APPENDIX E

WorkCover NSW Information

NSW GOVERNMENT | WorkCover

WorkCover NSW
92-100 Donnison Street, Gosford, NSW 2250
Locked Bag 2906, Lisarow, NSW 2252
T 02 4321 5000 F 02 4325 4145
WorkCover Assistance Service 13 10 50
DX 731 Sydney workcover.nsw.gov.au

Our Ref: D14/040431
Your Ref: Stephen McCormack

4 April 2014

Attention: Stephen McCormack
Geo-Environmental Engineering
82 Bridge St
Lane Cove NSW 2066

Dear Mr McCormack,

RE SITE: 175-177 Cleveland St Redfern NSW

I refer to your site search request received by WorkCover NSW on 1 April 2014 requesting information on licences to keep dangerous goods for the above site.

A search of the Stored Chemical Information Database (SCID) and the microfiche records held by WorkCover NSW has not located any records pertaining to the above mentioned premises.

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

Yours Sincerely

Brent Jones
Senior Licensing Officer
Dangerous Goods Team

APPENDIX F

NSW EPA Database Information

List of NSW Contaminated Sites Notified to EPA as of 14 February 2014

Background

In response to 2008 amendments to the *Contaminated Land Management Act 1997* (CLM Act) clarifying the Section 60 duty to report contaminated sites, the Environment Protection Authority (EPA) has received 1,063 notifications (as 14 February 2014) from owners or occupiers of sites where they believe the site is contaminated.

A strategy to systematically assess, prioritise and respond to these notifications has been developed by the EPA. This strategy acknowledges the EPA's obligations to make information available to the public under *Government Information (Public Access) Act 2009*.

When a site is notified to the EPA, it may be accompanied by detailed site reports where the owner has been proactive in addressing the contamination and its source. However, often there is minimal information on the nature or extent of the contamination.

For some notifications, the information indicates the contamination is securely immobilised within the site, such as under a building or carpark, and is not currently causing any offsite consequences to the community or environment. Such sites would still need to be cleaned up, but this could be done in conjunction with any subsequent building or redevelopment of the land. These sites may not require intervention under the CLM Act, but could be dealt with through the planning and development consent process.

Where indications are that the nominated site is causing actual harm to the environment or an unacceptable offsite impact (i.e. it is a "significantly contaminated site"), the EPA would apply the regulatory provisions of the CLM Act to have the responsible polluter and/or landowner investigate and remediate the site.

As such, the sites notified to the EPA and presented in the following table are at various stages of the assessment and/or remediation process. Understanding the nature of the underlying contamination, its implications and implementing a remediation program where required, can take a considerable period of time. The tables provide an indication, in relation to each nominated site, as to the management status of that particular site. Further detailed information may be available from the EPA or the responsible landowner.

The following questions and answers may assist those interested in this issue:

Frequently asked questions

What is the difference between the "List of NSW Contaminated Sites Notified to the EPA" and the "Contaminated Land: Record of Notices"?

A site will be on the Contaminated Land: Record of Notices only if the EPA has issued a regulatory notice in relation to the site under the *Contaminated Land Management Act 1997*.

The sites appearing on this "List of NSW contaminated sites notified to the EPA" indicate that the notifiers consider that the sites are contaminated and warrant reporting to the EPA. However, the contamination may or may not be significant enough to warrant regulation by the EPA. The EPA needs to review and, if necessary, obtain more information before it can make a determination as to whether the site warrants regulation.

Why my site appears on the list?

Your site appears on the list because of one or more of the following reasons:

- The site owner and/or the person partly or fully responsible for causing the contamination notified to the EPA about the contamination under Section 60 of the *Contaminated Land Management Act 1997*. In other words, the site owner or the "polluter" believes the site is contaminated.
- The EPA has been notified via other means and is satisfied that the site is or was contaminated.

Does the list contain all contaminated sites in NSW?

No. The list only contains contaminated sites that the EPA is aware of, with regard to its regulatory role under the CLM Act. An absence of a site from the list does not necessarily imply the site is not contaminated.

The EPA relies upon responsible parties to notify contaminated sites.

How are these notified contaminated sites managed by the EPA?

There are different ways that the EPA manages these notified contaminated sites. First, an initial assessment is carried out by the EPA. At the completion of the initial assessment, the EPA may take one or more than one of the following management approaches:

- The contamination warrants the EPA's direct regulatory intervention either under the *Contaminated Land Management Act 1997* or the *Protection of the Environment Operations Act 1997* (POEO Act), or both. Information about current or past regulatory action on this site can be found on EPA website.
- The contamination with respect to the current use or approved use of the site, as defined under the *Contaminated Land Management Act 1997,* is not significant enough that it warrants EPA regulation.
- The contamination does not require EPA regulation and can be managed by a planning approval process.
- The contamination is related to an operational Underground Petroleum Storage System, such as a service station or fuel depot. The contamination may be managed under the POEO Act and the Protection of the Environment Operation (Underground Petroleum Storage Systems) Regulation 2008.
- The contamination is being managed under a specifically tailored program operated by another agency (for example the Department of Industry and Investment's *Derelict Mines Program*).

I am the owner of a site that appears on the list. What should I do?

First of all, you should ensure the current use of the site is compatible with the site contamination. Secondly, if the site is the subject of EPA regulation, make sure you comply with the regulatory requirements, and you have considered your obligations to notify other parties who may be affected.

If you have any concerns, contact us and we may be able to offer you general advice, or direct you to accredited professionals who can assist with specific issues.

I am a prospective buyer of a site that appears on the list. What should I do?

You should seek advice from the vendor to put the contamination issue into perspective. You may need to seek independent expert advice.

The information provided in the list, particularly the EPA Site Management Class, is meant to be indicative only, and a starting point for your own assessment. Site contamination as a legacy of past site uses is not uncommon, particularly in an urbanised environment. If the contamination on a site is properly remediated or managed, it may not materially impact upon the intended future use of the site. However, each site needs to be considered in context.

List of NSW Contaminated Sites Notified to the EPA

Disclaimer

The EPA has taken all reasonable care to ensure that the information in the list of contaminated sites notified to the EPA (the list) is complete and correct. The EPA does not, however, warrant or represent that the list is free from errors or omissions or that it is exhaustive.

The EPA may, without notice, change any or all of the information in the list at any time.

You should obtain independent advice before you make any decision based on the information in the list.

The list is made available on the understanding that the EPA, its servants and agents, to the extent permitted by law, accept no responsibility for any damage, cost, loss or expense incurred by you as a result of:

1. any information in the list; or
2. any error, omission or misrepresentation in the list; or
3. any malfunction or failure to function of the list;
4. without limiting (2) or (3) above, any delay, failure or error in recording, displaying or updating information.

