GROUND TECHNOLOGIES

Geotechnical Testing Services

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GTE1355 – Preliminary Contamination And Salinity Report
19 October 2017

Client: Club Marconi
c/- Restifa & Partners Pty Ltd
Suite 302, 123 Walker Street
North Sydney 2060

Attention: Sam Restifa
E-mail: Sam@restifa.com.au

Dear Sir,

RE: PRELIMINARY CONTAMINATION AND SALINITY ASSESSMENT at No.121-133 Prairie Valley Road, Bossley Park

This report presents a Preliminary Contamination And Salinity Assessment on the inspection and testing services 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.George
Environmental Engineer

A.Bennett
Senior Geotechnical Engineer

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EXECUTIVE SUMMARY

Ground Technologies Pty Ltd have undertaken a Preliminary Contamination Investigation and Salinity Report at Club Marconi, No. 121-133 Prairie Valley Road, Bossley Park. It is understood that this preliminary investigation was undertaken for due diligence purposes prior to re-development of the site. No details pertaining to the re-development were made available to Ground Technologies at the time of preparing this report. Borehole and sampling locations were were provided by Mr. Sam Restifa to determine the quality of the subsurface soil material within the marked areas given in figure 6.

The objective of the preliminary Contamination and Salinity Report (factual) was to ascertain whether the sub-surface material present within the boreholes sampled on site poses a risk to human health and/or the environment at the site or neighbouring properties. This was achieved by undertaking a brief desk top study and a sampling regime as advised by the client.

The conclusions of this preliminary contamination report are as follows:

- A review of aerial photography suggests that the neighbouring properties are residential and not considered to have posed a risk for potential contamination to the site.
- A search of the NSW EPA Contaminated Land Management record of notices revealed that there were no notices issued to the subject site. No history of dangerous manufacturing utilizing heavy chemicals or metals was documented.
- Significant filling was observed predominantly at the south-west portion of the site. The source of this fill material is unknown.
- Eleven borehole and sampling locations were requested to be investigated as a part of this investigation in order to determine the quality of the subsurface soil material.
- Twenty four (24) samples were submitted for chemical analysis. The concentrations of all Heavy Metals, PAHs, Petroleum Hydrocarbons and BTEX were well below the Health Investigation Levels (HIL) for all four different exposure settings.
- Eight (8) samples were submitted for salinity analysis. The electrical conductivity results indicate that the soil salinity is predominately non saline to slightly saline, with the exception of two samples which were moderately saline.
- Eight (8) samples were submitted for aggressivity analysis. The laboratory test values of sulphates, chlorides and pH indicate that the soil samples are not aggressive to both steel and concrete.
- One (1) small piece of cement sheeting was recovered from borehole 5 at the time of the site investigation and was identified by laboratory analysis as a piece of asbestos chrysotile cement sheeting (approximately 20 x18 x 7mm). No other signs of bonded asbestos or asbestos fibres were observe during the field investigation. No asbestos was identified by laboratory analysis within the recovered laboratory samples from the remaining boreholes (BH1-4, BH6-11).

The above report is only a primary contamination and salinity investigation (factual investigation) assessment which comprises a brief desktop study and sub-surface investigation of the fill material at eleven boreholes within the site as advised by the client. The initial results indicate that there is a low risk of widespread contamination across the site, as chemical levels in all samples were below the Health Investigation Levels (HIL) for all four different exposure settings. One potenetial asbestos contamination hot spot was observed at the location of borehole BH5. Hence It is recommended that an additional assessment (detailed investigation) be undertaken at the time of proposed development works to further determine the full nature, location and likely distribution of any contamination of the fill material within the subject site.

It is understood that the north-western portion of the site, currently covered by a car park, is to potentially be re-developped for Independent Unit Living. Based upon the results of this preliminary study, the site would be low risk of presenting a contamination risk, especially if the development was to comprise an apartment style development with limited site access to soils (HIL B assessment criteria).

1. INTRODUCTION

Ground Technologies Pty Ltd have undertaken a Preliminary Contamination Investigation and Salinity Report at Club Marconi, No. 121-133 Prairie Valley Road, Bossley Park. It is understood that this preliminary investigation was undertaken for due diligence purposes prior to re-development of the site. No details pertaining to the re-development were made available to Ground Technologies at the time of preparing this report. Borehole and sampling locations were were provided by Mr. Sam Restifa to determine the quality of the subsurface soil material within the marked areas given in figure 6.

2. SCOPE OF WORK

The following scope of work was conducted:

- Desktop Study of the following to assist in identification of potential contamination issues:
  - Data from Environment Protection Authority
    - Scheduled premises
    - Sites which are likely contaminated and not contaminated
  - Data from the Protection of the Environment Operations Public Register (POEO)
- Review of soils and geological maps.
- Review of aerial photography
- Site Inspection by a Geotechnical Engineer to ascertain current activities, and any visible signs of contamination.
- Collection of soil samples (fill material) by a Geotechnical Engineer according to a sampling plan (11 Boreholes) marked out by the client.
- Chemical analysis by a NATA accredited laboratory.
- Assessment of the results of the chemical analysis against the appropriate guidelines.
- Preparation of the Contamination Report.

3. SITE DESCRIPTION

Table 1 - Summary of Site Details

Site Address	121-133 Prairie Vale Road Bossley Park
Council Area	Fairfield City Council
Lot / DP	Lot 5 Section B DP6934, Lot 6 Section B DP 6934, Lot 1 DP 332770, Lot 3B DP 407243, Lot 7 DP664803

Figure 1 – Site Location

4. SITE CONDITION AND SURROUNDING ENVIRONMENT

The site investigation was conducted on 13th and 14th September 2017. 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, however a small piece of asbestos cement sheeting was recovered from borehole 5. No staining of the soils or odours were documented.
Signs of plant stress	None observed.
Signs of Agriculture	None observed. No visible indicators of tilled land
Presence of drums or waste materials	No visible indicators of underground fuel tanks (bowsers or venting pipes)
Presence of fill	Significant filling was observed across the majority of the site, however, deep fill was concentrated within the south west portion of the site

5. SITE GEOLOGY

The 1:100,000 scale Geological Series Map of the Penrith region indicates that the subject site is underlain by Bringelly Shale of the Wianamatta Group dating back to the Middle Triassic period and generally comprises *shale, carbonaceous claystone, claystone, laminate, fine to medium grained lithic sandstone, and rare coal / tuff.*

6. SITE HISTORY

In order to ascertain the site history, a limited documentary review of past and present land use at the subject site and the surrounding area has been undertaken as follows

6.1 Aerial Photographs:

A review of Historical Aerial Photographs was undertaken in order to provide a greater insight into the site history.

1961 – In 1961 the subject site was predominatly covered with vegetation(trees), however there appears to be a small house and some sheds at the north-west portion of the site facing Restwell Road. There appears to be a water body at the south-west portion of the site. The area surrounding the site appears to be predominately undeveloped. The approximate location of the subject site is highlighted in figure 2.

Figure 2 – Aerial Photograph from 1961

1975 – In 1975, the house and structures have been demolished. The site has been cleared off trees and has been developed. A building (club building) is present on the central portion of the site. The water body at the south-west portion of the site is still present on site. The remainder of the site has been cleared and remain unsealed with sparse vegetation. There also appears to be a structure at the rear of the club building.The area surrounding the site appears to be predominately undeveloped. The subject site is highlighted in figure 3.

Figure 3 – Aerial Photograph from 1975

1984 – In 1984 the water body(dam) at the south west corner of the site appear to be back filled. The area to the west of the property has been cleared off trees. Some houses have been constructed to the north and south of the property. The subject site is highlighted in figure 4.

Figure 4 – Aerial Photograph from 1984

1994 – In 1994, there has been further development at the site. There are other strcutures that appear within the site. There also appears to be a building on the south east corner of the property where currently part of the carpark is located. The playing fields and courts also appear on site. Further residential development of land surrounding the site has occurred, since the 1987 aerial photograph was taken. The subject site is highlighted in figure 5.

Figure 5 – Aerial Photograph from 1994

6.2 Search of Contaminated Land Management Register (NSW EPA):

A summary of the search of the NSW EPA Contaminated Land Management record of notices for Bossley Park can be found in Appendix A. No notices have been issued to the subject site and no notices have been issued within the region.

6.3 Search of Protection of Environment Operations Public Register(POEO)

A search of the POEO public register of licensed and delicensed premises showed there are no premises within the Bossley Park area, see Appendix B.

