ENVIRONMENTAL SITE INVESTIGATION INCLUDING SUPPLEMENTARY SOIL SAMPLING

ST. PATRICK'S COLLEGE STRATHFIELD

20th June 2020

Prepared for:

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Ref: St. Pat's College, Strathfield – ESI Suppl. Samples

DISTRIBUTION

Preliminary Environmental Site Investigation (Supplementary Soil Sampling) Report – St. Patrick's Catholic College, Strathfield NSW (Proposed Development)

June 2020

Copies	Recipient
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1	**Banksia EnviroSciences Pty. Limited**

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CONTENTS

EXECUTIVE SUMMARY

This reports presents the results of follow-up soil sampling conducted as part of the Phase 1 Preliminary Environmental Site Investigation (ESI) undertaken by Banksia EnviroSciences Pty. Limited (BES) for St. Patrick's College, Strathfield (the site). The follow up assessment works were commissioned by Mr. Richie Charcon of St. Patrick's College on behalf of the College.

It is understood that the ESI (with soil sampling) is required to support a development application for the site. The proposed development will include the construction of a new 3 storey classroom block with a single level basement. Bulk excavation is expected to be required of the existing tennis courts area within the college grounds.

The initial ESI identified that the history of the site has been stable and relatively unchanged since construction on the site over the period of circa 1920-1950 with ongoing maintenance presumed. The recent ESI conducted without soil sampling has indicated a range of potential contaminants to be present in the material to be excavated beneath the current surface. Based on the site history a preliminary conceptual site model was prepared which identified potential contamination sources such as hazardous building materials, local road infrastructure and imported filling material.

The current intrusive investigation indicated that the site is underlain by filling to between 0.15 m to 0.5 m and natural material to remaining depth. Detailed reports of the nature of the various depths have been recently investigated and described by qualified others in geo-technical reports.

The results contained within this report follows on from the reporting's contained in the Stage 1 – Preliminary Environmental Site Investigation (ESI) and Assessment and is designed to be read and interpreted in conjunction with the findings and recommendations contained within the ESI report.

The current review involved the collection of 10 representative soil samples from the fill and natural material located beneath the existing concrete sealed surface of the tennis court area at the site. Laboratory testing of the collected sample material was conducted, and the results described in this report. Details of the testing, findings of the assessment are presented within the body of this report, as well as an assessment of the significance with regards to the findings of the investigation.

Based on the available information, a grid type sampling plan was considered most appropriate to provide sufficient characterization data of accessible areas. A total of ten (10) sampling sites were nominated across the existing site

All analyte concentrations in all ten representative samples were reported to be below the conservatively adopted human health assessment criteria for Residential A type land use.

The site is considered suitable for the proposed development considering the following:

- The site history, desk study and inspection indicates past activities on and surrounding the site have a low potential for environmental impacts on the soil and groundwater; and
- In accordance with the Department of Urban Affairs and Planning and Environment Protection Authority Managing Land Contamination: Planning Guidelines, State Environmental Planning Policy No. 55 - Remediation of Land 1998, the site is suitable for the proposed use and the site is considered to have a LOW RISK of soil and groundwater contamination.

Yours truly,

Nik Orr
Banksia EnviroSciences

1.0 INTRODUCTION

1.1 Background

This report presents the results of supplementary soil sampling undertaken as part and follow up of the Phase 1 Environmental Site Investigation (ESI) recently undertaken by Banksia EnviroSciences Pty. Limited (BES) for St. Patrick's College, located at Francis St., Strathfield (the site). The follow up investigation was commissioned by Mr. Richie Charcon of St. Patrick's College on behalf of the College.

The ESI (with soil samples) will support the current development application for the site. It is understood that plans to construct a 3 storey classroom block with a single level basement are proposed and to be constructed within the space currently occupied by the (5) tennis courts in the approximate centre of the college grounds.

Investigation of soil contaminants was required to supplement the recently conducted Phase 1 Environmental Site Investigation and to identify levels of potential contamination in the material to be excavated to prepare for proposed construction works in and around the material beneath the tennis courts and included intrusive ground investigations.

This report should be read in conjunction with the Phase 1 Site investigation report.

The details of the review and field work are presented in this report, together with comments and recommendations related to contamination levels in the filling material at the site.

2.0 SCOPE OF WORKS

The scope of works included the flowing:

1. The collection of samples for chemical and asbestos analysis from each of 10 locations across the site at depths of 0.5 – 1.0 m;
2. NATA accredited laboratory analysis of soil samples for the following common contaminants:

    - Heavy metals (Arsenic, Cadmium, Copper, Lead, Mercury, Nickel, Zinc)
    - Total Recoverable Hydrocarbons (TRH)
    - Monocyclic Aromatic Hydrocarbons (Benzene, toluene, Ethylbenzene, Xylenes [BTEX])
    - Polycyclic aromatic hydrocarbons (PAH)
    - Phenols
    - Organochlorine pesticides (OCP)
    - Organophosphorus pesticides (OPP)
    - Polychlorinated biphenyls (PCB)
    - Asbestos

3. Interpretation and comparison the results against relevant standards; and
4. Give recommendations on additional assessment works if required.

