DLA Environmental Services

Supplementary Site Investigation

New Property Acquisition - Ivanhoe Estate
2 Lyon Park Road
Macquarie Pak NSW 2113

Frasers Property Australia

DL3953_S007076

July 2017

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This report is limited to the scope defined herein. Sampling and chemical analysis of environmental media are based on representative samples, the intensity of those samples being in accordance with the usual levels of testing carried out for this type of investigation and appropriate for the objectives of this report. Due to the inherent variability in environmental media, DLA cannot warrant that the whole overall condition of the Site is identical or substantially similar to the representative samples.

ABBREVIATIONS

A list of the common abbreviations used throughout environmental reports is provided below:

AS	Australian Standard
BGL	Below Ground Level
BH	Borehole
BTEX	Benzene, Toluene, Ethyl Benzene, Xylene
COPC	Contaminant of Potential Concern
CRC CARE	Cooperative Research Centre for Contamination Assessment and Remediation of the Environment
CT	Contaminant Threshold
DLA	DLA Environmental Services
DQI	Data Quality Indicator
DQO	Data Quality Objective
EC	Electrical Conductivity
EPA	Environment Protection Authority (NSW)
HIL	Health-Based Investigation Level
HSL	Health Screening Level
LOR	Limit of Reporting
ML	Management Limit
NA	Not Applicable
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NL	Not Limiting
NSW	New South Wales
OC/OP	Organochlorine / Organophosphorus Pesticides
OEH	Office of Environmental and Heritage
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
QA/QC	Quality Assurance and Quality Control
RPD	Relative Percentage Difference
SCC	Specific Contaminant Concentration
SEPP	State Environmental Planning Policy
TCLP	Toxicity Characteristics Leaching Procedure
TEQ	Toxicity Equivalence Quotient
TRH	Total Recoverable Hydrocarbons
UCL	Upper Confidence Limit

EXECUTIVE SUMMARY

DLA Environmental Services was engaged by Frasers Property Australia to undertake a Supplementary Site Investigation of a parcel of land identified as part of 2 Lyon Park Road, Macquarie Park, NSW, 2113, hereafter referred to as the Site. The Site comprises a new property acquisition that will be redeveloped as a road reserve, providing vehicular access to the southern areas of Ivanhoe Estate.

The objective of the investigation was to provide conclusions regarding the suitability of the Site for future land use consistent with 'Commercial / Industrial' as described by the *National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No.1)* ('NEPM', NEPC, 2013).

The investigation included the collection and laboratory analysis of soil samples from six boreholes. All soil samples reported contaminant concentrations below the adopted investigation and screening levels.

Based on a review of the available investigation data, DLA consider that there is a low likelihood of unacceptable contamination to be present on the Site as a result of past and present land use activities. As a result, the Site is considered suitable for redevelopment as a road reserve from a contamination perspective.

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1.0 INTRODUCTION

1.1 General

DLA Environmental Services (DLA) was engaged by Frasers Property Australia (the Client) to carry out a Supplementary Site Investigation of the following area:

New Property Acquisition - 'Ivanhoe Estate'
Part of 2 Lyon Park Road, Macquarie Park, NSW, 2113 ('the Site')

The Site comprises a narrow corridor of land along the north-eastern boundary of the property identified as 2 Lyon Park Road, Macquarie Park, NSW, 2113. The Site currently comprises paved access roads associated with the adjacent office building, and an area of uncleared bushland. It is proposed to redevelop the Site as a road reserve running perpendicular to Lyon Park Road, providing vehicular access to the southern areas of Ivanhoe Estate.

A Detailed Site Investigation (JBS&G, 2016) and a supplementary data gap investigation (DLA, 2017) were previously undertaken within Ivanhoe Estate to assess its contamination status. Recent acquisition of the Site requires that investigation within this area be carried out separately.

This investigation report provides information on the characterisation and environmental status of the Site and assesses the effects of any potential identified contamination on public health and the environment. This report has been prepared utilising information from current investigation works, and from experience, knowledge, and current industry practice in the investigation of similar sites.

1.2 Objectives

The objective of this investigation is to satisfy the general requirements of State Environmental Planning Policy No.55 (SEPP 55) in accordance with *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites* (NSW OEH, 2011).

Specifically, this investigation will consider the potential for historical activities to have caused contamination of the Site, and provide conclusions regarding the suitability of the Site for future land use consistent with 'Commercial / Industrial' as described by the *National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No.1)* ('NEPM', NEPC, 2013).

1.3 Scope of Works

To achieve these objectives, DLA carried out the following works:

- Targeted intrusive investigations comprising the collection of soil samples from six boreholes (BH1 to BH6);
- Data assessment and reporting, including comparison with relevant New South Wales (NSW) Environment Protection Authority (EPA) made or endorsed investigation and screening levels;
- Assessment of whether the Site subject to the current investigation is suitable for the proposed land use from a contamination perspective;
- Consideration of potential Site contamination management requirements, if any; and
- Preparation of this Supplementary Investigation report.

2.0 SITE DESCRIPTION

2.1 Site Identification

Site identification details are summarised in Table 1.

Table 1: Site Identification Summary

ITEMS	DETAILS
Site Name	New Property Acquisition, 'Ivanhoe Estate'
Address	Part of 2 Lyon Park Road, Macquarie Park, NSW 2113
Lot and Deposited Plan	Part of Lot 1 in Deposited Plan 859537
Local Government Authority	City of Ryde
Site Zoning	B7 – Business Park under the Ryde Local Environmental Plan 2014
Current Use	Access roadways associated with adjacent office building
Proposed Use	Formal road reserve
Site Area (approx.)	1,490m^2
Locality Map	Refer to **Figure 1** – Site Location
Site Survey	Refer to **Figure 2** – Site Layout and Sample Locations

2.2 Proposed Development

The Site is to be redeveloped as a formal road reserve to provide vehicular access to the southern areas of Ivanhoe Estate. As such, the development scenario is consistent with the definition of 'Commercial / Industrial' as described in Schedule B7 of the NEPM (NEPC, 2013).

2.3 Boundaries and Surrounding Land Use

The boundary and surrounding landscape features of the Site are summarised in Table 2.

Table 2: Boundaries and Surrounding Land Use

DIRECTION	DETAILS
North-west	Future 'Ivanhoe Estate' redevelopment
North-east	Commercial building
South-west	5 storey office building
South-east	Lyon Park Road with commercial premises beyond

2.4 Environmental Setting

The landscape and environmental setting of the Site is summarised in Table 3.

Table 3: Environmental Setting

DIRECTION	DETAILS
Topography	The Site lies at elevations between approximately 47m and 49m Australian Height Datum. The existing access roads are level, while minor undulations are present in the bushland comprising the north-western part of the Site.
Geology and Soil	The 1:100,000 Sydney Geological Series Sheet (9130) indicates that the Site is underlain by Triassic-aged Ashfield Shale of the Wianamatta Group. This formation comprises black and dark grey shale and laminite derived from lacustrine environments. The 1:100,000 Sydney Soil Landscape Group Sheet 9130 indicates that the Site lies on the boundary of the Glenorie Soil Landscape Group in the south-east and the Lucas Heights Soil Landscape Group in the north-west. The Glenorie group comprises shallow to moderately deep red podzolic soils on crests, moderately deep red and brown podzolic soils on upper slopes, and deep yellow podzolic soils and gleyed podzolic soils along drainage lines. The limitations of this soil group include high soil erosion hazard, localised impermeable highly plastic soil, and moderate reactivity. The Lucas Heights group comprises moderately deep hard-setting yellow podzolic soils and yellow soloths, and yellow earths on outer edges. The limitations of this soil group include stony soil, low soil fertility, and low available water capacity.
Acid Sulfate Soils	The 1:25,000 Prospect / Parramatta River Acid Sulfate Soil Risk Map indicates that there are no known occurrences of acid sulfate soil in the vicinity of the Site.
Hydrology	Shrimpton Creek runs along the north-western boundary of the Site. Shrimpton Creek flows in a broadly northerly direction, ultimately discharging to the Lane Cove River which is located approximately 1.35 km to the north-east of the Site. The surface of the Site comprises both sealed and unsealed surfaces. In areas of the Site where unsealed surfaces are present (i.e. the bushland area in the north-western portion of the Site), it is expected that surface water (rainfall) would infiltrate into the subsurface. In areas of the Site where impervious pavements are present (i.e. access roads), or where the subsurface becomes waterlogged following periods of prolonged or heavy rainfall, runoff water would form overland flow and follow the gradient of the land.
Hydrogeology	Review of the NSW Office of Water groundwater database indicates that there are no registered bores within a 500m radius of the Site. It is expected that regional groundwater would be present at depth within the underlying bedrock. Based on the hydrology of the local area, it is expected that groundwater underlying the Site would flow in a north-easterly direction towards the Lane Cove River.

3.0 SUMMARY OF PREVIOUS INVESTIGATIONS

3.1 Detailed Site Investigation

Detailed Site Investigation – Ivanhoe Estate, Herring Road, Macquarie Park NSW (JBS&G, dated 30 September 2016, reference: 52047/104956 (Rev A)).

The Detailed Site Investigation comprised a review of previous investigations, historical information and intrusive sampling which included 26 grid-based and targeted borehole locations.

The results of the soil sampling and laboratory analysis reported contaminants of potential concern at concentrations less than the investigation criteria, with the exception of benzo(a)pyrene which exceeded the adopted ecological criteria at one sample location. This ecological exceedance was not considered to present an unacceptable ecological risk due to its limited effects on plant uptake.

The report concluded that the soils underlying the Site do not present an unacceptable risk to human health or the environment and do not preclude redevelopment of the Site for its intended land use.

3.2 Summary of In-Ground Contamination

Summary of In-Ground Contamination – Ivanhoe Estate, Cnr Herring and Epping Roads, Macquarie Park NSW 2113 (DLA, dated 11 October 2016, reference: DL3951_S005491).

The document was prepared in response to a review of the Detailed Site Investigation report (JBS&G, 2016) which indicated that historical cut and fill activities were undertaken on-site to facilitate the construction of larger developments in the estate.

Based on a review of the available historical and investigation data, DLA concluded that there was a low likelihood of unacceptable contamination to be present on the Site as a result of past and present land use activities, however data gaps existed for the cut and fill areas.

DLA recommended that additional visual inspections and limited sampling be performed across the cut and fill areas with the aim of addressing the identified data gaps with regards to the presence of subsurface contamination associated with fill material.

3.3 Supplementary Site Investigation

Supplementary Site Investigation – *Ivanhoe Estate, Corner Herring Road and Epping Road, Macquarie Park NSW 2113* (DLA, dated June 2017, reference: DL3953_S006887).

The Supplementary Investigation provided environmental characterisation of soil across the areas of the Site that were identified as data gaps to the Detailed Site Investigation.

The investigation included the collection and laboratory analysis of soil samples from nine targeted boreholes. One soil sample reported petroleum hydrocarbons at a concentration exceeding the health and ecological screening levels. The soil in this location was not considered suitable for the proposed redevelopment from a contamination perspective and, therefore, remediation was recommended.

All other soil samples reported contaminant concentrations below the adopted investigation and screening levels. In addition, asbestos was not detected in any of the samples submitted for analysis.

4.0 SAMPLING, ANALYSIS AND QUALITY PLAN

4.1 Data Quality Objectives

The NEPM (NEPC, 2013) and Australian Standard (AS) 4482.1-2005 recommend that data quality objectives (DQOs) be implemented during the investigation of potentially contaminated sites. The DQO process described in AS 4482.1-2005 *Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soil Part 1: Non-Volatile and Semi-Volatile Compounds* outlines seven distinct steps to outline the project goals, decisions, constraints and an assessment of the project uncertainties and how to address these when they arise. The DQOs have been summarised in Table 4.

Table 4: Summary of DQOs

1	State the Problem	This Supplementary Investigation aims to address the question of whether previous land uses have affected the suitability of the Site for future land use consistent with 'Commercial / Industrial' as defined by the NEPM (NEPC, 2013).
2	Identify the Decisions	Decisions include: – Do contaminant concentrations in soil comply with the investigation criteria? – Have the previous land uses affected the environmental quality of the land? – Do residual soils pose an unacceptable risk to human health or the environment?
3	Identify Inputs to Decisions	Inputs to the decision include: – Previous environmental data. – Relevant NSW EPA produced or endorsed criteria. – Field observations. – The results of judgemental soil sampling and laboratory analysis.
4	Define Study Boundaries	– Spatial Boundaries – the physical study will focus on soil within the confines of the Site boundaries as shown in Figure 2. – Temporal Boundaries – the temporal boundary of the investigation is the period of the current investigation.

