location.

e) Collect samples and place in glass jar with a Teflon seal. This should be undertaken as quickly as possibly to prevent the loss of volatiles. If possible, fill the glass jars completely.

f) Collect samples for asbestos analysis and place in a zip-lock plastic bag.

g) Label the jar and/or bag with the EIS job number, sample location (eg. BH1), sampling depth interval and date. If more than one sample container is used, this should also be indicated (eg. 2 = Sample jar 1 of 2 jars).

h) Photoionisation detector (PID) screening of volatile organic compounds (VOCs) should be undertaken on samples using the soil sample headspace method. Headspace measurements are taken following equilibration of the headspace gasses in partly filled zip-lock plastic bags. PID headspace data is recorded on the borehole/test pit log and the chain of custody forms.

i) Record the lithology of the sample and sample depth on the borehole/test pit log in accordance with AS1726-1993[31].

j) Store the sample in a sample container cooled with ice or chill packs. On completion of the sampling the sample container should be delivered to the lab immediately or stored in the refrigerator prior to delivery to the lab. All samples are preserved in accordance with AS 4482.1:2005, AS 4482.2:1999 and AS/NZS 5667.1:1998.

k) Check for the presence of groundwater after completion of each borehole using an electronic dip metre or water whistle. Boreholes should be left open until the end of fieldwork. All groundwater levels in the boreholes should be rechecked on the completion of the fieldwork.

---

[31] *Geotechnical Site Investigations*, Standards Australia 1993 (AS1726-1993)

l) Backfill the boreholes/test pits with the excavation cuttings or clean sand prior to leaving the site.

Decontamination Procedures for Soil Sampling Equipment

a) All of the equipment associated with the soil sampling procedure should be decontaminated between every sampling location.

b) The following equipment and materials are required for the decontamination procedure:
   - Phosphate free detergent (Decon 90)
   - Potable water
   - Stiff brushes
   - Plastic sheets

c) Ensure the decontamination materials are clean prior to proceeding with the decontamination.

d) Fill both buckets with clean potable water and add phosphate free detergent to one bucket.

e) In the bucket containing the detergent scrub the sampling equipment until all the material attached to the equipment has been removed.

f) Rinse sampling equipment in the bucket containing potable water.

g) Place cleaned equipment on clean plastic sheets.

If all materials are not removed by this procedure, high-pressure water cleaning is recommended. If any equipment is not completely decontaminated by both these processes that equipment should not be used until it has been thoroughly cleaned.

Groundwater Sampling

Groundwater samples are more sensitive to contamination than soil samples and therefore adhesion to this protocol is particularly important to obtain reliable, reproducible results. The recommendations detailed in AS/NZS 5667.1:1998 are considered to form a minimum standard.

The basis of this protocol is to maintain the security of the borehole and obtain accurate and representative groundwater samples. The following procedure should be used for collection of groundwater samples from previously installed groundwater monitoring wells.

a) After monitoring well installation, at least three bore volumes should be pumped from the monitoring wells (well development) to remove any water introduced during the drilling process and/or the water that is disturbed during installation of the monitoring well. This should be completed prior to purging and sampling.

b) Groundwater monitoring wells should then be left to recharge for at least three days before purging and sampling. Prior to purging or sampling the condition of each well should observed and any anomalies recorded on the field data sheets. The following information should be noted: the condition of the well, noting any signs of damage, tampering or complete destruction; the condition and operation of the well lock; the condition of the protective casing and the cement footing (raised or cracked); and, the presence of water between protective casing and well.

c) Take the groundwater level from the collar of the piezometer/monitoring well using an electronic dip meter. The collar level should be taken (if required) during the site visit using a dumpy level and staff.

d) Purging and sampling of piezometers/monitoring wells is done on the same site visit when using micro-purge (or low flow) techniques. Layout and organize all equipment associated with groundwater sampling in a location where they will not interfere with the sampling procedure and will not pose a risk of contaminating samples. Equipment generally required includes:
   - Micropore filtration system or Stericup single-use filters (for heavy metals samples).
   - Filter paper for Micropore filtration system.
   - Bucket with volume increments.
   - Sample containers: teflon bottles with 1 ml nitric acid, 75mL glass vials with 1 mL hydrochloric acid, 1 L amber glass bottles.
   - Bucket with volume increments.
   - Flow cell.
   - pH/EC/Eh/T meters.
   - Plastic drums used for transportation of purged water.
   - Esky and ice.
   - Nitrile gloves.
   - Distilled water (for cleaning).
   - Electronic dip meter.
   - Micro-purge pump pack and pump head.
   - Air and water tubing for Micro-purge.
   - Groundwater sampling forms.