7. POTENTIAL SOURCES OF CONTAMINATION

A search of the NSW EPA Contaminated Land Management record of notices revealed that there were no notices issued to the subject site. No history of dangerous manufacturing utilizing heavy chemicals or metals was observed. No history of heavy chemicals or metals storage was documented. No industrial facilities undertaking heavy manufacturing are located within 500m of the subject site. The surrounding sites are residential therefore, the risk of contamination migration caused by surface run-off from adjoining sites is minimal.

During the course of the site walk over, the morphology of the site indicated significant filling within the rear portion of the site mainly at the south-west portion of the site. No documentation pertaining to the source of this fill was provided.

From the aerial photographs it can be inferred that part of the fill was placed at the site some time between 1975 and 1984. The source of the fill material is unknown, and as such presents a contamination risk. Potential contamination exists in the form of heavy metals, petroleum hydrocarbons (TPH), polynuclear aromatic hydrocarbons (PAH) and asbestos.

8. SAMPLING AND ANALYSIS PLAN

8.1 Sampling Points

The sampling regime for this investigation was advised by the client. As part of this investigation, eleven (11) boreholes were drilled across the site (see Figure 6). Twenty four (24) discrete samples were recovered from within the fill for chemical anaylsis, eleven (11) composite samples were recovered from the fill for asbestos identification and eight (8) samples were recovered for salinity / aggressivity analysis from within the fill and natural soil profile.

8.2 Sampling Methodology

Each sample location was excavated using a solid flight auger drill rig. The sample was collected from the auger using a stainless steel trowel. 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 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.

8.3 Soil Profiles

Fieldwork was undertaken on 13th and 14th of September 2017 and comprised drilling 11 boreholes using a solid flight auger drill rig and a hand auger at locations shown on Figure 6. The profile of the boreholes are broadly summarised in table 3 and the full borehole logs are supplied within Appendix C. A summary of fill depth is presented in Table 4.

Figure 6- Location of Boreholes

(Note: This investigation is limited to the areas marked in yellow)

Table 3 - Borehole Profile

Profile	Depth
TOPSOIL; Silty Sand	Brown Silty SAND to depths of 0.1m
FILL; Silty Clay, yellow brown to red brown	Yellow brown to red brown Silty Clay at depths between 0.1m and 1.5≈2.0m and in two boreholes to depths of 3.0≈3.5m
FILL; Admixed Silty Sandy Clay, with gravels	Yellow brown, red brown to grey brown, Silty Sandy Clay with gravels at depths between 0.1m and 1.5≈2.0m
NATURAL; Silty Clay	Red brown to grey brown, Silty Clay mostly from depths between 1.8≈3.5m
BEDROCK; Extremely Weathered Sandstone	Weathered shale slightly mottled brown in two boreholes(9 and 11) from depths 0.8m≈1.4m

Table 4 – Fill Depth

Borehole	BH1	BH2	BH3	BH4	BH5	BH6	BH7	BH8	BH9	BH10	BH11
Depth of Fill	1.8m	3.5m	3.0m	3.5m	2.8m	2.5m	2.4m	0.8m+	1.4m	0.8m	1.2m+

8.4 Groundwater

No Groundwater was encountered during the course of the investigation.

9. BASIS FOR ASSESMENT CRITERIA

The source fill material is unknown, and as such presents a contamination risk. Potential contamination exists in the form of heavy metals, petroleum hydrocarbons (TPH), Polynuclear aromatic hydrocarbons (PAH), BTEX and asbestos.

The Assessment criteria used in this investigation have been obtained from the National Environment Protection (Assessment of Site Contamination) Measure (NEPM, 1999). This document presents risk-based Health Investigation Levels based on a variety of exposure settings for a number of organic and inorganic contaminants. As the details of any future development are unknown the results of the laboratory analysis are compared against all four of the Health Investigation Levels (HIL) for different exposure settings. The selected assessment criteria used in this assessment are summarized in table 5 below:

Table 5 - Site Assessment Criteria

Chemicals and other attributes		Health Based Investigation Level (HIL'A')$_1$	Health Based Investigation Level (HIL'B')$_2$	Health Based Investigation Level (HIL'C')$_3$	Health Based Investigation Level (HIL'D')$_4$
Heavy Metals	Mercury	40	120	80	730
	Cadmium	20	150	90	900
	Lead	300	1200	600	1500
	Arsenic	100	500	300	3000
	Chromium	100	500	300	3600
	Copper	6000	30000	17000	240000
	Nickel	400	1200	1200	6000
	Zinc	7400	60000	30000	400000
PAH	Total PAH	300	400	300	4000
	Carcinogenic PAH	3	4	3	40
	Benzo(a)pyrene	0.7	0.7	0.7	0.7
BTEX	Benzene	65	65	65	95
	Toluene	105	105	105	135
	Ethyl-Benzene	125	125	125	185
	Xylenes	45	45	45	95
TPH	TPH – C6-C10	800	800	800	800
	TPH – C10-C16	1000	1000	1000	1000
	TPH – C16-C34	3500	3500	3500	5000
	TPH – C34-C40	10000	10000	10000	10000

1. HIL A: Residential A with garden/accessible soil also includes children's day care centres, preschools and primary schools.

2. HIL B: Residential B with minimal opportunities for soil access; includes dwellings with fully and permanently paved yard space such as high-rise buildings and apartments.

3.HIL C: Recreational C includes public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and unpaved footpaths.

4. HIL D: Commercial/industrial D includes premises such as shops, offices, factories and industrial sites.

10. LABORATORY TEST RESULTS – CHEMICAL CONTAMINATION

Test results obtained from ALS (Certificate Reference number ES1723266) are summarised in Table 6 with the above mentioned contaminant threshold values. The test values are highlighted in bold if they exceed the values obtained from the guidelines.

Table 6 Laboratory Test Results – Chemical Contamination

Contaminant of Concern	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E12	HIL (A) Threshold	HIL (B) Threshold	HIL (C) Threshold	HIL (D) Threshold
Mercury	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**40**	**120**	**80**	**730**
Cadmium	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**20**	**150**	**90**	**900**
Lead	16	13	18	18	19	16	15	54	14	13	38	30	**300**	**1200**	**600**	**1500**
Arsenic	6	7	<5	9	9	15	6	9	11	<5	8	9	**100**	**500**	**300**	**3000**
Chromium	16	14	18	19	14	40	12	19	24	12	18	20	**100**	**500**	**300**	**3600**
Copper	24	24	34	25	23	65	21	34	8	24	28	28	**6000**	**30000**	**17000**	**240000**
Nickel	12	8	11	12	5	9	8	10	<2	9	10	16	**400**	**1200**	**1200**	**6000**
Zinc	46	36	71	50	36	60	37	2960	20	48	66	86	**7400**	**60000**	**30000**	**400000**
Total PAH	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**300**	**400**	**300**	**4000**
Carcinogenic PAH	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**3**	**4**	**3**	**40**
Benzo(a)pyrene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**0.7**	**0.7**	**0.7**	**0.7**
Benzene	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	**65**	**65**	**65**	**95**
Toluene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**105**	**105**	**105**	**135**
Ethylbenzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**125**	**125**	**125**	**185**
Total Xylenes	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**45**	**45**	**45**	**95**
C6 – C10 Fraction (sum)	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**800**	**800**	**800**	**800**
C10 - C16 Fraction (sum)	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	**1000**	**1000**	**1000**	**1000**
C16 - C34 Fraction (sum)	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**3500**	**3500**	**3500**	**5000**
C34 - C40 Fraction (sum)	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**10000**	**10000**	**10000**	**10000**

Contaminant of Concern	E13	E14	E15	E16	E17	E18	E19	E20	E21	E22	E23	E24	HIL (A) Threshold	HIL (B) Threshold	HIL (C) Threshold	HIL(D) Threshold
Mercury	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**40**	**120**	**80**	**730**
Cadmium	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**20**	**150**	**90**	**900**
Lead	39	15	16	17	16	13	15	13	11	17	18	17	**300**	**1200**	**600**	**1500**
Arsenic	5	6	7	6	<5	<5	7	11	7	19	17	8	**100**	**500**	**300**	**3000**
Chromium	22	11	10	14	16	13	14	10	12	14	21	18	**100**	**500**	**300**	**3600**
Copper	31	20	26	21	40	36	14	25	31	37	26	27	**6000**	**30000**	**17000**	**240000**
Nickel	11	6	16	8	16	25	10	9	11	8	20	13	**400**	**1200**	**1200**	**6000**
Zinc	55	144	61	45	88	76	35	74	76	59	61	68	**7400**	**60000**	**30000**	**400000**
Total PAH	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**300**	**400**	**300**	**4000**
Carcinogenic PAH	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**3**	**4**	**3**	**40**
Benzo(a)pyrene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**0.7**	**0.7**	**0.7**	**0.7**
Benzene	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	**65**	**65**	**65**	**95**
Toluene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**105**	**105**	**105**	**135**
Ethylbenzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**125**	**125**	**125**	**185**
Total Xylenes	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**45**	**45**	**45**	**95**
C6 – C10 Fraction (sum)	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**800**	**800**	**800**	**800**
C10 - C16 Fraction (sum)	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	**1000**	**1000**	**1000**	**1000**
C16 - C34 Fraction (sum)	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**3500**	**3500**	**3500**	**5000**
C34 - C40 Fraction (sum)	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**10000**	**10000**	**10000**	**10000**