5	Develop Decision Rule	The Site will be considered suitable for its intended land use if concentrations of soils comply with the investigation criteria, as determined by the following decision rules being applied to the data: – The 95% Upper Confidence Limit (UCL) of the arithmetic mean for each contaminant of concern must comply with the respective investigation criteria; – The individual contaminant concentration should not exceed the investigation criteria by more than 250%, and; – The standard deviation of individual contaminants should not exceed 50% of the investigation criteria. The Site will be deemed to contain contamination "hotspots" if any of the above criteria are unfulfilled.
6	Specify Limits on Decision Errors	Field and laboratory quality controls are implemented to avoid error and to ensure the action levels exceed the measurement detection limits. The performance of decision making inputs will be enhanced through the application of Data Quality Indicators (DQI), defined in Table 5. A Site under investigation is assumed to be contaminated until statistically proven otherwise (eg: H_o= Analyte 95% UCL exceeds the Assessment Criteria), therefore two types of error are possible: - Type 1 error (α or false negative), where the Site is assessed to be uncontaminated when it is actually is; and - Type 2 error (β or false positive), when the Site is assessed to be contaminated though is actually not. The more severe consequence is with Type 1 errors (α) since the risk of jeopardising human or environmental health outweighs the consequences of additional remediation costs. Therefore, to achieve appropriate confidence in the data, probabilities are set at 5% for Type 1 error, whilst Type 2 errors are set at a 20% probability limit.
7	Optimise Design for Obtaining Data	– Ensure access to all relevant and previous environmental data. – Identify the most resource-effective sampling and analysis design for general data that are expected to satisfy the DQOs.

Table 5: Summary of DQIs

DATA PRECISION AND ACCURACY	
Acceptable Relative Percentage Difference (RPD)	>10 x Limit of Reporting (LOR): 30% inorganics; 50% organics (field) <10 x LOR: Assessed on individual basis (field) >5 x LOR: 50% (laboratory) <5 x LOR: No Limit (laboratory)
Adequate Laboratory Performance	Based on acceptance criteria of laboratory as specified on certificate of analysis, includes: blank samples, control samples, and surrogate spike samples. Use of analytical laboratories with adequately trained and experienced testing staff experienced in the analyses undertaken, with appropriate NATA certification.
DATA REPRESENTATIVENESS	
Sample and Analysis Selection	Representativeness of all contaminants of concern.
Laboratory Selection	Adequate laboratory internal quality control and quality assurance methods, complying with the NEPM (NEPC, 2013).
DOCUMENTATION COMPLETENESS	
Chain of Custody Records	Laboratory sample receipt information received confirming receipt of samples intact and appropriate chain of custody.
	NATA registered laboratory results certificates provided.
DATA COMPLETENESS	
	Analysis for all contaminants of concern.
	Field duplicate sample numbers complying with NEPM (NEPC, 2013)
COMPARABILITY	
	Use of NATA registered laboratories.
	Detailed logs of all sample locations recorded.
	Test methods comparable between primary and secondary laboratory
	Acceptable RPD's between original samples and field duplicates and inter-laboratory duplicate samples.

4.2 Field Investigation Procedure

Field investigation carried out as part of the Supplementary Investigation comprised the collection of 11 primary soil samples from six boreholes (BH1 to BH6). Boreholes were placed systematically across the Site with the aim of achieving sufficient Site coverage.

For a site covering an area of approximately 1,490m^2, the NSW EPA (1995) *Sampling Design Guidelines* recommend a minimum of seven test locations be targeted for assessment. Although the adopted sampling density is marginally less than the minimum recommended, given the currently nature of the Site and the proposed future land use, the sampling density is considered adequate for the purposes of the investigation.

The justification of the sampling point regime for the investigation was based on the investigator's knowledge, operational requirements and experience.

Refer to **Figure 2** – Site Layout and Sample Locations.

4.2.1 Sample Collection

Boreholes were drilled using a hand auger to depths between 0.4m and 1.5m below ground level (bgl). Soil samples were obtained directly off the auger and immediately transferred to sample containers of appropriate composition (glass jars for chemical analysis). Job number; sample identification number; sampler's initials and date of sampling were recorded on sample labels affixed to the sample containers.

Chemical samples were immediately placed into a chilled cooler to minimise the likelihood for loss of potential volatile components during storage and transport. Chemical samples were stored and transported at temperatures below 4°C. Samples were transported under standard DLA chain-of-custody protocols to Envirolab Services Pty Ltd, a NATA accredited laboratory.

Soil samples were not screened in the field for the presence of volatile organic compounds using a Photoionization Detection as all samples collected were submitted for analysis for volatile contaminants of concern.

Samples were collected by DLA staff who are specifically trained in hazardous waste field investigation techniques and health and safety procedures. Field sampling techniques used are specified in DLA Field Manual for Contaminated Sites, which are based on methods specified in the NEPM (NEPC, 2013).

4.3 Analytical Strategy

Soil samples were analysed for the contaminants of potential concern (COPC) presented in Table 6.

Table 6: Analytical Schedule

SOIL SAMPLES	NO. OF PRIMARY SAMPLES
Total Recoverable Hydrocarbons (TRH)	11
Benzene, Toluene, Ethylbenzene, Xylene (BTEX)	11
Polycyclic Aromatic Hydrocarbons (PAH)	11
Heavy Metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn)	11
Organochlorine / Organophosphorus Pesticides (OC/OP)	5
Polychlorinated Biphenyls (PCBs)	5

4.4 Investigation Criteria

The investigation criteria have been derived from NEPM (NEPC, 2013) and are specific to the proposed development scenario for the Site.

The investigation criteria are not clean up criteria, but are indicative of a level of contamination above which there is a potentially unacceptable risk which may require further assessment, management or remediation.

4.4.1 Health Investigation Levels

The Health Investigation Levels (HILs) are scientifically based, generic assessment criteria designed to be used in the first stage (Tier 1) of an assessment of potential risks to human health from chronic exposure to contaminants. They are intentionally conservative and are based on a reasonable worst case scenario for four generic land use scenarios. Considering the proposed land use, the following HIL has been adopted:

- HIL D – Commercial / Industrial.

The adopted HILs from Table 1A(1) and Table 7, Schedule B1 of NEPM (NEPC, 2013) are shown in Table 7.

Table 7: Health Investigation Levels for Soils

ANALYTES	HIL-D
Heavy Metals	
Arsenic	3,000
Cadmium	900
Chromium	3,600
Copper	240,000
Lead	1,500
Mercury	730
Nickel	6,000
Zinc	400,000
PAH	
Benzo(a)pyrene TEQ	40
Total PAHs	4,000
PCB	
PCB	7
Pesticides	
DDT+DDE+DDD	3,600
Aldrin and Dieldrin	45
Chlordane	530
Endosulfan	2,000
Endrin	100
Heptachlor	50
HCB	80
Methoxychlor	2,500
Mirex	100
Toxaphene	160

Health Investigation Levels soured from NEPM (NEPC, 2013) Table 1A(1)
TEQ: Toxic Equivalence Quotient expresses an aggregate measure of toxicity based on a number of contributing PAH compounds.

4.4.2 Health Screening Levels

Health Screening Levels (HSLs) are used to assess selected petroleum compounds and fractions to assess the risk to human health via inhalation and direct contact with affected soils. The HSLs were developed by the Co-operative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) and were derived through the consideration of health effects only, with particular emphasis on the vapour exposure pathway. Other considerations such as ecological risk, aesthetics, the presence of free phase product and explosive / fire risk are not addressed by the HSLs.

In order to determine whether the HSLs tabulated in Schedule B1 of NEPC (2013) are applicable or whether a site-specific determination is required, CRC CARE provide an application checklist which should be completed prior to using the HSLs. The following parameters were considered in completing the checklist:

- **Potential Contaminants –** Petroleum Hydrocarbons;
- **Land use –** HSL D;
- **Potential Pathways –** soil vapour intrusion, direct contact;
- **Media –** soil;
- **Soil Types –** the subsurface of the Site comprises sandy fill overlying clay, therefore a conservative approach has been implemented whereby sand has been adopted as the dominant sub-surface profile; and
- **Depth to Contamination –** all data will be compared with the HSLs.

On the basis of these considerations, the following HSL has been adopted:

- HSL D Commercial / Industrial for ‘sand’ (or ‘coarse’).

The adopted soil HSLs for vapour intrusion from Table 1A(3), Schedule B1 of NEPM (NEPC, 2013) are shown in Table 8.

Table 8: Health Screening Levels for Soils

ANALYTES	HSL-D (Sand) 0.0 to <1.0m	HSL-D (Sand) 1.0 to <2.0m	Direct Contact HSL-D
Benzene	3	3	430
Toluene	NL	NL	99,000
Ethylbenzene	NL	NL	27,000
Xylenes	230	NL	81,000
Naphthalene	NL	NL	11,000
F1: C_6-C_{10}	260	370	26,000
F2: C_{10}-C_{16}	NL	NL	20,000
F3: C_{16}-C_{34}	NA	NA	27,000
F4: C_{34}-C_{40}	NA	NA	38,000

NL = Not Limiting (i.e. the soil vapour concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for the given scenario).

NA = Not Applicable (i.e. NEPM (NEPC, 2013) does not provide HSLs for the F3 and F4 hydrocarbon fractions).

Vapour Intrusion Criteria sourced from NEPM (NEPC, 2013) *Table 1A(3).*

Direct Contact Criteria sourced from Friebel and Nadebaum 2011, Health Screening Levels for petroleum Hydrocarbons in Soil and Groundwater, Part 1: Technical Development Document, *Table A4 – Soil Health Screening Levels for Direct Contact.*

4.4.3 Management Limits

In addition to appropriate consideration and application of the HSLs, there are additional considerations which reflect the nature and properties of petroleum hydrocarbons, including:

- Formation of observable light non-aqueous phase liquids;
- Fire and explosion hazards; and
- Effects on buried infrastructure e.g. penetration of, or damage to, in-ground services.

Management Limits (ML) to avoid or minimise these potential effects have been adopted in NEPM (NEPC, 2013) as interim Tier 1 guidance.

The adopted management limits from Table 1B(7), Schedule B1 of NEPM (NEPC, 2013) are shown in Table 9.

Table 9: Management Limits for Soils

ANALYTES	ML (Coarse) Commercial / Industrial
F1: C_6-C_{10}	700
F2: C_{10}-C_{16}	1,000
F3: C_{16}-C_{34}	3,500
F4: C_{34}-C_{40}	10,000

Management Limits sourced from NEPM (NEPC, 2013) *Table 1 B(7).*

4.4.4 Waste Classification Assessment Criteria

The characterisation of materials for off-site disposal will be performed in accordance with:

- *Waste Classification Guidelines* (NSW EPA, 2014);
- *Excavated Natural Material (ENM) Order* (NSW EPA, 2014) and *Excavated Natural Material Exemption* (NSW EPA, 2014);
- *Protection of the Environment Operations Act 1997* (NSW) and associated regulations; and
- All other relevant resource recovery orders, resource recovery exemptions and approvals issued by the NSW EPA.

A selection of criteria from the aforementioned sources are summarised in Table 10.

Table 10: Waste Classification Criteria

ANALYTE	GENERAL SOLID WASTE			RESTRICTED SOLID WASTE			ENM	
	CT1[a]	TCLP1[b]	SCC1[c]	CT2[d]	TCLP2[e]	SCC2[f]	Ave. Conc.[g]	Max. Conc.[h]
	mg/kg	mg/L	mg/kg	mg/kg	mg/L	mg/kg	mg/kg	mg/kg
BTEX								
Benzene	10	0.5	18	40	2	72	--	0.5
Toluene	288	14.4	518	1,152	57.6	2073	--	65
Ethylbenzene	600	30	1080	2,400	120	4320	--	25
Xylenes (total)	1000	50	1800	4,000	200	7200	--	15
TRH								
$C_6 - C_{10}$	NA	NA	650	NA	NA	2600	--	--
$>C_{10} - C_{36}$	NA	NA	10000	NA	NA	40000	250	500
PAH								
PAH (total)	NA	NA	200	NA	NA	800	20	40
Benzo(a)pyrene	0.8	0.04	10	3.2	0.16	23	0.5	1

Heavy Metals								
Arsenic	100	5.0	500	400	20	2000	20	40
Cadmium	20	1.0	100	80	4	400	0.5	1
Chromium	100	5	1900	400	20	7600	75	150
Copper	--	--	--	--	--	--	100	200
Lead	100	5	1500	400	20	6000	50	100
Mercury	4	0.2	50	16	0.8	200	0.5	1
Nickel	40	2	1050	160	8	4200	30	60
Zinc	--	--	--	--	--	--	150	300
Other								
pH (pH units)	--	--	--	--	--	--	5 to 9	4.5 to 10
Foreign Materials	--	--	--	--	--	--	0.05%	0.10%
E.C. (dS/m)	--	--	--	--	--	--	1.5	3.0

CT – Contaminant Threshold.