THE EPA Site Management Class	Explanation
A	The contamination of this site is being assessed by the EPA. Sites which have yet to be determined as significant enough to warrant regulation may result in no further regulation under the *Contaminated Land Management Act 1997*.
B	The EPA is awaiting further information to progress its initial assessment of this site.
C	The contamination of this site is or was regulated under the *Contaminated Land Management Act 1997*. Information about current or past regulatory action on this site can be found on the EPA website (www.epa.nsw.gov.au) - Environmental Issues - Contaminated Land - Record of EPA notices.
D	The contamination of this site is or was regulated under the *Protection of the Environment Operations Act 1997*. Information about current or past regulatory action on this site can be found on the EPA website (www.epa.nsw.gov.au) - Environmental Issues - Environment Protection Licences - POEO public register.
E	This is a premises with an operational Underground Petroleum Storage System, such as a service station or fuel depot. The contamination of this site is managed under the *Protection of the Environment Operations Act 1997* and the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2008.
F	The contamination of this site is managed by a planning approval process. The consent authority is either the local council or a government agency, such as the Department of Planning.
G	Based on the information made available to the EPA to date, the contamination of this site is considered by the EPA to be not significant enough to warrant regulatory intervention under the *Contaminated Land Management Act 1997*
H	Initial assessment completed. The contamination of this site is to be regulated by the EPA

Suburb/City	Site Description	Site Address	Activity that caused the contamination	s60 Form Received	EPA Initial Assessment	EPA Management Class
Ravensworth	Ravensworth Operations Narama Mine	Lemington Road	Other Industry	Yes	In progress	A
Ravensworth	Cumnock Colliery	Old New England Highway	Other Industry	Yes	In Progress	B
Raymond Terrace	Shell Coles Express Service Station	105 Pacific Highway	Service Station	Yes	In Progress	A
Raymond Terrace	Former Motor Registry	53 William Street	Other Petroleum	Yes	In progress	A
Raymond Terrace	Caltex Service Station	Cnr Adelaide & Glenelg Streets	Service Station	Yes	In progress	B
Redfern	Former Printing Works	101a Marriott St	Other Industry	yes	Completed	G
Redfern	BP Service Station	116 Regent Street	Service Station	Yes	In Progress	E
Revesby	Caltex Service Station	181 The River Rd	Service Station	Yes	In progress	B
Revesby	Dorf Clark Industries	184-194 Milperra Road	Metal Industry	No	Completed	G
Revesby	Mirotone	21 Marigold St	Chemical Industry	No	Completed	C
Revesby	Bituminous Products	33-35 Violet Street	Chemical Industry	No	Completed	C
Rhodes	Former Glad factory site	10-16 Marquet Street	Chemical Industry	No	Completed	G
Rhodes	Homebush Bay sediments adjoining former Berger Paint factory	Oulton Avenue	Chemical Industry	No	Completed	C
Rhodes	Former Allied Feeds site	Walker Street	Other Industry	No	Completed	C F
Rhodes	Former UCAL site	Walker Street	Chemical Industry	No	Completed	C F
Richmond	Caltex Service Station	98 March St	Service Station	Yes	In progress	B
Riverstone	7 Eleven Service Station	55 Garfield Road	Service Station	Yes	In Progress	A
Riverwood	7-Eleven Service Station	30 Bonds Road	Service Station	Yes	In progress	B
Rockdale	Mobil Service Station	239 West Botany Street	Service Station	Yes	In progress	B
Rockdale	7 Eleven Service Station	99 Railway Street	Service Station	Yes	In progress	B
Rooty Hill	Mobil Service Station	1042 Great Western Highway	Service Station	Yes	In progress	B
Rooty Hill	Mobil Service Station	106 Rooty Hill Road South	Service Station	Yes	In progress	B
Rose Bay	Caltex Service Station	488 Old South Head Rd	Service Station	Yes	In progress	B

APPENDIX G

Data Quality Objectives

INTRODUCTION

The Data Quality Objectives (DQOs) process was used to define the type, quantity and quality of the data needed to support decisions relating to the environmental condition of a site (reference G1). The process consists of seven steps, with the output from each step influencing the choices that will be made later in the process.

According to USEPA (reference G2), DQOs are qualitative and quantitative statements, derived from the first six steps of the process, that:

- ◊ Clarify the study objective;
- ◊ Define the most appropriate type of data to collect;
- ◊ Determine the most appropriate conditions from which to collect the data; and
- ◊ Specify tolerable limits on decision errors which will be used as the basis for establishing the quantity and quality of data needed to support the decision.

The DQOs are then used to develop a scientific and resource-effective data collection design.

STEP 1 - STATE THE PROBLEM

The problem is the potential for the site to be impacted by contamination caused by past activities undertaken on or adjacent to the site, at levels in excess of those permissible for the proposed residential land-use with minimal access to soil, and which could impact upon anticipated receiving environments and the intended purchase of the property.

STEP 2 - IDENTIFY THE DECISION STATEMENT

Identify contamination at the site which would pose an unacceptable risk as defined by relevant guidelines endorsed by the NSW Office of Environment and Heritage (reference G3, G4, G5) for the proposed residential land-use for the site and/or that would impact upon anticipated receiving environments.

STEP 3 - IDENTIFY INPUTS TO THE DECISION

The following information inputs are required to resolve the decision statement:

- ◊ Collection of environmental soil and groundwater samples using appropriate methods;
- ◊ Analysis of selected samples for the contaminants of concern;
- ◊ Comparison of the results with relevant Site Assessment Criteria (SAC) as defined in the main body of the report; and
- ◊ Accurate measurements of sample locations to allow for accurate mapping and contouring of contamination (if identified).

STEP 4 - DEFINE THE BOUNDARIES OF THE STUDY

The site covers a combined area of approximately 650m^2 and the following allotments:

- ◊ Lot 1 in Deposited Plan (DP) 1093304.
- ◊ Lot 1 in DP 724328.
- ◊ Lot 10 in DP 809537.
- ◊ Lot 15 in DP 57107.

The lateral extent of the study is the boundaries of the site (as depicted on **Figure 1**). The horizontal extent of the study is approximately 1m below ground surface (bgs), 0.5m into natural soils or drilling / excavation method refusal.

STEP 5 - DEVELOP A DECISION RULE

The purpose of this step is to define the parameter of interest, specify the action level, and integrate previous DQO outputs into a single "if…then…" statement that describes a logical basis for choosing among alternative actions.

The parameters of interest (or contaminants of concern) are a broad group of common contaminant compounds known to occur within the Sydney area.

The action level or Site Assessment Criteria (SAC) will be used to decide if the parameter represents an unacceptable risk for residential land-use and/or the receiving environment. If the measured concentration of a parameter or compound exceeds the action levels (SAC) in soils, then this is deemed to present an unacceptable risk if the site is developed for residential land-use or to environmental receptors.

If the concentrations of a parameter or compound, whichever is representative for of the site, are above the nominated action levels, then further sampling may be proposed to determine the extent of contamination.

STEP 6 - SPECIFY ACCEPTABLE LIMITS ON DECISION ERRORS

There are two types of errors:

1) Deciding that the site is acceptable for residential land-use and that there is a low risk to receiving environments when it actually is not. The consequence of this error may be unacceptable health risk for current and future users of the sites.

2) Deciding that the site is unacceptable for residential land-use and that there is a risk to receiving environments when it is acceptable. The consequence of this error is that the client will pay for further investigation / remediation that are not necessary.

The more severe consequences are with decision error (1) since the risk of jeopardising human health outweighs the consequences of paying more for remediation. It will not be possible to conduct statistical hypothesis tests as the proposed sampling programme consists of the collection of one round of samples only.