10.1 Discussion of Laboratory Test Results

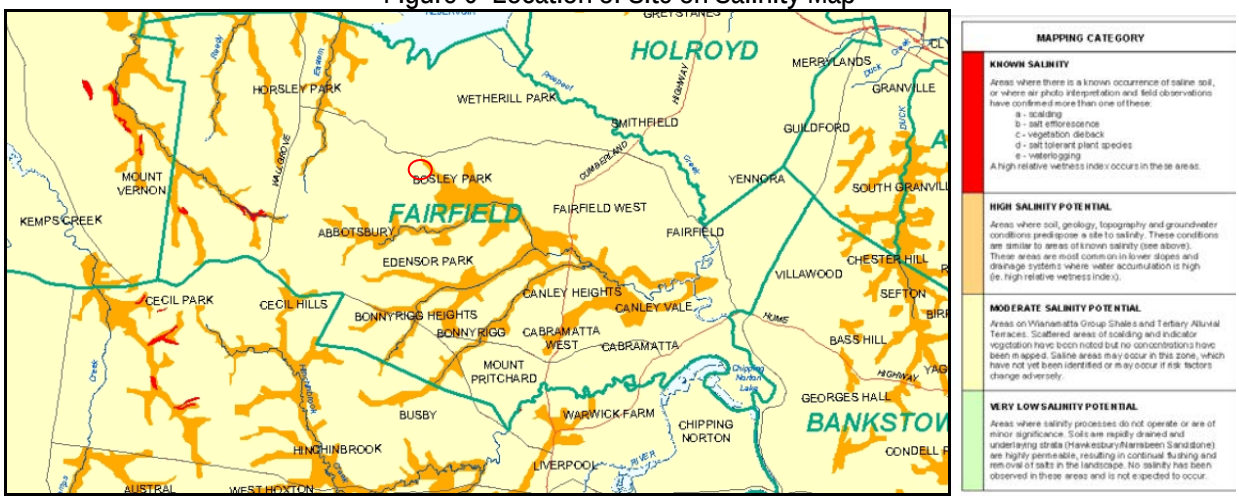
No suspicious odours or obvious signs of contamination were observed within the fill material. Twenty four (24) samples were submitted for chemical testing. The results of the laboratory testing are summarized below;

- The concentrations of all Heavy Metals were well below the exposure threshold values for all four of the Health Investigation Levels (HIL) exposure settings.
- The concentrations of all Polycyclic Aromatic Hydrocarbons(PAHs) were well below the exposure threshold values for all four of the Health Investigation Levels (HIL) exposure settings.
- The concentrations of all Petroleum Hydrocarbons were well below the exposure threshold values for all four of the Health Investigation Levels (HIL) exposure settings.
- The concentrations of all BTEX were well below the exposure threshold values for all four of the Health Investigation Levels (HIL) exposure settings.

11. SALINITY ASSESSMENT

The Department of Infrastructure and Planning (2002) Salinity Potential in Western Sydney map "Salinity Potential in Western Sydney 2002" indicates that the subject site is situated in a region with a moderate to high risk of saline soils. The moderate classification is attributed to scattered areas of scalding and vegetation indicators in areas where the concentrations have not been mapped. There is the possibility of encountering saline areas which were not identified due to localised factors. Saline soils could occur within areas of lower slopes and drainage systems where water accumulation is high or where movement of water through the soil profile is low.

Figure 6- Location of Site on Salinity Map



Eight (8) preliminary screening tests were collected as a part of this assessment in order to gain a limited view on the risk of saline soils. This assessments is based on the booklet "Site Investigations for Urban Salinity" published by Department of Land and Water Conservation 2002. Laboratory analysis was completed by Australian Laboratory Services (ALS) Pty Ltd, a NATA accredited laboratory. See appendix D for laboratory test results.

12. LABORATORY TEST RESULTS – SALINITY

Test results obtained from ALS (Certificate Reference number ES1723266) are summarised in Tables 7 & 8.

Table 7 : Analysis of the Soil Samples (Salinity)

Sample	Depth (m)	EC µS/cm	Texture Factor	ECe	Salinity Class
S1	0.50	0.104	10	1.04	NS
S2	1.50	0.474	10	4.74	MS
S3	2.50	0.484	10	4.84	MS
S4	0.50	0.502	7	3.51	SS
S5	1.50	0.458	7	3.21	SS
S6	0.50	0.212	10	2.12	SS
S7	1.50	0.256	14	3.58	SS
S8	2.00	0.226	14	3.16	SS
Abbreviations:					
NS	*Not Saline*				
SS	*Slightly Saline*				
MS	*Moderate Saline*				
VS	*Very Saline*				

Table 8 - Analysis of the Soil Samples (Aggressiveness)

Sample	Depth (m)	pH	Chloride	Sulphate	Resistivity	Aggressivity to Concrete	Aggressivity to Steel
		pH Units	mg/kg	mg/kg	Ohm.cm		
S1	0.50	8.2	40	40	9620	Not Agg	Not Agg
S2	1.50	8.6	230	370	2110	Not Agg	Not Agg
S3	2.50	8.3	730	100	2070	Not Agg	Not Agg
S4	0.50	6.2	540	460	1990	Not Agg	Not Agg
S5	1.50	6.1	550	360	2180	Not Agg	Not Agg
S6	0.50	5.8	170	180	4720	Not Agg	Not Agg
S7	1.50	6.0	220	140	3910	Not Agg	Not Agg
S8	2.00	9.0	70	110	4420	Not Agg	Not Agg
Abbreviations:							
Not Agg	*Non-Aggressive*						
Mild	*Mildly Aggressive*						
Mod	Moderately Aggressive						

From the results presented in Table 7, the electrical conductivity results indicate that the soil salinity is predominately non saline to slightly saline, with the exception of two samples which were moderately saline. However, the moderately saline test results were at the lower end of the classification threshold.

Table 8 provides the test results for the aggressiveness of the soil samples. The pH, resistivity, chloride and sulphate concentrations in the soil samples are compared with the Australian Standard *2159:2009 Piling – Design and Installation.* The laboratory test values of sulphates, chlorides and pH indicate that the soil samples are not aggressive to both steel and concrete.

13. LABORATORY TEST RESULTS – ASBESTOS

Eleven samples of the fill material were recovered and sent for laboratory analysis of asbestos identification, with one sample composited from each borehole location. Test results obtained from ALS (Certificate Reference number ES1723266) are summarised in Table 8.

Table 9- Laboratory Test Results for Asbestos Identification

Sample No.	Borehole	Depth (Composite samples)	Material	Asbestos Identification
AS1	BH1	0.100-2.10m	Fill	NIL
AS2	BH2	0.100-3.50m	Fill	NIL
AS3	BH3	0.100-3.50m	Fill	NIL
AS4	BH4	0.100-3.50m	Fill	NIL
AS5	BH5	0.150-3.50m	Fill	NIL
AS6	BH6	0.025-2.50m	Fill	Yes-(Chrysotile)
AS7	BH7	0.000-3.00m	Fill	NIL
AS8	BH8	0.100-0.800m	Fill	NIL
AS9	BH9	0.150-2.00m	Fill	NIL
AS10	BH10	0.129-1.20m	Fill	NIL
AS11	BH11	0.100-1.40m	Fill	NIL

13.1 Discussion of Laboratory Test Results

Eleven samples of the fill material were recovered and sent for laboratory analyses. The results of the laboratory testing indicate that a small piece of cement sheeting that was recovered from borehole 5 at the time of the site investigation is identified as asbestos chrysotile cement sheeting (approximately 20 x18 x 7mm). However there was no other signs of bonded asbestos or asbestos fibres within any of the other boreholes.

14. LABORATORY QUALITY ASSESSMENT AND QUALITY CONTROL

14.1 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.

14.2 Laboratory Duplicate Results

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. Laboratory Duplicates were within the recovery limits, see certificates in Appendix D.