TCLP – Toxicity Characteristics Leaching Procedure.

SCC – Specific Contaminant Concentration

NA – No applicable as these contaminants are only assessed using Specific Contaminant Concentrations.

E.C.– Electrical Conductivity

a – *Waste Classification Guidelines* (NSW EPA, 2014), Table 1: CT1 & CT2 values for classifying waste by chemical assessment without the TCLP test, Column 1: General Solid Waste.

b – *Waste Classification Guidelines* (NSW EPA, 2014), Table 2: TCLP and SCC values for classifying waste by chemical assessment, General Solid Waste Column 1: Leachable concentration.

c – *Waste Classification Guidelines* (NSW EPA, 2014), Table 2: TCLP and SCC values for classifying waste by chemical assessment, General Solid Waste Column 2: Specific Contaminant Concentration.

d – *Waste Classification Guidelines* (NSW EPA, 2014), Table 1: CT1 & CT2 values for classifying waste by chemical assessment without the TCLP test, Column 2: Restricted Solid Waste.

e – *Waste Classification Guidelines* (NSW EPA, 2014), Table 2: TCLP and SCC values for classifying waste by chemical assessment, Restricted Solid Waste Column 1: Leachable concentration.

f – *Waste Classification Guidelines* (NSW EPA, 2014), Table 2: TCLP and SCC values for classifying waste by chemical assessment, Restricted Solid Waste Column 2: Specific Contaminant Concentration.

g – *Excavated Natural Material Order* (NSW EPA, 2014), Table 4, Column 2 – Maximum Average Concentration for Characterisation.

h – *Excavated Natural Material Order* (NSW EPA, 2014), Table 4, Column 3 – Maximum Average Concentration for Characterisation.

5.0 QUALITY ASSURANCE AND QUALITY CONTROL

5.1 Field Quality Assurance / Quality Control

5.1.1 Sampling Team

Soil sampling was undertaken by Matthew Junghans, an experienced environmental consultant from DLA.

5.1.2 Field Procedures

The following field procedures were implemented as part of field quality assurance / quality control (QA/QC):

- **Sample Containers:** soil samples collected during the investigation were placed immediately into laboratory prepared glass jars with Teflon lid inserts, and zip-lock plastic bags. Standard identification labels were adhered to each individual container and labelled according to depth, date, sampling team and media collected;
- **Decontamination:** all equipment used in the sampling program was decontaminated prior to use and between samples to minimise the potential for cross contamination. Decontamination of equipment involved:
    - Cleaning equipment in potable water to remove gross contamination;
    - Cleaning in a solution of Decon 90; and
    - Rinsing in clean demineralised water.
- **Chain of Custody**: samples were recorded on a chain of custody form. The chain of custody form accompanied samples upon dispatch to the NATA registered laboratories for analysis. Copies of the chain of custody forms, signed by laboratory, that acknowledged sample receipt date and time, samples received in good condition and adequately chilled and documentation received in proper order, are provided in **Appendix B**;
- **Photoionisation Detector:** given that volatile contaminants were not considered a primary contaminant of concern, screening of the samples using a photoionisation detector was not considered necessary. Regardless, all soil samples collected as part of the current investigations were submitted for laboratory analysis for TRH and BTEX.
- **Trip Spike / Trip Blank:** Trip spikes are used to assess whether volatile contaminants in samples may have been lost during transport. Trip blanks are used to assess whether volatile contamination may have been introduced to a sample during shipping and handling. Given the absence of potential sources of hydrocarbon-based contamination identified on-site at the time of fieldwork, hydrocarbons were not considered a primary contaminant of

concern. Consequently, the collection of trip spikes and trip blanks was not considered necessary. The absence of detectable volatile hydrocarbon concentrations in soil samples suggests that the loss or transfer of volatile contamination from and between soil samples is unlikely. The absence of trip spike and trip blank sample data is not considered to affect the precision or accuracy of the laboratory data, or the conclusions of the overall assessment.

- **Rinsate Blanks**: Rinsate blanks are used to assess the effectiveness of field decontamination techniques in minimising cross-contamination of samples. Rinsate blanks were not collected during fieldwork. All care was taken to remove soil adhered to the hand auger between each sampling interval, and sampling equipment was decontaminated between each borehole location. As such, the potential for cross contamination was considered minimal. The absence of rinsate blank sample data is not considered to affect the precision or accuracy of the laboratory data, or the conclusions of the overall assessment.

5.1.3 Field QA/QC Duplicate Analysis

Field duplicate samples for soil were prepared in the field through the following process:

- A larger than normal quantity of soil is recovered from the sample location selected for duplication;
- The sample is placed in a decontaminated stainless bowl and mixed as thoroughly as practicable before being divided into equal parts;
- Two portions of the sub-sample are immediately transferred, one for an intra-laboratory duplicate and another as a sample; and
- Samples are placed into a labelled, laboratory supplied 250ml glass jar and sealed with an airtight, Teflon screw top lid. The fully filled jars are labelled as the sample and duplicate and immediately placed in a chilled cooler.

Duplicate samples were prepared on the basis of sample numbers recovered during the field work. The duplicate sample frequency was computed using the total number of samples analysed as part of this assessment. The duplicate sample frequencies are shown below:

SOIL SAMPLES	**11 Samples**	1 intra-laboratory duplicate	9%

An intra-laboratory duplicate sampling rate of 9% was achieved which is marginally less than the 10% recommended by DLA's Field Quality Plan. No inter-laboratory duplicate samples were collected for analysis.

Comparisons were made of the laboratory test results for the duplicate samples with the original samples and the Relative Percentage Difference (RPD) calculated as difference/average in order to assess the accuracy of the sampling and laboratory test procedures. The comparisons between the duplicates and original samples indicate acceptable RPDs when they comply with criteria which are commonly set at:

- Less than 30% for inorganics and 50% for organics;
- Less than five times the laboratory LOR; and
- The difference between concentrations is less than 5% of the relevant HIL concentration.

Field duplicates provide an indication of the whole validation process, including the sampling process, sample preparation and analysis.

The laboratory duplicate samples reported RPDs within the acceptable range for all analytes.

Given the limited number of primary samples collected overall and the lack of significant variation in contaminant concentrates as indicated by the RPD calculations, the field duplicate sampling ratio is considered sufficient for the purposes of this investigation to assess the precision of the project laboratory.

RPD results are tabulated in **Appendix A** – Data Summary Tables.

5.2 Laboratory QA/QC

5.2.1 Selected Laboratory

The laboratory for used for the analysis of primary soil samples and intra-laboratory duplicate samples was Envirolab Services Pty Ltd located at Chatswood in Sydney. The analytical methods and procedures used by the laboratory are NATA certified and meet requirements of NEPM (NEPC, 2013).

5.2.2 Laboratory Control Measures

The project laboratory adopted a quality program that comprises of reagent/method blanks, matrix spikes, surrogate spikes, laboratory duplicates and laboratory control samples at or in excess of current NEPM guidelines.

5.2.3 Laboratory QA/QC Results

Soil samples were received at the laboratory in good order, with the correct documentation and were adequately chilled. All samples were analysed within the recommended holding times. The signed sample receipt advice is included on the chain of custody forms.

A laboratory quality control summary and full laboratory QA/QC checklist is included on the laboratory reports presented in **Appendix B**. Laboratory QA/QC procedures to determine the accuracy and precision of the analyses comprised the following:

- No target analytes were detected in any of the method blanks, indicating that the analytical method was satisfactory and no contamination occurred;
- Matrix spike samples were within the accepted range indicating low matrix interference;
- Surrogate spikes were within the accepted range indicating no gross errors have occurred in the analysis procedure leading to significant analyte loss;
- Laboratory control samples were within the accepted range confirming primary calibration; and
- RPDs for the laboratory duplicate samples were within the acceptable limit with the exception of the following:
    - Chromium with a RPD of 59%
    - Nickel with a RPD of 40%
    - Fluoranthene with RPDs of 67%
    - Pyrene with a RPD of 67%

  It is expected that the outliers for heavy metals are associated with the heterogeneity of the sample matrix and the uneven distribution of contaminants, rather than poor laboratory techniques. The PAH-based outliers can be attributed to the reported contaminant concentrations being close to the laboratory LOR which results in exaggerated RPDs.

5.3 QA/QC Assessment

Based on the QA/QC results, DLA considers the field measurement data and laboratory analytical results obtained are valid and meet the data quality objectives set for this investigation. DLA concludes that the field and laboratory data presented herein is representative of the overall Site condition at the time of fieldwork.

6.0 RESULTS

6.1 Fieldwork Observations

The subsurface typically consisted of sand and clay fill with sandstone gravel and cobbles to the maximum extent of the boreholes, with the except of borehole BH1 which encountered residual sandy clay at 1.4m bgl.

No visual or olfactory evidence of contamination (i.e. staining or odours) was recorded during fieldwork. No anthropogenic material, including fragments of fibre cement sheeting, was observed.

Subsurface conditions are provided in detail in the borehole logs presented in **Appendix C**.

6.2 Analytical Results

The results of the soil sampling are summarised below.

Refer to **Appendix A –** Data Summary Table and **Appendix B** – NATA Certified Analytical Results.

6.2.1 Total Recoverable Hydrocarbons and Monocyclic Aromatic Hydrocarbons

The results of the laboratory analysis reported TRH and BTEX in soil at concentrations less than the laboratory LOR and the adopted investigation criteria.

6.2.2 Polycyclic Aromatic Hydrocarbons

The results of the laboratory analysis reported PAHs in soil at concentrations less than the adopted investigation criteria.

6.2.3 Pesticides and Polychlorinated Biphenyls

The results of the laboratory analysis reported pesticides and PCBs in soil at concentrations less than the laboratory LOR and the adopted investigation criteria.

6.2.4 Heavy Metals

The results of the laboratory analysis reported heavy metals in soil at concentrations less than the adopted investigation criteria.

7.0 DISCUSSION

7.1 Soil Contamination

The objective of this investigation was to assess the suitability of the Site for redevelopment for future land use consistent with 'Commercial / Industrial' as described by the NEPM (NEPC, 2013).

Intrusive investigations indicated that the subsurface of the Site comprises sand and clay fill with sandstone gravel and cobbles, overlying residual sandy clay.

Soil samples were collected from six test pits and submitted for laboratory analysis for a suite of typical contaminants of potential concern. All soil samples reported contaminant concentrations below the adopted investigation and screening levels.

7.2 Preliminary Waste Classification

A preliminary waste classification has been carried out using existing analytical data to provide an indicative classification to facilitate off-site disposal of excavated soil, if required. Analytical results were compared against the contaminant thresholds presented in Table 1 of the NSW EPA (2014) *Waste Classification Guidelines, Part 1: Classifying Waste*.

The data indicates that fill material comprising the subsurface of the Site is classified as General Solid Waste, non-putrescible.

A more detailed assessment of the fill material underlying the Site would be required to more thoroughly classify this material to facilitate appropriate off-site disposal.

8.0 CONCLUSIONS AND RECOMMENDIATIONS

The sampling regime and subsequent assessment and reporting of the site are considered to be adequate for investigation purposes to assess the suitability of the Site for its intended use in accordance with the general requirements of SEPP 55.

Reporting has been undertaken in accordance with the *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites* (NSW OEH, 2011) and the *Guidelines for the NSW Site Auditor Scheme* (NSW EPA, 2nd ed., 2006).

Based on a review of the available investigation data, DLA consider that there is a low likelihood of unacceptable contamination to be present on the Site as a result of past and present land use activities.

As a result, the Site is considered suitable for redevelopment as a road reserve from a contamination perspective.

9.0 REFERENCES

AS 4482.1-2005 *Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soil Part 1: Non-Volatile and Semi-Volatile Compounds*.

DLA (2016). *Summary of In-Ground Contamination – Ivanhoe Estate, Cnr Herring and Epping Roads, Macquarie Park NSW 2113*. DLA Environmental Services.