STEP 7 - OPTIMISING THE DESIGN FOR OBTAINING DATA

The purpose of this step is to identify a resource-effective data collection design for generating data that are expected to satisfy the DQOs.

The resource effective data collection design that is expected to satisfy the DQOs is described in detail in Section 7 of the report. To ensure the design satisfies the DQOs a comprehensive Quality Assurance and Quality Control Plan will be implemented.

References

G1. NSW DEC (2006) *Contaminated Sites: Guidelines for NSW Site Auditor Scheme, 2nd Edition.*

G2. USEPA, 2000: *Guidance for Data Quality Objectives Process*. EPA QA/G-4.

G3. NEPC, 2013: National Environment Protection Council (1999*).* National Environment Protection (Assessment of Site Contamination) Measure. *Schedule B(1) Guideline on the Investigation Levels for Soil and Groundwater.*

G4. Friebel & Nadebaum (2011): *Technical Report No. 10 - Health screening levels for petroleum hydrocarbons in soil and groundwater Part 1: Technical development document*. CRC for Contamination Assessment and Remediation of the Environment.

G5. ANZECC/ARMCANZ, 2000: Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, 2000: *Guidelines for Fresh and Marine Water Quality, National Water Quality Management Strategy*. October 2000.

APPENDIX H

Borehole Logs

Groundwater Well Log Report

Geo Environmental Engineering Pty Ltd
82 Bridge Street
Lane Cove NSW 2066
T 02 8964 6045

Hole ID. **BH1**
Hole Depth: **7.40 m**
Sheet: **1 of 1**

Project Name: **Stage 1 and 2 Environmental Site Assessment** Project Number: **E14002RED**
Location / Site: **175-177 Cleveland Street, Redfern** Client: **High Quality Building Pty Ltd**

Drilling Company: **Ground Technologies** Date Started: **1/05/2014** Ground Level: **RL22.8m** (approx)
Drill Method: **Solid Flight Auger - TC Bit** Date Completed: **1/05/2014** Easting: ----------
Equipment: **4WD Utility Rig** Northing: ----------

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests ID No.	Observations / Comments
							Surface: Asphalt				
Solid Flight Auger - TC Bit	▼	0.0	22.8			Fill	**FILL**- Asphalt, 40mm.	compacted	moist	SM010514 - 01 / 0.1-0.3m	slight hydrocarbon odour at 0.1 - 0.8m
							FILL- Sandy Gravel, Road Base, dark grey, fine to coarse grained sand and gravel.	compacted	moist	SM010514 - 02 / 0.5-0.7m	
		1.0	21.8				**FILL**- Sandy Gravel / Gravelly Sand, orange brown and brown, fine to coarse grained sand and gravel, with crushed sandstone and brick as well as some wood fragments.			SM010514 - 03 / 1.5-1.8m	
		2.0	20.8								concrete or rock boulder encountered at 2.7 - 2.9m
		3.0	19.8				**FILL**- Gravelly Silty Clay, grey / brown, low to medium plasticity, fine to coarse grained gravel, with some sand.	compacted	very moist	SM010514 - 04 / 2.9-3.0m	
					CL	Natural	**SILTY CLAY**- pale grey with red brown streaks, low to medium plasticity.	stiff	moist	SM010514 - 05 / 3.3-3.5m	
		4.0	18.8								
		5.0	17.8				**SHALE**- grey / brown, extremely weathered to distinctly weathered and estimated to be very low to low strength.			SM010514 - 06 / 5.0-5.3m	
							becoming dark grey.				
		6.0	16.8								
		7.0	15.8				**Hole Terminated at 7.40m** Target depth reached				
		8.0									

Well Details: 0.00 slotted PVC; 0.30 Gatic Cover with Concrete; 2.50 Bentonite; 3.20 Coarse Sand; 50mm Ø Screen; 7.20 Cave-in

Moisture	
D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments

Logged By: **Stephen McCormack** Date: **1/05/2014**
Checked By: **Stephen McCormack** Date: **13/05/2014**

GEE DAVIES BH LOG E14002RED.GPJ GEE.GDT 19/5/14 9:28:40 AM

Borehole Log Report

Geo Environmental Engineering Pty Ltd
82 Bridge Street
Lane Cove NSW 2066
T 02 8964 6045

Hole ID. **BH2**
Hole Depth: **3.00 m**
Sheet: **1 of 1**

Project Name: **Stage 1 and 2 Environmental Site Assessment** Project Number: **E14002RED**
Location / Site: **175-177 Cleveland Street, Redfern** Client: **High Quality Building Pty Ltd**

Drilling Company: **Ground Technologies** Date Started: **1/05/2014** Ground Level: **RL22.1m** (approx)
Drill Method: **Solid Flight Auger - TC Bit** Date Completed: **1/05/2014** Easting: ----------
Equipment: **4WD Utility Rig** Northing: ----------

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests ID No.	Observations / Comments
							Surface: Asphalt				
Solid Flight Auger - TC Bit		0.0	22.0			Fill	**FILL**- Asphalt, 40mm.	compacted	moist	SM010514 - 07/08 / 0.1-0.3m	
							FILL- Sandy Gravel, Road Base, dark grey, fine to coarse grained sand and gravel.	firm	moist	SM010514 - 09/10 / 0.5-0.7m	
		1.0	21.0				**FILL**- Sandy Clay, dark grey and brown, low plasticity, fine to medium grained sand, with some minor gravel.				
					CL	Natural	**Silty CLAY**- orange brown and slightly dark grey, low plasticity, with some fine to medium grained sand.	firm	moist	SM010514 - 11 / 1.3-1.5m	
		2.0	20.0		CH		**Silty CLAY**- orange brown and red brown, medium to high plasticty.	stiff	moist	SM010514 - 12/13 / 1.6-1.8m	
							becoming pale grey with red brown streaks from 2.2m.			SM010514 - 14 / 2.3-2.5m	
		3.0	19.0				**Hole Terminated at 3.00m** Target depth reached				
		4.0	18.0								
		5.0	17.0								
		6.0	16.0								
		7.0	15.0								
		8.0									

Moisture

D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments

Logged By: **Stephen McCormack** Date: **1/05/2014**
Checked By: **Stephen McCormack** Date: **13/05/2014**

GEE DAVIES BH LOG E14002RED.GPJ GEE.GDT 19/5/14 9:28:41 AM

Groundwater Well Log Report

Geo Environmental Engineering Pty Ltd
82 Bridge Street
Lane Cove NSW 2066
T 02 8964 6045

Hole ID. **BH3**
Hole Depth: **7.50 m**
Sheet: **1 of 1**

Project Name: **Stage 1 and 2 Environmental Site Assessment** Project Number: **E14002RED**
Location / Site: **175-177 Cleveland Street, Redfern** Client: **High Quality Building Pty Ltd**

Drilling Company: **Ground Technologies** Date Started: **1/05/2014** Ground Level: **RL22.4m** (approx)
Drill Method: **Solid Flight Auger - TC Bit** Date Completed: **1/05/2014** Easting: ----------
Equipment: **4WD Utility Rig** Northing: ----------