3.0 SITE INFORMATION

The site comprises an open outdoor space of 5 adjoining marked tennis courts within a central location of the general college grounds. The site is relatively flat and is bounded:

- **West:** Fraser Street and private residences
- **East:** 3-storey college classroom block
- **South**: Former public road – (current college nature reserve space)

- **North:** College Sports field (Bringelly Oval)

4.0 PROPOSED DEVELOPMENT

Plans indicate that the proposed development will involve the construction of a 3 storey classroom building with a single level basement. Bulk excavation will be required to achieve depths for the construction works in this area. The footprint of the new structure is not expected to extend to the site boundaries.

5.0 PRELIMINARY CONCEPTUAL SITE MODEL

A preliminary conceptual site model (CSM) is a representation of site-related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The CSM provides the framework for identifying how the site may have become contaminated and how potential receptors may be exposed to contamination either in the present or the future. That is, the preliminary CSM enables an assessment of the potential source – pathway – receptor linkages (complete pathways).

5.1 Potential Sources

Based on the recent ESI assessment, the following potential sources of contamination and associated contaminants of potential concern (COPC) were identified:

5.1.1 Hazardous Building Material (Potential Source S1)

Structures erected near to and adjacently to the site were undertaken during a time when the use of asbestos containing materials (ACM) were common in construction. Other hazardous building materials (such as lead paint and PCBs) may have also been used in construction. Therefore, remnant building materials at the site may be a source of contamination.

There is potential for contamination of surface soils in the vicinity of the current structures and land adjacent to the site to be impacted by hazardous building material related COPC including:

- Asbestos;
- Lead and Zinc;
- Pesticides / Herbicides.

5.1.2 Tennis Courts (Potential Source S2)

Construction and re-grading of the tennis courts occurred on site prior to 1980. Coal tar was often used as a binder instead of bitumen in the 1970s and early 1980s in asphalt mixes. Although the site appears to have been more recently re-surfaced, it is unclear if any / all previously laid asphalt was removed.

PAH and TRH have also been a known source of hydrocarbon contamination to soils underlying asphalt and there is potential for localised contamination.

There is potential for contamination of surface soils from related COPC asphalt including:

- TRH and BTEXN;
- PAH; and
- Coal tar.

5.1.3 Imported Fill (Source S3)

It is highly likely that fill was applied to the site at some stage prior to or during the construction of the tennis courts or during any re-grading works. It is not known whether fill materials were sourced from within the site or imported from an off-site source.
There is potential for areas of the site to be impacted from uncontrolled fill and demolition waste related COPC including:

- Heavy metals;
- TRH;
- BTEX;
- PAH;
- PCB;
- OCP and OPP; and
- Asbestos.

5.1.4 Local Roadways (public/current and former; Source S4)

Construction and regrading of the local roads in the immediate vicinity of the site occurred across the past decades. In a similar vain to the potential issues noted in 5.1.2 (S2) Coal tar was often used as a binder of bitumen in the 1970-1980 era in asphalt mixes.

Again, PAH and TRH have been a source of hydrocarbon contamination to soils underlying asphalt. This material may also leech into adjoining areas and potentially into the site which sits adjacent to these roadways.

There is potential for contamination of surface soils from related COPC asphalt including:

- TRH and BTEX;
- PAH; and
- Coal tar.

5.2 Potential Receptors

5.2.1 Human Health Receptors

R1 – Current users and works (recreational);
R2 – Construction and maintenance works;
R3 – End users and works (recreational); and
R4 – Adjacent site users (recreational, commercial and residential).

5.2.2 Environmental Receptors

R5 – Surface water (Canada Bay – located 600 m east);
R6 – Groundwater; and
R7 – Terrestrial ecology.

5.2.3 Potential Pathways

P1 – Ingestion and dermal contact;
P2 – Inhalation of dust and/or vapours;
P3 – Surface water run-off;
P4 – Lateral migration of groundwater providing base flow to water bodies;
P5 – Leaching of contaminants and vertical migration into groundwater; and
P6 – Contact with terrestrial ecology.

5.3 Summary of Potential Complete Pathways

A 'source–pathway–receptor' approach has been used to assess the potential risks of harm being caused to human or environmental receptors from contamination sources on or in the vicinity of the site, via exposure pathways (potential complete pathways). The possible pathways between the above sources (S1 to S4) and receptors (R1 to R7) are provided in **Table 1** below.

Table 1: Summary of Potential Complete Pathways

Source and COPC	Transport Pathway	Receptor	Risk Management Action Recommended
S1: Hazardous building materials S2: Tennis courts S3: Imported fill	P1: Ingestion and dermal contact P2: Inhalation of dust and/or vapours	R1: Current users and workers R2: Construction and maintenance workers R3: End users ad workers	An intrusive investigation is recommended to supplement the ESI assessment and assess possible contamination including chemical testing of the soils. The intrusive investigation and soil testing is included in this report.
	P2: Inhalation of dust and/or vapours	R4: Adjacent site users	
	P3: Surface water run-off P4: Lateral migration of ground water providing base flow to water bodies	R5: Surface water	
	P5: Leaching of contaminants and vertical migration into groundwater	R6: Groundwater	
	P6: Contact with terrestrial ecology	R7: Terrestrial ecology	
S4: Local roadways		R1: Current users and workers R2: Construction and maintenance workers R3: End users and workers	

6.0 SITE ASSESSMENT CRITERIA

The Site Assessment Criteria (SAC) applied in the current investigation are informed by the CSM which identified human and environmental receptors to potential contamination on the site (refer to **Section 5**). Analytical results are assessed (as a Tier 1 assessment) against the SAC comprising primarily the investigation and screening levels of Schedule B1, National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended 2013 (NEPC, 2013).

