

GTE796-Stage 2
31 March 2016

Yang Lan
3 King Street
Concord West

By email:
Yanglan11@hotmail.com

RE: STAGE 2 CONTAMINATION ASSESSMENT at No. 3 King Street, Concord West, NSW.

This letter presents a Detailed Contamination report on the inspection and testing services associated with the contamination assessment undertaken at the above project.

Should you have any questions related to this report please do not hesitate to contact the undersigned.

For and on behalf of
Ground Technologies Pty Ltd

Reviewed By



J. Harendran
Geotechnical Engineer



A. Bennett
Senior Geotechnical Engineer

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EXECUTIVE SUMMARY

This executive summary presents a synopsis of the Stage 2 Contamination Report for the site; No.3 King Street, Concord West, NSW.

The objective of the Stage 2 Contamination Report was to ascertain whether the site presents a risk to human health and/or the environment arising from any past/present activities at the site. The scope of work included a review of the stage 1 contamination assessment, site investigation, chemical analyses of fourteen (14) soil samples and the preparation of this report.

A Stage 1 Preliminary Site Contamination Assessment has been prepared by geo-environmental engineering, referenced report E15030CW-R01F. The historical information indicated that the existing industrial development was constructed circa 1953 and since then, the site has been used for the manufacturing of electrical products, followed by fabrication of glass and aluminium products.

Based upon the site history the main sources of contamination include;

- Former use as an electrical part manufacturing facility, may have resulted in “top down” intrusions of oils during the machinery operations. However concrete pavement / floor slab across the site would have mitigated any migration of contaminants into the ground and therefore the risk of contamination is considered low.
- Former use as a glass and aluminium product fabrication facility, may have resulted in “top down” intrusions of oils during the machinery operations. However concrete pavement / floor slab across the site would have mitigated any migration of contaminants into the ground and therefore the risk of contamination is considered low.
- Past Development of the site specifically the potential for contaminated fill.

The guidelines produced by NSW EPA, 1995 ‘Sampling Design Guidelines for Contaminated Sites’, state that a minimum of seven (7) sampling locations is required for a site with an area of between 1,000m² and 2,000m². As part of this investigation, seven (7) boreholes were drilled across the site in an approximate square grid pattern (see Figure 2). Samples were recovered at depths of approximately 0.3m, 0.6m and 1.0m within the natural soil profile to determine if the potential contamination identified within the Stage 1 Preliminary Site Contamination Assessment had leached into the underlying soil profile. Samples were also recovered from within the fill profile when it was encountered within the borehole.

To assess the risk to human health the results of the laboratory analysis are compared against the Health Investigation Levels (HIL) for the exposure setting; “Residential B” – Residential with minimum opportunities for soil access such as high rise buildings and apartments.

The laboratory test results indicate;

- The fill material, approximately 0.1-1.2m in thickness across the site, has contaminant levels within tolerance limits under a ‘Residential B’ setting.
- The natural material, has contaminant levels within tolerance limits under a ‘Residential B’ setting.

It is anticipated that fill materials will be excavated and removed as part of the proposed development. This material should be disposed of as General Solid Waste as per the Waste Classification Guidelines published by the NSW EPA (2014). The underlying natural soils may be disposed of as a VENM.

The results of the chemical analyses indicate that the site does not present a risk to human health or the environment in a “Residential B” – Residential with minimum opportunities for soil access such as high rise buildings and apartments setting.

1.0 INTRODUCTION

Ground Technologies Pty Ltd have undertaken a Stage 2 Contamination Assessment with full testing and analysis as requested by Yang Lan of 3 King Street, Concord West. It is understood that the proposed development will comprise the construction of a mixed use commercial / residential development within the subject site incorporating a basement level requiring between 3.0 to 6.0m of excavation. The site is currently used for industrial purposes and will be re-zoned.

2.0 SCOPE OF WORK

The following scope of work was conducted:

- Review of the Stage 1 Preliminary Site Contamination Assessment prepared by Geo-environmental engineering, referenced report E15030CW-R01F.
- Site Inspection by a Geotechnical Engineer to ascertain current activities, and any visible signs of contamination.
- Collection of soil samples by a Geotechnical Engineer according to a sampling plan.
- Chemical analysis by a NATA accredited laboratory.
- Assessment of the results of the chemical analysis against the appropriate guidelines.
- Preparation of the Stage 2 Contamination Report.

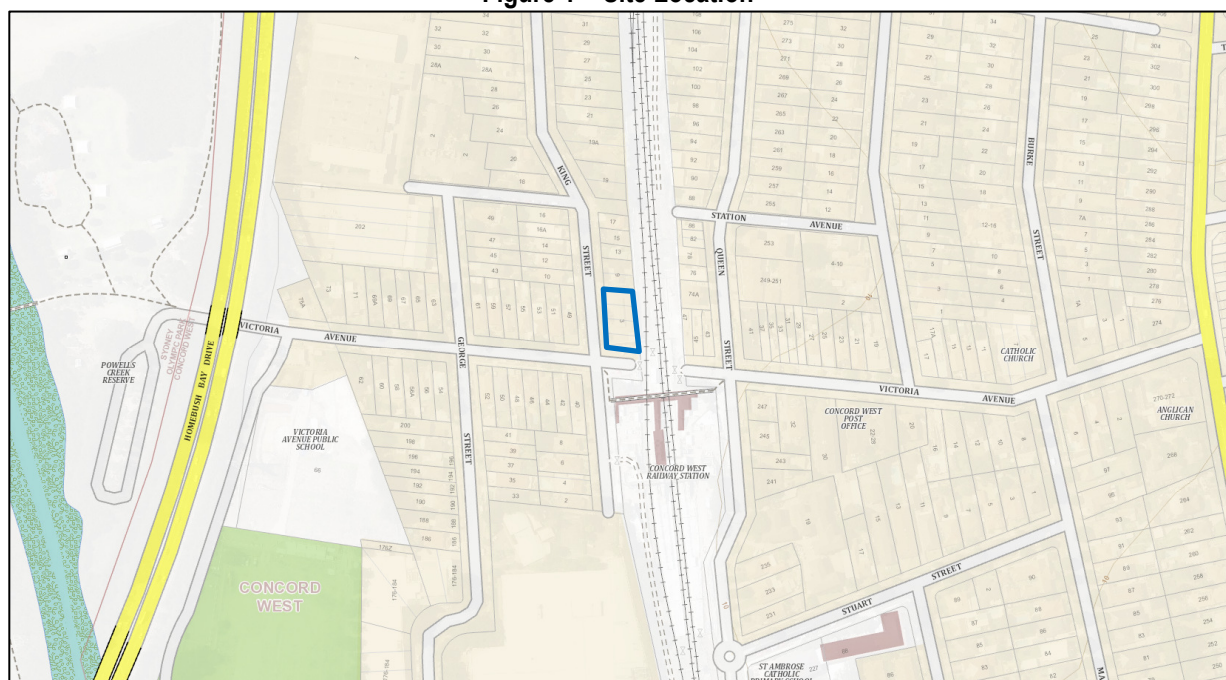
3.0 SITE DESCRIPTION

The following information, presented in Table 1, describes the site.