Method	Water Level	Depth (m)	RL (m)	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests ID No.	Observations / Comments
						Surface: Asphalt				
Solid Flight Auger - TC Bit	▼	0.0	22.4		Fill	**FILL**- Asphalt, 40mm.	compacted	moist	SM010514 - 15 / 0.1-0.2m	
						FILL- Sandy Gravel, Road Base, dark grey / brown, fine to coarse grained sand and gravel.	compacted	moist	SM010514 - 16 / 0.5-0.6m	
		1.0	21.4	SC		**FILL**- Gravelly Sand, dark grey and brown, fine to coarse grained sand and gravel, with some clay and crushed sandstone as well as glass and ceramic fragments.			SM010514 - 17 / 1.0-1.2m	
						Sandy CLAY- yellow brown, low plasticity, fine to medium grained sand.	firm	moist	SM010514 - 18 / 1.2-1.4m	
		2.0	20.4			**Silty CLAY**- red brown / orange brown, medium to high plasticty, with some fine to medium grained sand.	stiff	moist	SM010514 - 19 / 1.6-1.8m	
		3.0	19.4	CL	Natural	becoming pale grey with some red brown streaks.				
		4.0	18.4							
		5.0	17.4			**SHALE**- brown / grey, extremely weathered and estimated to be extremely low to very low strength.			SM010514 - 20 / 4.5-5.0m	
		6.0	16.4			becoming dark grey, becoming very low to low strength.				
		7.0	15.4							
		8.0				**Hole Terminated at 7.50m** Target depth reached				

Well Details: 0.00 Gatic Cover with Concrete; 0.50 Bentonite; 3.00; 3.90 Coarse Sand; 50mm Ø Screen; 7.40 Cave-in

Well Construction

Moisture

D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments

Logged By: **Stephen McCormack** Date: **1/05/2014**
Checked By: **Stephen McCormack** Date: **13/05/2014**

GEE DAVIES BH LOG E14002RED.GPJ GEE.GDT 19/5/14 9:28:42 AM

Borehole Log Report

Geo Environmental Engineering Pty Ltd
82 Bridge Street
Lane Cove NSW 2066
T 02 8964 6045

Hole ID. **BH4**
Hole Depth: **3.00 m**
Sheet: **1 of 1**

Project Name: **Stage 1 and 2 Environmental Site Assessment** Project Number: **E14002RED**
Location / Site: **175-177 Cleveland Street, Redfern** Client: **High Quality Building Pty Ltd**

Drilling Company: **Ground Technologies** Date Started: **1/05/2014** Ground Level: **RL22.5m** (approx)
Drill Method: **Solid Flight Auger - TC Bit** Date Completed: **1/05/2014** Easting: ----------
Equipment: **4WD Utility Rig** Northing: ----------

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests ID No.	Observations / Comments
							Surface: Asphalt				
Solid Flight Auger - TC Bit		0.0	22.5			Fill	**FILL**- Asphalt, 40mm.	compacted	moist	SM010514 - 21 / 0.1-0.3m	
			22.0				**FILL**- Sandy Gravel, Road Base, dark grey, fine to coarse grained sand and gravel.				
		1.0					**FILL**- Clayey Sand With Some Gravel, dark brown / brown, fine to coarse grained gravel, fine to coarse grained sand.	compacted	moist	SM010514 - 22/23 / 0.5-0.7m	
			21.0		CH	Natural	**Silty CLAY**- orange brown and red brown, medium to high plasticty.	stiff to very stiff	moist	SM010514 - 24 / 1.3-1.5m	
		2.0					becoming pale grey with red brown streaks from 2.2m.			SM010514 - 25 / 2.2-2.5m	
		3.0	20.0				**Hole Terminated at 3.00m** Target depth reached				
		4.0	19.0								
		5.0	18.0								
		6.0	17.0								
		7.0	16.0								
		8.0	15.0								

Moisture

D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments

Logged By: **Stephen McCormack** Date: **1/05/2014**
Checked By: **Stephen McCormack** Date: **13/05/2014**

Groundwater Well Log Report

Geo Environmental Engineering Pty Ltd
82 Bridge Street
Lane Cove NSW 2066
T 02 8964 6045

Hole ID. **BH5**
Hole Depth: **7.50 m**
Sheet: **1 of 1**

Project Name: **Stage 1 and 2 Environmental Site Assessment** Project Number: **E14002RED**
Location / Site: **175-177 Cleveland Street, Redfern** Client: **High Quality Building Pty Ltd**

Drilling Company: **Ground Technologies** Date Started: **1/05/2014** Ground Level: **RL19.2m** (approx)
Drill Method: **Solid Flight Auger - TC Bit** Date Completed: **1/05/2014** Easting: ----------
Equipment: **4WD Utility Rig** Northing: ----------

Depth (m)	RL (m)	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Sample ID No.	DCP blows/100mm	Observations / Comments
				Surface: Concrete					
0.0	19.0		Fill	**FILL**- Concrete, 110mm.					
				FILL- Sand, pale grey brown, fine to coarse grained, with a trace of clay.	firm to stiff	moist	SM010514 - 26 / 0.1-0.2m		
1.0	18.0	SC		**Sandy CLAY**- mid brown / orange brown, low plasticity, fine to medium grained.		moist	SM010514 - 27/28 / 0.2-0.4m		
				Silty CLAY- orange brown and red brown, medium to high plasticty.	stiff to very stiff	moist	SM010514 - 29 / 1.3-1.5m		
2.0	17.0			becoming red to pale grey.					
					very stiff		SM010514 - 30 / 2.4-2.6m		DCP terminated at 2.6m, very slow to progress
3.0	16.0			becoming predominantly pale grey.					
4.0	15.0	CH	Natural				SM010514 - 31 / 4.0-4.3m		
5.0	14.0								
6.0	13.0								
7.0	12.0			**SHALE**- grey / brown, extremely weathered and estimated to be extremely low to very low strength.			SM010514 - 32 / 7.0-7.5m		
8.0				**Hole Terminated at 7.50m** Target depth reached					

Method: Solid Flight Auger - TC Bit
Water Level: ▼ 2.6m

Well Details: 0.00 Gatic Cover with Concrete; 0.50 Bentonite; 3.00; 3.90 Coarse Sand; 50mm Ø Screen; 7.00 Cave-in

Well Construction

Moisture

D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments

Logged By: **Stephen McCormack** Date: **1/05/2014**
Checked By: **Stephen McCormack** Date: **13/05/2014**

GEE DAVIES BH LOG E14002RED.GPJ GEE.GDT 19/5/14 9:28:44 AM

Borehole Log Report

Geo Environmental Engineering Pty Ltd
82 Bridge Street
Lane Cove NSW 2066
T 02 8964 6045

Hole ID. **BH6**
Hole Depth: **1.10 m**
Sheet: **1 of 1**

Project Name: **Stage 1 and 2 Environmental Site Assessment** Project Number: **E14002RED**
Location / Site: **175-177 Cleveland Street, Redfern** Client: **High Quality Building Pty Ltd**

Drilling Company: **Geo Environmental Engineering** Date Started: **1/05/2014** Ground Level: **RL18.9m** (approx)
Drill Method: **Hand Auger** Date Completed: **1/05/2014** Easting: ----------
Equipment: **Manual** Northing: ----------