1. *Health Investigation Levels (HIL) for Soil Contaminants – Residential A;*
2. *Soil Health Screening Levels (HSL) for Vapour Intrusion – Residential A & B;*
3. *Management Limits for TRH Fractions F1-F4 in Soil - Residential, Parkland and Public Open Space (Fine Grained Soils); and*

4. *Health Screening Levels for Asbestos Contamination in Soil – Residential A with accessible soil also includes children's day care centres, preschools and primary schools.*

The investigation and screening levels applied in the current investigation comprise conservative levels adopted for a generic Residential A land use scenario and are shown below in **Table 2**.

Table 2: Human Health Based Soil Criteria and Hydrocarbon Management Limits (all units in mg/kg)

	Limit of Reporting	Health Investigation / Screening Levels	Management Levels
Metals & Inorganics			
Arsenic	5.0	100	-
Cadmium	1.0	20	-
Chromium (VI)	2.0	100	-
Copper	5.0	6000	-
Nickel	2.0	400	-
Lead	5.0	300	-
Zinc	5.0	8000	-
Mercury	0.1	200	-
PCBs			
PCB	0.1	1	
PAH			
BaP (TEQ)	0.5	3	-
Total PAH	0.5	300	-
BTEXN			
Benzene	0.2	0.6	-
Toluene	0.5	190	-
Total Xylenes	0.5	45	-
Naphthalene	1	3	-
OC Pesticides			
DDT+DDE+DDD	0.05	260	
aldrin and dieldrin	0.05	7	
chlordane	0.05	50	
endosulfan	0.05	300	
Endrin	0.05	10	
heptachlor	0.05	7	
HCB	0.05	10	
methoxychlor	0.2	400	
OP Pesticides			
Chlorpyrifos	0.05	170	
Phenols			
Phenol	0.5	3000	-
Pentachlorophenol	2	100	-
Cresols	0.5	400	-
TRH			
F1 C6 – C10	10	50	700
F2 > C10 – C16	50	130	1000
F3 > C16 – C34	100	-	2500
F4 > C34 – C40	100	-	10000
Friable Asbestos	**0.1**	**0.001 %**	**-**

Bonded Asbestos	0.1	0.01 %	-

7.0 SUPPLEMENTARY SOIL SAMPLING AND ANALYSIS

7.1 Data Quality Objectives

Data quality objectives were established for the site characterisation works, following the decision-making procedures outlined in NEPC (2013):

1. Define the problem;
2. Identify the decision;
3. Identify inputs to the decision;
4. Define the study boundaries
5. Develop a decision rule
6. Specify limits on decision errors; and
7. Optimise the design for obtaining data.

7.1.1 Define the Problem

Preliminary Investigations indicate that potentially contaminated surface soils could exist on the site.

7.1.2 Identify the Decision

Based on the decision-making process for assessing urban redevelopment sites, the following decisions must be made:

1. Are there any unacceptable health risks to future onsite receptors?
2. Are there any unacceptable ecological risks posed by the site?
3. Are there any aesthetic issues at the site?
4. Is there any evidence of, or potential for, migration of contaminants from the site?
5. Is a site management strategy required?

7.1.3 Identify Inputs to the Decision

The following inputs were used to allow the assessment of the decisions:

1. Historical information;
2. Observations made during site investigations;
3. Soil analytical data from samples collected on site;
4. Adopted site assessment criteria; and
5. Data quality indicators.

7.1.4 Define the Study Boundaries

The study site is a central section (5 x connected full sized tennis courts) of the St. Patrick's Catholic College, Strathfield located at Francis St., Strathfield.

7.1.5 Develop a Decision Rule

Soil analytical data were assessed against National Environmental Protection Measure (NEPM) criteria as identified in **Section 6**. Statistical analysis of the data will be undertaken if necessary. The following statistical criteria shall be adopted:

1. The upper 95% confidence limit on the average concentration for each analyte (calculated for samples collected from consistent soil horizons, stratigraphy or material type) must be below the adopted criterion;
2. No single analyte shall exceed 250% of the adopted criterion; and
3. The standard deviation of the results must be below 50% of the criterion.

7.1.6 Specify Limits of Decision Errors

Data generated during the project must be appropriate to allow decisions to be made with confidence. The acceptable limit on decision error is 95% compliance with data quality indicators.

7.1.7 Optimize Design for Obtaining Data

Based on the available information, a grid type sampling plan was considered most appropriate to provide sufficient characterisation data. A total of ten (10) sampling sites were nominated across the existing site (see **Figures 1 & 2**).

7.2 Soil Sample Methodology

Soil samples were collected on 6 June 2020 via shallow test pitting. All samples were collected from approximately 150 – 500 mm depth.