Table 1: Summary of Site Details

Site Address	3 King Street, Concord West, NSW
Lot & Plan No.	Lot 89 & 91 DP88392 Lot 88 & 90 DP60683
Council Area	Canada Bay Council

Figure 1 – Site Location



The subject site is located at the north-east corner of the intersection between King Street and Victoria Avenue, in Concord West NSW. The site is bounded to the south and west by a paved parking area and King Street, respectively, to the north by a residential property and to the west by a rail corridor. Concord West railway station is located 30m to the south-east of the site.

The site currently contains a brick warehouse and adjoining two storey office. The two storey part of the building is being used as a residential building, whereas the warehouse is used to hold human health supplement products.

Photograph 1 – Industrial Warehouse



Photograph 2 – Inside Warehouse



4.0 PREVIOUS SITE INVESTIGATION

A Stage 1 Preliminary Site Contamination Assessment has been prepared by geo-environmental engineering, referenced report E15030CW-R01F. The historical information indicated that the existing industrial development was constructed circa 1953 and since then, the site has been used for the manufacturing of electrical products, followed by fabrication of glass and aluminium products.

Based upon the site history the main sources of contamination include;

- Former use as an electrical part manufacturing facility, may have resulted in “top down” intrusions of oils during the machinery operations. However concrete pavement / floor slab across the site would have mitigated any migration of contaminants into the ground and therefore the risk of contamination is considered low.
- Former use as a glass and aluminium product fabrication facility, may have resulted in “top down” intrusions of oils during the machinery operations. However concrete pavement / floor slab across the site would have mitigated any migration of contaminants into the ground and therefore the risk of contamination is considered low.
- Past Development of the site specifically the potential for contaminated fill.

In summary, potential contamination for Heavy Metals, Total Petroleum Hydrocarbons (TPH), BTEX and Polynuclear Aromatic Hydrocarbons (PAH) exists within the subject site.

5.0 FIELD INVESTIGATION, SAMPLING & ANALYSIS PLAN AND SAMPLING METHODOLOGY

5.1 Sampling Points

Sampling and analysis was undertaken in order to assess the nature, location and likely distribution of any contamination present at the subject site, and also any potential risk posed to human health or the environment.

The guidelines produced by NSW EPA, 1995 ‘Sampling Design Guidelines for Contaminated Sites’, state that a minimum of seven (7) sampling locations is required for a site with an area of between 1,000m² and 2,000m². As part of this investigation, seven (7) boreholes were drilled across the site in an approximate square grid pattern (see Figure 2). Samples were recovered at depths of approximately 0.3m, 0.6m, 1.0m and 1.8m to determine if the potential contamination identified within the Stage 1 Preliminary Site Contamination Assessment had leached into the underlying soil profile. Samples were also recovered from within the fill profile when it was encountered within the borehole.

5.2 Sampling Methodology

Each sample location was excavated utilizing a hand auger or solid flight auger mount drill rig. The sample was collected from the auger using a stainless steel trowel, which had been decontaminated prior to use to prevent cross contamination occurring. The samples were placed in 250g laboratory prepared glass jars which were capped using Teflon-sealed screw caps and then placed in a chilled container. The sample jars were transported to our West Hoxton office and placed in a refrigerator. The samples were forwarded to Australian Laboratory Services Pty Ltd (ALS) for analysis along with a Chain of Custody which was subsequently returned to confirm the receipt of all samples.

5.3 Field Investigation

A site investigation was conducted on 9th and 14th of March 2016. The field observations are summarised in the table below:

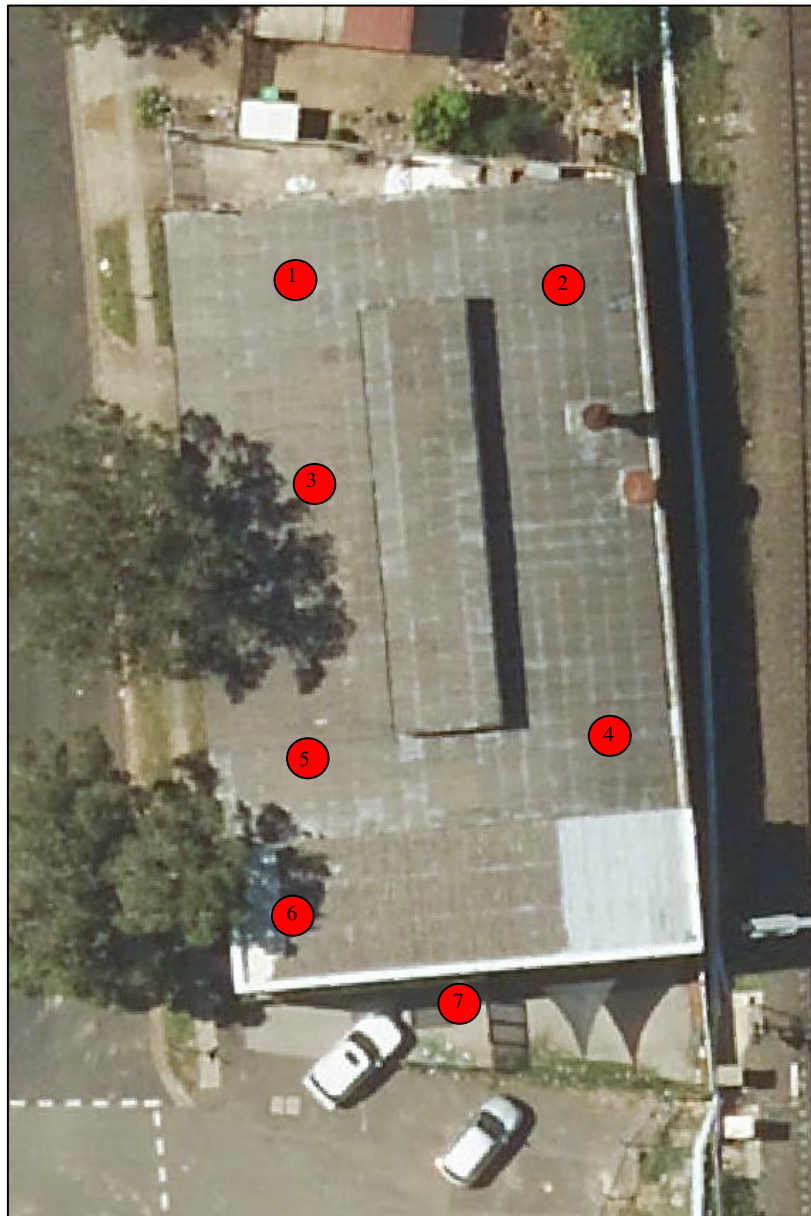
Table 2 - Summary of Field Observations

Parameter	Observation
Visible observations on soil contamination	No visible evidence of contamination was observed. No staining of the soils or odours were documented.
Signs of plant stress	None observed.
Presence of drums, fill or waste materials	None observed.
Presence of fill	Fill was observed within the site. No details of origin available.