e) If single-use stericup filtration is not being used, clean the Micropore filtration system thoroughly with distilled water prior to use and between each sample. Filter paper should be changed between samples. 0.45um filter paper should be placed below the glass fibre filter paper in the filtration system.

f) Ensure all non-disposable sampling equipment is decontaminated or that new disposable equipment is available prior to any work commencing at a new location. The procedure for decontamination of groundwater equipment is outlined at the end of this section.

g) Disposable gloves should be used whenever samples are taken to protect the sampler and to assist in avoidance of contamination.

h) Groundwater samples are obtained from the monitoring wells using low flow/micro-purge sampling equipment to reduce the disturbance of the water column and loss of volatiles.

i) During pumping to purge the well, the pH, temperature, conductivity, dissolved oxygen, redox potential and groundwater levels are monitored (where possible) using calibrated field instruments to assess the development of steady state conditions. Steady state conditions are generally considered to have been achieved when the difference in the pH measurements was less than 0.2 units and the difference in conductivity was less than 10%.

j) All measurements are recorded on specific data sheets.

k) Once steady state conditions are considered to have been achieved, groundwater samples are obtained directly from the pump tubing and placed in appropriate glass bottles, BTEX vials or plastic bottles.

l) All samples are preserved in accordance with water sampling requirements detailed in the NEPM 1999 and placed in an insulated container with ice. Groundwater samples are preserved by immediate storage in an insulated sample container with ice in accordance with AS/NZS 5667.1:1998.

m) Record the sample on the appropriate log in accordance with AS1726:1993. At the end of each water sampling complete a chain of custody form.

Decontamination Procedures for Groundwater Sampling Equipment

a) All of the equipment associated with the groundwater sampling procedure (other than single-use items) should be decontaminated between every sampling location.

b) The following equipment and materials are required for the decontamination procedure:
   - Phosphate free detergent.
   - Potable water.
   - Distilled water
   - Plastic Sheets or bulk bags (plastic bags)

c) Fill one bucket with clean potable water and phosphate free detergent, and one bucket with distilled water.

d) Flush potable water and detergent through pump head. Wash sampling equipment and pump head using brushes in the bucket containing detergent until all materials attached to the equipment are removed.

e) Flush pump head with distilled water.

f) Change water and detergent solution after each sampling location.

g) Rinse sampling equipment in the bucket containing distilled water.

h) Place cleaned equipment on clean plastic sheets.

i) If all materials are not removed by this procedure that equipment should not be used until it has been thoroughly cleaned

QA/QC DEFINITIONS

The QA/QC terms used in this report are defined below. The definitions are in accordance with US EPA publication SW-846, entitled *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (1994[32]) methods and those described in *Environmental Sampling and Analysis, A Practical Guide,* (H. Keith 1991[33]).

Practical Quantitation Limit (PQL), Limit of Reporting (LOR) and Estimated Quantitation Limit (EQL)

These terms all refer to the concentration above which results can be expressed with a minimum 95% confidence level. The laboratory reporting limits are generally set at ten times the standard deviation for the Method Detection limit (MDL) for each specific analyte. For the purposes of this report the LOR, PQL, and EQL are considered to be equivalent.

When assessing laboratory data it should be borne in mind that values at or near the PQL have two important limitations. *"The uncertainty of the measurement value can approach, and even equal, the reported value. Secondly, confirmation of the analytes reported is virtually impossible unless identification uses highly selective methods. These issues diminish when reliably measurable amounts of analytes are present. Accordingly, legal and regulatory actions should be limited to data at or above the reliable detection limit"* Keith 1991.

Precision

The degree to which data generated from repeated measurements differ from one another due to random errors. Precision is measured using the standard deviation or Relative Percent Difference (RPD). Acceptable targets for precision in this report will be less than 50% RPD for concentrations greater than ten times the PQL, less than 75% RPD for concentrations between five and ten times the PQL and less than 100% RPD for concentrations that are less than five times the PQL.