DLA (2017). *Supplementary Site Investigation - Ivanhoe Estate, Corner Herring Road and Epping Road, Macquarie Road NSW 2113*. DLA Environmental Services.

Friebel, E and Nadebaum, P (2011). *Health screening levels for petroleum hydrocarbons in soil and groundwater, Part 2: Application document, CRC CARE Technical Report no. 10.* CRC for Contamination Assessment and Remediation of the Environment.

JBS&G (2016). *Detailed Site Investigation – Ivanhoe Estate, Herring Road, Macquarie Park NSW.* JBS&G Pty Ltd.

NEPC (1999). *National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No.1).* National Environment Protection Council.

NSW DEC (2006). *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme 2nd edition.* New South Wales Department of Environment and Conservation.

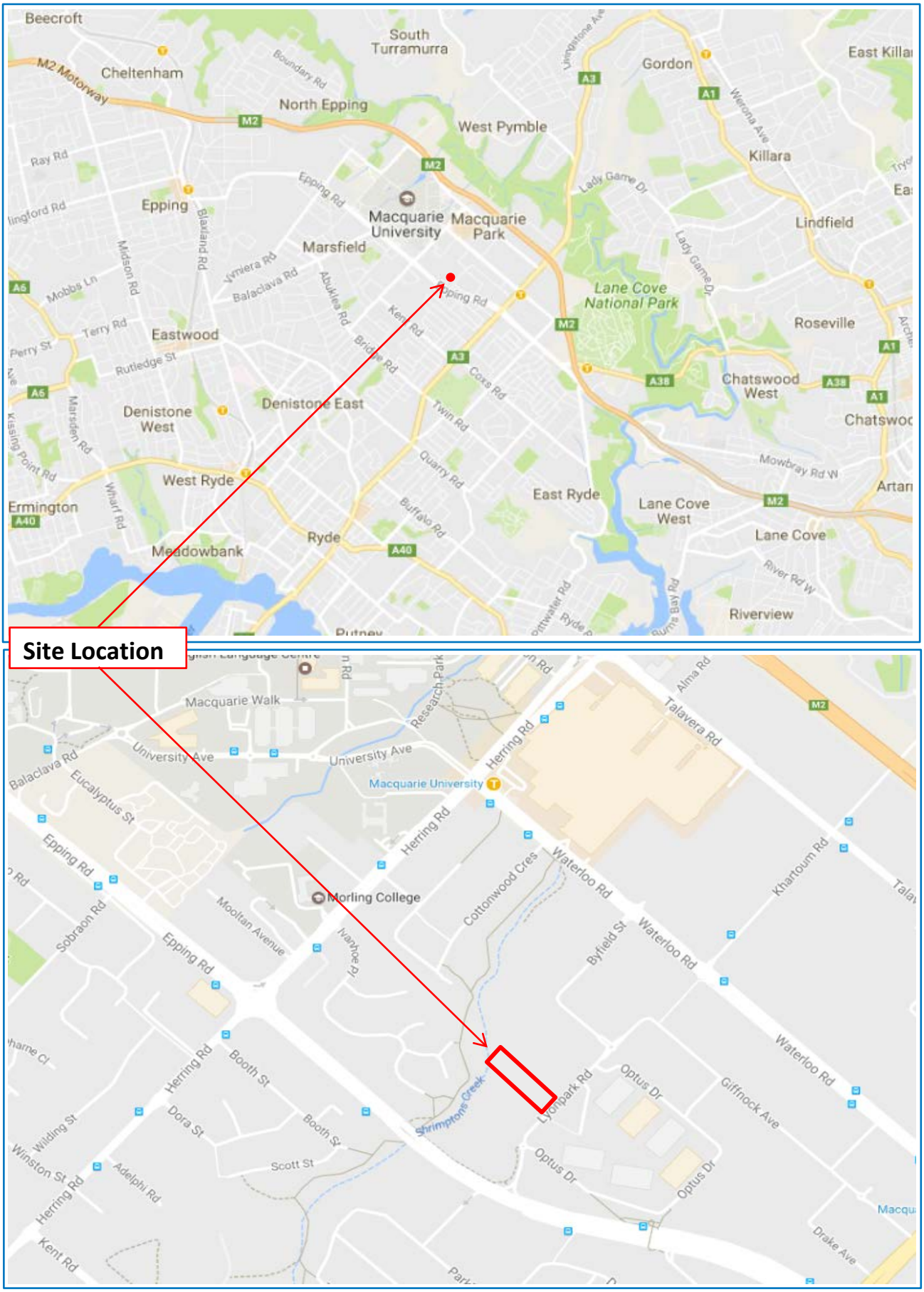
NSW EPA (1995). *Contaminated Sites: Sampling Design Guidelines.* New South Wales Environment Protection Authority.

NSW EPA (2014). *Waste Classification Guidelines, Part 1: Classifying Waste*. New South Wales Environment Protection Authority.

NSW OEH (2011). *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites*. New South Wales Office of Environment and Heritage.

FIGURE 1

SITE LOCATION



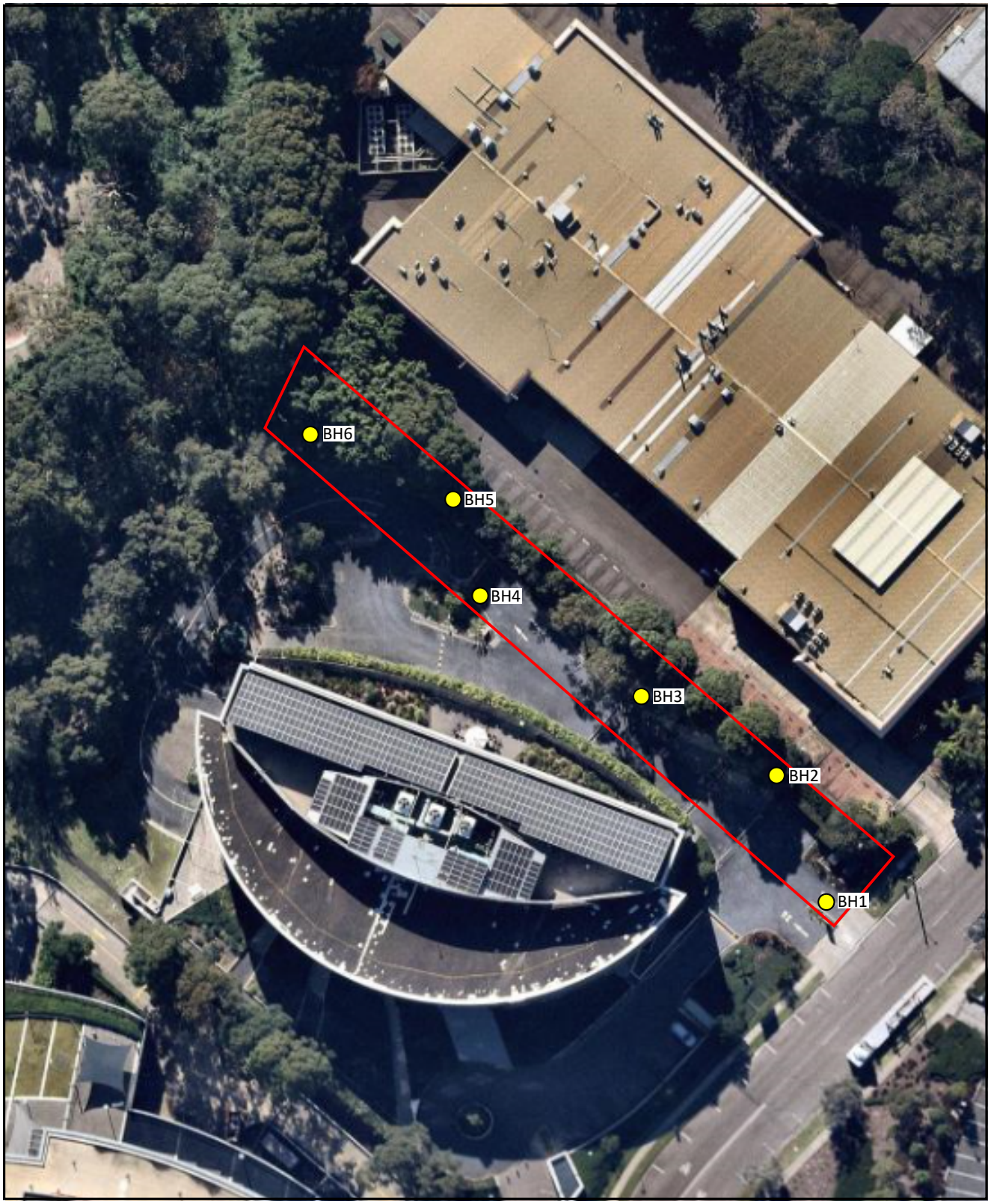
DLA Environmental Services A Pacific Environment company Unit 3, 38 Leighton Place Hornsby NSW 2077	**DESIGNED:** DLA **COMPILED:** SK **PROJ. No.** DL3953	**FIGURE TITLE:**	SITE LOCATION	
		PROJECT TITLE:	New Acquisition, Ivanhoe Estate, Macquarie Park	**DATE:** 10/07/2017
		CLIENT:	Frasers Property Australia	**FIGURE:** 1

FIGURE 2

SITE LAYOUT AND SUPPLEMENTARY SAMPLE LOCATIONS

DLA Environmental Services
A Pacific Environment company

Compiled
AR



Legend

- Approximate Site Boundary
- Sample Locations (approximate)

N

Approximate Scale

0m 7.5m 15m

Figure Title: Site Layout and Sample Locations

Project Title: New Property Acquisition
Ivanhoe Estate, Macquarie Park

Client: Frasers Property Australia

Project No.	Date	Scale	Figure No.	Revision
DL3953	10/7/2017	As Shown	2	Version 1.0

APPENDIX A

DATA SUMMARY TABLES

Table 1 - Soil Analytical Results
Supplementary Investigation
New Property Aquisition
'Ivanhoe Estate'
Macquarie Park NSW

Sample ID	Depth (m)	Date	Chemical Report	BTEX				Naphthalene	TRH				PAH		Pesticides		PCB	Heavy Metals							
				Benzene	Toluene	Ethylbenzene	Xylene		F1	F2	F3	F4	BaP TEQ	Total PAH	OCP	OPP		As	Cd	Cr VI	Cu	Pb	Hg	Ni	Zn
SITE ASSESSMENT CRITERIA																									
HIL D Commercial / Industrial (NEPC, 2013)				-	-	-	-	-	-	-	-	-			-	-	-	3000	900	3600	240000	1500	730	6000	400000
HSL D Commercial / Industrial, 0-<1m, sand (NEPM, 2013)				3.0	NL	NL	230	NL	260	NL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HSL D Commercial / Industrial, 1-<2m, sand (NEPM, 2013)				3.0	NL	NL	NL	NL	370	NL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HSL D Direct Contact (Friebel, et al, 2011)				430	99000	27000	81000	11000	26000	20000	27000	38000	-	-	-	-	-	-	-	-	-	-	-	-	-
Management Limits, Commercial / Industrial, coarse (NEPC, 2013)				-	-	-	-	-	700	1000	3500	10000	-	-	-	-	-	-	-	-	-	-	-	-	-
PRIMARY SAMPLES																									
BH1	0.2	27-Jun-17	170151	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	0.4	<0.1	<0.1	<0.1	<4	<0.4	12	24	47	<0.1	7	100
BH1	0.7	27-Jun-17	170151	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	0.9	-	-	-	<4	<0.4	11	13	70	<0.1	6	62
BH1	1.4	27-Jun-17	170151	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05	<0.1	<0.1	<0.1	9	<0.4	24	5	24	<0.1	2	13
BH1	0.4	27-Jun-17	170151	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05	-	-	-	4	<0.4	21	1	10	<0.1	2	3
BH2	0.5	27-Jun-17	170151	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05	-	-	-	<4	<0.4	3	210	6	<0.1	5	42
BH3	0.2	27-Jun-17	170151	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05	<0.1	<0.1	<0.1	<4	<0.4	5	9	6	<0.1	1	7
BH4	0.4	27-Jun-17	170151	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05	-	-	-	<4	<0.4	1	2	4	<0.1	<1	5
BH5	0.2	27-Jun-17	170151	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	2.2	<0.1	<0.1	<0.1	<4	<0.4	3	5	9	<0.1	1	22
BH5	0.5	27-Jun-17	170151	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05	-	-	-	4	0.5	12	10	17	<0.1	4	23
BH6	0.1	27-Jun-17	170151	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	0.51	<0.1	<0.1	<0.1	<4	<0.4	6	12	18	<0.1	2	35
BH6	0.4	27-Jun-17	170151	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05	-	-	-	4	<0.4	12	5	15	<0.1	2	13
INTRA-LABORATORY DUPLICATE																									
BH1	1.4A	27-Jun-17	170151	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05	<0.1	<0.1	<0.1	8	<0.4	19	4	30	<0.1	2	15
STATISTICAL ANALYSIS																									
Min	MiMin			0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	1	1	4	0	1	3
Max	MaMax			0	0	0	0	0	0	0	0	0	0	2	0	0	0	9	1	24	210	70	0	7	100
Avg	AvAvg			-	-	-	-	-	-	-	-	-	-	1	-	-	-	5	1	10	27	21	-	3	30
Stdev				-	-	-	-	-	-	-	-	-	-	0.8	-	-	-	3	-	7	61	20	-	2	29