5.4 Soil Profiles

Fieldwork was undertaken on 9th and 14th of March 2016 and included five boreholes using a 4WD Toyota Landcruiser Ute mounted drill rig with 100 mm solid flight spiral augers and two boreholes by hand auger, at locations shown on Figure 2. Borehole logs are summarized below and full borehole logs are supplied within Appendix A.

Figure 2 – Borehole Locations



Four (3) distinct geological units were encountered during the field investigation. These units are detailed in Table 3 and the approximate depth of the top of each unit is detailed in Table 4. Full borehole logs are available in Appendix A.

Table 3 - Summary of Geological Units

UNIT	SOIL TYPE
UNIT A	PAVEMENT: Concrete, observed to be in good condition, and Road-base type gravel
UNIT B	FILL: Admixed Silty CLAY, brown
UNIT C	NATURAL: Silty CLAY, red-brown, orange-brown, pale grey and red.
UNIT D	BEDROCK: SHALE/SILTSTONE, completely weathered to slightly weathered, brown, grey.

Table 4 - Depth of each Geological Unit

Unit	Borehole and Intercept Depth (m)						
	BH1	BH2	BH3	BH4	BH5	BH6	BH7
UNIT A	0.0-0.25	0.0-0.25	0.0-0.25	0.0-0.2	0.0-0.2	0.0-0.25	0.0-0.1
UNIT B	0.25-1.2	0.25-1.0	0.25-1.0	0.2-0.5	0.2-1.0	0.25-0.8	0.1-0.2
UNIT C	1.2-2.0	1.0-2.0	1.0-2.0	0.5-1.3	1.0-1.8	0.8-1.2	0.2-1.2
UNIT D	-	-	-	1.3-1.5	1.8-4.5	-	-

5.5 Groundwater

No Groundwater was encountered to a depth of 4.5m during the course of the investigation. Therefore, the risk of surficial contaminants reaching ground water is low.

No long term groundwater monitoring was undertaken as a part of this investigation.

5.6 Laboratory Accreditation

Australian Laboratory Services (ALS) are accredited by the National Association of Testing Authorities (NATA) for the analyses carried out and are also accredited for compliance with ISO/IEC 17025.

5.7 Laboratory Blank Results

During each analytical method reagents are carried through the preparation/extraction/ digestion procedure. A reagent blank is prepared and analysed with every batch of samples plus with each new batch of solvent prior to use to ensure that there are no interferences with the test results. The reported blank concentrations were below the relevant PQL/LOR.

5.8 Laboratory Control Standards

A known matrix spiked with compound(s) representative of the target analytes is used to document the laboratories performance. This is known as the Laboratory Control Standard (LCS). The LCS is analysed with the sample batch and the resultant concentrations reported as a percentage recovery of the expected concentration. The results from the LCS analysis met the acceptance criteria.

5.9 Laboratory Blank Results

During each analytical method reagents are carried through the preparation/extraction/ digestion procedure. A reagent blank is prepared and analysed with every batch of samples plus with each new batch of solvent prior to use to ensure that there are no interferences with the test results. Blank samples were analysed by Australian Laboratory Services (ALS) for metals, PAH and TPH. The reported blank concentrations were below the relevant PQL/LOR.

5.10 Laboratory Control Standards

A known matrix spiked with compound(s) representative of the target analytes is used to document the laboratories performance. This is known as the Laboratory Control Standard (LCS). The LCS is analysed with the sample batch and the resultant concentrations reported as a percentage recovery of the expected concentration. At Australian Laboratory Services (ALS), the LCS was analysed for the same suite of analytes as the submitted samples (heavy metals, PAH & TPH) and the results from the LCS analysis met the acceptance criteria.

6.0 BASIS FOR ASSESMENT CRITERIA

The subject site has been used for industrial purposes. The possible sources of contamination of these procedures could be from Heavy Metals, Total Petroleum Hydrocarbons (TPH), BTEX and Polynuclear Aromatic Hydrocarbons (PAH). The risk of surficial contaminants reaching ground water or natural water courses is low.

Analysis of the laboratory test results will be broken into two classes; Fill and Natural soils. The Assessment criteria used in this investigation have been obtained from the National Environment Protection (Assessment of Site Contamination) Measure (NEPM, 1999 amended 2013). This document presents risk-based Health Investigation Levels based on a variety of exposure settings for a number of organic and inorganic contaminants. To assess the risk to human health the results of the laboratory analysis are compared against the Health Investigation Levels (HIL) for the exposure setting; "Residential B" – Residential with minimum opportunities for soil access such as high rise buildings and apartments. The selected assessment criteria used in this assessment are summarized in table 5:

Table 5 - Site Assessment Criteria

Contaminant	Health Based Investigation Level (HIL'B')	Soil HSL I	ESL	Management Limits
METALS				
Arsenic	500	-	-	-
Cadmium	150	-	-	-
Chromium	500	-	-	-
Copper	30,000	-	-	-
Lead	1,200	-	-	-
Mercury	120	-	-	-
Nickel	1,200	-	-	-
Zinc	60,000	-	-	-
TPH, BTEX, PAH – Fine Grained Material				
C6-C10	-	40	180	800
C10-C16	-	230	120	1,000
C16-C34	-	-	1,300	5,000
C34-C40	-	-	5,600	10,000
Benzene	-	0.6	65	-
Toulene	-	390	105	-
Ethylbenzene	-	-	125	-
Xylenes	-	40	45	-
Total PAH	400	-	-	-
Benzo(a)pyrene	-	-	0.7	-
Carcinogenic PAH	4	-	-	-

7.0 LABORATORY TEST RESULTS – CONTAMINATION ASSESSMENT

Test results are tabulated and presented in tables 6 and 7 along with the relevant assessment criteria. Areas in bold highlighting have exceeded the site threshold values. Laboratory test certificates (ES1605662) are located in Appendix B.