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests ID No.	Samples / Tests DCP blows/100mm	Observations / Comments
							Surface: Concrete				5 10	
Hand Auger						Fill	**FILL**- Concrete, 80mm.					
					SC	Natural	**Sandy CLAY**- mid brown / orange brown, low plasticity, fine to medium grained.	stiff	moist	SM010514 - 33 / 0.1-0.2m		
							becoming predominantly pale grey with red mottling.			SM010514 - 34 / 0.5-0.6m		
		1.0	18.0									
							Hole Terminated at 1.10m Target depth reached			SM010514 - 35 / 1.0-1.1m		
		2.0	17.0									DCP terminated at 2.3m, very slow to progress
		3.0	16.0									
		4.0	15.0									

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Moisture	
D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments

Logged By: **Stephen McCormack** Date: **1/05/2014**
Checked By: **Stephen McCormack** Date: **13/05/2014**

Borehole Log Report

Geo Environmental Engineering Pty Ltd
82 Bridge Street
Lane Cove NSW 2066
T 02 8964 6045

Hole ID. **BH7**
Hole Depth: **0.90 m**
Sheet: **1 of 1**

Project Name: **Stage 1 and 2 Environmental Site Assessment** Project Number: **E14002RED**
Location / Site: **175-177 Cleveland Street, Redfern** Client: **High Quality Building Pty Ltd**

Drilling Company: **Geo Environmental Engineering** Date Started: **1/05/2014** Ground Level: **RL20.2m** (approx)
Drill Method: **Hand Auger** Date Completed: **1/05/2014** Easting: ----------
Equipment: **Manual** Northing: ----------

Method	Depth (m)	RL (m)	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests ID No.	Observations / Comments
					Surface: Concrete				
Hand Auger		20.0		Fill	**FILL**- Concrete, 130mm.				
					FILL- Gravelly Sand, dark brown / dark grey, fine to coarse grained sand and gravel, with large fragments of brick up to 150mm thick and a trace of silt.		moist	SM010514 - 42 / 0.2-0.3m	
					FILL- Gravelly Sandy Clay, dark brown / dark grey, low to medium plasticity, fine to medium grained sand and gravel.		moist	SM010514 - 43 / 0.5-0.6m	
			SC	Natural	**Sandy CLAY**- orange brown, low to medium plasticity, fine to medium grained.	firm	moist	SM010514 - 44 / 0.8-0.9m	
	1.0	19.0			**Hole Terminated at 0.90m** Target depth reached				
	2.0	18.0							DCP terminated at 2m
	3.0	17.0							
	4.0								

DCP blows/100mm: 5, 10

Moisture	
D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments

Logged By: **Stephen McCormack** Date: **1/05/2014**
Checked By: **Stephen McCormack** Date: **13/05/2014**

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Borehole Log Report

Geo Environmental Engineering Pty Ltd
82 Bridge Street
Lane Cove NSW 2066
T 02 8964 6045

Hole ID. **BH8**
Hole Depth: **1.10 m**
Sheet: **1 of 1**

Project Name: **Stage 1 and 2 Environmental Site Assessment** Project Number: **E14002RED**
Location / Site: **175-177 Cleveland Street, Redfern** Client: **High Quality Building Pty Ltd**

Drilling Company: **Geo Environmental Engineering** Date Started: **1/05/2014** Ground Level: **RL20.2m** (approx)
Drill Method: **Hand Auger** Date Completed: **1/05/2014** Easting: **----------**
Equipment: **Manual** Northing: **----------**

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests ID No.	Observations / Comments
							Surface: Concrete			
Hand Auger			20.0			Fill	**FILL**- Concrete, 150mm.			
							FILL- Gravelly Sand, dark brown / dark grey, fine to coarse grained sand and gravel, with large fragments of brick up to 150mm thick and a trace of silt.	moist	SM010514 - 36/37 / 0.2-0.3m	
		1.0					**FILL**- Gravelly Sandy Clay, dark brown / dark grey, medium plasticity, fine to medium grained sand and gravel.	moist	SM010514 - 38 / 0.5-0.6m	
			19.0				**Practical Hand Auger Refusal at 1.10m** Refusal likely caused by slab of concrete		SM010514 - 39 / 1.0-1.1m	
		2.0	18.0							
		3.0	17.0							
		4.0								

Moisture

D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments

Logged By: **Stephen McCormack** Date: **1/05/2014**
Checked By: **Stephen McCormack** Date: **13/05/2014**

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Borehole Log Report

Geo Environmental Engineering Pty Ltd
82 Bridge Street
Lane Cove NSW 2066
T 02 8964 6045

Hole ID. **BH9**
Hole Depth: **0.55 m**
Sheet: **1 of 1**

Project Name: **Stage 1 and 2 Environmental Site Assessment** Project Number: **E14002RED**
Location / Site: **175-177 Cleveland Street, Redfern** Client: **High Quality Building Pty Ltd**

Drilling Company: **Geo Environmental Engineering** Date Started: **1/05/2014** Ground Level: **RL20.4m** (approx)
Drill Method: **Hand Auger** Date Completed: **1/05/2014** Easting: ----------
Equipment: **Manual** Northing: ----------

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests ID No.	Observations / Comments
							Surface: Wooden floor boards over concrete			
Hand Auger							gap between floor boards and underlying concrete slab.			
			20.0			Fill	**FILL**- Concrete, 250mm.			
							FILL- Gravelly Sand, pale brown / brown, fine to coarse grained sand and gravel, with large fragments of brick up to 150mm thick and a trace of silt.	moist	SM010514 - 40/41 / 0.5-0.6m	
		1.0					**Practical Hand Auger Refusal at 0.55m** Refusal likely caused by slab of concrete			
			19.0							
		2.0								
			18.0							
		3.0								
			17.0							
		4.0								

Moisture

D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments

Logged By: **Stephen McCormack** Date: **1/05/2014**
Checked By: **Stephen McCormack** Date: **13/05/2014**

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APPENDIX I

Quality Assurance Assessment Report

I1. INTRODUCTION

A detailed Quality Assurance (QA) assessment, including the analysis of Quality Control (QC) samples, was carried out by GEE to determine the reliability of field procedures and analytical results.

I2. QUALITY ASSURANCE

Quality Assurance (QA) involves all of the actions, procedures, checks and decisions undertaken to ensure the representativeness and integrity of samples and accuracy and reliability of analysis results (reference I1).

In accordance with AS4482.1 (reference I2), a series of QA procedures were integrated within the sampling and analysis plan and included:

- ◊ The collection of Quality Control (QC) samples.
- ◊ The use of standardised field sampling forms developed by GEE.
- ◊ Documentation of calibration and use of field instruments.

To ensure QA in the field, samples were collected by experienced and trained personnel using appropriate methods detailed herein, including appropriate sample handling, containment and transport, and calibrated equipment. Additionally QC samples were collected and analysed as discussed in Section I3.

To ensure QA in the laboratory, GEE used laboratories that are NATA accredited for the analytical tests carried out, therefore it is reasonable for GEE to rely on the laboratories to be proficient in all tests conducted. This encompasses all actions, procedures, checks and decisions undertaken, to ensure the accuracy and reliability of the analysis results. As part of the laboratory QA, QC samples were analysed with each batch of samples as part of this investigation as required by NATA. A discussion of the laboratory QC samples analysed as part of this investigation is provided in Section I3.3.2.