Reported in mg/kg unless stated otherwise

* Depth relates to Depth Below Surface Level

nd = not detected above laboratory LOR

NL = Not Limiting

RED = Exceeds HIL Criteria

YELLOW = Exceeds EIL Criteria

Table 2 - RPD Results
Supplementary Investigation
New Property Aquisition
'Ivanhoe Estate'
Macquarie Park NSW

Sample ID	Date	Report	BTEX					TRH				PAH	
			Benzene	Toluene	EthylBenzene	Xylene	Naphthalene	F1	F2	F3	F4	B(a)P TEQ	Total
INTRA-LABORATORY													
BH1_1.4	27-Jun-17	170151	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05
BH1_1.4A	27-Jun-17	170151	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05
RPD			**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Sample ID	Date	Report	Heavy Metals							
			As	Cd	Cr	Cu	Pb	Hg	Ni	Zn
INTRA-LABORATORY										
BH1_1.4	27-Jun-17	170151	9	<0.4	24	5	24	<0.1	2	13
BH1_1.4A	27-Jun-17	170151	8	<0.4	19	4	30	<0.1	2	15
RPD			**12%**	**NA**	**23%**	**22%**	**22%**	**NA**	**0%**	**14%**

APPENDIX B

NATA CERTIFIED ANALYTICAL DATA

CHAIN OF CUSTODY - Client

ENVIROLAB GROUP - National phone number 1300 42 43 44

Sydney Lab - Envirolab Services
12 Ashley St, Chatswood, NSW 2067
Ph 02 9910 6200 / sydney@envirolab.com.au

Combo1=TRH/BTEX/Pb
Combo2=TRH/BTEX/PAH/Pb
Combo3=TRH/BTEX/PAH/Met
Combo4=TRH/BTEX/PAH/Met/Phen
Combo5=TRH/BTEX/PAH/OC/PCB/Met
Combo6=TRH/BTEX/PAH/OC/OP/PCB/Met
Combo7=TRH/BTEX/PAH/OC/PCB/Met/Phen
Combo8=TRH/BTEX/PAH/OC/OP/PCB/Met/Phen
Combo9=TRH/BTEX/PAH/OC/PCB/Met/Phen/CN
Combo10=TRH/BTEX/PAH/OC/OP/PCB/Met/Phen/CN
Combo11=TRH/BTEX/PAH/OC/PCB/12met/Phen/CN
Combo12=TRH/BTEX/PAH/OC/PCB/Met/TCLP-PAH ,6 Met
Combo13=TRH/BTEX/PAH/OC/OP/PCB/Met/TCLP-PAH ,6Met

A Combo with an `A' indicates Asbestos is also needed.

Client: DLA

Contact Person: Matthew Junghans + Simon Spyrakis

Project Mgr: Simon Spyrakis

Sampler: Matthew Junghans

Address: Unit 3/38 Leighton Place Hornsby NSW

Phone: **Mob:**

Email: sydney@dlaenvironmental.com.au

Client Project Name / Number / Site etc (ie report title): DL3953 - May Park

PO No.:

Envirolab Quote No. :

Date results required:

Or choose: (standard) / same day / 1 day / 2 day / 3 day

Note: Inform lab in advance if urgent turnaround is required - surcharges apply

Report format: esdat / equis /

Lab Comments:

Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample	Combo 6	Combo 3	pH/EC/CEC	Hold												Comments
1	BH1/0.2	0.2	27-6-17	Soil	X															Provide as much information about the sample as you can
2	" 0.7	0.7				X														
3	" 1.4	1.4			X															
4	" 1.4A	1.4			X															
5	" 1.5	1.5				X	X													
6	BH2/0.4	0.4				X														
7	" 0.5	0.5						X												
8	BH3/0.2	0.2			X															
9	" 0.5	0.5						X												
10	BH4/0.4	0.4				X														
11	" 0.6	0.6						X												
12	BH5/0.2	0.2			X															
13	" 0.5	0.5				X														
14	BH6/0.1	0.1			X															
15	" 0.4	0.4				X														

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

Job No: 170151
Date Received: 27/06/2017
Time Received: 1600
Received by: KM
Temp: Cool/Ambient
Cooling: Ice/icepack
Security: Intact/Broken/None

Relinquished by (Company): DLA

Print Name: Matthew Junghans

Date & Time: 27-6-17

Signature:

Received by (Company): ELS

Print Name: KM

Date & Time: 27/06/17 1600

Signature:

Lab use only:

Samples Received: Cool or Ambient (circle one)

Temperature Received at: (if applicable)

Transported by: Hand delivered / courier

White - Lab copy / Blue - Client copy / Pink - Retain in Book

12 Ashley Street, Chatswood, NSW 2067
tel: +61 2 9910 6200

email: sydney@envirolab.com.au
envirolab.com.au

Envirolab Services Pty Ltd - Sydney | ABN 37 112 535 645

CERTIFICATE OF ANALYSIS 170151

Client:

DLA Environmental Services Pty Ltd
Unit 3, 38 Leighton Pl
Hornsby
NSW 2077

Attention: M Junghans, S Sprydz

Sample log in details:

Your Reference:	**DL3953 - Maq Park**		
No. of samples:	15 soils		
Date samples received / completed instructions received	27/06/17	/	27/06/17

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	4/07/17	/	4/07/17
Date of Preliminary Report:	Not Issued		

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

Results Approved By:

David Springer
General Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	170151-1	170151-2	170151-3	170151-4	170151-5
Your Reference	---------- -	BH1	BH1	BH1	BH1	BH1
Depth	----------	0.2	0.7	1.4	1.4A	0.4
Date Sampled		27/06/2017	27/06/2017	27/06/2017	27/06/2017	27/06/2017
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017
Date analysed	-	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	109	118	119	121	117

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	170151-6	170151-8	170151-10	170151-12	170151-13
Your Reference	---------- -	BH2	BH3	BH4	BH5	BH5
Depth	----------	0.5	0.2	0.4	0.2	0.5
Date Sampled		27/06/2017	27/06/2017	27/06/2017	27/06/2017	27/06/2017
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017
Date analysed	-	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	117	129	121	117	106

vTRH(C6-C10)/BTEXN in Soil			
Our Reference:	UNITS	170151-14	170151-15
Your Reference	---------- -	BH6	BH6
Depth	----------	0.1	0.4
Date Sampled		27/06/2017	27/06/2017
Type of sample		soil	soil
Date extracted	-	30/06/2017	30/06/2017
Date analysed	-	30/06/2017	30/06/2017
TRH C_6 - C_9	mg/kg	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25
Benzene	mg/kg	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1
m+p-xylene	mg/kg	<2	<2
o-Xylene	mg/kg	<1	<1
Total +ve Xylenes	mg/kg	<1	<1
naphthalene	mg/kg	<1	<1
Surrogate aaa-Trifluorotoluene	%	107	132

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	170151-1	170151-2	170151-3	170151-4	170151-5
Your Reference	---------- -	BH1	BH1	BH1	BH1	BH1
Depth	----------	0.2	0.7	1.4	1.4A	0.4
Date Sampled		27/06/2017	27/06/2017	27/06/2017	27/06/2017	27/06/2017
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017
Date analysed	-	30/06/2017	30/06/2017	30/06/2017	01/07/2017	01/07/2017
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	97	87	87	87	87

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	170151-6	170151-8	170151-10	170151-12	170151-13
Your Reference	---------- -	BH2	BH3	BH4	BH5	BH5
Depth	----------	0.5	0.2	0.4	0.2	0.5
Date Sampled		27/06/2017	27/06/2017	27/06/2017	27/06/2017	27/06/2017
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017
Date analysed	-	01/07/2017	01/07/2017	01/07/2017	01/07/2017	01/07/2017
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	86	86	89	86	89

svTRH (C10-C40) in Soil			
Our Reference:	UNITS	170151-14	170151-15
Your Reference	----------	BH6	BH6
	-		
Depth	----------	0.1	0.4
Date Sampled		27/06/2017	27/06/2017
Type of sample		soil	soil
Date extracted	-	30/06/2017	30/06/2017
Date analysed	-	01/07/2017	01/07/2017
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50
Surrogate o-Terphenyl	%	90	86

PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- - ---------- 	170151-1 BH1 0.2 27/06/2017 soil	170151-2 BH1 0.7 27/06/2017 soil	170151-3 BH1 1.4 27/06/2017 soil	170151-4 BH1 1.4A 27/06/2017 soil	170151-5 BH1 0.4 27/06/2017 soil
Date extracted	-	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017
Date analysed	-	03/07/2017	03/07/2017	03/07/2017	03/07/2017	03/07/2017
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.2	0.2	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.2	0.2	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.1	0.1	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	0.4	0.90	<0.05	<0.05	<0.05
Surrogate p-Terphenyl-d14	%	102	94	90	94	102

PAHs in Soil Our Reference: Your Reference	UNITS ----------	170151-6 BH2	170151-8 BH3	170151-10 BH4	170151-12 BH5	170151-13 BH5
Depth	----------	0.5	0.2	0.4	0.2	0.5
Date Sampled		27/06/2017	27/06/2017	27/06/2017	27/06/2017	27/06/2017
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017
Date analysed	-	03/07/2017	03/07/2017	03/07/2017	03/07/2017	03/07/2017
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	0.4	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	0.4	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	0.2	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	0.2	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	0.4	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	0.2	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	0.2	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	2.2	<0.05
Surrogate p-Terphenyl-d14	%	94	90	92	89	92

PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- - ---------- -	170151-14 BH6 0.1 27/06/2017 soil	170151-15 BH6 0.4 27/06/2017 soil
Date extracted	-	30/06/2017	30/06/2017
Date analysed	-	03/07/2017	03/07/2017
Naphthalene	mg/kg	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1
Fluoranthene	mg/kg	0.2	<0.1
Pyrene	mg/kg	0.2	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5
Total +ve PAH's	mg/kg	0.51	<0.05
Surrogate p-Terphenyl-d14	%	98	97

Organochlorine Pesticides in soil						
Our Reference:	UNITS	170151-1	170151-3	170151-4	170151-8	170151-12
Your Reference	----------	BH1	BH1	BH1	BH3	BH5
Depth	----------	0.2	1.4	1.4A	0.2	0.2
Date Sampled		27/06/2017	27/06/2017	27/06/2017	27/06/2017	27/06/2017
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017
Date analysed	-	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	97	90	89	91	92

Organochlorine Pesticides in soil		
Our Reference:	UNITS	170151-14
Your Reference	---------- -	BH6
Depth	----------	0.1
Date Sampled		27/06/2017
Type of sample		soil
Date extracted	-	30/06/2017
Date analysed	-	30/06/2017
HCB	mg/kg	<0.1
alpha-BHC	mg/kg	<0.1
gamma-BHC	mg/kg	<0.1
beta-BHC	mg/kg	<0.1
Heptachlor	mg/kg	<0.1
delta-BHC	mg/kg	<0.1
Aldrin	mg/kg	<0.1
Heptachlor Epoxide	mg/kg	<0.1
gamma-Chlordane	mg/kg	<0.1
alpha-chlordane	mg/kg	<0.1
Endosulfan I	mg/kg	<0.1
pp-DDE	mg/kg	<0.1
Dieldrin	mg/kg	<0.1
Endrin	mg/kg	<0.1
pp-DDD	mg/kg	<0.1
Endosulfan II	mg/kg	<0.1
pp-DDT	mg/kg	<0.1
Endrin Aldehyde	mg/kg	<0.1
Endosulfan Sulphate	mg/kg	<0.1
Methoxychlor	mg/kg	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1
Surrogate TCMX	%	91