Table 6 - Laboratory Test Results of the Fill Material

Location			Metals								Hydrocarbons										
Sample No.	Borehole	Depth (m)	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	C6-C10	C10-C16	C16-C34	C34-C40	Benzene	Toulene	Ethylbenzene	Xykses	Total PAH	Carcinogenic PAH	Benzo(a)pyrene
S1	TS1	0.7	16	<1	32	71	331	0.3	11	172	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	2.0	<0.5	<0.5
S5	TS2	0.5	17	<1	28	73	417	0.3	10	223	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	4.0	<0.5	<0.5
S9	TS3	0.5	10	<1	36	25	264	<0.1	10	105	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	1.4	<0.5	<0.5
S12	TS4	0.4	10	<1	28	25	199	0.2	7	129	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
S16	TS7	0.1	7	<1	20	16	47	<0.1	6	17	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	>0.5	<0.5	<0.5
S20	TS5	0.6	14	<1	33	24	262	>0.1	11	67	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	>0.5	<0.5	<0.5
S24	TS6	0.5	9	<1	27	18	39	<0.1	8	21	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	>0.5	<0.5	<0.5
Site Threshold (HIL & HSL)			500	150	500	30,000	1,200	120	1,200	60,000	40	230	-	-	0.6	390	-	40	400	4	-
Site Threshold (ESL)			-	-	-	-	-	-	-	-	180	120	1,300	5,600	65	105	125	45	-	-	0.7
Site Threshold (Management)			-	-	-	-	-	-	-	-	800	1,000	5,000	10,000	-	-	-	-	-	-	-

Table 7 - Laboratory Test Results for the Natural Soils

Location			Metals								Hydrocarbons										
Sample No.	Borehole	Depth (m)	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	C6-C10	C10-C16	C16-C34	C34-C40	Benzene	Toulene	Ethylbenzene	Xykses	Total PAH	Carcinogenic PAH	Benzo(a)pyrene
S2	TS1	1.4	14	<1	17	13	19	<0.1	2	16	<10	<10	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
S6	TS2	1.2	11	<1	31	26	80	<0.1	8	41	<10	<10	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
S10	TS3	1.2	9	<1	36	19	29	<0.1	7	8	<10	<10	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
S13	TS4	0.7	7	<1	22	22	22	<0.1	2	<5	<10	<10	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
S17	TS7	0.4	11	<1	34	23	33	<0.1	8	13	<10	<10	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
S21	TS5	1.2	9	<1	33	25	29	<0.1	6	7	<10	<10	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
S25	TS6	1.0	9	<1	28	23	24	<0.1	4	5	<10	<10	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Site Threshold (HIL & HSL)			500	150	500	30,000	1,200	120	1,200	60,000	40	230	-	-	0.6	390	-	40	400	4	-
Site Threshold (ESL)			-	-	-	-	-	-	-	-	180	120	1,300	5,600	65	105	125	45	-	-	0.7
Site Threshold (Management)			-	-	-	-	-	-	-	-	800	1,000	5,000	10,000	-	-	-	-	-	-	-

7.1 Discussion of Laboratory Test Results

Within the fill profile, the heavy metal and hydrocarbon levels were less than the relevant assessment criteria. Therefore, the heavy metal and hydrocarbon concentrations present in the natural soil profile are not considered likely to pose a risk to human health or the environment under a 'Residential B' setting.

Within the natural soil profile, the heavy metal and hydrocarbon levels were less than the relevant assessment criteria. Therefore, the heavy metal and hydrocarbon concentrations present in the natural soil profile are not considered likely to pose a risk to human health or the environment under a 'Residential B' setting.

8.0 CONCLUSIONS AND RECOMMENDATIONS

The conclusions of this Contamination Report are as follows:

- the existing industrial development was constructed circa 1953 and since then, the site has been used for the manufacturing of electrical products, followed by fabrication of glass and aluminium products

Based upon the site history the main sources of contamination include;

- Former use as an electrical part manufacturing facility, may have resulted in "top down" intrusions of oils during the machinery operations. However concrete pavement / floor slab across the site would have mitigated any migration of contaminants into the ground and therefore the risk of contamination is considered low.
- Former use as a glass and aluminium product fabrication facility, may have resulted in "top down" intrusions of oils during the machinery operations. However concrete pavement / floor slab across the site would have mitigated any migration of contaminants into the ground and therefore the risk of contamination is considered low.
- Past Development of the site specifically the potential for contaminated fill.

The laboratory test results indicate;

- The fill material, approximately 0.1-1.2m in thickness across the site, has contaminant levels within tolerance limits under a 'Residential B' setting.
- The natural material, has contaminant levels within tolerance limits under a 'Residential B' setting.

The results of the chemical analyses indicate that the site **does not** present a risk to human health or the environment in a "Residential B" – Residential with minimum opportunities for soil access such as high rise buildings and apartments setting.

It is anticipated that fill materials will be excavated and removed as part of the proposed development. The excavated material should be disposed of as per section 9.0 of this report.

9.0 WASTE CLASSIFICATION

9.1 Fill Materials

The Assessment criteria used in this investigation have been obtained from the Specific Contaminant Concentrations from Table 1 of Part 1: Classifying Waste, Waste Classification Guidelines published by the NSW EPA (2014).

Table 8 - Chemical Analysis of the Fill Material – Waste Classification

Location			Metals						Hydrocarbons							
Sample No.	Borehole	Depth	Arsenic	Cadmium	Chromium	Lead	Mercury	Nickel	C6-C9	C10-C40	Benzene	Toulene	Ethylbenzene	Xyleses	Total PAH	Benzo(a)pyrene
S1	TS1	0.7	16	<1	32	331	0.3	11	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5
S5	TS2	0.5	17	<1	28	417	0.3	10	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5
S9	TS3	0.5	10	<1	36	264	<0.1	10	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5
S12	TS4	0.4	10	<1	28	199	0.2	7	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5
S16	TS7	0.1	7	<1	20	47	<0.1	6	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5
S20	TS5	0.6	14	<1	33	262	>0.1	11	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5
S24	TS6	0.5	9	<1	27	39	<0.1	8	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5
General Solid Waste Criteria			100	20	100	100	4	40	650	10000	10	288	600	1000	200	0.8
Restricted Solid Waste Criteria			400	80	400	400	16	160	2600	40000	40	1152	2400	4000	800	3.2
Classification			General	General	General	Hazardous	General	General	General	General	General	General	General	General	General	General

Results of the analyses on the soil show that the material could not be classified as Restricted Solid Waste without testing Lead with the Toxicity Characteristics Leaching Procedure (TCLP). As such, additional testing was undertaken by ALS (Certificate Reference number ES16016665). The results are summarised in Table 9 with the relevant Contaminant Concentrations from Table 2 of Part 1: Classifying Waste, Waste Classification Guidelines published by the NSW EPA (2014).