I3. QUALITY CONTROL

QC involves those parts of QA which serve to monitor and measure the effectiveness of QA procedures. QC samples assess sample integrity, accuracy and precision and can be separated into field and laboratory QC.

I3.1 DEFINITIONS

Table I1 provides a description and objective of each of the field and laboratory QC samples used during this investigation.

Table I1: QC Sample Types, Descriptions and Recommended Frequency of Analysis

Type	Description	Purpose	Recommended Frequency
	FIELD QC SAMPLES		
Blind Replicate	A sample collected at the same time and from the same sampling point as the corresponding primary sample[1], and analysed at the same laboratory. Blind replicates are collected, preserved, stored, transported and analysed in the same manner as the primary sample, with the laboratory having no knowledge of the source of the replicate sample. The assessment of blind replicates samples is undertaken by calculating the Relative Percent Difference (RPD) which is defined as: $RPD\ (\%) = 100 \times \frac{\text{Result No. 1} - \text{Result No. 2}}{\text{Mean Result}}$	Used to evaluate total sampling and analysis precision and, in the case of soil samples, sample variability.	In accordance with AS4482.1 (reference I2) and NEPM (reference I3) it is recommended that 1 blind replicate sample is collected for every 20 primary samples.
Split Duplicate	A sample collected at the same time and from the same sampling point as the corresponding primary sample, and analysed at a separate laboratory. Split duplicates are collected, preserved, stored, transported and analysed in the same manner as the primary sample, with the laboratories having no knowledge of the purpose of the sample. The assessment of split duplicates samples is undertaken by calculating the Relative Percent Difference (RPD) which is defined as: $RPD\ (\%) = 100 \times \frac{\text{Result No. 1} - \text{Result No. 2}}{\text{Mean Result}}$	Used to provide a check on the analytical proficiency of the laboratories and hence precision and comparability.	In accordance with AS4482.1 (reference I2) and NEPM (reference I3) it is recommended that 1 split duplicate sample is collected for every 20 primary samples.
Rinsate	This is a sample of distilled or de-ionised water poured over the surface of a decontaminated piece of sampling equipment and collected in appropriate laboratory supplied sample containers. The sample is then analysed for contaminants of concern analysed as part of the investigation.	Provides an assessment of potential cross contamination of chemicals from sampling equipment caused by inadequate decontamination procedures.	In accordance with AS4482.1 – (reference I2) one rinsate sample should be collected each day per piece of sampling equipment and.

[1] Primary samples are the original representative samples of soil or groundwater collected for analysis to determine aspects of their chemical composition. Primary samples are the original sample taken from a particular location and other samples from the same location are duplicates, replicates or splits.

Table I1 Continued

Type	Description	Purpose	Recommended Frequency
Trip Blank	Trip blanks are laboratory supplied test samples of analyte-free media (either washed sand or de-ionised water) which remain in the sample storage eskies during sampling activities and returned to the laboratory unopened. For soil sampling programmes, the trip blank consists of acid-washed quartz sand that has been heated to 400ºC. For water sampling programs trip blanks comprise pre-washed glass vials containing distilled or de-ionised water with appropriate preservatives. The USEPA has shown that cross-contamination only occurs with volatile organics (reference I4), therefore, trip blanks are only analysed for volatile organics.	Used to measure cross-contamination during sampling, transport, sample preparation and analysis.	Industry standard is 1 trip blank per batch of primary samples.
Trip Spike	Trip spikes, like trip blanks, are supplied by the primary laboratory using analyte-free media (either washed sand or de-ionised water) and remain in the sample storage eskies during sampling activities and returned to the laboratory unopened. The sample media, however, is spiked with BTEX. For water sampling programmes the BTEX concentration is known and standardised by each laboratory, while for soil sampling programmes the exact spike concentration is not known, rather two identical jars of sand are spiked the same concentration with one sample becoming the trip-spike and the other becoming a control sample, which remains in a refrigerator at the laboratory. The trip spike is analysed after returning from the field and the % recovery of the known spike (for water sampling programs), or of the control sample (for soil sampling programs), is calculated.	Used to monitor VOC losses during transit.	Industry standard is 1 trip spike per batch of primary samples where volatile concentrations are being measured.

Table I1 Continued

Type	Description	Purpose	Recommended Frequency
	LABORATORY QC SAMPLES		
Laboratory Duplicate	Laboratory duplicates are field samples which are prepared and analysed in the same manner twice. The assessment of laboratory duplicates is undertaken by calculating the (RPD) which is defined as: $RPD\ (\%) = 100 \times \frac{\text{Result No. 1 – Result No. 2}}{\text{Mean Result}}$	Determines analytical precision for a sample batch	NATA specifies 1 per 10 samples for trace element and inorganic analysis
Laboratory Control Sample (LCS)	Laboratory Control Samples (LCS) are analyte-free matrices (de-ionised water or clean sand) spiked with a known concentration of target analytes and carried through the entire preparation and analysis. Assessment of LCS is undertaken by calculating the percent recovery (%R) of the spike which is defined as: $\text{Percent Recovery (\%R)} = 100 \times \frac{\text{Spikes Sample Result (SSR) – Sample Result (SR)}}{\text{Concentration of Spike Added (SA)}}$	Determines analytical accuracy and precision for a batch of samples	NATA specifies 1 per batch of up to 20 samples
Surrogates	Surrogates are organic compounds added to field samples and laboratory QC samples prior to preparation. They are similar in chemical behaviour to the target analytes and are not expected to be present in samples.. form part of the laboratory QC for organic analyses, and are used to indicate the presence of sample specific interferences. The surrogate is added at the extraction stage then analysed with the batch of samples. Like LCSs, surrogates are assessed by calculating the percent recovery (%R), although the definition is slightly different as shown below: $\text{Percent Recovery (\%R)} = 100 \times \frac{\text{Spiked Sample Result (SSR)}}{\text{Concentration of Spike Added (SA)}}$	Used to demonstrate that the surrogate does not interfere with the target analytes, therefore determines analytical accuracy for each sample	Added to every blank, field and laboratory QC sample
Matrix Spikes	Field samples spiked with a known concentration of a target analytes and carried through the entire preparation and analysis. Matrix spike samples are assessed by calculating the percent recovery (%R) of the spike which is defined as: $\text{Percent Recovery (\%R)} = 100 \times \frac{\text{Spikes Sample Result (SSR) – Sample Result (SR)}}{\text{Concentration of Spike Added (SA)}}$	Determine the effects of matrix interferences on analytical accuracy of a sample.	Performed at least 1 per batch of up to 20 samples.
Method Blank	Method blanks are an analyte-free matrices (reagent water or clean sand) that is carried through the entire preparation and analysis.	Establishes that laboratory contamination does not cause false positives.	Prepared with every batch of up to 20 samples for all organic and inorganic analyses.

I3.2 CRITERIA / ACCEPTABLE RANGE

The QC Acceptance Criteria adopted for this investigation is provided in Table I2 and is in general accordance with the Table 4 of AS4482.1 (reference I2) and NEPM (reference I3).