7.3 Laboratory Analysis

The laboratory used for the analysis of all samples was ALS Environmental located at 277-289 Woodpark Road, Smithfield NSW Australia. The laboratory is NATA accredited for the selected analyses. The completed analysis schedule is summarised in **Table 3** below providing a diverse range of analytes:

Table 3: Analytical Schedule

Sample ID	Location	Analytes
1, 2, 3, 4, 5, 6, 7, 8, 9 & 10	Tennis courts surface and surrounds (centre of College)	TRH PAH BTEXN PCBs Phenols OCC/OPP Pesticides Heavy Metals Asbestos

Figure 1: Overview of St. Patricks College showing "Tennis Courts" Area

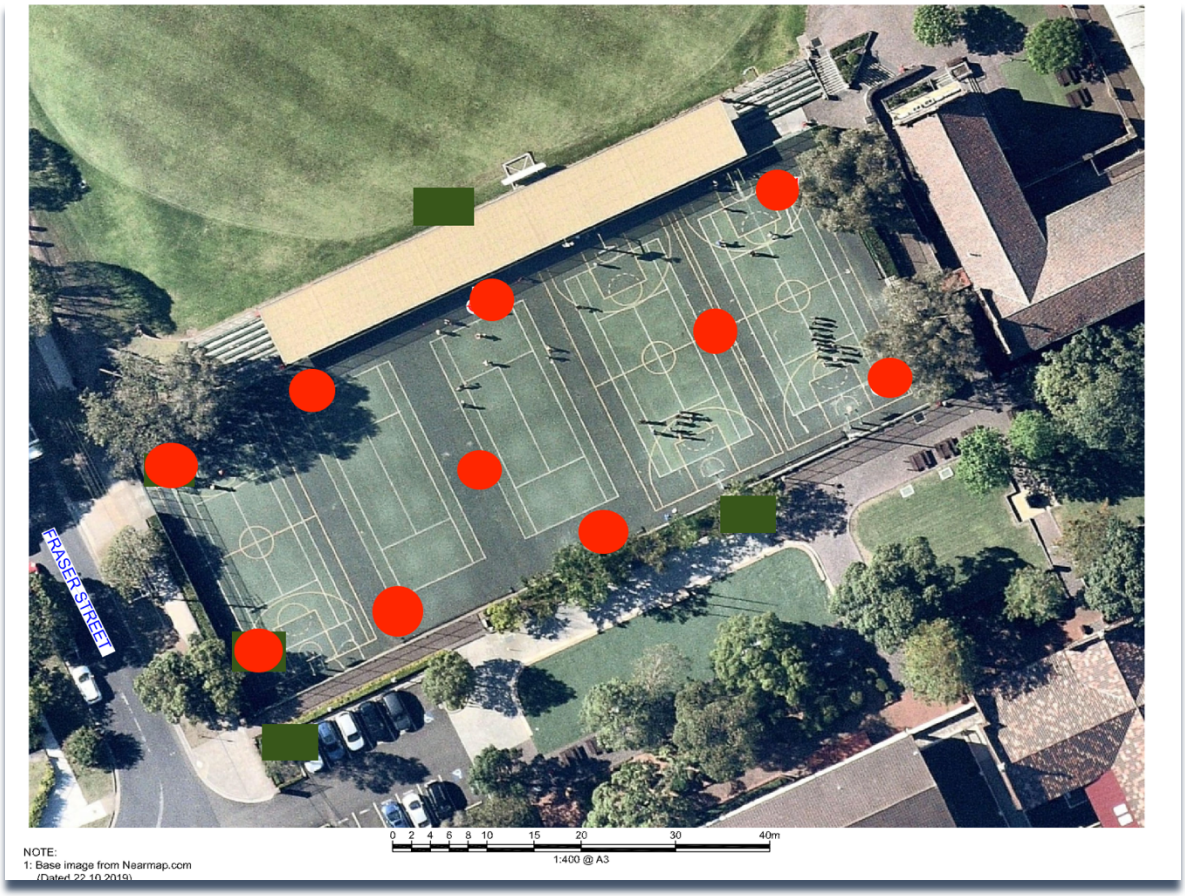

Figure 2: Site Plan showing location of test pits (TP1-10)

8.0 QUALITY ASSURANCE / QUALITY CONTROLS

8.1 Site Procedures

The following field quality assurance and quality control measures were implemented:

1. All sample jars and sample bags were clearly labelled prior to site visit;
2. All soil samples were collected by hand held trowel (after shallow excavation using a clean motorised auger device);
3. Devices were wet-wiped clean between each sample location
4. Disposable gloves were worn throughout the process and changed between the collection of each sample;
5. All sample jars and bags were immediately placed in an ice-block chilled esky;
6. All samples were clearly labelled and sealed for couriering; and
7. The ALS Environmental chain-of-custody form was completed, and a hard copy being submitted with the samples

8.2 Laboratory

The following is an extract from the quote for service provided by ALS Environmental Division.

"ALS has a comprehensive QA/QC program. Our QA/QC procedures are designed to provide reliable and defensible analytical results. Our analytical services are based on internal QCS3 schedule, which includes Laboratory Control Samples (LCS), Method Blanks (MB), Matrix Spikes (MS), Laboratory Duplicates (Dups) and Surrogates (for target organics) where applicable, at frequencies at or above that detailed in the 1999 NEPM guidelines.

The basis of the QCS3 Schedule is the 'analytical lot' (process analytical batch) of samples. Generally, the laboratory processes samples of similar matrices in groups called 'Lots'. 'Lots' are made up of 20 samples that may consist of several discrete batches and may be independent of project and / or client. The selection of samples for QC purposes will be biased towards the larger batches within the process lot" ...

The following summarizes the frequency that QC samples are processed:

1. 5% Method Blanks (MB) –1 analysed within each process lot of 20 samples.
2. 10% Laboratory Duplicates (Dups) –2 analysed within each process lot of 20 samples.
3. 5% Laboratory Control Samples (LCS) –1 analysed within each process lot of 20 samples.
4. 5% Matrix Spikes (MS) – 1 analysed within each process lot of 20 samples (except for dioxins).
5. Surrogate Spikes on all 'target' organics analyses.