14.3 Laboratory Blanks

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. All blanks were reported at Limits of Recovery (LOR), see certificates in Appendix D.

14.4 Laboratory Control Spikes

The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Laboratory Control Spikes were within the recovery limits, see certificates in Appendix D.

14.5 Laboratory Matrix Spikes

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Matrix Spikes were within the recovery limits, see certificates in Appendix D.

15. CONCLUSIONS AND RECOMMENDATIONS

The conclusions of this preliminary contamination report are as follows:

- A review of aerial photography suggests that the neighbouring properties are residential and not considered to have posed a risk for potential contamination to the site.
- A search of the NSW EPA Contaminated Land Management record of notices revealed that there were no notices issued to the subject site. No history of dangerous manufacturing utilizing heavy chemicals or metals was documented.
- Significant filling was observed predominantly at the south-west portion of the site. The source of this fill material is unknown.
- Eleven borehole and sampling locations were requested to be investigated as a part of this investigation in order to determine the quality of the subsurface soil material.
- Twenty four (24) samples were submitted for chemical analysis. The concentrations of all Heavy Metals, PAHs, Petroleum Hydrocarbons and BTEX were well below the Health Investigation Levels (HIL) for all four different exposure settings.
- Eight (8) samples were submitted for salinity analysis. The electrical conductivity results indicate that the soil salinity is predominately non saline to slightly saline, with the exception of two samples which were moderately saline.
- Eight (8) samples were submitted for aggressivity analysis. The laboratory test values of sulphates, chlorides and pH indicate that the soil samples are not aggressive to both steel and concrete.
- One (1) small piece of cement sheeting was recovered from borehole 5 at the time of the site investigation and was identified by laboratory analysis as a piece of asbestos chrysotile cement sheeting (approximately 20 x18 x 7mm). No other signs of bonded asbestos or asbestos fibres were observe during the field investigation. No asbestos was identified by laboratory analysis within the recovered laboratory samples from the remaining boreholes (BH1-4, BH6-11).

The above report is only a primary contamination and salinity investigation (factual investigation) assessment which comprises a brief desktop study and sub-surface investigation of the fill material at eleven boreholes within the site as advised by the client. The initial results indicate that there is a low risk of widespread contamination across the site, as chemical levels in all samples were below the Health Investigation Levels (HIL) for all four different exposure settings. One potenetial asbestos contamination hot spot was observed at the location of borehole BH5. Hence It is recommended that an additional assessment (detailed investigation) be undertaken at the time of proposed development works to further determine the full nature, location and likely distribution of any contamination of the fill material within the subject site.

It is understood that the north-western portion of the site, currently covered by a car park, is to potentially be re-developped for Independent Unit Living. Based upon the results of this preliminary study, the site would be low risk of presenting a contamination risk, especially if the development was to comprise an apartment style development with limited site access to soils (HIL B assessment criteria).

16. 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.

17. REFERENCES:

Geological Series Sheet 9130 (EDITION 1) 1983, Map of the Sydney region, scale 1:100,000

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

SEARCH RESULTS OF EPA CONTAMINATED LAND REGISTER

Healthy Environment, Healthy Community, Healthy Business

Home Contaminated land Record of notices

Search results

Your search for:Suburb: BOSSLEY PARK

Search Again
Refine Search

did not find any records in our database.

If a site does not appear on the record it may still be affected by contamination. For example:

- Contamination may be present but the site has not been regulated by the EPA under the Contaminated Land Management Act 1997 or the Environmentally Hazardous Chemicals Act 1985.
- The EPA may be regulating contamination at the site through a licence or notice under the Protection of the Environment Operations Act 1997 (POEO Act).
- Contamination at the site may be being managed under the planning process.

Search TIP

To search for a specific site, search by LGA (local government area) and carefully review all sites listed.

... more search tips

More information about particular sites may be available from:

- The POEO public register
- The appropriate planning authority: for example, on a planning certificate issued by the local council under section 149 of the Environmental Planning and Assessment Act.

See What's in the record and What's not in the record.

If you want to know whether a specific site has been the subject of notices issued by the EPA under the CLM Act, we suggest that you search by Local Government Area only and carefully review the sites that are listed.
This public record provides information about sites regulated by the EPA under the Contaminated Land Management Act 1997, including sites currently and previously regulated under the Environmentally Hazardous Chemicals Act 1985. Your inquiry using the above search criteria has not matched any record of current or former regulation. You should consider searching again using different criteria. The fact that a site does not appear on the record does not necessarily mean that it is not affected by contamination. The site may have been notified to the EPA but not yet assessed, or contamination may be present but the site is not yet being regulated by the EPA. Further information about particular sites may be available from the appropriate planning authority, for example, on a planning certificate issued by the local council under section 149 of the Environmental Planning and Assessment Act. In addition the EPA may be regulating contamination at the site through a licence under the Protection of the Environment Operations Act 1997. You may wish to search the POEO public register.POEO public register

9 October 2017

APPENDIX B

SEARCH OF POEO REGISTER OF LICENSED AND DELICENSED PREMISES

Healthy Environment, Healthy Community, Healthy Business

Search results

Your search for: **General Search** with the following criteria

Suburb - BOSSLEY PARK

returned 0 result

Search Again

APPENDIX C

BOREHOLE LOGS

GROUND TECHNOLOGI

Geotechnical Testing Services

Ground Technologies Pty Ltd
ABN 25 089 213 294
PO Box 1121 Green Valley NSW 2168
Ph: (02) 8783 8200
Fax: (02) 8783 8210
Email: lab@groundtech.com.au

SITE LOCATION: Club Marconi, Bossley Park

Borehole NO. 1

WATER	DEPTH (m)	SOIL DESCRIPTION (*SOIL TYPE, COLOUR, MOISTURE, CONSISTENCY*)	GRAPHIC LOG	SAMPLES	REMARKS
NIL		Silty SAND, brown, dry to slightly moist			TOPSOIL
		Silty CLAY, yellow-brown, grey brown with minor gravel, slightly moist			FILL
	0.5			AS1 0-1.0m &1.5-1.8m	
	1			E1 1.0m	
	1.5			E2 1.50 - 1.80m	
		Silty CLAY, red-brown, damp to dry, very stiff			NATURAL
	2				
	2.5	Borehole terminated at 2.5m			
	3				
	3.5				

Method: *4WD Mounted Rig/Solid FlightSpiral Augers*
Date of Drilling: 14/09/2017
Logged and Drilled by: JG/SM

GROUND TECHNOLOGI
Geotechnical Testing Services

Ground Technologies Pty Ltd
ABN 25 089 213 294
PO Box 1121 Green Valley NSW 2168
Ph: (02) 8783 8200
Fax: (02) 8783 8210
Email: lab@groundtech.com.au

SITE LOCATION: Club Marconi, Bossley Park

Borehole NO. 2

WATER	DEPTH (m)	SOIL DESCRIPTION (*SOIL TYPE, COLOUR, MOISTURE, CONSISTENCY*)	GRAPHIC LOG	SAMPLES	REMARKS
N I L		Silty SAND, brown, dry to slightly moist			TOPSOIL
		Silty CLAY, yellow-brown, grey brown with minor gravel, slightly moist			FILL
	0.5				
				E3 1.0m	AS2 Composite sample 1.0-3.0m
	1				
	1.5				
				E4 2.0m	
	2				
	2.5				
				E5 3.0m	
	3	Silty CLAY, brown and red brown with minor gravel, damp to slightly moist			Fill
	3.5	Silty CLAY, red brown, damp to dry, very stiff			Natural
		Borehole terminated at 3.5m			

Method: *4WD Mounted Rig/Solid FlightSpiral Augers*
Date of Drilling: 14/9/2017
Logged and Drilled by: JG/SM

GROUND TECHNOLOGI
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PO Box 1121 Green Valley NSW 2168
Ph: (02) 8783 8200
Fax: (02) 8783 8210
Email: lab@groundtech.com.au

SITE LOCATION: Club Marconi, Bossley Park

Borehole NO. 3

WATER	DEPTH (m)	SOIL DESCRIPTION (SOIL TYPE, COLOUR, MOISTURE, CONSISTENCY)	GRAPHIC LOG	SAMPLES	REMARKS
NIL		Silty SAND, brown, dry to slightly moist			TOPSOIL
		Silty CLAY, brown and red brown with minor gravel, damp to slightly moist			FILL
	0.5	Silty CLAY, yellow-brown, grey brown with minor gravel, slightly moist		E7 0.1-1.0m	
	1				AS3 Composite sample 0.1-1.0m and 2.0m
	1.5				
	2			E8 2.0m	
	2.5				
	3	Silty CLAY, red-brown, damp to dry, very stiff			Natural
	3.5	Borehole terminated at 3.5m			