Table I2: QC Sample Acceptance Criteria

QC Sample	Criteria / Acceptable Range
FIELD QC SAMPLES	
Blind Replicate & Split Duplicate	RPD < 50 % When average concentration is > 10 x LOR/PQL[2] RPD < 75 % When average concentration is 5 to 10 x LOR/PQL RPD < 100 % When average concentration is< 5 x LOR/PQL
Rinsate	Analytical Result < LOR/PQL
Trip Blank	Analytical Result < LOR/PQL
Trip Spike	± 30%
LABORATORY QC SAMPLES	
Laboratory Duplicates	RPD < 30 % When average concentration is > 10 x LOR/PQL RPD < 50 % When average concentration is 4 to 10 x LOR/PQL RPD < 100 % When average concentration is< 4 x LOR/PQL
Laboratory Control Samples	%R of 70 – 130% (General analytes) %R of 50 – 130% (Phenols) %R of 60 – 130% (OCP/OPPs) %R of 62 – 130% (Chromium)
Surrogates	%R of 70 – 130% (General analytes) %R of 50 – 130% (Phenols) %R of 60 – 130% (OCP/OPPs)
Matrix Spikes	%R of 70 – 130% (General analytes) %R of 50 – 130% (Phenols) %R of 60 – 130% (OCP/OPPs) %R of 62 – 130% (Chromium)
Method Blanks	Analytical Results < LOR/PQL

If data do not meet the QC Acceptance Criteria then a judgement is made as to whether the exceedance is critical in relation to the suitability of the data set. Otherwise the following steps will be taken:

- ◊ Request that the laboratory re-check or even re-analyse the sample.
- ◊ Inspect the sample for anomalies which may be causing the failure.
- ◊ If necessary, undertake additional sampling and analyses.

[2] Both the LOR and PQL are interchangeable terms used by laboratories and is defined as the lowest concentration that can be reliably achieved within specific limits of precision and accuracy during routine laboratory operating conditions (reference I5).

I3.3 RESULTS

I3.3.1 Field QC Samples

Field QC samples collected and analysed as part of this investigation comprised:

Soil Sampling

- ◊ Two blind replicates (SM010514-08 and SM010514-28)
- ◊ One trip blank (labelled 'trip blank')
- ◊ One trip spike (labelled 'trip spike')
- ◊ One rinsate blank (from the hand auger).

Note: Two split duplicates were sent to a secondary laboratory (ALS) however, the samples were misplaced during transit.

Water Sampling

- ◊ One trip blank (labelled 'trip blank')
- ◊ One trip spike (labelled 'trip spike')

A split duplicate and blind replicate sample was not collected during the groundwater sampling event due to the small number of samples analysed.

Tabulated results are presented at the conclusion of this Appendix. Table I3 and I4 provides a summary of the frequency of QC samples and lists results which do not meet the criteria established in Table I2.

Table I3: QC Sample Acceptance Criteria - Soil

Type	Frequency Conducted	Results Not Meeting the Criteria
Blind Replicates	Metals - 2 per 21 samples (9.5%)	--
	TRH/BTEX - 1 per 13 samples (7.7%)	--
	PAHs - 1 per 11 samples (9.1%)	--
Trip Blank	1 per sample batch	--
Trip Spike	1 per sample batch	--
Rinsate	1 from the hand auger taken on 1 May 2014	--

Table I4: QC Sample Acceptance Criteria - Water

Type	Frequency Conducted	Results Not Meeting the Criteria
Trip Blank	1 per sample batch	--
Trip Spike	1 per sample batch	--

The quality control results all conformed to the sample acceptance criteria.

I3.3.2 Laboratory QC

Laboratory QC results are provided in the laboratory reports while a summary of the results which exceeded the acceptance criteria is provided in Table I5.

Table I5: QC Sample Acceptance Criteria

Type	Results Exceeding Criteria
Laboratory Duplicates	--
Laboratory Control Samples	--
Surrogates	--
Matrix Spikes	--
Method Blanks	--

I4. DATA QUALITY ASSESSMENT

In accordance with reference I6, Data Quality Indicators (DQIs), specifically, precision, accuracy, representativeness, completeness and comparability, were used to assess the reliability of field procedures and analytical results.

I4.1 PRECISION

This is the measure of the variability (or reproducibility) of the data. In the field precision is achieved by using standard operating procedures which were adopted by GEE during this investigation. For laboratory analysis precision is assessed using blind replicates and trip spikes. The measured RPDs for the blind replicate samples and split samples were considered acceptable as were the analytical results for the trip spike.

I4.2 ACCURACY

Accuracy is a measure of the closeness of a measurement to the true parameter value. In the field, accuracy is achieved by using standard operating procedures which were adopted by GEE. For laboratory analysis, accuracy is assessed using tip blanks, rinsate blanks, method blanks, matrix spikes, surrogates and laboratory control samples. Considering that these QC samples were of an acceptable standard, GEE considers the laboratory data set to be accurate.

I4.3 REPRESENTATIVENESS

This is the confidence (expressed qualitatively) that the data are representative of each media present on the site. This is achieved in the field and laboratory by using an adequate number of sampling points to characterise the site and ensuring that the samples collected were representative of the media from which they were collected. Additionally, samples should be analysed within necessary holding times depending on the analyte.

Environmental samples were collected from each borehole in general accordance with techniques described in Australian Standards AS4482.1 (reference I2) AS4482.2 (reference I7) and NEPM (reference I1), to maintain the representativeness and integrity of the samples. The number of sampling points exceeded the minimum required sampling density as defined by NSW EPA (reference I8), however, were considered sufficient for the purpose of this investigation.

Finally all samples were analysed within holding times.

I4.4 COMPLETENESS

This is a measure of whether all the data necessary to meet the project objectives, were collected. In the field and laboratory, this is achieved by

sampling all critical locations and depths using acceptable methods and ensuring samples are analysed for appropriate chemicals.

GEE selected sufficient a sufficient number of sample points for the purpose of the investigation as defined by the NSW EPA (reference I8). Additionally, samples were analysed for chemicals of concern based on appropriate field screening measures and logging of unusual aesthetics which may indicate contamination. Combined with the fact that standard operating procedures were adopted by GEE, the investigation is assessed as being complete.

I4.5 COMPARABILITY

This is a measure of confidence that data may be considered to be equivalent for each sampling and analysis event. Soil samples were collected by experienced GEE personnel using standard operating procedures and analysed in accordance with NATA accredited laboratory methods. The comparability of the data should be consistent as sampling protocols were employed throughout the duration of the fieldwork and analysis was undertaken by NATA registered laboratories using accredited analytical methods.

I5. CONCLUSION

A review of the DQIs indicates that the field procedures and analytical results adopted for this investigation are able to be relied upon for making conclusions and recommendations regarding the contamination status of the site.

References

I1. *NEPC, 1999: National Environment Protection Council (1999). National Environment Protection (Assessment of Site Contamination) Measure. Schedule B(2) Data Collection, Sample Design and Reporting.*

I2. *Australian Standard AS4482.1 – 2005: Guide to the sampling and investigation of potentially contaminated soil Part 1: Non-volatile and semi-volatile compounds.*

I3. *NEPC, 1999: National Environment Protection Council (1999). National Environment Protection (Assessment of Site Contamination) Measure.*

Schedule B(3) Guideline of Laboratory Analysis of Potentially contaminated Soils.