Accuracy

Accuracy is a measure of the agreement between an experimental result and the true value of the parameter being measured. The assessment of accuracy for an analysis can be achieved through the analysis of known reference materials or assessed by the analysis of surrogates, field blanks, trip spikes and matrix spikes.

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[32] *SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* US EPA, 1994 (US EPA SW-846)

[33] *Environmental Sampling and Analysis, A Practical Guide*, Keith, H, 1991 (Keith 1991)

The proximity of an averaged result to the true value, where all random errors have been statistically removed. Accuracy is measured by percent recovery. Acceptable limits for accuracy generally lie between 70% to 130% recoveries. Certain laboratory methods may allow for values that lie outside these limits.

Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is primarily dependent upon the design and implementation of the sampling program. Representativeness of the data is partially ensured by the avoidance of contamination, adherence to sample handing and analysis protocols and use of proper chain-of-custody and documentation procedures.

Completeness

Completeness is a measure of the number of valid measurements in a data set compared to the total number of measurements made and overall performance against DQIs. The following information is assessed for completeness:

- Chain-of-custody forms;
- Sample receipt form;
- All sample results reported;
- All blank data reported;
- All laboratory duplicate and RPDs calculated;
- All surrogate spike data reported;
- All matrix spike and lab control spike (LCS) data reported and RPDs calculated;
- Spike recovery acceptable limits reported; and
- NATA stamp on reports.

Comparability

Comparability is the evaluation of the similarity of conditions (eg. sample depth, sample homogeneity) under which separate sets of data are produced. Data comparability checks include a bias assessment that may arise from the following sources:

- Collection and analysis of samples by different personnel;
- Use of different techniques;
- Collection and analysis by the same personnel using the same methods but at different times; and
- Spatial and temporal changes (due to environmental dynamics).

Blanks

The purpose of laboratory and field blanks is to check for artifacts and interferences that may arise during sampling and analysis.

Matrix Spikes

Samples are spiked with laboratory grade standards to detect interactive effects between the sample matrix and the analytes being measured. Matrix Spikes are reported as a percent recovery and are prepared for 1 in every 20 samples. Sample batches that contain less than 20 samples may be reported with a Matrix Spike from another batch. The percent recovery is calculated using the formula;

$$\frac{\text{(Spike Sample Result} - \text{Sample Result)}}{\text{Concentration of Spike Added}} \times 100$$

Acceptable recovery limits are 70% to 130%.

Surrogate Spikes

Samples are spiked with a known concentration of compounds that are chemically related to the analyte being investigated but unlikely to be detected in the environment. The purpose of the Surrogate Spikes is to check the accuracy of the analytical technique. Surrogate Spikes are reported as percent recovery.

Duplicates

Laboratory duplicates measure precision, expressed as Relative Percent Difference. Duplicates are prepared from a single field sample and analysed as two separate extraction procedures in the laboratory. The RPD is calculated using the formula where D1 is the sample concentration and D2 is the duplicate sample concentration:

$$\frac{(D1 - D2)}{\{(D1 + D2)/2\}} \times 100$$

APPENDIX D

(EPA Voluntary Remediation Agreement No. 26115)

Environment Protection Authority (EPA)

AGREEMENT NOT TO ISSUE ORDER DURING COMPLIANCE WITH A VOLUNTARY PROPOSAL

(Section 26 of the Contaminated Land Management Act 1997)

Agreement No.: 26115

Agreement Date: 3/4/2009

Area No.: 3263

This agreement relates to the attached proposal, which comprises three Parts: Part 1 – Preliminary Details; Part 2 – Undertakings; and Part 3 – Performance Schedule.

Proponent: The Shell Company of Australia Limited (ACN 46 004 610 459)

Site: The site comprises 14 Evans Avenue (SP3818), Eastlakes Reserve (Lot 1 DP565621), the section of Evans Avenue between Racecourse Place and Longworth Avenue, and the section of Evans Lane between SP45459 and SP3818.