Table 9 - Analysis of TCLP Extract

Sample	Contaminant	SCC mg/kg	General Solid Waste Criteria (mg/kg)	TCLP (mg/L)	General Solid Waste Criteria mg/L	Classification (with TCLP)
S1	Lead	331	1500	0.1	5	General
S5	Lead	417	1500	0.2	5	General
S9	Lead	264	1500	0.1	5	General
S12	Lead	199	1500	<0.1	5	General
S20	Lead	262	1500	0.1	5	General

After analysing the soil samples recovered from the subject site, the spoil material is classified as **General Solid Waste** (non putrescible) for landfill disposal purposes since the results are in accordance with the values in Table 1 and 2 of the Part 1: Classifying Waste, Waste Classification Guidelines published by the NSW EPA (2014).

9.2 Waste Disposal of Natural Materials Comment

Based upon visual observations and laboratory test results, the material on the above site is classified as virgin excavated natural material (VENM) for future use; since it is in accordance with the definition of VENM given under the *Protection of the Environments Operations Act 1997* as outlined below:

‘Natural material (such as clay, gravel, sand, soil or rock fines):

- That has been excavated or quarried from areas that are not contaminated with manufactured chemicals or process residues, as a result of industrial, commercial, mining or agricultural activities, and
- That does not contain any sulfidic ores or soils or any other waste.’

10.0 LIMITATIONS

It is possible that contaminated soils and differing ground conditions may be present between sampling locations, or in the remainder of the site not intrusively investigated. If the materials or conditions encountered are other than those that have been described, Ground Technologies should be notified immediately as further assessment will be required.

The scope and the period of Ground Technologies services are described in the report and are subject to restrictions and limitations. Ground Technologies did not perform a complete assessment of all possible conditions or circumstances that may exist at the site. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by Ground Technologies in regards to it.

Where data has been supplied by the client or a third party, it is assumed that the information is correct unless otherwise stated. No responsibility is accepted by Ground Technologies for incomplete or inaccurate data supplied by others.

Any drawings or figures presented in this report should be considered only as pictorial evidence of our work. Therefore, unless otherwise stated, any dimensions should not be used for accurate calculations or dimensioning.

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11.0 REFERENCES

Contaminated Sites – Guidelines for Assessing Service Stations. NSW Environment Protection Authority (EPA) 1994

Contaminated Sites – Guidelines for Consultants Reporting on Contaminated Sites. NSW Environment Protection Authority (EPA) 2000.

Managing Land Contamination: Planning Guidelines SEPP55 – Remediation of Land - Department of Urban Affairs and Planning and Environment Protection Authority (DUAP and EPA) 1998.

National Environment Protection (Assessment of Site Contamination) Measure – National Environmental Protection Council 1999.

APPENDIX A

BOREHOLE LOGS

Method: 4WD Mounted rig, solid flight spiral augers

Surface RL:

Sheet 1 of 1

Co-ords:

WATER	DEPTH (m)	USCS	SOIL/ROCK DESCRIPTION	MOISTURE	DENSITY / CONSISTENCY	GRAPHIC LOG	SAMPLES	REMARKS
N I L	0.5	-	CONCRETE (0.0-0.15m)	-	-			PAVEMENT
			GRAVEL, Road base.					
			Admixed Silty CLAY, brown	SM - M				FILL
	1						S1	
	1.5	CH	Silty CLAY, mottled brown, orange-brown.	SM	St			NATURAL
			As above, pale grey and red.				S2	
							S3	
							S4	
	2		Borehole terminated at 2.0m					
	2.5							
	3							
	3.5							
	4							
	4.5							

Explanatory Notes

Density / Consistency: Very Loose: VL, Loose: L, Medium Dense: MD, Dense: D, Very Dense: VD ,Very Soft: VS, Soft: S, Firm: F, Stiff: St, Very Stiff: VSt, Hard: H

Moisture Condition: Dry: D, Slightly Moist: SM, Moist: M, Very Moist: VM, Wet: W.

Method: 4WD Mounted rig, solid flight spiral augers

Surface RL:

Sheet 1 of 1

Co-ords:

WATER	DEPTH (m)	USCS	SOIL/ROCK DESCRIPTION	MOISTURE	DENSITY / CONSISTENCY	GRAPHIC LOG	SAMPLES	REMARKS
N I L	0.5	-	CONCRETE (0.0-0.15m)	-	-			PAVEMENT
			GRAVEL, Road base.					
			Admixed Silty CLAY, brown	SM - M				FILL
	1	CH	Silty CLAY, mottled brown, orange-brown.	SM	St		S5	NATURAL
	1.5						S6	
							S7	
							S8	
	2							
	2.5		Borehole terminated at 2.0m					
	3							
	3.5							
	4							
	4.5							

Explanatory Notes

Density / Consistency: Very Loose: VL, Loose: L, Medium Dense: MD, Dense: D, Very Dense: VD ,Very Soft: VS, Soft: S, Firm: F, Stiff: St, Very Stiff: VSt, Hard: H

Moisture Condition: Dry: D, Slightly Moist: SM, Moist: M, Very Moist: VM, Wet: W.

Method: 4WD Mounted rig, solid flight spiral augers

Surface RL:

Sheet 1 of 1

Co-ords:

WATER	DEPTH (m)	USCS	SOIL/ROCK DESCRIPTION	MOISTURE	DENSITY / CONSISTENCY	GRAPHIC LOG	SAMPLES	REMARKS
N I L	0.5	-	CONCRETE (0.0-0.15m)	-	-			PAVEMENT
			GRAVEL, Road base.					
			Admixed Silty CLAY, brown	SM - M				FILL
	1	CH	Silty CLAY, mottled brown, orange-brown.	SM	St		S9	
	1.5						S10	NATURAL
	2						S11	
	2		Borehole terminated at 2.0m					
	2.5							
	3							
	3.5							
	4							
	4.5							

Explanatory Notes

Density / Consistency: Very Loose: VL, Loose: L, Medium Dense: MD, Dense: D, Very Dense: VD ,Very Soft: VS, Soft: S, Firm: F, Stiff: St, Very Stiff: VSt, Hard: H

Moisture Condition: Dry: D, Slightly Moist: SM, Moist: M, Very Moist: VM, Wet: W.

Method: 4WD Mounted rig, solid flight spiral augers

Surface RL:

Sheet 1 of 1

Co-ords:

WATER	DEPTH (m)	USCS	SOIL/ROCK DESCRIPTION	MOISTURE	DENSITY / CONSISTENCY	GRAPHIC LOG	SAMPLES	REMARKS
N I L	0.5	-	CONCRETE (0.0-0.15m)	-	-			PAVEMENT
			GRAVEL, Road base.					
			Admixed Silty CLAY, brown	SM - M			S12	FILL
		CH	Silty CLAY, mottled brown, orange-brown.	SM	St			NATURAL
			As above, pale grey and red.				S13	
							S14	
			SHALE / SILTSTONE, completely weathered, pale grey / brown.				S15	
	1.5		Borehole terminated at 1.5m					
	2.5							
	3							
	3.5							
	4							
	4.5							

Explanatory Notes

Density / Consistency: Very Loose: VL, Loose: L, Medium Dense: MD, Dense: D, Very Dense: VD ,Very Soft: VS, Soft: S, Firm: F, Stiff: St, Very Stiff: VSt, Hard: H

Moisture Condition: Dry: D, Slightly Moist: SM, Moist: M, Very Moist: VM, Wet: W.