Organophosphorus Pesticides						
Our Reference:	UNITS	170151-1	170151-3	170151-4	170151-8	170151-12
Your Reference	---------- -	BH1	BH1	BH1	BH3	BH5
Depth	----------	0.2	1.4	1.4A	0.2	0.2
Date Sampled		27/06/2017	27/06/2017	27/06/2017	27/06/2017	27/06/2017
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017
Date analysed	-	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	97	90	89	91	92

Organophosphorus Pesticides		
Our Reference:	UNITS	170151-14
Your Reference	---------- -	BH6
Depth	----------	0.1
Date Sampled		27/06/2017
Type of sample		soil
Date extracted	-	30/06/2017
Date analysed	-	30/06/2017
Azinphos-methyl (Guthion)	mg/kg	<0.1
Bromophos-ethyl	mg/kg	<0.1
Chlorpyriphos	mg/kg	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1
Diazinon	mg/kg	<0.1
Dichlorvos	mg/kg	<0.1
Dimethoate	mg/kg	<0.1
Ethion	mg/kg	<0.1
Fenitrothion	mg/kg	<0.1
Malathion	mg/kg	<0.1
Parathion	mg/kg	<0.1
Ronnel	mg/kg	<0.1
Surrogate TCMX	%	91

PCBs in Soil						
Our Reference:	UNITS	170151-1	170151-3	170151-4	170151-8	170151-12
Your Reference	----------	BH1	BH1	BH1	BH3	BH5
	-					
Depth	----------	0.2	1.4	1.4A	0.2	0.2
Date Sampled		27/06/2017	27/06/2017	27/06/2017	27/06/2017	27/06/2017
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017
Date analysed	-	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	97	90	89	91	92

PCBs in Soil		
Our Reference:	UNITS	170151-14
Your Reference	----------	BH6
	-	
Depth	----------	0.1
Date Sampled		27/06/2017
Type of sample		soil
Date extracted	-	30/06/2017
Date analysed	-	30/06/2017
Aroclor 1016	mg/kg	<0.1
Aroclor 1221	mg/kg	<0.1
Aroclor 1232	mg/kg	<0.1
Aroclor 1242	mg/kg	<0.1
Aroclor 1248	mg/kg	<0.1
Aroclor 1254	mg/kg	<0.1
Aroclor 1260	mg/kg	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1
Surrogate TCLMX	%	91

Acid Extractable metals in soil						
Our Reference:	UNITS	170151-1	170151-2	170151-3	170151-4	170151-5
Your Reference	----------	BH1	BH1	BH1	BH1	BH1
	-					
Depth	----------	0.2	0.7	1.4	1.4A	0.4
Date Sampled		27/06/2017	27/06/2017	27/06/2017	27/06/2017	27/06/2017
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017
Date analysed	-	03/07/2017	03/07/2017	03/07/2017	03/07/2017	03/07/2017
Arsenic	mg/kg	<4	<4	9	8	4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	12	11	24	19	21
Copper	mg/kg	24	13	5	4	1
Lead	mg/kg	47	70	24	30	10
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	7	6	2	2	2
Zinc	mg/kg	100	62	13	15	3

Acid Extractable metals in soil						
Our Reference:	UNITS	170151-6	170151-8	170151-10	170151-12	170151-13
Your Reference	----------	BH2	BH3	BH4	BH5	BH5
	-					
Depth	----------	0.5	0.2	0.4	0.2	0.5
Date Sampled		27/06/2017	27/06/2017	27/06/2017	27/06/2017	27/06/2017
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017
Date analysed	-	03/07/2017	03/07/2017	03/07/2017	03/07/2017	03/07/2017
Arsenic	mg/kg	<4	<4	<4	<4	4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	0.5
Chromium	mg/kg	3	5	1	3	12
Copper	mg/kg	210	9	2	5	10
Lead	mg/kg	6	6	4	9	17
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	5	1	<1	1	4
Zinc	mg/kg	42	7	5	22	23

Acid Extractable metals in soil				
Our Reference:	UNITS	170151-14	170151-15	170151-16
Your Reference	---------- -	BH6	BH6	BH6 - [TRIPLICATE]
Depth	----------	0.1	0.4	0.1
Date Sampled		27/06/2017	27/06/2017	27/06/2017
Type of sample		soil	soil	soil
Date prepared	-	30/06/2017	30/06/2017	30/06/2017
Date analysed	-	03/07/2017	03/07/2017	30/06/2017
Arsenic	mg/kg	<4	4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4
Chromium	mg/kg	6	12	7
Copper	mg/kg	12	5	12
Lead	mg/kg	18	15	17
Mercury	mg/kg	<0.1	<0.1	<0.1
Nickel	mg/kg	2	2	2
Zinc	mg/kg	35	13	35

Moisture						
Our Reference:	UNITS	170151-1	170151-2	170151-3	170151-4	170151-5
Your Reference	---------- -	BH1	BH1	BH1	BH1	BH1
Depth	----------	0.2	0.7	1.4	1.4A	0.4
Date Sampled		27/06/2017	27/06/2017	27/06/2017	27/06/2017	27/06/2017
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017
Date analysed	-	03/07/2017	03/07/2017	03/07/2017	03/07/2017	03/07/2017
Moisture	%	42	13	15	16	16

Moisture						
Our Reference:	UNITS	170151-6	170151-8	170151-10	170151-12	170151-13
Your Reference	---------- -	BH2	BH3	BH4	BH5	BH5
Depth	----------	0.5	0.2	0.4	0.2	0.5
Date Sampled		27/06/2017	27/06/2017	27/06/2017	27/06/2017	27/06/2017
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017
Date analysed	-	03/07/2017	03/07/2017	03/07/2017	03/07/2017	03/07/2017
Moisture	%	5.1	8.4	6.8	9.8	9.1

Moisture			
Our Reference:	UNITS	170151-14	170151-15
Your Reference	---------- -	BH6	BH6
Depth	----------	0.1	0.4
Date Sampled		27/06/2017	27/06/2017
Type of sample		soil	soil
Date prepared	-	30/06/2017	30/06/2017
Date analysed	-	03/07/2017	03/07/2017
Moisture	%	26	12

Misc Inorg - Soil		
Our Reference:	UNITS	170151-5
Your Reference	----------	BH1
	-	
Depth	----------	0.4
Date Sampled		27/06/2017
Type of sample		soil
Date prepared	-	30/06/2017
Date analysed	-	30/06/2017
pH 1:5 soil:water	pH Units	6.3
Electrical Conductivity 1:5 soil:water	µS/cm	11

CEC		
Our Reference:	UNITS	170151-5
Your Reference	----------	BH1
	-	
Depth	----------	0.4
Date Sampled		27/06/2017
Type of sample		soil
Date prepared	-	29/06/2017
Date analysed	-	29/06/2017
Exchangeable Ca	meq/100g	2.2
Exchangeable K	meq/100g	0.3
Exchangeable Mg	meq/100g	2.0
Exchangeable Na	meq/100g	<0.1
Cation Exchange Capacity	meq/100g	4.6

Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'TEQ PQL' values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'TEQ zero' values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'TEQ half PQL' values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.
Org-008	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.

Method ID	Methodology Summary
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25°C in accordance with APHA latest edition 2510 and Rayment & Lyons.
Metals-009	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-AES analytical finish.

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			30/06/2017	[NT]	[NT]	LCS-1	30/06/2017
Date analysed	-			30/06/2017	[NT]	[NT]	LCS-1	30/06/2017
TRHC$_6$ - C$_9$	mg/kg	25	Org-016	<25	[NT]	[NT]	LCS-1	114%
TRHC$_6$ - C$_{10}$	mg/kg	25	Org-016	<25	[NT]	[NT]	LCS-1	114%
Benzene	mg/kg	0.2	Org-016	<0.2	[NT]	[NT]	LCS-1	122%
Toluene	mg/kg	0.5	Org-016	<0.5	[NT]	[NT]	LCS-1	124%
Ethylbenzene	mg/kg	1	Org-016	<1	[NT]	[NT]	LCS-1	107%
m+p-xylene	mg/kg	2	Org-016	<2	[NT]	[NT]	LCS-1	109%
o-Xylene	mg/kg	1	Org-016	<1	[NT]	[NT]	LCS-1	103%
naphthalene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%		Org-016	91	[NT]	[NT]	LCS-1	124%
QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			30/06/2017	[NT]	[NT]	LCS-1	30/06/2017
Date analysed	-			30/06/2017	[NT]	[NT]	LCS-1	30/06/2017
TRHC$_{10}$ - C$_{14}$	mg/kg	50	Org-003	<50	[NT]	[NT]	LCS-1	111%
TRHC$_{15}$ - C$_{28}$	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-1	107%
TRHC$_{29}$ - C$_{36}$	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-1	91%
TRH>C$_{10}$-C$_{16}$	mg/kg	50	Org-003	<50	[NT]	[NT]	LCS-1	111%
TRH>C$_{16}$-C$_{34}$	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-1	107%
TRH>C$_{34}$-C$_{40}$	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-1	91%
Surrogate o-Terphenyl	%		Org-003	92	[NT]	[NT]	LCS-1	86%
QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			30/06/2017	[NT]	[NT]	LCS-1	30/06/2017
Date analysed	-			03/07/2017	[NT]	[NT]	LCS-1	03/07/2017
Naphthalene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	LCS-1	102%
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Fluorene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	LCS-1	95%
Phenanthrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	LCS-1	100%
Anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	LCS-1	101%
Pyrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	LCS-1	101%
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Chrysene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	LCS-1	112%
Benzo(b,j +k)fluoranthene	mg/kg	0.2	Org-012	<0.2	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	[NT]	[NT]	LCS-1	90%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012	97	[NT]	[NT]	LCS-1	117%
QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			30/06/2017	[NT]	[NT]	LCS-1	30/06/2017
Date analysed	-			30/06/2017	[NT]	[NT]	LCS-1	30/06/2017
HCB	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-1	80%
gamma-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
beta-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-1	98%
Heptachlor	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-1	101%
delta-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Aldrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-1	93%
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-1	97%
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
pp-DDE	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-1	94%
Dieldrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-1	105%
Endrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-1	95%
pp-DDD	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-1	102%
Endosulfan II	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
pp-DDT	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-1	94%
Methoxychlor	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate TCMX	%		Org-005	94	[NT]	[NT]	LCS-1	108%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			30/06/2017	[NT]	[NT]	LCS-1	30/06/2017
Date analysed	-			30/06/2017	[NT]	[NT]	LCS-1	30/06/2017
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NR]	[NR]
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NR]	[NR]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-1	96%
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NR]	[NR]
Diazinon	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NR]	[NR]
Dichlorvos	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-1	97%
Dimethoate	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NR]	[NR]
Ethion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-1	97%
Fenitrothion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-1	91%
Malathion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-1	90%
Parathion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-1	106%
Ronnel	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-1	102%
Surrogate TCMX	%		Org-008	94	[NT]	[NT]	LCS-1	89%

QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			30/06/2017	[NT]	[NT]	LCS-1	30/06/2017
Date analysed	-			30/06/2017	[NT]	[NT]	LCS-1	30/06/2017
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	LCS-1	121%
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%		Org-006	94	[NT]	[NT]	LCS-1	89%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			30/06/2017	[NT]	[NT]	LCS-1	30/06/2017
Date analysed	-			03/07/2017	[NT]	[NT]	LCS-1	03/07/2017
Arsenic	mg/kg	4	Metals-020	<4	[NT]	[NT]	LCS-1	111%
Cadmium	mg/kg	0.4	Metals-020	<0.4	[NT]	[NT]	LCS-1	101%
Chromium	mg/kg	1	Metals-020	<1	[NT]	[NT]	LCS-1	110%
Copper	mg/kg	1	Metals-020	<1	[NT]	[NT]	LCS-1	110%
Lead	mg/kg	1	Metals-020	<1	[NT]	[NT]	LCS-1	106%
Mercury	mg/kg	0.1	Metals-021	<0.1	[NT]	[NT]	LCS-1	104%
Nickel	mg/kg	1	Metals-020	<1	[NT]	[NT]	LCS-1	103%
Zinc	mg/kg	1	Metals-020	<1	[NT]	[NT]	LCS-1	105%

QUALITY CONTROL Misc Inorg - Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			30/06/2017	[NT]	[NT]	LCS-1	30/06/2017
Date analysed	-			30/06/2017	[NT]	[NT]	LCS-1	30/06/2017
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	LCS-1	102%
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	[NT]	[NT]	LCS-1	93%