8.3 QA/QC Results

8.3.1 Site

1. All soil samples arrived at ALS Environmental within specified holding times;
2. All soil samples arrived at ALS Environmental within specified temperature requirements;
3. No potential OHS incidents were recorded on site;
4. No quality assurance incidents (such as cross contamination or similar) were recorded.

8.3.2 Laboratory

ALS Environmental Division provided a Quality Control Report and Interpretive Quality Control Report. Those Quality Control Reports contain the following information:

1. A Laboratory Duplicate (DUP) Report - referring to a randomly selected intra-laboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. For all matrices, no Duplicate outliers occurred.
2. A Method Blank (MB) Report - referring 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. For all matrices, no Method Blank outliers occurred.
3. Laboratory Control Spike (LCS) Report - referring 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. For all matrices, no Laboratory Control outliers occurred.
4. A Matrix Spike (MS) Report – referring to an intra-laboratory 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. For all matrices, no Matrix Spike outliers occurred.
5. An Analysis Holding Time Compliance Report - No Analysis Holding Time outliers exist. A Frequency of Quality Control Samples Report - No Quality Control Frequency Outliers exist.

8.4 QA/QC Conclusions

The field sampling and handling procedures across the site produced QA/QC results which indicate that the soil data collected is of acceptable quality and suitable for use in site characterisation.

The NATA certified laboratory reports indicate that the laboratory was generally achieving levels of performance within its recommended control limits during the period when the samples from this program were analysed.

On this basis of the results and the laboratory QA/QC program, the soil data is of an acceptable quality upon which to draw conclusions regarding the environmental condition of the site.

9.0 RESULTS

9.1 Soil Laboratory Results

Detailed laboratory reports are provided at the end of this report. Laboratory results are summarized in **Table 4** and discussed in the following sections in relation to the adopted assessment criteria. The results were as follows:

Asbestos: All samples were reported by the laboratory to have concentrations below the adopted site assessment criteria (all below limit of reporting).

Total Metals: All samples were reported by the laboratory to have concentrations below the adopted site assessment criteria (all below limit of detection).

PAH: All samples were reported by the laboratory to have concentrations below the adopted site assessment criteria (all below limit of detection).

TPH: All samples were reported by the laboratory to have concentrations below the adopted site assessment criteria (all below limit of detection).

OC/OP (Pesticides): All samples were reported by the laboratory to have concentrations below the adopted site assessment criteria (all below limit of detection).

BTEXN (Benzene, Toluene, Ethyl-Benzene, Xylenes and Naphthalene): All samples were reported by the laboratory to have concentrations below the adopted site assessment criteria (all below limit of detection).

Table 4: Soil Laboratory Results

Sample	1	2	3	4	5
Arsenic	Pass	Pass	Pass	Pass	Pass
Cadmium	Pass	Pass	Pass	Pass	Pass
Chromium	Pass	Pass	Pass	Pass	Pass
Copper	Pass	Pass	Pass	Pass	Pass
Nickel	Pass	Pass	Pass	Pass	Pass
Lead	Pass	Pass	Pass	Pass	Pass
Zinc	Pass	Pass	Pass	Pass	Pass
Mercury	Pass	Pass	Pass	Pass	Pass
PCBs	Pass	Pass	Pass	Pass	Pass
BaP	Pass	Pass	Pass	Pass	Pass
Total PAH	Pass	Pass	Pass	Pass	Pass
Benzene	Pass	Pass	Pass	Pass	Pass
Toluene	Pass	Pass	Pass	Pass	Pass
Total Xylenes	Pass	Pass	Pass	Pass	Pass
Naphthalene	Pass	Pass	Pass	Pass	Pass
DDT+DDE+DDD	Pass	Pass	Pass	Pass	Pass
Aldrin and dieldrin	Pass	Pass	Pass	Pass	Pass
Chlordane	Pass	Pass	Pass	Pass	Pass
Endosulfan	Pass	Pass	Pass	Pass	Pass
Endrin	Pass	Pass	Pass	Pass	Pass
Heptachlor	Pass	Pass	Pass	Pass	Pass
HCB	Pass	Pass	Pass	Pass	Pass
Methoxychlor	Pass	Pass	Pass	Pass	Pass
chlorpyrifos	Pass	Pass	Pass	Pass	Pass
Phenol	Pass	Pass	Pass	Pass	Pass
Pentachlorophenol	Pass	Pass	Pass	Pass	Pass
Cresols	Pass	Pass	Pass	Pass	Pass
F1 C6 – C10	Pass	Pass	Pass	Pass	Pass
F2 > C10 – C16	Pass	Pass	Pass	Pass	Pass
F3 > C16 – C34	Pass	Pass	Pass	Pass	Pass
F4 > C34 – C40	Pass	Pass	Pass	Pass	Pass
Friable Asbestos	Pass	Pass	Pass	Pass	Pass
Bonded Asbestos	Pass	Pass	Pass	Pass	Pass

Sample	6	7	8	9	10
Arsenic	Pass	Pass	Pass	Pass	Pass
Cadmium	Pass	Pass	Pass	Pass	Pass
Chromium	Pass	Pass	Pass	Pass	Pass
Copper	Pass	Pass	Pass	Pass	Pass
Nickel	Pass	Pass	Pass	Pass	Pass
Lead	Pass	Pass	Pass	Pass	Pass
Zinc	Pass	Pass	Pass	Pass	Pass
Mercury	Pass	Pass	Pass	Pass	Pass
PCBs	Pass	Pass	Pass	Pass	Pass
BaP	Pass	Pass	Pass	Pass	Pass
Total PAH	Pass	Pass	Pass	Pass	Pass
Benzene	Pass	Pass	Pass	Pass	Pass
Toluene	Pass	Pass	Pass	Pass	Pass