Method: 4WD Mounted rig, solid flight spiral augers

Surface RL:

Sheet 1 of 1

Co-ords:

WATER	DEPTH (m)	USCS	SOIL/ROCK DESCRIPTION	MOISTURE	DENSITY / CONSISTENCY	GRAPHIC LOG	SAMPLES	REMARKS			
N I L	0.5	-	CONCRETE (0.0-0.15m)	-	-			PAVEMENT			
			GRAVEL, Road base.								
			Admixed Silty CLAY, brown	SM - M					FILL		
	1	CH	Silty CLAY, mottled brown, orange-brown.	SM	St-VSt			NATURAL			
									S21	pp. 350 kPa	
									S22	pp. 250 kPa	
	2	Rock	SHALE, extremely weathered, pale brown, brown, extremely low strength.					BEDROCK			
									S23		
	2.5		As above, highly weathered, pale brown and grey, low strength.					High drilling resistance.			
	3		As above, moderately weathered, pale brown-grey, grey, dark grey, low to medium strength.								
3.5											
4		As above, moderately to slightly weathered, medium strength.									
4.5			Borehole terminated at 4.5m					BH terminated due to practical refusal.			

Explanatory Notes

Density / Consistency: Very Loose: VL, Loose: L, Medium Dense: MD, Dense: D, Very Dense: VD ,Very Soft: VS, Soft: S, Firm: F, Stiff: St, Very Stiff: VSt, Hard: H

Moisture Condition: Dry: D, Slightly Moist: SM, Moist: M, Very Moist: VM, Wet: W.

Method: 4WD Mounted rig, solid flight spiral augers

Surface RL:

Sheet 1 of 1

Co-ords:

WATER	DEPTH (m)	USCS	SOIL/ROCK DESCRIPTION	MOISTURE	DENSITY / CONSISTENCY	GRAPHIC LOG	SAMPLES	REMARKS
N I L	0.5	-	CONCRETE (0.0-0.15m)	-	-			PAVEMENT
			GRAVEL, Road base.					
			Admixed Silty CLAY, brown	SM - M				FILL
	1	CH	Silty CLAY, mottled brown, orange-brown.	SM	St		S24	
							S25	NATURAL
							S26	
	1.5		Borehole terminated at 1.2m					
	2.5							
	3							
	3.5							
	4							
	4.5							

Explanatory Notes

Density / Consistency: Very Loose: VL, Loose: L, Medium Dense: MD, Dense: D, Very Dense: VD ,Very Soft: VS, Soft: S, Firm: F, Stiff: St, Very Stiff: VSt, Hard: H

Moisture Condition: Dry: D, Slightly Moist: SM, Moist: M, Very Moist: VM, Wet: W.

Method: Hand Auger

Sheet 1 of 1

Surface RL:

Co-ords:

WATER	DEPTH (m)	USCS	SOIL/ROCK DESCRIPTION	MOISTURE	DENSITY / CONSISTENCY	GRAPHIC LOG	SAMPLES	REMARKS
N I L	0.5 1	-	CONCRETE (0.0-0.1m)	-	-			PAVEMENT
			Admixed Silty CLAY, brown	M-		S16	FILL	
		CH	Silty CLAY, mottled brown, orange-brown.	VM	F			NATURAL
			As above, red-brown, yellow-brown.	SM	St- VSt			
							S17	
							S18	
							S19	
1.5 2.5 3 3.5 4 4.5		Borehole terminated at 1.2m						

Explanatory Notes

Density / Consistency: Very Loose: VL, Loose: L, Medium Dense: MD, Dense: D, Very Dense: VD ,Very Soft: VS, Soft: S, Firm: F, Stiff: St, Very Stiff: VSt, Hard: H

Moisture Condition: Dry: D, Slightly Moist: SM, Moist: M, Very Moist: VM, Wet: W.

APPENDIX B

LABORATORY TEST CERTIFICATES



CMACKAY 78 Harbour Road Mackay QLD 4740
 Ph: 07 4944 0177 E: mackay@atsglobal.com
CMELBOURNE 2-4 Weiskal Road Springvale VIC 3171
 Ph: 03 8549 9600 E: samples.melbourne@atsglobal.com
CMUDGEE 27 Sydney Road Mudgee NSW 2850
 Ph: 02 6372 6735 E: mudgee.mal@atsglobal.com

DNEWCASTLE 5 Rose Gum Road Warabrook NSW 2300
Ph: 02 4968 9433 E: samples.newcastle@alsiglobal.com
CINOWRA 4/13 Geary Place North Nowra NSW 2541
Ph: 024423 2063 E: nowra@alsiglobal.com
DPERTH 10 Hod Way Malaga WA 6090
Ph: 08 9208 7655 E: samples.perth@alsiglobal.com

DSYDNEY 277-289 Woodpark Road Smithfield NSW 2166
 Ph: 02 8784 8555 E: samples_sydney@aiglobal.com
 DTOWNSVILLE 14-15 Desma Court Bohle QLD 4818
 Ph: 07 4736 0600 E: townsville.environments@aiglobal.com
 PW 07 4736 0600 99 Kenny Street Wollongong NSW 2508
 Ph: 07 4736 3125 E: northkanbha@aiglobal.com

CLIENT: Ground Technologies

OFFICE: 55 Fifteenth Avenue, West Hoxton

PROJECT: GTE796	ALSO QUOTE NO.:
-----------------	-----------------

☒ Standard TAT (List due date):

☐ Non Standard or urgent TAT (List due date):

COC SEQUENCE NUMBER (Circle)

Free ice / frozen ice packs present upon receiving

	☒ Yes	☐ No	☐ N/A
1. Did you have any contact with the person(s) who were arrested?			
2. If yes, how many times did you have contact with them?			
3. How long ago was your last contact with them?			
4. What was the nature of your contact with them?			
5. Did they ever ask you for help or support?			
6. If yes, what kind of help or support did they ask for?			
7. Did you provide any help or support to them?			
8. If yes, what kind of help or support did you provide?			
9. Did you know anyone else who had contact with the person(s) who were arrested?			
10. If yes, who was that person?			
11. Did that person provide any help or support to the person(s) who were arrested?			
12. If yes, what kind of help or support did they provide?			