Method: *4WD Mounted Rig/Solid FlightSpiral Augers*
Date of Drilling: 14/9/2017
Logged and Drilled by: JG/SM

GROUND TECHNOLOGI
Geotechnical Testing Services

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Ph: (02) 8783 8200
Fax: (02) 8783 8210
Email: lab@groundtech.com.au

SITE LOCATION: Club Marconi, Bossley Park

Borehole NO. 4

WATER	DEPTH (m)	SOIL DESCRIPTION (SOIL TYPE, COLOUR, MOISTURE, CONSISTENCY)	GRAPHIC LOG	SAMPLES	REMARKS
NIL		Silty SAND, brown, dry to slightly moist			TOPSOIL
		Silty CLAY, yellow brown, grey brown with minor gravel, slightly moist to moist			FILL
	0.5			AS1 0.1-1.0m, 2.0m, 3.0-3.5m	
	1				
	1.5	slightly moist to moist			
	2			E11 2.0m	
	2.5				
	3	Silty CLAY, brown to grey brown, yellow brown peaty smell, moist and hydrocarbon smell		E12 3.0m	
				E13 3.0-3.5m	rotten wood chips
	3.5	Silty CLAY, red-brown, damp to dry, very stiff			Natural
		Borehole terminated at 3.6m			

Method: *4WD Mounted Rig/Solid FlightSpiral Augers*
Date of Drilling: 14/9/2017
Logged and Drilled by: JG/SM

GROUND TECHNOLOGI
Geotechnical Testing Services

Ground Technologies Pty Ltd
ABN 25 089 213 294
PO Box 1121 Green Valley NSW 2168
Ph: (02) 8783 8200
Fax: (02) 8783 8210
Email: lab@groundtech.com.au

SITE LOCATION: Club Marconi, Bossley Park

Borehole NO. 5

WATER	DEPTH (m)	SOIL DESCRIPTION (SOIL TYPE, COLOUR, MOISTURE, CONSISTENCY)	GRAPHIC LOG	SAMPLES	REMARKS
NIL		Silty SAND, brown, dry to slightly moist			TOPSOIL FILL
		Admixed Silty Sandy CLAY, yellow-brown, grey brown with some small gravels damp to slightly moist			
	0.5			S1 0.5m	
				E14 1.0m	AS5 Composite sample 1.5-3.5m
	1				
	1.5	slightly moist to moist		S2 1.5m	
				E15 2.0m	
	2	Admixed Silty Shaley CLAY, grey brown organge brown, slightly moist			
	2.5			S3 2.50 m	
		Silty Clay (Alluvial), pale grey, brown, moist to very moist		E16 2.8m	Natural
	3				
	3.5	Borehole terminated at 3.5m			

Method: *4WD Mounted Rig/Solid FlightSpiral Augers*
Date of Drilling: 14/9/2017
Logged and Drilled by: JG/SM

GROUND TECHNOLOGI

Geotechnical Testing Services

Ground Technologies Pty Ltd
ABN 25 089 213 294
PO Box 1121 Green Valley NSW 2168
Ph: (02) 8783 8200
Fax: (02) 8783 8210
Email: lab@groundtech.com.au

SITE LOCATION: Club Marconi, Bossley Park

Borehole NO. 6

WATER	DEPTH (m)	SOIL DESCRIPTION (SOIL TYPE, COLOUR, MOISTURE, CONSISTENCY)	GRAPHIC LOG	SAMPLES	REMARKS
NIL		Bitumen sprayed surface			TOPSOIL
		Roadbase, dark grey, brown gravel			
		Silty Clay, orange brown, slightly mottled, pale grey			FILL
	0.5			S4 0.50m	
				E17 1.0m	
	1				
		Silty CLAY, orange brown, pale grey, slightly moist			
	1.5			S5 1.50m	
	2			E18 2.00m	
		some gravel encountered			
	2.5	Borehole terminated at 2.5m			
	3				
	3.5				

Method: *4WD Mounted Rig/Solid FlightSpiral Augers*
Date of Drilling: 14/9/2017
Logged and Drilled by: JH/SM

GROUND TECHNOLOGI
Geotechnical Testing Services

Ground Technologies Pty Ltd
ABN 25 089 213 294
PO Box 1121 Green Valley NSW 2168
Ph: (02) 8783 8200
Fax: (02) 8783 8210
Email: lab@groundtech.com.au

SITE LOCATION: Club Marconi, Bossley Park

Borehole NO. 7

WATER	DEPTH (m)	SOIL DESCRIPTION (*SOIL TYPE, COLOUR, MOISTURE, CONSISTENCY*)	GRAPHIC LOG	SAMPLES	REMARKS
NIL	0.5	Admixed silty sandy gravelly CLAY, brown, slightly grey brown, dry to damp			FILL
	1			E19 1.0m	
	1.5				
		Silty CLAY, red-brown, damp to dry, very stiff			
	2			E20 2.0m	
	2.5	Silty CLAY, pale grey, brown, dark brown, slightly moist very stiff			NATURAL
	3	Borehole terminated at 3.0m			
	3.5				

Method: *4WD Mounted Rig/Solid FlightSpiral Augers*
Date of Drilling: 14/09/2017
Logged and Drilled by: JG/SM

GROUND TECHNOLOGI

Geotechnical Testing Services

Ground Technologies Pty Ltd
ABN 25 089 213 294
PO Box 1121 Green Valley NSW 2168
Ph: (02) 8783 8200
Fax: (02) 8783 8210
Email: lab@groundtech.com.au

SITE LOCATION: Club Marconi, Bossley Park

Borehole NO. 8

WATER	DEPTH (m)	SOIL DESCRIPTION (SOIL TYPE, COLOUR, MOISTURE, CONSISTENCY)	GRAPHIC LOG	SAMPLES	REMARKS
NIL		Clayey Silt, slightly moist, dark brown, black			TOPSOIL
		Silty CLAY, brown, orange brown, grey brown, yellow brown, slightly moist, with some gravel pieces of bricks		E21& AS8 0.1-0.8m	FILL
	0.5				
		Borehole terminated at 0.8m			
	1				
	1.5				
	2				
	2.5				
	3				
	3.5				

Method: *Hand Auger*
Date of Drilling: 14/09/2017
Logged and Drilled by: JG/SM

GROUND TECHNOLOGI

Geotechnical Testing Services

Ground Technologies Pty Ltd
ABN 25 089 213 294
PO Box 1121 Green Valley NSW 2168
Ph: (02) 8783 8200
Fax: (02) 8783 8210
Email: lab@groundtech.com.au

SITE LOCATION: Club Marconi, Bossley Park

Borehole NO. 9

WATER	DEPTH (m)	SOIL DESCRIPTION (SOIL TYPE, COLOUR, MOISTURE, CONSISTENCY)	GRAPHIC LOG	SAMPLES	REMARKS
NIL	0	Concrete core			TOPSOIL
		Silty gravelly CLAY, yellow-brown, orange brown			FILL
				E22 0.1-1.0m	S6 0.50m AS9 0.19-1.40m
	0.5				
	1				
	1.5	SHALE,weathered and extremely weathered			Natural
				S7 1.50m	
	2	Borehole terminated at 2.0m		S8 2.0m	
	2.5				
	3				
	3.5				

Method: *4WD Mounted Rig/Solid FlightSpiral Augers*
Date of Drilling: 14/09/2017
Logged and Drilled by: JG/SM

GROUND TECHNOLOGI

Geotechnical Testing Services

Ground Technologies Pty Ltd
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Email: lab@groundtech.com.au

SITE LOCATION: Club Marconi, Bossley Park

Borehole NO. 10

WATER	DEPTH (m)	SOIL DESCRIPTION (*SOIL TYPE, COLOUR, MOISTURE, CONSISTENCY*)	GRAPHIC LOG	SAMPLES	REMARKS
NIL		Concrete core			TOPSOIL
		Silty gravelly CLAY, yellow-brown, orange brown with some gravel grey-brown dry to damp		E23 &AS10 0.1-1.2m	FILL AS10 0.19-1.40m
	0.5				
	1				Hit gravel fill
		Borehole terminated at 1.2m			
	1.5				
	2				
	2.5				
	3				
	3.5				

Method: *Hand Auger*
Date of Drilling: 14/09/2017
Logged and Drilled by: JG/SM

GROUND TECHNOLOGI
Geotechnical Testing Services

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Ph: (02) 8783 8200
Fax: (02) 8783 8210
Email: lab@groundtech.com.au