Total Xylenes	Pass	Pass	Pass	Pass	Pass
Naphthalene	Pass	Pass	Pass	Pass	Pass
DDT+DDE+DDD	Pass	Pass	Pass	Pass	Pass
Aldrin and dieldrin	Pass	Pass	Pass	Pass	Pass
Chlordane	Pass	Pass	Pass	Pass	Pass
Endosulfan	Pass	Pass	Pass	Pass	Pass
Endrin	Pass	Pass	Pass	Pass	Pass
Heptachlor	Pass	Pass	Pass	Pass	Pass
HCB	Pass	Pass	Pass	Pass	Pass
Methoxychlor	Pass	Pass	Pass	Pass	Pass
chlorpyrifos	Pass	Pass	Pass	Pass	Pass
Phenol	Pass	Pass	Pass	Pass	Pass
Pentachlorophenol	Pass	Pass	Pass	Pass	Pass
Cresols	Pass	Pass	Pass	Pass	Pass
F1 C6 – C10	Pass	Pass	Pass	Pass	Pass
F2 > C10 – C16	Pass	Pass	Pass	Pass	Pass
F3 > C16 – C34	Pass	Pass	Pass	Pass	Pass
F4 > C34 – C40	Pass	Pass	Pass	Pass	Pass
Friable Asbestos	Pass	Pass	Pass	Pass	Pass
Bonded Asbestos	Pass	Pass	Pass	Pass	Pass

10.0 DISCUSSION

10.1 Soil Laboratory Results

All analyte concentrations in all ten (10) representative soil samples were reported to be below the adopted human health assessment criteria for Residential type-A land use.

10.2 Potential Risk to Onsite Receptors

No hazardous or potentially hazardous concentrations of toxicants have been identified within the representative surface soil samples collected from across the site.

10.3 Potential for Migration of Contaminants

The absence of contaminants at the site establishes that the risk of contaminant migration is negligible.

11.0 CONCLUSIONS

Based on the data and evidence collected during the site inspection and site history review, the findings of the preliminary Environmental Site Investigation with soil sampling are as follows:

1. At the time of inspection, the site was occupied by five adjoining concrete sealed open-space tennis courts immediately surrounded with raised gardens and paved areas;
2. The site was in a moderately well-maintained condition with no obvious indicators of contamination. However, the following areas of potential concern were identified:
    a. Potentially hazardous building materials within existing adjacent site buildings;
    b. Unknown fill material used to fill and level the paved areas and beneath existing structure; and
    c. Vegetated areas subject to historical flaking of asbestos and lead based paints and pesticide use.
3. Based on the available information, a grid type sampling plan of the accessible surfaces at the site was considered most appropriate to provide sufficient characterisation of data. A total of ten (10) sampling sites were nominated across the existing site;

4. All ten representative soil samples collected from the site found that analyte concentrations were below the conservatively adopted human health assessment criteria for Residential type A land use.

Based on the findings and outcomes of the preliminary environmental site investigation and soil sampling it is our opinion that no further investigative measures are warranted to establish contamination of the site.

12.0 LIMITATIONS STATEMENT

Banksia EnviroSciences (BES) Pty. Limited has undertaken the following report in accordance with the scope of works set out between BES and the client. BES derived the data in this report primarily from the brief onsite assessment and remote evaluation of the site and representative soil samples from the site. The impacts of future events may require future investigation of the site and subsequent data analysis, together with a re-evaluation of the conclusions and recommendations of this report.

In preparing this report, BES has relied upon, and assumed accurate, certain site information provided by the client and other persons. Except as otherwise stated in the report, we have not attempted to verify the accuracy or completeness of any such information. BES accepts no liability or responsibility whatsoever for or in respect to any use or reliance upon this report by any third party.

The information contained within this report have been prepared exclusively for the client. BES have prepared the report to address the risk associated with scale of the works. The report has been prepared with a degree of care and skill ordinarily exercised in similar investigations by reputable members of the environmental industry in Australia. No other warranty, expressed or implied, is made or intended. This report is to be read in its entirety including attachments and should not read in individual sections.

A third party should not rely upon the information prior to making an assessment that the scope of work conducted meets their specific needs. BES cannot be held liable for third party reliance on this document.

BESs professional opinions are based upon its professional judgment, experience, training and results from analytical data. In some cases, testing or further testing and analysis may be required, thus producing different results and/or opinions. BES has limited its investigation to the scope agreed upon with its client.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2019743**	Page	: 1 of 15
Client	: **BANKSIA ENVIROSCIENCES**	Laboratory	: Environmental Division Sydney
Contact	: MR NIK ORR	Contact	: Customer Services ES
Address	: 5 Cantwell Road LOCHINVAR 2321	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: St. Pats's College Strathfield	Date Samples Received	: 09-Jun-2020 09:57
Order number	: ----	Date Analysis Commenced	: 10-Jun-2020
C-O-C number	: ----	Issue Date	: 17-Jun-2020 08:53
Sampler	: NIK ORR		
Site	: ----		
Quote number	: EN/333		
No. of samples received	: 30		
No. of samples analysed	: 20		

ilac-MRA NATA

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*
Alana Smylie	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

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General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

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.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) 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 '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: 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.