ORDER NUMBER

PROJECT MANAGER: Joshua Harendran

CONTACT PH: 0414805603

SAMPLER: Joshua Harendran

SAMPLER MOBILE:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

COC emailed to ALS? (NO)

EDD FORMAT (or default):

J Harendran

Don

Email Reports to: anthony@groundtech.com.au, joshua@groundtech.com.au

DATE/TIME:

DATE/TIME:

DATE/TIME

PATIENT/TIME

Email Invoice to (will default to PM if no other addresses are listed)

4316

12-2-10

10

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

SAMPLE DETAILS
MATRIX: SOLID (S) WATER (W)

CONTAINER INFORMATION

ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price)
Where Metals are required, specify **Total** (unfiltered bottle required) or **Dissolved** (field filtered bottle required)

Additional Information

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE codes below)	(refer to	TOTAL CONTAINERS								
1	S1	9/03/2016	S			1	S26							
2	S2	9/03/2016	S			1	X							
3	S5	9/03/2016	S			1	X							
4	S6	9/03/2016	S			1	X							
5	S7	9/03/2016	S			1	X							
6	S8	9/03/2016	S			1	X							
7	S9	9/03/2016	S			1	X							
8	S10	9/03/2016	S			1	X							
9	S12	9/03/2016	S			1	X							
10	S13	9/03/2016	S			1	X							
11	S16	14/03/2016	S			1	X							
12	S17	14/03/2016	S			1	X							
13	S20	14/03/2016	S			1	X							
14	S21	14/03/2016	S			1	X							
15	S24	14/03/2016	S			1	X							
16	S25	14/03/2016	S			1	X							

Environmental Division
Sydney
Work Order Reference
ES1605662

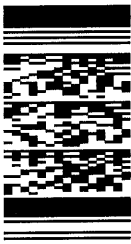


Telephone : + 61-2-8784 8555

S7 and S8 samples
were not received.

Comments on likely contaminant levels,
dilutions, or samples requiring specific QC
analysis etc.

Telephone : + 61-2-8784 8554



Environmental Division
Sydney
Work Order Reference
ES1605662

Water Container Codes: P = Unpreserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide Preserved; S = Sodium Hydroxide Preserved Plastic; AP - Air-tight Unpreserved Plastic; VB = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulfate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Air-tight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass

Zinc Acetate Preserved Bottle: E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Solids; B = Unpreserved Bag.

CERTIFICATE OF ANALYSIS

Work Order : **ES1605662**
Client : **GROUND TECHNOLOGIES**
Contact : JOSHUA HARENDRAN
Address : PO BOX 1121
 GREEN VALLEY NSW,AUSTRALIA 2168
Telephone : +61 02 8783 8200
Project : GTE796
Order number : ----
C-O-C number : ----
Sampler : JOSHUA HARENDRAN
Site : ----
Quote number : ----
No. of samples received : 14
No. of samples analysed : 14

Page : 1 of 12
Laboratory : Environmental Division Sydney
Contact :
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 14-Mar-2016 17:15
Date Analysis Commenced : 15-Mar-2016
Issue Date : 21-Mar-2016 15:35

NATA Accredited Laboratory 825
 Accredited for compliance with
 ISO/IEC 17025.



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW



General Comments

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

Ø = ALS is not NATA accredited for these tests.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a,h)anthracene (1.0), Benzo(g,h,i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR.

Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	S1	S2	S5	S6	S9
Client sampling date / time					[09-Mar-2016]	[09-Mar-2016]	[09-Mar-2016]	[09-Mar-2016]	[09-Mar-2016]
Compound	CAS Number	LOR	Unit		ES1605662-001	ES1605662-002	ES1605662-003	ES1605662-004	ES1605662-005
					Result	Result	Result	Result	Result
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1	%		21.7	18.9	22.2	25.0	18.6
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		16	14	17	11	10
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		32	17	28	31	36
Copper	7440-50-8	5	mg/kg		71	13	73	26	25
Lead	7439-92-1	5	mg/kg		331	19	417	80	264
Nickel	7440-02-0	2	mg/kg		11	2	10	8	10
Zinc	7440-66-6	5	mg/kg		172	16	223	41	105
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		0.3	<0.1	0.3	<0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	1.0	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		1.0	<0.5	1.2	<0.5	0.7
Pyrene	129-00-0	0.5	mg/kg		1.0	<0.5	1.2	<0.5	0.7
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	0.6	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		2.0	<0.5	4.0	<0.5	1.4
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		0.6	0.6	0.6	0.6	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		1.2	1.2	1.2	1.2	1.2
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	S1	S2	S5	S6	S9
Client sampling date / time					[09-Mar-2016]	[09-Mar-2016]	[09-Mar-2016]	[09-Mar-2016]	[09-Mar-2016]
Compound	CAS Number	LOR	Unit		ES1605662-001	ES1605662-002	ES1605662-003	ES1605662-004	ES1605662-005
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	1330-20-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		79.5	84.7	79.0	82.4	82.9
2-Chlorophenol-D4	93951-73-6	0.5	%		86.2	90.8	84.8	88.3	88.8
2,4,6-Tribromophenol	118-79-6	0.5	%		50.6	50.9	45.8	42.3	47.2
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		101	106	98.8	104	105
Anthracene-d10	1719-06-8	0.5	%		94.6	99.4	93.0	99.5	95.6
4-Terphenyl-d14	1718-51-0	0.5	%		106	113	106	116	115
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		82.8	80.6	83.6	88.6	85.1
Toluene-D8	2037-26-5	0.2	%		92.4	85.5	82.6	110	87.0



Analytical Results

Sub-Matrix: **SOIL**
 (Matrix: **SOIL**)

Client sample ID

				S1	S2	S5	S6	S9
Client sampling date / time				[09-Mar-2016]	[09-Mar-2016]	[09-Mar-2016]	[09-Mar-2016]	[09-Mar-2016]
Compound	CAS Number	LOR	Unit	ES1605662-001	ES1605662-002	ES1605662-003	ES1605662-004	ES1605662-005
				Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	0.2	%	94.4	86.6	84.6	113	85.7