QUALITY CONTROL CEC	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			29/06/2017	170151-5	29/06/2017 || 29/06/2017	LCS-1	29/06/2017
Date analysed	-			29/06/2017	170151-5	29/06/2017 || 29/06/2017	LCS-1	29/06/2017
Exchangeable Ca	meq/100g	0.1	Metals-009	<0.1	170151-5	2.2 || 1.8 || RPD: 20	LCS-1	104%
Exchangeable K	meq/100g	0.1	Metals-009	<0.1	170151-5	0.3 || 0.2 || RPD: 40	LCS-1	124%
Exchangeable Mg	meq/100g	0.1	Metals-009	<0.1	170151-5	2.0 || 1.6 || RPD: 22	LCS-1	102%
Exchangeable Na	meq/100g	0.1	Metals-009	<0.1	170151-5	<0.1 || <0.1	LCS-1	123%

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	170151-1	30/06/2017 || 30/06/2017	170151-3	30/06/2017
Date analysed	-	170151-1	30/06/2017 || 30/06/2017	170151-3	30/06/2017
TRHC$_6$ - C$_9$	mg/kg	170151-1	<25 || <25	170151-3	100%
TRHC$_6$ - C$_{10}$	mg/kg	170151-1	<25 || <25	170151-3	100%
Benzene	mg/kg	170151-1	<0.2 || <0.2	170151-3	109%
Toluene	mg/kg	170151-1	<0.5 || <0.5	170151-3	114%
Ethylbenzene	mg/kg	170151-1	<1 || <1	170151-3	88%

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
m+p-xylene	mg/kg	170151-1	<2 || <2	170151-3	95%
o-Xylene	mg/kg	170151-1	<1 || <1	170151-3	84%
naphthalene	mg/kg	170151-1	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%	170151-1	109 || 108 || RPD: 1	170151-3	117%
QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	170151-1	30/06/2017 || 30/06/2017	170151-3	30/06/2017
Date analysed	-	170151-1	30/06/2017 || 30/06/2017	170151-3	01/07/2017
TRHC$_{10}$ - C$_{14}$	mg/kg	170151-1	<50 || <50	170151-3	102%
TRHC$_{15}$ - C$_{28}$	mg/kg	170151-1	<100 || <100	170151-3	97%
TRHC$_{29}$ - C$_{36}$	mg/kg	170151-1	<100 || <100	170151-3	72%
TRH>C$_{10}$-C$_{16}$	mg/kg	170151-1	<50 || <50	170151-3	102%
TRH>C$_{16}$-C$_{34}$	mg/kg	170151-1	<100 || <100	170151-3	97%
TRH>C$_{34}$-C$_{40}$	mg/kg	170151-1	<100 || <100	170151-3	72%
Surrogate o-Terphenyl	%	170151-1	97 || 95 || RPD: 2	170151-3	87%
QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	170151-1	30/06/2017 || 30/06/2017	170151-3	30/06/2017
Date analysed	-	170151-1	03/07/2017 || 03/07/2017	170151-3	03/07/2017
Naphthalene	mg/kg	170151-1	<0.1 || <0.1	170151-3	98%
Acenaphthylene	mg/kg	170151-1	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	170151-1	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	170151-1	<0.1 || <0.1	170151-3	90%
Phenanthrene	mg/kg	170151-1	<0.1 || <0.1	170151-3	91%
Anthracene	mg/kg	170151-1	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	170151-1	0.2 || 0.1 || RPD: 67	170151-3	93%
Pyrene	mg/kg	170151-1	0.2 || 0.1 || RPD: 67	170151-3	101%
Benzo(a)anthracene	mg/kg	170151-1	<0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	170151-1	<0.1 || <0.1	170151-3	107%
Benzo(b,j+k)fluoranthene	mg/kg	170151-1	<0.2 || <0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	170151-1	0.1 || 0.1 || RPD: 0	170151-3	95%
Indeno(1,2,3-c,d)pyrene	mg/kg	170151-1	<0.1 || 0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	170151-1	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	170151-1	<0.1 || 0.1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%	170151-1	102 || 102 || RPD: 0	170151-3	114%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	170151-1	30/06/2017 || 30/06/2017	170151-3	30/06/2017
Date analysed	-	170151-1	30/06/2017 || 30/06/2017	170151-3	30/06/2017
HCB	mg/kg	170151-1	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	170151-1	<0.1 || <0.1	170151-3	78%
gamma-BHC	mg/kg	170151-1	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	170151-1	<0.1 || <0.1	170151-3	90%
Heptachlor	mg/kg	170151-1	<0.1 || <0.1	170151-3	98%
delta-BHC	mg/kg	170151-1	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	170151-1	<0.1 || <0.1	170151-3	90%
Heptachlor Epoxide	mg/kg	170151-1	<0.1 || <0.1	170151-3	92%
gamma-Chlordane	mg/kg	170151-1	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	170151-1	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	170151-1	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	170151-1	<0.1 || <0.1	170151-3	92%
Dieldrin	mg/kg	170151-1	<0.1 || <0.1	170151-3	102%
Endrin	mg/kg	170151-1	<0.1 || <0.1	170151-3	86%
pp-DDD	mg/kg	170151-1	<0.1 || <0.1	170151-3	98%
Endosulfan II	mg/kg	170151-1	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	170151-1	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	170151-1	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	170151-1	<0.1 || <0.1	170151-3	87%
Methoxychlor	mg/kg	170151-1	<0.1 || <0.1	[NR]	[NR]
Surrogate TCMX	%	170151-1	97 || 94 || RPD: 3	170151-3	107%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	170151-1	30/06/2017 || 30/06/2017	170151-3	30/06/2017
Date analysed	-	170151-1	30/06/2017 || 30/06/2017	170151-3	30/06/2017
Azinphos-methyl (Guthion)	mg/kg	170151-1	<0.1 || <0.1	[NR]	[NR]
Bromophos-ethyl	mg/kg	170151-1	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos	mg/kg	170151-1	<0.1 || <0.1	170151-3	83%
Chlorpyriphos-methyl	mg/kg	170151-1	<0.1 || <0.1	[NR]	[NR]
Diazinon	mg/kg	170151-1	<0.1 || <0.1	[NR]	[NR]
Dichlorvos	mg/kg	170151-1	<0.1 || <0.1	170151-3	95%
Dimethoate	mg/kg	170151-1	<0.1 || <0.1	[NR]	[NR]
Ethion	mg/kg	170151-1	<0.1 || <0.1	170151-3	105%
Fenitrothion	mg/kg	170151-1	<0.1 || <0.1	170151-3	86%
Malathion	mg/kg	170151-1	<0.1 || <0.1	170151-3	81%
Parathion	mg/kg	170151-1	<0.1 || <0.1	170151-3	109%
Ronnel	mg/kg	170151-1	<0.1 || <0.1	170151-3	96%
Surrogate TCMX	%	170151-1	97 || 94 || RPD: 3	170151-3	89%
QUALITY CONTROL PCBs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	170151-1	30/06/2017 || 30/06/2017	170151-3	30/06/2017
Date analysed	-	170151-1	30/06/2017 || 30/06/2017	170151-3	30/06/2017
Aroclor 1016	mg/kg	170151-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1221	mg/kg	170151-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1232	mg/kg	170151-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1242	mg/kg	170151-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1248	mg/kg	170151-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1254	mg/kg	170151-1	<0.1 || <0.1	170151-3	121%
Aroclor 1260	mg/kg	170151-1	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%	170151-1	97 || 94 || RPD: 3	170151-3	89%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	170151-1	30/06/2017 || 30/06/2017	170151-3	30/06/2017
Date analysed	-	170151-1	03/07/2017 || 03/07/2017	170151-3	03/07/2017
Arsenic	mg/kg	170151-1	<4 || <4	170151-3	87%
Cadmium	mg/kg	170151-1	<0.4 || <0.4	170151-3	85%
Chromium	mg/kg	170151-1	12 || 10 || RPD: 18	170151-3	94%
Copper	mg/kg	170151-1	24 || 18 || RPD: 29	170151-3	99%
Lead	mg/kg	170151-1	47 || 40 || RPD: 16	170151-3	80%
Mercury	mg/kg	170151-1	<0.1 || <0.1	170151-3	103%
Nickel	mg/kg	170151-1	7 || 6 || RPD: 15	170151-3	88%
Zinc	mg/kg	170151-1	100 || 82 || RPD: 20	170151-3	89%

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date extracted	-	170151-14	30/06/2017 || 30/06/2017
Date analysed	-	170151-14	30/06/2017 || 30/06/2017
TRHC$_6$ - C$_9$	mg/kg	170151-14	<25 || <25
TRHC$_6$ - C$_{10}$	mg/kg	170151-14	<25 || <25
Benzene	mg/kg	170151-14	<0.2 || <0.2
Toluene	mg/kg	170151-14	<0.5 || <0.5
Ethylbenzene	mg/kg	170151-14	<1 || <1
m+p-xylene	mg/kg	170151-14	<2 || <2
o-Xylene	mg/kg	170151-14	<1 || <1
naphthalene	mg/kg	170151-14	<1 || <1
Surrogate aaa-Trifluorotoluene	%	170151-14	107 || 122 || RPD: 13

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date extracted	-	170151-14	30/06/2017 || 30/06/2017
Date analysed	-	170151-14	01/07/2017 || 01/07/2017
TRHC$_{10}$ - C$_{14}$	mg/kg	170151-14	<50 || <50
TRHC$_{15}$ - C$_{28}$	mg/kg	170151-14	<100 || <100
TRHC$_{29}$ - C$_{36}$	mg/kg	170151-14	<100 || 120
TRH>C$_{10}$-C$_{16}$	mg/kg	170151-14	<50 || <50
TRH>C$_{16}$-C$_{34}$	mg/kg	170151-14	<100 || <100
TRH>C$_{34}$-C$_{40}$	mg/kg	170151-14	<100 || <100
Surrogate o-Terphenyl	%	170151-14	90 || 91 || RPD: 1

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date extracted	-	170151-14	30/06/2017 || 30/06/2017
Date analysed	-	170151-14	03/07/2017 || 03/07/2017
Naphthalene	mg/kg	170151-14	<0.1 || <0.1
Acenaphthylene	mg/kg	170151-14	<0.1 || <0.1
Acenaphthene	mg/kg	170151-14	<0.1 || <0.1
Fluorene	mg/kg	170151-14	<0.1 || <0.1
Phenanthrene	mg/kg	170151-14	0.1 || <0.1
Anthracene	mg/kg	170151-14	<0.1 || <0.1
Fluoranthene	mg/kg	170151-14	0.2 || 0.1 || RPD: 67
Pyrene	mg/kg	170151-14	0.2 || 0.2 || RPD: 0
Benzo(a)anthracene	mg/kg	170151-14	<0.1 || <0.1
Chrysene	mg/kg	170151-14	<0.1 || <0.1
Benzo(b,j+k)fluoranthene	mg/kg	170151-14	<0.2 || <0.2
Benzo(a)pyrene	mg/kg	170151-14	0.05 || 0.06 || RPD: 18
Indeno(1,2,3-c,d)pyrene	mg/kg	170151-14	<0.1 || <0.1
Dibenzo(a,h)anthracene	mg/kg	170151-14	<0.1 || <0.1

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Benzo(g,h,i)perylene	mg/kg	170151-14	<0.1 || <0.1
Surrogate p-Terphenyl-d14	%	170151-14	98 || 98 || RPD: 0
QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date extracted	-	170151-14	30/06/2017 || 30/06/2017
Date analysed	-	170151-14	30/06/2017 || 30/06/2017
HCB	mg/kg	170151-14	<0.1 || <0.1
alpha-BHC	mg/kg	170151-14	<0.1 || <0.1
gamma-BHC	mg/kg	170151-14	<0.1 || <0.1
beta-BHC	mg/kg	170151-14	<0.1 || <0.1
Heptachlor	mg/kg	170151-14	<0.1 || <0.1
delta-BHC	mg/kg	170151-14	<0.1 || <0.1
Aldrin	mg/kg	170151-14	<0.1 || <0.1
Heptachlor Epoxide	mg/kg	170151-14	<0.1 || <0.1
gamma-Chlordane	mg/kg	170151-14	<0.1 || <0.1
alpha-chlordane	mg/kg	170151-14	<0.1 || <0.1
Endosulfan I	mg/kg	170151-14	<0.1 || <0.1
pp-DDE	mg/kg	170151-14	<0.1 || <0.1
Dieldrin	mg/kg	170151-14	<0.1 || <0.1
Endrin	mg/kg	170151-14	<0.1 || <0.1
pp-DDD	mg/kg	170151-14	<0.1 || <0.1
Endosulfan II	mg/kg	170151-14	<0.1 || <0.1
pp-DDT	mg/kg	170151-14	<0.1 || <0.1
Endrin Aldehyde	mg/kg	170151-14	<0.1 || <0.1
Endosulfan Sulphate	mg/kg	170151-14	<0.1 || <0.1
Methoxychlor	mg/kg	170151-14	<0.1 || <0.1
Surrogate TCMX	%	170151-14	91 || 96 || RPD: 5