Proposal Date: 26 March 2009

1. The EPA is satisfied that the terms of the proposal are appropriate.
2. The EPA notes for the purposes of section 26 of the *Contaminated Land Management Act 1997* (CLM Act) that the proponent has undertaken in writing to the EPA not to recover contributions under Part 3, Division 6 of the CLM Act in respect of implementation of the proposal.
3. The EPA agrees, in accordance with the provisions of Part 3 of the CLM Act, that it will not issue a remediation order against the proponent if and for so long as the proposal is complied with.
4. The EPA may issue a remediation order against the proponent in accordance with the CLM Act if the EPA is not satisfied that the proposal is being or has been complied with.
5. The EPA is not prevented by this agreement from making a remediation order against persons (whether or not they were originally parties to the proposal and including public authorities) other than the proponent.
6. The EPA is not prevented by this agreement from exercising its powers under the *Protection of the Environment Operations Act 1997* in relation to activities conducted in association with or under the proposal.
7. Each component of the proposal, as described in the proposal is to be completed by the date specified in the proposal. Failure to satisfactorily complete any component by the due date for that component may be taken as a failure to carry out the terms of the proposal for the purposes of section 27 of the CLM Act.
8. This agreement takes effect on the "Agreement Date" specified above and continues in effect subject to satisfactory performance and progress with implementation of the proposal.

Signed: 3/4/2009

NIALL JOHNSTON
Manager Contaminated Sites
Department of Environment and Climate Change (NSW)

VOLUNTARY REMEDIATION PROPOSAL UNDER CONTAMINATED LAND MANAGEMENT ACT 1997

Part 1

Preliminary Details

1. Proponent's Details

(a) Name and contact details

THE SHELL COMPANY OF AUSTRALIA LIMITED
ABN: 46004610459

Phone: 02 9897 8566
Fax: 02 9897 8373
Postal address: PO Box 63, Parramatta, NSW
Postcode: 2124
EPA licence number: NOT APPLICABLE

(b) Who the EPA should contact with technical enquiries about the proposal

The Shell Company of Australia Limited
Phone (business): (02) 9897 8566
Fax: (02) 9897 8373
Postal address: PO Box 63, Parramatta, NSW
Postcode: 2124

2. Land to which proposal applies

The land to which the proposal applies ("the site") is land to the south and southwest of the former Shell Rosebery Self Select Service Station located at 275-279 Gardeners Road, Rosebery. The site is known as:

Site Description	Address
SP3818	14 Evans Avenue (corner Racecourse place) (also referred to as Lot 5 Evans Avenue)
Lot 1 DP 565621	Eastlakes Reserve, corner of Evans Avenue and Longworth Avenue
	The section of Evans Avenue between Racecourse Place and Longworth Avenue
	The section of Evans Lane between SP45459 and SP3818

Remediation works and groundwater monitoring will be conducted at SP3818. Groundwater monitoring only will be conducted at the other land parcels listed above (as described in Part 3 of this document). The site and adjacent area are shown in the attached plan (Attachment 1).

3. The contamination

Data from the previous investigations completed in connection with the Shell Select Service Station site during the period 1995 to 2008 indicate that soil and groundwater contamination is present at the site. The substances of concern ("the contaminants") include:

- Total petroleum hydrocarbons (TPHs);
- Volatile aromatic compounds including benzene, toluene, ethylbenzene and xylenes (BTEX);
- Polycyclic aromatic hydrocarbons (PAHs); and
- Lead.

4. The remediation proposal

The remediation proposal ("the proposal") comprises:

a) the information set out above;
b) the actions, works and other components recommended in the following documents:
    - Site Audit Report, C.M. Jewell & Associates, May 2008;
c) the scope and activities set out in Part 2 of this document; and
d) the performance schedule set out in Part 3 of this document.

Signed by the propponent 26 March 2009

Part 2

Undertakings Included in Voluntary Remediation Proposal

THE PROPOSAL INCLUDES THE FOLLOWING UNDERTAKINGS:

General

1. All activities carried out in connection with the proposal including sampling and preparation of associated reports ("the activities") will be carried out in accordance with applicable guidelines made or approved under section 105 of the Contaminated Land Management Act 1997 (CLM Act). (See http://www.environment.nsw.gov.au/clm/guidelines.htm)
2. All remedial works will comply with relevant provisions of *State Environmental Planning Policy 55 – Remediation of Land, City of Botany Bay Development Control Plan No. 34, Contaminated Land* and any requirements imposed by these instruments in relation to the works.
3. All activities will be carried out in compliance with applicable NSW environmental legislation, and in particular:
    i) All the activities, including:
        (1) the processing, handling, movement and storage of materials and substances used to carry out the activities; and
        (2) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activities

        will be carried out in a competent manner;
    ii) All plant and equipment installed at the site or used in connection with the activities:
        (1) will be maintained in a proper and efficient condition; and
        (2) will be operated in a proper and efficient manner.
4. All the activities at the site will be carried out in a manner that prevents or minimises the emission of dust, odour and noise from the site.
5. Waste generated or stored at the site will be assessed and classified in accordance with the DECC's *Waste Classification Guidelines Part 1: Classifying Waste.*