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Project : St. Pats's College Strathfield

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SPS - 1A	SPS - 2A	SPS - 3A	SPS - 4A	SPS - 5A
			Client sampling date / time	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00
Compound	CAS Number	LOR	Unit	ES2019743-001	ES2019743-002	ES2019743-003	ES2019743-004	ES2019743-005
				Result	Result	Result	Result	Result
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	No	No	No	No	No
Asbestos (Trace)	1332-21-4	5	Fibres	No	No	No	No	No
Asbestos Type	1332-21-4	-	--	-	-	-	-	-
Sample weight (dry)	----	0.01	g	51.0	47.1	62.8	60.4	63.8
APPROVED IDENTIFIER:	----	-	--	B.SCHRADER	B.SCHRADER	B.SCHRADER	B.SCHRADER	B.SCHRADER
Synthetic Mineral Fibre	----	0.1	g/kg	No	No	No	No	No
Organic Fibre	----	0.1	g/kg	No	No	No	No	No

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Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SPS - 6A	SPS - 7A	SPS - 8A	SPS - 9A	SPS - 10A
				Client sampling date / time	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00
Compound	CAS Number	LOR	Unit		ES2019743-006	ES2019743-007	ES2019743-008	ES2019743-009	ES2019743-010
					Result	Result	Result	Result	Result
EA200: AS 4964 - 2004 Identification of Asbestos in Soils									
Asbestos Detected	1332-21-4	0.1	g/kg		No	No	No	No	No
Asbestos (Trace)	1332-21-4	5	Fibres		No	No	No	No	No
Asbestos Type	1332-21-4	-	--		-	-	-	-	-
Sample weight (dry)	----	0.01	g		65.7	50.4	46.5	46.1	48.6
APPROVED IDENTIFIER:	----	-	--		B.SCHRADER	B.SCHRADER	B.SCHRADER	B.SCHRADER	B.SCHRADER
Synthetic Mineral Fibre	----	0.1	g/kg		No	No	No	No	No
Organic Fibre	----	0.1	g/kg		No	No	No	No	No

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Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SPS - 1B	SPS - 2B	SPS - 3B	SPS - 4B	SPS - 5B
			Client sampling date / time	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00
Compound	CAS Number	LOR	Unit	ES2019743-011	ES2019743-012	ES2019743-013	ES2019743-014	ES2019743-015
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	20.7	24.6	20.4	27.4	39.9
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	11	9	17	9	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	10	11	12	12	12
Copper	7440-50-8	5	mg/kg	37	17	23	14	89
Lead	7439-92-1	5	mg/kg	21	9	11	13	32
Nickel	7440-02-0	2	mg/kg	27	2	22	3	42
Zinc	7440-66-6	5	mg/kg	94	22	171	14	63
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05

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Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SPS - 1B	SPS - 2B	SPS - 3B	SPS - 4B	SPS - 5B
				Client sampling date / time	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00
Compound	CAS Number	LOR	Unit		ES2019743-011	ES2019743-012	ES2019743-013	ES2019743-014	ES2019743-015
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
4.4`-DDT	50-29-3	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	60-51-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Diazinon	333-41-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	121-75-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Fenthion	55-38-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Parathion	56-38-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Prothiofos	34643-46-4	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Ethion	563-12-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Carbophenothion	786-19-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
EP075(SIM)A: Phenolic Compounds									
Phenol	108-95-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
2-Chlorophenol	95-57-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
2-Methylphenol	95-48-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
3- & 4-Methylphenol	1319-77-3	1	mg/kg		<1	<1	<1	<1	<1
2-Nitrophenol	88-75-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dimethylphenol	105-67-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dichlorophenol	120-83-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
2.6-Dichlorophenol	87-65-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5

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Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SPS - 1B	SPS - 2B	SPS - 3B	SPS - 4B	SPS - 5B
				Client sampling date / time	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00
Compound	CAS Number	LOR	Unit		ES2019743-011	ES2019743-012	ES2019743-013	ES2019743-014	ES2019743-015
					Result	Result	Result	Result	Result
EP075(SIM)A: Phenolic Compounds - Continued									
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	87-86-5	2	mg/kg		<2	<2	<2	<2	<2
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
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

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				Client sampling date / time	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00
Compound	CAS Number	LOR	Unit		ES2019743-011	ES2019743-012	ES2019743-013	ES2019743-014	ES2019743-015
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ 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	----	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
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		95.9	92.4	88.7	90.2	82.9
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		102	108	96.0	104	94.9
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		89.1	121	87.5	96.0	96.6
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		93.8	87.7	87.4	91.7	84.3
2-Chlorophenol-D4	93951-73-6	0.5	%		94.0	86.7	88.3	95.1	83.9
2.4.6-Tribromophenol	118-79-6	0.5	%		62.5	67.0	58.6	62.1	56.7
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		102	97.5	99.7	97.9	100.0
Anthracene-d10	1719-06-8	0.5	%		87.6	86.7	87.9	89.1	87.1
4-Terphenyl-d14	1718-51-0	0.5	%		104	101	99.8	106	99.7
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		78.9	92.3	85.3	73.3	83.7
Toluene-D8	2037-26-5	0.2	%		97.3	107	93.4	86.0	90.4

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Client : BANKSIA ENVIROSCIENCES
Project : St. Pats's College Strathfield