I4. *Keith, 1991: Environmental sampling and Analysis, A practical guide. Lewis Publishers.*

I5. *Popek (2003). Sampling and Analysis of Environmental Chemical Pollutants. Academic Press.*

I6. *NSW DEC (2006) Contaminated Sites: Guidelines for NSW Site Auditor Scheme, 2nd Edition.*

I7. *Australian Standard AS4482.2 – 1999: Guide to the sampling and investigation of potentially contaminated soil Part 2: Volatile substances.*

I8. *NSW EPA, 1995: Environment Protection Authority NSW, 1995: Contaminated Sites: Sampling Design Guidelines, EPA NSW.*

SOIL - Blind Replicate Results

			Sample Date	1/05/2014	7/03/2014	RPD	1/05/2014	1/05/2014	RPD
			Sample Identification	**SM010514-07**	**SM010514-08**		**SM010514-27**	**SM010514-28**	
Analyte	Units	LOR							
Total Metals				Envirolab	Envirolab		Envirolab	Envirolab	
Arsenic	mg/kg	4		8	6	29%	<4	<4	--
Cadmium	mg/kg	0.5		1	1	0%	<0.4	<0.4	--
Chromium	mg/kg	1		18	14	25%	8	8	0%
Copper	mg/kg	1		120	85	34%	2	2	0%
Lead	mg/kg	1		2200	1600	32%	12	12	0%
Mercury	mg/kg	0.1		0.5	0.3	50%	<0.1	<0.1	--
Nickel	mg/kg	1		13	12	8%	1	1	0%
Zinc	mg/kg	1		1700	1200	34%	10	13	26%
Polycyclic Aromatic Hydrocarbons									
Naphthalene	mg/kg	0.1		--	--	--	<0.1	<0.1	--
Acenaphthylene	mg/kg	0.1		--	--	--	<0.1	<0.1	--
Acenaphthene	mg/kg	0.1		--	--	--	<0.1	<0.1	--
Fluorene	mg/kg	0.1		--	--	--	<0.1	<0.1	--
Phenanthrene	mg/kg	0.1		--	--	--	<0.1	<0.1	**--**
Anthracene	mg/kg	0.1		--	--	--	<0.1	<0.1	**--**
Fluoranthene	mg/kg	0.1		--	--	--	<0.1	<0.1	--
Pyrene	mg/kg	0.1		--	--	--	<0.1	<0.1	--
Benz(a)anthracene	mg/kg	0.1		--	--	--	<0.1	<0.1	--
Chrysene	mg/kg	0.1		--	--	--	<0.1	<0.1	--
Benzo(b&k)fluoranthene	mg/kg	0.2		--	--	--	<0.2	<0.2	--
Benzo(a)pyrene	mg/kg	0.05		--	--	--	<0.05	<0.05	--
Indeno(1.2.3.cd)pyrene	mg/kg	0.1		--	--	--	<0.1	<0.1	--
Dibenz(a.h)anthracene	mg/kg	0.1		--	--	--	<0.1	<0.1	--
Benzo(g.h.i)perylene	mg/kg	0.1		--	--	--	<0.1	<0.1	--
TOTAL PAHs	mg/kg	0.1		--	--	--	--	--	--
BTEX									
Benzene	mg/kg	0.2		--	--	--	<0.2	<0.2	--
Toluene	mg/kg	0.5		--	--	--	<0.5	<0.5	--
Ethylbenzene	mg/kg	0.5		--	--	--	<1	<1	--
meta- & para-Xylene	mg/kg	0.5		--	--	--	<2	<2	--
ortho-Xylene	mg/kg	0.5		--	--	--	<1	<1	--
Total Petroleum Hydrocarbons									
C6 - C9 Fraction	mg/kg	10		--	--	--	<25	<25	--
C10 - C14 Fraction	mg/kg	50		--	--	--	<50	<50	--
C15 - C28 Fraction	mg/kg	100		--	--	--	<100	<100	--
C29 - C36 Fraction	mg/kg	100		--	--	--	<100	<100	--

Values in Bold Indicate: RPD > 50 % When average concentration is > 10 x LOR
RPD > 75 % When average concentration is 5 to 10 x LOR
RPD > 100 % When average concentration is< 5 x LOR

SOIL - Trip Blank Results

Laboratory:		Envirolab 109344
Date		1-May-14 ##
Sample ID		**Trip Blank**
Analyte	Units	
BTEX		
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
meta- & para-Xylene	mg/kg	<2
ortho-Xylene	mg/kg	<1
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	mg/kg	<25
C10 - C14 Fraction	mg/kg	--
C15 - C28 Fraction	mg/kg	--
C29 - C36 Fraction	mg/kg	--

Notes:

--- Not Analysed

SOIL - Trip Spike Results

Laboratory:		Envirolab
Laboratory Report Number:		1409344
Sample ID		**Spike Recovery**
Analyte	Units	
BTEX		
Benzene	mg/kg	93%
Toluene	mg/kg	98%
Ethylbenzene	mg/kg	103%
meta- & para-Xylene	mg/kg	101%
ortho-Xylene	mg/kg	105%

Notes:

--- Not Analysed

SOIL - Rinsate Results

Laboratory:			Envirolab
Date:			1-May-14
Sample ID			**Rinsate**
Analyte	Units	LOR	
Total Metals			
Arsenic	mg/L	0.05	<0.05
Cadmium	mg/L	0.01	<0.01
Chromium	mg/L	0.01	<0.01
Copper	mg/L	0.01	<0.01
Lead	mg/L	0.03	<0.03
Nickel	mg/L	0.02	<0.02
Zinc	mg/L	0.02	<0.02
Mercury	mg/L	0.0001	<0.0005
BTEX			
Benzene	µg/L	1	<1
Toluene	µg/L	1	<1
Ethylbenzene	µg/L	1	<1
meta- & para-Xylene	µg/L	2	<2
ortho-Xylene	µg/L	1	<1
Total Petroleum Hydrocarbons			
C6 - C9 Fraction	µg/L	10	<10
C10 - C14 Fraction	µg/L	50	<50
C15 - C28 Fraction	µg/L	100	<100
C29 - C36 Fraction	µg/L	100	<100

Notes:

--- Not Analysed

Note 1: Results in **BOLD** indicate detection above the Limit of Reporting

WATER - Trip Blank Results

Laboratory:			Envirolab 109532
Date			7-Mar-14
Sample ID			**Trip blank**
Analyte	Units	LOR	
BTEX			
Benzene	µg/L	1	<1
Toluene	µg/L	5	<1
Ethylbenzene	µg/L	2	<1
meta- & para-Xylene	µg/L	2	<2
ortho-Xylene	µg/L	2	<1
Total Petroleum Hydrocarbons			
C6 - C9 Fraction	µg/L	20	<10

7/03/2014

Notes:

--- Not Analysed

WATER - Trip Spike Results

Laboratory:			Envirolab 109532
Laboratory Report Number:			7-Mar
Sample ID			**Spike Recovery**
Analyte	Units	LOR	
BTEX			
Benzene	mg/kg	0.2	103%
Toluene	mg/kg	0.5	108%
Ethylbenzene	mg/kg	0.5	104%
meta- & para-Xylene	mg/kg	0.5	103%
ortho-Xylene	mg/kg	0.5	105%

Notes:

--- Not Analysed