    (See http://www.environment.nsw.gov.au/waste/envguidlns/index.htm)
6. All waste transported from the site that is required by the *Protection of the Environment (Waste) Regulation 2005* to be tracked must be tracked using the DECCs on-line tracking system or an alternative tracking system approved in writing by the DECC.

    (See http://www.environment.nsw.gov.au/waste/wastetracking.htm)

7. The proponent will, and acknowledges that the EPA may, make all documents and information relating to the activities available to the public free of charge.

8. The proponent will:

   i) prior to the implementation of the proposal provide for the EPA's approval a strategy for communicating about that implementation, particularly the actual remediation works, with members of the public who are likely to have a real interest in or be affected by that implementation and

   ii) implement the strategy as approved by the EPA.

Monitoring, Record Keeping & Reporting

9. At least until the EPA has notified the proponent that the EPA no longer considers that the contamination poses a significant risk of harm, record and retain all monitoring data and information and provide this record to the EPA at any reasonable time if so requested by the EPA and as specifically provided under the proposal.

10. The EPA will be informed in writing within 7 days of the proponent becoming aware of information or data indicating a material change in conditions at the site or in its surrounding environment which could adversely affect the prospects of successful investigation or remediation of the site or result in harm to the environment.

11. The EPA will be informed in writing within 7 days of the proponent becoming aware of any failure, either by the proponent or any other person, to comply with any component or aspect of the proposal.

12. The EPA will be informed in writing as soon as practicable of any notification by the proponent, its employees or its agents to an appropriate regulatory authority other than the EPA of any pollution incident at the site within the meaning of the *Protection of the Environment Operations Act 1997*.

    (See http://www.environment.nsw.gov.au/licensing/dutytonotify.htm)

Performance Schedule

13. The performance schedule which is in Part 3 of this document will be adhered to.

Signed by the proponent 26 March 2009

Part 3

Performance Schedule

1. Objectives of the proposal

The general objective of the proposal is:

O1 To take a course of actions that will facilitate remediation of the contaminants in soil and groundwater such that the residual petroleum hydrocarbon contamination in groundwater underlying the site does not pose an unacceptable risk of harm to human health or the environment.

The specific objectives of this proposal are to:

O2 Undertake pilot testing and remediation via in-situ oxygen-enhanced bioremediation in the areas subject to this proposal to reduce contaminant concentrations in the subsurface;

O3 Conduct groundwater monitoring to demonstrate a downward trend in contaminant concentrations; and

O4 Assess the risks to human health and the environment posed by any residual contamination detected at the completion of the remediation works and monitoring outlined in this proposal.

2. Principal features of the proposal

For reference, we note that the NSW Accredited Site Auditor (Chris Jewell) reported in May 2008 to the NSW Department of Environment and Climate Change (DECC) that, except as noted in the report, investigations, remediation, validation and plume monitoring on the former Service Station and "the site" were carried out in an adequate manner, and in accordance with appropriate guidelines. He also reported that the Service Station property had been validated to the required standard for residential land use and that there are no unacceptable risks associated with the remaining contamination. However, as he noted that residual off-site groundwater contamination remains, the Auditor could not exclude the possibility that unacceptable risks may be present at down-gradient receptors. The Auditor therefore recommended remedial actions and two years of additional groundwater monitoring activities.

In response to these recommendations, the proponent has agreed to provide the DECC with this Voluntary Remediation Proposal (VRP) to conduct remedial actions and monitoring at the site, in accordance with section 26 of the *Contaminated Land Management Act 1997* ("the CLM Act").

The principal features of the proposal include, but are not limited to the following:

P1 Communication strategy and consultation

Community consultations by informing the affected landowners and occupiers of the proposed remediation works. Updates on the progress of the remediation works are to be communicated with relevant authorities.