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SPS - 1B	SPS - 2B	SPS - 3B	SPS - 4B	SPS - 5B
				Client sampling date / time	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00
Compound	CAS Number	LOR	Unit		ES2019743-011	ES2019743-012	ES2019743-013	ES2019743-014	ES2019743-015
					Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued									
4-Bromofluorobenzene	460-00-4	0.2	%		104	107	95.0	94.6	79.5

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Work Order : ES2019743
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Project : St. Pats's College Strathfield

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SPS - 6B	SPS - 7B	SPS - 8B	SPS - 9B	SPS - 10B
			Client sampling date / time	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00
Compound	CAS Number	LOR	Unit	ES2019743-016	ES2019743-017	ES2019743-018	ES2019743-019	ES2019743-020
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	21.3	25.8	28.9	22.1	20.8
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	14	11	11	<5	10
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	25	19	15	16	19
Copper	7440-50-8	5	mg/kg	126	14	36	68	43
Lead	7439-92-1	5	mg/kg	59	21	17	30	77
Nickel	7440-02-0	2	mg/kg	22	7	6	24	9
Zinc	7440-66-6	5	mg/kg	204	25	28	84	123
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05

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Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SPS - 6B	SPS - 7B	SPS - 8B	SPS - 9B	SPS - 10B
				Client sampling date / time	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00
Compound	CAS Number	LOR	Unit		ES2019743-016	ES2019743-017	ES2019743-018	ES2019743-019	ES2019743-020
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
4.4`-DDT	50-29-3	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	60-51-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Diazinon	333-41-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	121-75-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Fenthion	55-38-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Parathion	56-38-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Prothiofos	34643-46-4	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Ethion	563-12-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Carbophenothion	786-19-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
EP075(SIM)A: Phenolic Compounds									
Phenol	108-95-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
2-Chlorophenol	95-57-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
2-Methylphenol	95-48-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
3- & 4-Methylphenol	1319-77-3	1	mg/kg		<1	<1	<1	<1	<1
2-Nitrophenol	88-75-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dimethylphenol	105-67-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dichlorophenol	120-83-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
2.6-Dichlorophenol	87-65-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5

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Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SPS - 6B	SPS - 7B	SPS - 8B	SPS - 9B	SPS - 10B
				Client sampling date / time	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00
Compound	CAS Number	LOR	Unit		ES2019743-016	ES2019743-017	ES2019743-018	ES2019743-019	ES2019743-020
					Result	Result	Result	Result	Result
EP075(SIM)A: Phenolic Compounds - Continued									
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	87-86-5	2	mg/kg		<2	<2	<2	<2	<2
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	1.0	<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	2.9	<0.5
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	<0.5	3.4	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	<0.5	2.0	<0.5
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	1.7	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	1.9	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	0.8	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	1.8	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	0.7	<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	0.9	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	<0.5	<0.5	17.1	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	<0.5	2.4	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		0.6	0.6	0.6	2.6	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		1.2	1.2	1.2	2.9	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	160	100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	120	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	280	100
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10

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Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SPS - 6B	SPS - 7B	SPS - 8B	SPS - 9B	SPS - 10B
				Client sampling date / time	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00
Compound	CAS Number	LOR	Unit		ES2019743-016	ES2019743-017	ES2019743-018	ES2019743-019	ES2019743-020
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ 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	240	150
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	240	150
^ >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	----	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
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		83.4	80.1	79.2	77.0	83.0
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		90.7	88.7	90.5	93.6	92.1
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		88.9	83.1	82.5	94.0	90.6
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		86.4	84.6	89.4	89.9	95.8
2-Chlorophenol-D4	93951-73-6	0.5	%		84.5	86.9	82.8	85.6	91.0
2.4.6-Tribromophenol	118-79-6	0.5	%		55.3	53.8	54.4	55.3	60.4
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		94.6	93.7	97.3	98.4	101
Anthracene-d10	1719-06-8	0.5	%		86.8	83.9	88.5	89.0	90.7
4-Terphenyl-d14	1718-51-0	0.5	%		97.1	94.8	97.6	98.8	99.1
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		88.3	84.7	74.5	85.6	91.0
Toluene-D8	2037-26-5	0.2	%		100	97.0	83.4	98.0	100

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Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SPS - 6B	SPS - 7B	SPS - 8B	SPS - 9B	SPS - 10B
				Client sampling date / time	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00	06-Jun-2020 09:00
Compound	CAS Number	LOR	Unit		ES2019743-016	ES2019743-017	ES2019743-018	ES2019743-019	ES2019743-020
					Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued									
4-Bromofluorobenzene	460-00-4	0.2	%		99.6	109	91.3	94.4	102

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	SPS - 1A - 06-Jun-2020 09:00	Mid-brown soil.
EA200: Description	SPS - 2A - 06-Jun-2020 09:00	Mid-brown soil.
EA200: Description	SPS - 3A - 06-Jun-2020 09:00	Mid-brown soil.
EA200: Description	SPS - 4A - 06-Jun-2020 09:00	Mid-brown soil.
EA200: Description	SPS - 5A - 06-Jun-2020 09:00	Mid-brown soil.
EA200: Description	SPS - 6A - 06-Jun-2020 09:00	Mid-brown soil.
EA200: Description	SPS - 7A - 06-Jun-2020 09:00	Mid-brown soil.
EA200: Description	SPS - 8A - 06-Jun-2020 09:00	Mid-brown soil.
EA200: Description	SPS - 9A - 06-Jun-2020 09:00	Mid-brown soil.
EA200: Description	SPS - 10A - 06-Jun-2020 09:00	Mid-brown soil.

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Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143
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