QUALITY CONTROL Organophosphorus Pesticides	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date extracted	-	170151-14	30/06/2017 || 30/06/2017
Date analysed	-	170151-14	30/06/2017 || 30/06/2017
Azinphos-methyl (Guthion)	mg/kg	170151-14	<0.1 || <0.1
Bromophos-ethyl	mg/kg	170151-14	<0.1 || <0.1
Chlorpyriphos	mg/kg	170151-14	<0.1 || <0.1
Chlorpyriphos-methyl	mg/kg	170151-14	<0.1 || <0.1
Diazinon	mg/kg	170151-14	<0.1 || <0.1
Dichlorvos	mg/kg	170151-14	<0.1 || <0.1
Dimethoate	mg/kg	170151-14	<0.1 || <0.1
Ethion	mg/kg	170151-14	<0.1 || <0.1
Fenitrothion	mg/kg	170151-14	<0.1 || <0.1
Malathion	mg/kg	170151-14	<0.1 || <0.1
Parathion	mg/kg	170151-14	<0.1 || <0.1
Ronnel	mg/kg	170151-14	<0.1 || <0.1
Surrogate TCMX	%	170151-14	91 || 96 || RPD: 5
QUALITY CONTROL PCBs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date extracted	-	170151-14	30/06/2017 || 30/06/2017
Date analysed	-	170151-14	30/06/2017 || 30/06/2017
Aroclor 1016	mg/kg	170151-14	<0.1 || <0.1
Aroclor 1221	mg/kg	170151-14	<0.1 || <0.1
Aroclor 1232	mg/kg	170151-14	<0.1 || <0.1
Aroclor 1242	mg/kg	170151-14	<0.1 || <0.1
Aroclor 1248	mg/kg	170151-14	<0.1 || <0.1
Aroclor 1254	mg/kg	170151-14	<0.1 || <0.1
Aroclor 1260	mg/kg	170151-14	<0.1 || <0.1
Surrogate TCLMX	%	170151-14	91 || 96 || RPD: 5
QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date prepared	-	170151-14	30/06/2017 || 30/06/2017
Date analysed	-	170151-14	03/07/2017 || 03/07/2017
Arsenic	mg/kg	170151-14	<4 || <4
Cadmium	mg/kg	170151-14	<0.4 || <0.4
Chromium	mg/kg	170151-14	6 || 11 || RPD: 59
Copper	mg/kg	170151-14	12 || 10 || RPD: 18
Lead	mg/kg	170151-14	18 || 23 || RPD: 24
Mercury	mg/kg	170151-14	<0.1 || <0.1
Nickel	mg/kg	170151-14	2 || 3 || RPD: 40
Zinc	mg/kg	170151-14	35 || 31 || RPD: 12

Report Comments:

Acid Extractable Metals in Soil: The laboratory RPD acceptance criteria has been exceeded for 170151-14 for Cr. Therefore a triplicate result has been issued as laboratory sample number 170151-16.

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

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

Quality Control Definitions

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

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

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

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

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

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

APPENDIX C

BOREHOLE LOGS

DLA Environmental Services

Borelog

Location **BH1**

Client:	Frasers Property Australia	Job Type:	Supplementary Site Investigation
Project No:	DL3953	Address:	Ivanhoe Estate, Macquarie Park NSW
Date:	27/06/2017	Logged By:	MJ
Contractor:	-	Method:	Hand auger
Hole Size	100mm diameter	Co-ordinates:	Not surveyed

Method	Depth (m)	Graphic Log	USCS Classification	Material Description	Moisture	Density / Stiffness	Sampling	Comments
HA				Woodchip mulch				
	0.2			FILL: loamy sand, black				
				FILL: sand, coarse grained, brown, minor clay				
	0.4							
	0.6							
				FILL: clay, grey, with sand, brown black, trace sandstone fragments				
	0.8							
	1.0							
	1.2							
	1.4		SC	Sandy CLAY: orange brown				
				End of borehole at 1.5m depth				
	1.6							
	1.8							
	2.0							

Notes:

Method:	**Consistency**	**Plasticity**	**Moisture**	**Density**
SS - Solid Flight Auger	VS - Very Soft	HP - HighlyPlastic	D - Dry	VL - Very Loose
HS - Hollow Flight Auger	S - Soft	MP - Medium Plasticity	M - Moist	L - Loose
CC - Concrete Core	F - Firm	LP - Low Plasticity	W - Wet	MD - Medium Density
PT - Push Tube	VS - Very Stiff			D - Dense
RC - Rock Coring	H - Hard			VD - Very Dense

HA - Hand Auger Friable - Fb

DLA Environmental Services

Borelog

Location **BH2**

Client:	Frasers Property Australia	Job Type:	Supplementary Site Investigation
Project No:	DL3953	Address:	Ivanhoe Estate, Macquarie Park NSW
Date:	27/06/2017	Logged By:	MJ
Contractor:	-	Method:	Hand auger
Hole Size	100mm diameter	Co-ordinates:	Not surveyed

Method	Depth (m)	Graphic Log	USCS Classification	Material Description	Moisture	Density / Stiffness	Sampling	Comments
HA	0.1			Woodchip mulch				
	0.2			FILL: loamy sand, black				
	0.3			FILL: sand, coarse grained, brown, minor clay				
	0.4							
	0.5			FILL: clay, grey, with sand, brown black, sandstone cobbles				
	0.6			Borehole refusal at 0.5m depth				
	0.7							
	0.8							
	0.9							
	1.0							

Notes:

Method:
SS - Solid Flight Auger
HS - Hollow Flight Auger
CC - Concrete Core
PT - Push Tube

Consistency
VS - Very Soft
S - Soft
F - Firm
VS - Very Stiff

Plasticity
HP - HighlyPlastic
MP - Medium Plasticity
LP - Low Plasticity

Moisture
D - Dry
M - Moist
W - Wet

Density
VL - Very Loose
L - Loose
MD - Medium Density
D - Dense

RC - Rock Coring | H - Hard | VD - Very Dense

HA - Hand Auger | Friable - Fb

DLA Environmental Services

Borelog

Location **BH3**

Client:	Frasers Property Australia	Job Type:	Supplementary Site Investigation
Project No:	DL3953	Address:	Ivanhoe Estate, Macquarie Park NSW
Date:	27/06/2017	Logged By:	MJ
Contractor:	-	Method:	Hand auger
Hole Size	100mm diameter	Co-ordinates:	Not surveyed

Method	Depth (m)	Graphic Log	USCS Classification	Material Description	Moisture	Density / Stiffness	Sampling	Comments
HA	0.1			Woodchip mulch				
	0.2			FILL: sand, fine grained, yellow				
	0.3			FILL: loamy sand, black				
	0.4			FILL: sandstone gravel and cobbles, fine to coarse, orange				
	0.5							
	0.6			Borehole refusal at 0.5m depth				
	0.7							
	0.8							
	0.9							
	1.0							

Notes:

Method:	**Consistency**	**Plasticity**	**Moisture**	**Density**
SS - Solid Flight Auger	VS - Very Soft	HP - HighlyPlastic	D - Dry	VL - Very Loose
HS - Hollow Flight Auger	S - Soft	MP - Medium Plasticity	M - Moist	L - Loose
CC - Concrete Core	F - Firm	LP - Low Plasticity	W - Wet	MD - Medium Density

PT - Push Tube	VS - Very Stiff	D - Dense
RC - Rock Coring	H - Hard	VD - Very Dense
HA - Hand Auger	Friable - Fb	

DLA Environmental Services

Borelog

Location **BH4**

Client:	Frasers Property Australia	Job Type:	Supplementary Site Investigation
Project No:	DL3953	Address:	Ivanhoe Estate, Macquarie Park NSW
Date:	27/06/2017	Logged By:	MJ
Contractor:	-	Method:	Hand auger
Hole Size	100mm diameter	Co-ordinates:	Not surveyed

Method	Depth (m)	Graphic Log	USCS Classification	Material Description	Moisture	Density / Stiffness	Sampling	Comments
HA	0.1			Woodchip mulch				
	0.2			FILL: loamy sand, black				
	0.3			FILL: sand, fine grained, yellow				
	0.4							
	0.5			FILL: sandstone gravel and cobbles, fine to coarse, orange				
	0.6							
	0.7			Borehole refusal at 0.6m depth				
	0.8							
	0.9							
	1.0							

Notes:

Method:	**Consistency**	**Plasticity**	**Moisture**	**Density**
SS - Solid Flight Auger	VS - Very Soft	HP - HighlyPlastic	D - Dry	VL - Very Loose
HS - Hollow Flight Auger	S - Soft	MP - Medium Plasticity	M - Moist	L - Loose

CC - Concrete Core	F - Firm	LP - Low Plasticity	W - Wet	MD - Medium Density
PT - Push Tube	VS - Very Stiff			D - Dense
RC - Rock Coring	H - Hard			VD - Very Dense
HA - Hand Auger	Friable - Fb			

DLA Environmental Services

Borelog

Location **BH5**

Client:	Frasers Property Australia	Job Type:	Supplementary Site Investigation
Project No:	DL3953	Address:	Ivanhoe Estate, Macquarie Park NSW
Date:	27/06/2017	Logged By:	MJ
Contractor:	-	Method:	Hand auger
Hole Size	100mm diameter	Co-ordinates:	Not surveyed

Method	Depth (m)	Graphic Log	USCS Classification	Material Description	Moisture	Density / Stiffness	Sampling	Comments
HA	0.1			Woodchip mulch				
	0.2			FILL: loamy sand, black				
	0.3			FILL: sand, fine grained, yellow				
	0.4			FILL: sandstone gravel and cobbles, fine to coarse, orange				
	0.5							
	0.6			Borehole refusal at 0.5m depth				
	0.7							
	0.8							
	0.9							
	1.0							

Notes:

Method:	**Consistency**	**Plasticity**	**Moisture**	**Density**
SS - Solid Flight Auger	VS - Very Soft	HP - HighlyPlastic	D - Dry	VL - Very Loose

HS - Hollow Flight Auger	S - Soft	MP - Medium Plasticity	M - Moist	L - Loose
CC - Concrete Core	F - Firm	LP - Low Plasticity	W - Wet	MD - Medium Density
PT - Push Tube	VS - Very Stiff			D - Dense
RC - Rock Coring	H - Hard			VD - Very Dense
HA - Hand Auger	Friable - Fb			

DLA Environmental Services

Borelog

Location **BH6**

Client:	Frasers Property Australia	Job Type:	Supplementary Site Investigation
Project No:	DL3953	Address:	Ivanhoe Estate, Macquarie Park NSW
Date:	27/06/2017	Logged By:	MJ
Contractor:	-	Method:	Hand auger
Hole Size	100mm diameter	Co-ordinates:	Not surveyed

Method	Depth (m)	Graphic Log	USCS Classification	Material Description	Moisture	Density / Stiffness	Sampling	Comments
HA	0.1			FILL: loamy sand, black				
	0.2			FILL: sandstone gravel and cobbles, fine to coarse, orange				
	0.3							
	0.4							
	0.5			Borehole refusal at 0.4m depth				
	0.6							
	0.7							
	0.8							
	0.9							
	1.0							

Notes:

Method: **Consistency** **Plasticity** **Moisture** **Density**

SS - Solid Flight Auger	VS - Very Soft	HP - HighlyPlastic	D - Dry	VL - Very Loose
HS - Hollow Flight Auger	S - Soft	MP - Medium Plasticity	M - Moist	L - Loose
CC - Concrete Core	F - Firm	LP - Low Plasticity	W - Wet	MD - Medium Density
PT - Push Tube	VS - Very Stiff			D - Dense
RC - Rock Coring	H - Hard			VD - Very Dense
HA - Hand Auger	Friable - Fb			