P2 Remediation

Pilot Trial

Conduct an initial groundwater monitoring event of select monitoring wells in order to establish baseline conditions. The monitoring event will be followed by an initial injection of in-situ oxygen-enhanced bioremediation compounds at three locations to be defined in the work plan and three additional rounds of monthly groundwater monitoring events at select wells. It is currently anticipated that monitoring wells MW12, MW14, MW15, MW16, MW17, MW40, MW43, MW44, MW46 and MW47 will be sampled during all groundwater monitoring events associated with the pilot trial.

Full Scale Remediation

It is anticipated that three additional injection events will be scheduled on a quarterly basis following the pilot trial. Based on the results of the pilot trial, additional injection locations may be added to expand the bioremediation program. Should the monthly groundwater monitoring events conducted as part of the pilot trail demonstrate a reduction of hydrocarbon concentrations, it may not be required to continue or expand the bioremediation program.

P3 Monitoring

Conduct eight quarterly groundwater monitoring events beginning with the final event of the pilot trial. This will ensure that at least four events are conducted following the bioremediation program to monitor for any potential rebound effects. Each monitoring event will consist of: (a) collecting samples from relevant monitoring wells (as per P2) and, (b) laboratory analysis for TPH, BTEX, lead, phenol, PAHs and natural attenuation parameters.

P4 Reporting

A Groundwater Remediation Pilot Trial Report will be prepared, detailing the results of the remediation trial and any recommendations for expanding the remediation program.

The two proposed Annual Validation Reports will outline what remedial and validation activities have been performed in that year, present results and discuss data trends and findings of the remediation and post remediation groundwater monitoring results with discussion that the objectives stated in this proposal have been achieved. The final validation report will include an assessment of the risks to human health and the environment posed by any residual contamination.

The proponent will engage an accredited Site Auditor to prepare a Site Audit Report (SAR) and accompanying Site Audit Statement (SAS) commenting on whether the objectives of this proposal have been met, including whether any residual contamination presents an unacceptable risk (including vapour risks) to human health or the environment.