SITE LOCATION: Club Marconi, Bossley Park

Borehole NO. 11

WATER	DEPTH (m)	SOIL DESCRIPTION (*SOIL TYPE, COLOUR, MOISTURE, CONSISTENCY*)	GRAPHIC LOG	SAMPLES	REMARKS
N I L		Concrete core			TOPSOIL
		Silty gravelly CLAY, brown, yellow-brown, orange brown, grey-brown dry to damp			FILL
	0.5			AS11 0.1-0.8m	
	1	SHALE, completely weathered and extremely weathered, pale grey and grey with slightly mottled brown extremely low strength		E24 1.00m	
	1.5	Borehole terminated at 1.4m			
	2				
	2.5				
	3				
	3.5				

Method: *4WD Mounted Rig/Solid FlightSpiral Augers*
Date of Drilling: 14/09/2017
Logged and Drilled by: JG/SM

APPENDIX D

LABORATORY RESULTS

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com

☐BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com

☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com

☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com

☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com

☐MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com

☐NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com

☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 02 4423 2063 E: nowra@alsglobal.com

☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com

☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com

☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com

☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: Ground Technologies	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	Standard TAT (List due date):	**FOR LABORATORY USE ONLY (Circle)**
OFFICE: 19 Bernera Road, Prestons		☑ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes / No / N/A
PROJECT: GTE1355 (Bosley Park)	**ALS QUOTE NO.:** SY/554/14	**COC SEQUENCE NUMBER (Circle)**	Free ice / frozen ice bricks present upon receipt? Yes / No / N/A
ORDER NUMBER:		COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: °C
PROJECT MANAGER: Anthony Bennett	**CONTACT PH:** 0414 805 603	OF: 1 2 3 4 5 6 7	Other comment: 18.4

SAMPLER: Jasmine George and Shahezad Malik	**SAMPLER MOBILE:** 0430462394	**RELINQUISHED BY:** ~~A.Bennett~~ JG & SM	**RECEIVED BY:** MJawed	**RELINQUISHED BY:**
COC emailed to ALS? (NO)	**EDD FORMAT (or default):**	DATE/TIME: 15.09.17	DATE/TIME: 15-9-17 15:15	DATE/TIME
Email Reports to: anthony@groundtech.com.au, malik@groundtech.com.au,jasmine@groundtech.com.au				
Email Invoice to (will default to PM if no other addresses are listed): lab@groundtech.com.au				

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

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

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION								
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	S26	pH&EC	Sulphates&Chloride s	Resistivity	Asbestos		
1	E1	14/9/~~17~~ 17	S		1	X	X					
2	E2	14/9/~~17~~ 17			1	X	X					
3	E3	14/9/~~17~~ 17			1	X	X					
4	E4	14/9/~~17~~ 17			1	X	X					
5	E5	14/9/~~17~~ 17			1	X	X					
6	E6	14/9/~~17~~ 17			1	X	X					
7	E7	14/9/~~17~~ 17			1	X	X					
8	E8	14/9/~~17~~ 17			1	X	X					
9	E9	14/9/~~17~~ 17			1	X	X					
10	E10	14/9/17			1	X	X					
11	E11	14/9/17			1	X	X					
12	E12	14/9/17			1	X	X					
13	E13	14/9/17			1	X	X					
14	E14	14/9/17			1	X	X					
15	E15	14/9/17			1	X	X					
16	E16	14/9/17			1	X	X					
17	E17	15/9/17			1	X	X					
18	E18				1	X	X					
19	E19				1	X	X					
20	E20				1	X	X					
21	E21				1	X	X					
22	E22				1	X	X					
23	E23				1	X	X					
				TOTAL								

Environmental Division Sydney

Work Order Reference

ES1723266

Telephone : +61-2-8784 8555

Subcon / Forward Lab / Split WO

Lab / Analysis: Asbests

Organised By / Date:

Relinquished By / Date: Newcan 9

Connote / Courier:

WO No:

Attach By PO / Internal Sheet:

Spoke with Shahezad Malik. Client requires standard TAT

MJawed 15-9-17

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic

V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com

☐BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com

☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com

☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com

☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com

☐MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com

☐NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 8433 E: samples.newcastle@alsglobal.com

☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com

☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com

☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com

☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com

☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: pontkemba@alsglobal.com

CLIENT: Ground Technologies	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	Standard TAT (List due date):	**FOR LABORATORY USE ONLY (Circle)**
OFFICE: 19 Bernera Road, Prestons		☑ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes No N/A
PROJECT: GTE1355 (Bosley Park)	**ALS QUOTE NO.:** SY/564/14		Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER:		COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: 18.9 °C
PROJECT MANAGER: Anthony Bennett	**CONTACT PH:** 0414 805 603	OF: 1 2 3 4 5 6 7	Other comment:

SAMPLER: Jasmine George and Shahezad Malik	**SAMPLER MOBILE:** 0430462394	**RELINQUISHED BY:** ~~A.Bennett~~ JG/SM	**RECEIVED BY:** MGrewal	**RELINQUISHED BY:**
COC emailed to ALS? (NO)	**EDD FORMAT (or default):**	DATE/TIME: 15/09/17	DATE/TIME: 15.9.17 15:15	DATE/TIME:
Email Reports to: anthony@groundtech.com.au, malik@groundtech.com.au,jasmine@groundtech.com.au				**RECEIVED BY:**
Email Invoice to (will default to PM if no other addresses are listed): lab@groundtech.com.au				DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	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 (refer to codes below)	TOTAL CONTAINERS	S26	pH&EC	Sulphates&Chlorides	Resistivity	Asbestos				Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
24	E24	15/09/17	S		1	X	X							
25	S1	14/09			1		X	X	X					
26	S2	14/09			1		X	X	X					
27	S3	14/09			1		X	X	X					
28	S4	15/09/17			1		X	X	X					
29	S5	↓			1		X	X	X					
30	S6				1		X	X	X					
31	S7				1		X	X	X					
32	S8		↓		1		X	X	X					
33	AS1	14/09/17			1					X				
34	AS2	↓			1					X				
35	AS3				1					X				
36	AS4				1					X				
37	AS5				1					X				
38	AS6	15/09/17			1					X				
39	AS7	↓			1					X				
40	AS8				1					X				
41	AS9				1					X				
42	AS10				1					X				
43	AS11	↓	↓		1					X				
~~44~~														
				TOTAL										

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1723266**	Page	: 1 of 22
Client	: **GROUND TECHNOLOGIES**	Laboratory	: Environmental Division Sydney
Contact	: MR ANTHONY BENNETT	Contact	: Customer Services ES
Address	: 16 Weld Street PRESTONS NSW, AUSTRALIA 2170	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 8783 8200	Telephone	: +61-2-8784 8555
Project	: GTE1355 (BOSLEY PARK)	Date Samples Received	: 15-Sep-2017 15:15
Order number	: ----	Date Analysis Commenced	: 18-Sep-2017
C-O-C number	: ----	Issue Date	: 25-Sep-2017 15:28
Sampler	: JASMINE GEORGE AND SHAHEZAD MALIK		
Site	: ----		
Quote number	: SYBQ/270/16		
No. of samples received	: 43		
No. of samples analysed	: 43		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Descriptive 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.

Signatories	*Position*	*Accreditation Category*
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Christopher Owler	Team Leader - Asbestos	Newcastle - Asbestos, Mayfield West, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Rassem Ayoubi	Senior Organic Chemist	Sydney Organics, Smithfield, NSW
Raymond Commodore	Instrument Chemist	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 no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

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.
~ = Indicates an estimated value.

- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Trace' - Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EA200 Legend
- EA200 'Ch' Chrysotile (white asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EA200: Negative results for vinyl tiles should be confirmed by an independent analytical technique.
- 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.
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- EA200: 'Yes' - Asbestos detected by polarised light microscopy including dispersion staining.
- EA200: 'No*' - No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.
- EA200: 'No' - No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	E1	E2	E3	E4	E5
			Client sampling date / time	14-Sep-2017 00:00	14-Sep-2017 00:00	14-Sep-2017 00:00	14-Sep-2017 00:00	14-Sep-2017 00:00
Compound	CAS Number	LOR	Unit	ES1723266-001	ES1723266-002	ES1723266-003	ES1723266-004	ES1723266-005
				Result	Result	Result	Result	Result
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	8.1	7.7	7.5	8.3	7.6
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	119	246	78	391	359
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	12.9	13.1	12.3	15.6	18.3
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	6	7	<5	9	9
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	16	14	18	19	14
Copper	7440-50-8	5	mg/kg	24	24	34	25	23
Lead	7439-92-1	5	mg/kg	16	13	18	18	19
Nickel	7440-02-0	2	mg/kg	12	8	11	12	5
Zinc	7440-66-6	5	mg/kg	46	36	71	50	36
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<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	<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

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	E1	E2	E3	E4	E5
				Client sampling date / time	14-Sep-2017 00:00	14-Sep-2017 00:00	14-Sep-2017 00:00	14-Sep-2017 00:00	14-Sep-2017 00:00
Compound	CAS Number	LOR	Unit		ES1723266-001	ES1723266-002	ES1723266-003	ES1723266-004	ES1723266-005
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
^ 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
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	%		**91.6**	**89.3**	**90.5**	**95.7**	**89.3**
2-Chlorophenol-D4	93951-73-6	0.5	%		**97.8**	**94.9**	**96.2**	**102**	**94.9**
2.4.6-Tribromophenol	118-79-6	0.5	%		**90.3**	**84.0**	**91.8**	**89.6**	**89.6**
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**95.2**	**92.2**	**93.7**	**98.1**	**91.4**
Anthracene-d10	1719-06-8	0.5	%		**109**	**107**	**108**	**103**	**104**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	E1	E2	E3	E4	E5
				Client sampling date / time	14-Sep-2017 00:00	14-Sep-2017 00:00	14-Sep-2017 00:00	14-Sep-2017 00:00	14-Sep-2017 00:00
Compound	CAS Number	LOR	Unit		ES1723266-001	ES1723266-002	ES1723266-003	ES1723266-004	ES1723266-005
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued									
4-Terphenyl-d14	1718-51-0	0.5	%		85.4	84.4	85.9	90.8	82.9
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		92.7	96.4	98.3	99.2	89.8
Toluene-D8	2037-26-5	0.2	%		82.3	87.3	91.8	106	85.3
4-Bromofluorobenzene	460-00-4	0.2	%		91.2	93.9	97.1	97.2	92.9

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	E6	E7	E8	E9	E10
			Client sampling date / time	14-Sep-2017 00:00	14-Sep-2017 00:00	14-Sep-2017 00:00	14-Sep-2017 00:00	14-Sep-2017 00:00
Compound	CAS Number	LOR	Unit	ES1723266-006	ES1723266-007	ES1723266-008	ES1723266-009	ES1723266-010
				Result	Result	Result	Result	Result
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	7.6	7.3	7.6	7.0	8.0
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	365	96	524	588	105
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	16.4	8.8	15.5	15.3	14.4
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	15	6	9	11	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	4	<1	<1
Chromium	7440-47-3	2	mg/kg	40	12	19	24	12
Copper	7440-50-8	5	mg/kg	65	21	34	8	24
Lead	7439-92-1	5	mg/kg	16	15	54	14	13
Nickel	7440-02-0	2	mg/kg	9	8	10	<2	9
Zinc	7440-66-6	5	mg/kg	60	37	2960	20	48
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<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	<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

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	E6	E7	E8	E9	E10
				Client sampling date / time	14-Sep-2017 00:00	14-Sep-2017 00:00	14-Sep-2017 00:00	14-Sep-2017 00:00	14-Sep-2017 00:00
Compound	CAS Number	LOR	Unit		ES1723266-006	ES1723266-007	ES1723266-008	ES1723266-009	ES1723266-010
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
^ 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
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	%		**89.9**	**86.3**	**92.0**	**89.2**	**86.9**
2-Chlorophenol-D4	93951-73-6	0.5	%		**95.3**	**90.7**	**97.0**	**94.0**	**91.3**
2.4.6-Tribromophenol	118-79-6	0.5	%		**101**	**85.9**	**93.3**	**86.4**	**85.7**
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**91.7**	**88.5**	**93.9**	**91.1**	**89.2**
Anthracene-d10	1719-06-8	0.5	%		**106**	**102**	**107**	**103**	**103**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	E6	E7	E8	E9	E10
				Client sampling date / time	14-Sep-2017 00:00	14-Sep-2017 00:00	14-Sep-2017 00:00	14-Sep-2017 00:00	14-Sep-2017 00:00
Compound	CAS Number	LOR	Unit		ES1723266-006	ES1723266-007	ES1723266-008	ES1723266-009	ES1723266-010
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued									
4-Terphenyl-d14	1718-51-0	0.5	%		84.5	81.3	86.0	83.9	82.1
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		96.8	83.6	94.4	89.4	103
Toluene-D8	2037-26-5	0.2	%		99.8	96.7	87.0	83.6	78.0
4-Bromofluorobenzene	460-00-4	0.2	%		93.4	73.4	83.3	85.1	85.9

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	E11	E12	E13	E14	E15
			Client sampling date / time	14-Sep-2017 00:00	14-Sep-2017 00:00	14-Sep-2017 00:00	14-Sep-2017 00:00	14-Sep-2017 00:00
Compound	CAS Number	LOR	Unit	ES1723266-011	ES1723266-012	ES1723266-013	ES1723266-014	ES1723266-015
				Result	Result	Result	Result	Result
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	8.6	8.5	7.4	6.4	8.9
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	641	507	428	812	437
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	14.4	12.8	19.6	14.1	12.3
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	8	9	5	6	7
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	18	20	22	11	10
Copper	7440-50-8	5	mg/kg	28	28	31	20	26
Lead	7439-92-1	5	mg/kg	38	30	39	15	16
Nickel	7440-02-0	2	mg/kg	10	16	11	6	16
Zinc	7440-66-6	5	mg/kg	66	86	55	144	61
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<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	<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

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	E11	E12	E13	E14	E15
				Client sampling date / time	14-Sep-2017 00:00	14-Sep-2017 00:00	14-Sep-2017 00:00	14-Sep-2017 00:00	14-Sep-2017 00:00
Compound	CAS Number	LOR	Unit		ES1723266-011	ES1723266-012	ES1723266-013	ES1723266-014	ES1723266-015
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
^ 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
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	%		**87.7**	**88.3**	**87.0**	**88.9**	**86.2**
2-Chlorophenol-D4	93951-73-6	0.5	%		**92.9**	**93.4**	**92.0**	**94.2**	**91.4**
2.4.6-Tribromophenol	118-79-6	0.5	%		**94.5**	**91.3**	**92.0**	**87.2**	**86.8**
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**90.5**	**91.0**	**89.4**	**91.4**	**89.7**
Anthracene-d10	1719-06-8	0.5	%		**103**	**105**	**103**	**105**	**103**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	E11	E12	E13	E14	E15
				Client sampling date / time	14-Sep-2017 00:00	14-Sep-2017 00:00	14-Sep-2017 00:00	14-Sep-2017 00:00	14-Sep-2017 00:00
Compound	CAS Number	LOR	Unit		ES1723266-011	ES1723266-012	ES1723266-013	ES1723266-014	ES1723266-015
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued									
4-Terphenyl-d14	1718-51-0	0.5	%		83.2	83.6	82.7	84.0	82.7
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		93.1	86.4	103	93.9	90.9
Toluene-D8	2037-26-5	0.2	%		83.1	79.3	75.6	84.5	83.0
4-Bromofluorobenzene	460-00-4	0.2	%		79.0	83.8	83.8	84.5	77.8

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	E16	E17	E18	E19	E20
			Client sampling date / time	14-Sep-2017 00:00	15-Sep-2017 00:00	15-Sep-2017 00:00	15-Sep-2017 00:00	15-Sep-2017 00:00
Compound	CAS Number	LOR	Unit	ES1723266-016	ES1723266-017	ES1723266-018	ES1723266-019	ES1723266-020
				Result	Result	Result	Result	Result
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	8.5	7.3	7.6	6.8	5.4
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	258	651	332	377	741
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	14.6	15.9	11.0	7.8	10.3
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	6	<5	<5	7	11
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	14	16	13	14	10
Copper	7440-50-8	5	mg/kg	21	40	36	14	25
Lead	7439-92-1	5	mg/kg	17	16	13	15	13
Nickel	7440-02-0	2	mg/kg	8	16	25	10	9
Zinc	7440-66-6	5	mg/kg	45	88	76	35	74
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<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	<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