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	S10	S12	S13	S16	S17
Client sampling date / time					[09-Mar-2016]	[09-Mar-2016]	[09-Mar-2016]	[14-Mar-2016]	[14-Mar-2016]
Compound	CAS Number	LOR	Unit		ES1605662-006	ES1605662-007	ES1605662-008	ES1605662-009	ES1605662-010
					Result	Result	Result	Result	Result
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1	%		22.9	19.8	27.0	20.4	25.9
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		9	10	7	7	11
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		36	28	22	20	34
Copper	7440-50-8	5	mg/kg		19	25	22	16	23
Lead	7439-92-1	5	mg/kg		29	199	22	47	33
Nickel	7440-02-0	2	mg/kg		7	7	2	6	8
Zinc	7440-66-6	5	mg/kg		8	129	<5	17	13
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	0.2	<0.1	<0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		0.6	0.6	0.6	0.6	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		1.2	1.2	1.2	1.2	1.2
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	S10	S12	S13	S16	S17
Client sampling date / time					[09-Mar-2016]	[09-Mar-2016]	[09-Mar-2016]	[14-Mar-2016]	[14-Mar-2016]
Compound	CAS Number	LOR	Unit		ES1605662-006	ES1605662-007	ES1605662-008	ES1605662-009	ES1605662-010
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	1330-20-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		84.5	79.5	82.3	76.8	72.6
2-Chlorophenol-D4	93951-73-6	0.5	%		91.3	87.5	87.4	82.3	78.8
2,4,6-Tribromophenol	118-79-6	0.5	%		46.4	41.0	46.7	39.1	38.2
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		106	103	105	99.4	95.6
Anthracene-d10	1719-06-8	0.5	%		99.9	96.4	99.6	92.8	93.2
4-Terphenyl-d14	1718-51-0	0.5	%		119	126	118	119	125
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		85.4	85.6	82.7	87.2	80.7
Toluene-D8	2037-26-5	0.2	%		87.6	89.5	85.7	89.2	83.0



Analytical Results

Sub-Matrix: **SOIL**
 (Matrix: **SOIL**)

Client sample ID

				S10	S12	S13	S16	S17
Client sampling date / time				[09-Mar-2016]	[09-Mar-2016]	[09-Mar-2016]	[14-Mar-2016]	[14-Mar-2016]
Compound	CAS Number	LOR	Unit	ES1605662-006	ES1605662-007	ES1605662-008	ES1605662-009	ES1605662-010
				Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	0.2	%	92.0	88.2	94.3	88.7	87.7



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	S20	S21	S24	S25	----
Client sampling date / time					[14-Mar-2016]	[14-Mar-2016]	[14-Mar-2016]	[14-Mar-2016]	----
Compound	CAS Number	LOR	Unit		ES1605662-011	ES1605662-012	ES1605662-013	ES1605662-014	-----
					Result	Result	Result	Result	Result
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1	%		14.5	24.0	17.0	25.9	----
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		14	9	9	9	----
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	----
Chromium	7440-47-3	2	mg/kg		33	33	27	28	----
Copper	7440-50-8	5	mg/kg		24	25	18	23	----
Lead	7439-92-1	5	mg/kg		262	29	39	24	----
Nickel	7440-02-0	2	mg/kg		11	6	8	4	----
Zinc	7440-66-6	5	mg/kg		67	7	21	5	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Benzo(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		0.6	0.6	0.6	0.6	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		1.2	1.2	1.2	1.2	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	S20	S21	S24	S25	----
Client sampling date / time					[14-Mar-2016]	[14-Mar-2016]	[14-Mar-2016]	[14-Mar-2016]	----
Compound	CAS Number	LOR	Unit		ES1605662-011	ES1605662-012	ES1605662-013	ES1605662-014	-----
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	----
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	----
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	----
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	----
^ Total Xylenes	1330-20-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		76.8	78.4	77.1	80.2	----
2-Chlorophenol-D4	93951-73-6	0.5	%		82.4	83.1	84.2	86.2	----
2,4,6-Tribromophenol	118-79-6	0.5	%		41.2	39.2	40.6	47.7	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		100.0	98.0	99.4	102	----
Anthracene-d10	1719-06-8	0.5	%		85.7	94.3	91.5	99.8	----
4-Terphenyl-d14	1718-51-0	0.5	%		113	123	121	125	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		83.0	80.7	89.2	82.6	----
Toluene-D8	2037-26-5	0.2	%		84.3	80.0	88.3	82.6	----

Page : 11 of 12
 Work Order : ES1605662
 Client : GROUND TECHNOLOGIES
 Project : GTE796



Analytical Results

Sub-Matrix: **SOIL**
 (Matrix: **SOIL**)

Client sample ID

				S20	S21	S24	S25	----
Client sampling date / time				[14-Mar-2016]	[14-Mar-2016]	[14-Mar-2016]	[14-Mar-2016]	----
Compound	CAS Number	LOR	Unit	ES1605662-011	ES1605662-012	ES1605662-013	ES1605662-014	-----
				Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	0.2	%	80.0	83.7	92.2	88.4	----



Surrogate Control Limits

Sub-Matrix: **SOIL**

		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2,4,6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

CERTIFICATE OF ANALYSIS

Work Order : **ES1606665**
Client : **GROUND TECHNOLOGIES**
Contact : JOSHUA HARENDRAN
Address : PO BOX 1121
 GREEN VALLEY NSW,AUSTRALIA 2168
Telephone : +61 02 8783 8200
Project : GTE796
Order number : ----
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : ----
No. of samples received : 5
No. of samples analysed : 5

Page : 1 of 4
Laboratory : Environmental Division Sydney
Contact :
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 24-Mar-2016 16:00
Date Analysis Commenced : 29-Mar-2016
Issue Date : 30-Mar-2016 18:03

NATA Accredited Laboratory 825
 Accredited for compliance with
 ISO/IEC 17025.



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
RICHARD TEA	Lab technician	Sydney Inorganics, Smithfield, NSW



General Comments

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.



Analytical Results

Sub-Matrix: **SOIL**
 (Matrix: **SOIL**)

Client sample ID

				S1	S5	S9	S12	S20
Client sampling date / time				[09-Mar-2016]	[09-Mar-2016]	[09-Mar-2016]	[09-Mar-2016]	[14-Mar-2016]
Compound	CAS Number	LOR	Unit	ES1606665-001	ES1606665-002	ES1606665-003	ES1606665-004	ES1606665-005
				Result	Result	Result	Result	Result
EN33: TCLP Leach								
Initial pH	----	0.1	pH Unit	5.0	5.8	6.1	6.0	7.0
After HCl pH	----	0.1	pH Unit	----	1.6	1.7	1.6	1.6
Extraction Fluid Number	----	1	-	1	1	1	1	1
Final pH	----	0.1	pH Unit	4.9	4.9	4.9	4.9	5.0



Analytical Results

Sub-Matrix: **TCLP LEACHATE**
 (Matrix: **WATER**)

Client sample ID

				S1	S5	S9	S12	S20
Client sampling date / time				[09-Mar-2016]	[09-Mar-2016]	[09-Mar-2016]	[09-Mar-2016]	[14-Mar-2016]
Compound	CAS Number	LOR	Unit	ES1606665-001	ES1606665-002	ES1606665-003	ES1606665-004	ES1606665-005
				Result	Result	Result	Result	Result
EG005C: Leachable Metals by ICPAES								
Lead	7439-92-1	0.1	mg/L	0.1	0.2	0.1	<0.1	0.1