3. Action requirements and reporting schedule

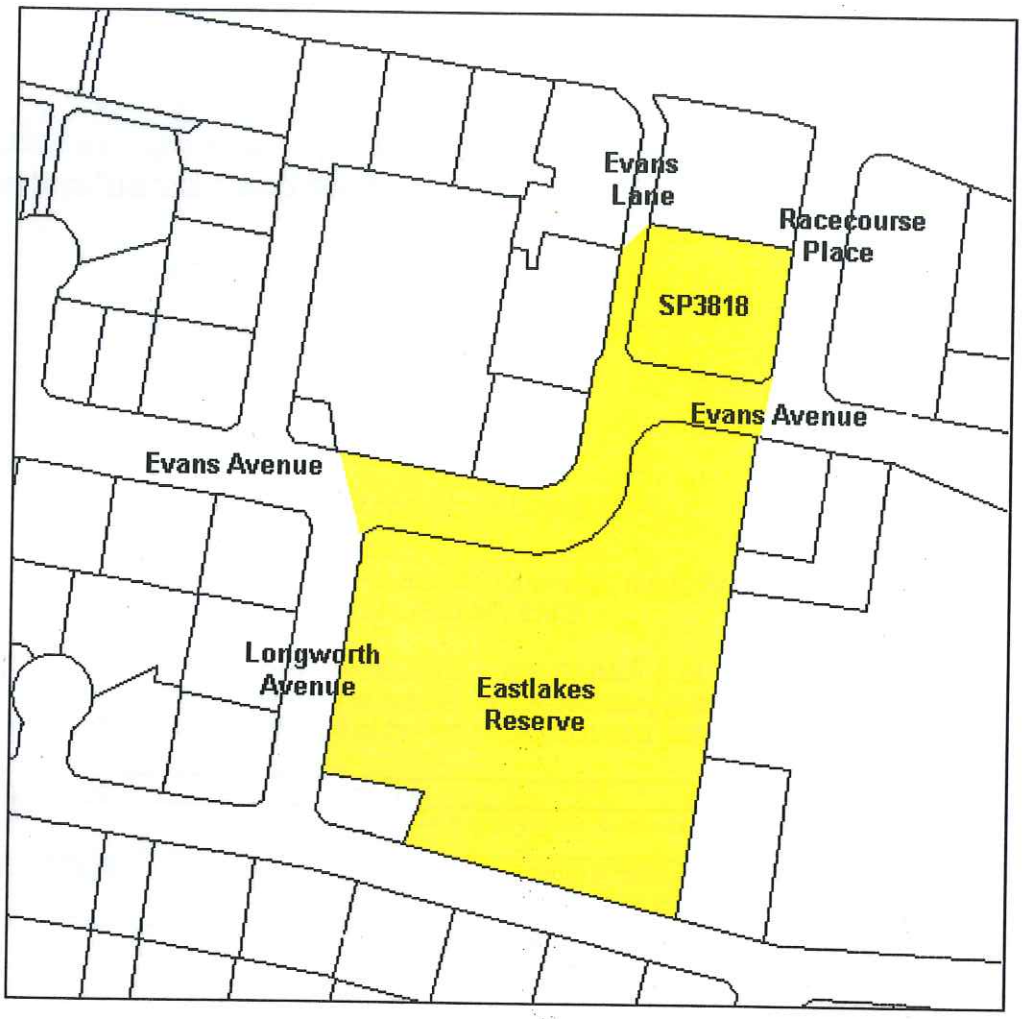
Action	*Deliverable*	*Date Estimate*
Communication strategy and consultation (P1)	None	As warranted throughout the proposed works
Prepare a detailed work plan for the proposed activities	Remedial Action Plan	Completed
Proponent to engage a Site Auditor to review the work plan, Pilot Trial Report, and Validation Reports, and to prepare a SAR and SAS.	Review letters forwarded to DECC	
Initial groundwater monitoring of select monitoring wells (P2 – Pilot Trial).	None	October 2008
SEPP55 Notification	Letter to Botany Bay City Council	
Injection of in-situ oxygen-enhanced bioremediation compounds at three locations (P2 - Pilot Trial).	None	April 2009
Three subsequent monthly groundwater monitoring events of select downgradient monitoring wells (P2 – Pilot Trial).	None	May, June and July 2009
Review pilot trial and expand the bioremediation program at additional locations as warranted (P2 - Full Scale Remediation).	None	September - October 2009
Groundwater Remediation Pilot Trial Report, detailing the results of the trial and any recommendations for expanding the remediation program.	Pilot Trial Report	October 2009
Continue quarterly (approximate) in-situ oxygen-enhanced bioremediation injection (P2 - Full Scale Remediation) and groundwater monitoring (P3) for one year (three events).	None	Injection: October 2009, January and April 2010 Monitoring: October 2009, January and April 2010 (prior to injection events)
Annual groundwater monitoring and remedial progress report (P4).	Annual Validation Report (Year 1)	June 2010
Conduct quarterly rebound groundwater monitoring for one year (four events) (P3).	None	July and October 2010, January and April 2011
Final Validation Report (P4), including an assessment of risks to human health and the environment.	Annual Validation Report (Year 2)	June 2011
Site Auditor to prepare a SAR and SAS.	SAR and SAS	September 2011

4. Key milestones for investigation, remediation and other actions

The key milestones for the project, including anticipated timelines and end points that are expected, are outlined in the table below.

Key Milestone	*Deadline*
Community Consultation (P1): Shell actively maintains the relationship with residents on an ongoing basis to facilitate discussion and access during sampling rounds.	Ongoing throughout the project
Endpoint of Pilot Trial (P2): Initial trial of remedial system will be undertaken from November 2008 to February 2009.	July 2009
Pilot Trial Report	October 2009
Endpoint of Full Scale Remediation (P2): Should results of ongoing groundwater monitoring show plume reduction, the requirement for ongoing remedial action may cease.	April 2010
Annual Groundwater Monitoring and Remedial Progress Report (P4):	June 2010
Endpoint of groundwater monitoring (P3): Quarterly groundwater monitoring will continue for an additional year (4 events) beyond the remediation program to assess the potential for rebound. Should it be demonstrated that contaminant concentrations exhibit a decreasing trend over that time, it is expected that regular monitoring may cease.	April 2011
Final Validation Report (P4)	June 2011
Site Audit Report and Site Audit Statement	September 2011

Signed by the proponent 26 March 2009



Land Subject to Voluntary Remediation Agreement No. 26115