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	E16	E17	E18	E19	E20
				Client sampling date / time	14-Sep-2017 00:00	15-Sep-2017 00:00	15-Sep-2017 00:00	15-Sep-2017 00:00	15-Sep-2017 00:00
Compound	CAS Number	LOR	Unit		ES1723266-016	ES1723266-017	ES1723266-018	ES1723266-019	ES1723266-020
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
^ 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
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	%		**87.0**	**86.1**	**90.6**	**89.0**	**88.3**
2-Chlorophenol-D4	93951-73-6	0.5	%		**92.1**	**91.3**	**95.8**	**93.9**	**93.7**
2.4.6-Tribromophenol	118-79-6	0.5	%		**93.3**	**90.0**	**93.6**	**91.0**	**88.2**
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**90.1**	**89.2**	**93.7**	**92.5**	**91.4**
Anthracene-d10	1719-06-8	0.5	%		**103**	**102**	**107**	**105**	**103**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	E16	E17	E18	E19	E20
				Client sampling date / time	14-Sep-2017 00:00	15-Sep-2017 00:00	15-Sep-2017 00:00	15-Sep-2017 00:00	15-Sep-2017 00:00
Compound	CAS Number	LOR	Unit		ES1723266-016	ES1723266-017	ES1723266-018	ES1723266-019	ES1723266-020
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued									
4-Terphenyl-d14	1718-51-0	0.5	%		82.5	82.2	86.4	84.8	84.0
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		110	110	97.0	104	102
Toluene-D8	2037-26-5	0.2	%		86.8	92.3	83.5	78.5	81.5
4-Bromofluorobenzene	460-00-4	0.2	%		87.6	88.7	83.9	79.7	88.8

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	E21	E22	E23	E24	S1
			Client sampling date / time	15-Sep-2017 00:00	15-Sep-2017 00:00	15-Sep-2017 00:00	15-Sep-2017 00:00	14-Sep-2017 00:00
Compound	CAS Number	LOR	Unit	ES1723266-021	ES1723266-022	ES1723266-023	ES1723266-024	ES1723266-025
				Result	Result	Result	Result	Result
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	7.8	6.4	9.0	5.2	8.2
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	49	244	215	588	104
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	19.0	9.9	19.2	11.3	10.4
EA080: Resistivity								
Resistivity at 25°C	----	1	ohm cm	----	----	----	----	9620
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	----	----	----	----	40
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	----	----	----	----	40
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	7	19	17	8	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	----
Chromium	7440-47-3	2	mg/kg	12	14	21	18	----
Copper	7440-50-8	5	mg/kg	31	37	26	27	----
Lead	7439-92-1	5	mg/kg	11	17	18	17	----
Nickel	7440-02-0	2	mg/kg	11	8	20	13	----
Zinc	7440-66-6	5	mg/kg	76	59	61	68	----
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	----
Benz(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	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	E21	E22	E23	E24	S1
				Client sampling date / time	15-Sep-2017 00:00	15-Sep-2017 00:00	15-Sep-2017 00:00	15-Sep-2017 00:00	14-Sep-2017 00:00
Compound	CAS Number	LOR	Unit		ES1723266-021	ES1723266-022	ES1723266-023	ES1723266-024	ES1723266-025
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
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	----
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									

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	E21	E22	E23	E24	S1
				Client sampling date / time	15-Sep-2017 00:00	15-Sep-2017 00:00	15-Sep-2017 00:00	15-Sep-2017 00:00	14-Sep-2017 00:00
Compound	CAS Number	LOR	Unit		ES1723266-021	ES1723266-022	ES1723266-023	ES1723266-024	ES1723266-025
					Result	Result	Result	Result	Result
EP075(SIM)S: Phenolic Compound Surrogates - Continued									
Phenol-d6	13127-88-3	0.5	%		80.9	77.2	78.9	76.8	----
2-Chlorophenol-D4	93951-73-6	0.5	%		95.1	92.7	90.5	97.8	----
2.4.6-Tribromophenol	118-79-6	0.5	%		81.1	85.8	76.4	85.3	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		97.7	94.9	102	97.7	----
Anthracene-d10	1719-06-8	0.5	%		106	100	96.8	94.1	----
4-Terphenyl-d14	1718-51-0	0.5	%		108	103	100.0	101	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		90.5	104	92.9	97.0	----
Toluene-D8	2037-26-5	0.2	%		94.6	110	97.3	103	----
4-Bromofluorobenzene	460-00-4	0.2	%		90.8	103	90.4	97.7	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	S2	S3	S4	S5	S6
			Client sampling date / time	14-Sep-2017 00:00	14-Sep-2017 00:00	15-Sep-2017 00:00	15-Sep-2017 00:00	15-Sep-2017 00:00
Compound	CAS Number	LOR	Unit	ES1723266-026	ES1723266-027	ES1723266-028	ES1723266-029	ES1723266-030
				Result	Result	Result	Result	Result
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**8.6**	**8.3**	**6.2**	**6.1**	**5.8**
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**474**	**484**	**502**	**458**	**212**
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**15.4**	**14.9**	**16.2**	**16.6**	**8.2**
EA080: Resistivity								
Resistivity at 25°C	----	1	ohm cm	**2110**	**2070**	**1990**	**2180**	**4720**
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	**370**	**100**	**460**	**360**	**180**
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	**230**	**730**	**540**	**550**	**170**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	S7	S8	AS1	AS2	AS3
			Client sampling date / time	15-Sep-2017 00:00	15-Sep-2017 00:00	14-Sep-2017 00:00	14-Sep-2017 00:00	14-Sep-2017 00:00
Compound	CAS Number	LOR	Unit	ES1723266-031	ES1723266-032	ES1723266-033	ES1723266-034	ES1723266-035
				Result	Result	Result	Result	Result
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.0	9.0	----	----	----
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	256	226	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	5.8	18.7	----	----	----
EA080: Resistivity								
Resistivity at 25°C	----	1	ohm cm	3910	4420	----	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	----	----	No	No	No
Asbestos Type	1332-21-4	-	--	----	----	-	-	-
Sample weight (dry)	----	0.01	g	----	----	707	772	701
APPROVED IDENTIFIER:	----	-	--	----	----	S.SPOONER	S.SPOONER	S.SPOONER
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	140	110	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	220	70	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	AS4	AS5	AS6	AS7	AS8
			Client sampling date / time	14-Sep-2017 00:00	14-Sep-2017 00:00	15-Sep-2017 00:00	15-Sep-2017 00:00	15-Sep-2017 00:00
Compound	CAS Number	LOR	Unit	ES1723266-036	ES1723266-037	ES1723266-038	ES1723266-039	ES1723266-040
				Result	Result	Result	Result	Result
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	**No**	**Yes**	**No**	**No**	**No**
Asbestos Type	1332-21-4	-	--	**-**	**Ch**	**-**	**-**	**-**
Sample weight (dry)	----	0.01	g	**954**	**839**	**404**	**832**	**751**
APPROVED IDENTIFIER:	----	-	--	**S.SPOONER**	**C.OWLER**	**S.SPOONER**	**S.SPOONER**	**G.MORGAN**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	AS9	AS10	AS11	----	----
				Client sampling date / time	15-Sep-2017 00:00	15-Sep-2017 00:00	15-Sep-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1723266-041	ES1723266-042	ES1723266-043	--------	--------
					Result	Result	Result	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in Soils									
Asbestos Detected	1332-21-4	0.1	g/kg		**No**	**No**	**No**	**----**	**----**
Asbestos Type	1332-21-4	-	--		**-**	**-**	**-**	**----**	**----**
Sample weight (dry)	----	0.01	g		**1040**	**920**	**141**	**----**	**----**
APPROVED IDENTIFIER:	----	-	--		**G.MORGAN**	**S.SPOONER**	**S.SPOONER**	**----**	**----**

Analytical Results

Descriptive Results

Sub-Matrix: **SOIL**

Method: Compound	Client sample ID - Client sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in Soils		
EA200: Description	AS1 - 14-Sep-2017 00:00	Mid brown clay soil
EA200: Description	AS2 - 14-Sep-2017 00:00	Mid brown clay soil
EA200: Description	AS3 - 14-Sep-2017 00:00	Mid brown clay soil
EA200: Description	AS4 - 14-Sep-2017 00:00	Mid brown clay soil
EA200: Description	AS5 - 14-Sep-2017 00:00	Mid brown clay soil plus one piece of asbestos cement sheeting approx 20 x 18 x 7mm
EA200: Description	AS6 - 15-Sep-2017 00:00	Mid brown clay soil
EA200: Description	AS7 - 15-Sep-2017 00:00	Mid brown clay soil
EA200: Description	AS8 - 15-Sep-2017 00:00	Mid brown clay soil
EA200: Description	AS9 - 15-Sep-2017 00:00	Mid brown clay soil
EA200: Description	AS10 - 15-Sep-2017 00:00	Mid brown clay soil
EA200: Description	AS11 - 15-Sep-2017 00:00	Mid brown sandy soil

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	Recovery Limits (%) 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