Monterey Equity Pty Ltd

C/- Donald Cant Watts Cork

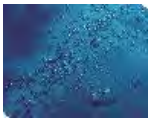
Contamination Assessment:
Lot 2, DP857520,
119 Barton Street, Monterey, NSW

P1706332JR01V01
March 2018

martens consulting engineers

ENVIRONMENTAL

WATER



WASTEWATER

GEOTECHNICAL

CIVIL

PROJECT MANAGEMENT

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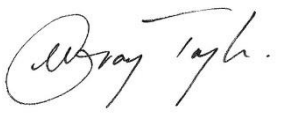
Robert Mehaffey	Gray Taylor Andrew Norris	Gray Taylor	

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All enquiries regarding this project are to be directed to the Project Manager.

Contents

1 Overview

1.1 Introduction

This report, prepared by Martens and Associates (MA), documents a contamination assessment which includes a preliminary site investigation (PSI) with limited testing to support a rezoning application to allow future residential subdivision of 119 Barton Street, Monterey, NSW ('the site').

The location of the site is shown in PS01-AZ06, Attachment A.

1.2 Objectives

Investigation objectives include:

- Identification of historic and current potentially contaminating site activities.
- Evaluation of areas of environmental concern (AEC) and associated contaminants of potential concern (COPC) within investigation area.
- Assess identified AECs and associated COPCs.
- Assess potential sources of site contamination identified in the preliminary investigation.
- Provide comment on suitability of investigation area for future development use, and where required, provide recommendations for remediation.

1.3 Project Scope

Scope of work included:

- Site walkover inspection to assess existing land condition and potential for site contamination.
- Review of 6 historical aerial photographs to assess past land use.
- Review of relevant Bayside Council historical database data (eg. BCC DA/BA history).

- Review of other relevant databases (SafeWork NSW and NSW EPA).
- Identification of AECs & COPCs.
- Conduct soil sampling in AECs. Sampling undertaken in general accordance with NSW EPA (1995) Site Sampling Guidelines. Investigations completed using hand methods (for surface samples) and hydraulic drill rig and push tube (for boreholes).
- Laboratory testing of soil contaminants of potential concern (COPC) within each AEC. For QA/QC purposes, duplicates and trip spike/blank samples were collected and analysed.
- Findings of the intrusive soil investigation documented in general accordance with NSW OEH (2011) and NEPM (1999, amended 2013).

1.4 Abbreviations

AEC – Area of environmental concern

ASC NEPM – Assessment of site contamination (National Environmental Protection Measure)

BA – Building application

BC – Bayside Council

BTEXN – Benzene, toluene, ethyl benzene, xylene and naphthalene

COPC – Contaminants of potential concern

DA – Development application

DEC – NSW Department of Environment and Conservation

DP – Deposited Plan

DPI – NSW Department of Primary Industries

DQI – Data quality indicators

DQO – Data quality objective

EIL – Ecological Investigation Levels

EPA – NSW Environment Protection Authority

EQL – Estimated quantitation limit

ESL – Ecological Screening Levels

HIL – Health investigation level

HM – Heavy metal

HSL – Health screening level

LGA – Local government area

MA – Martens and Associates Pty Ltd

mAHD – Metres Australian height datum

NATA – National Association of Testing Authorities

OCP – Organochloride pesticides

OEH – NSW Office of Environment and Heritage

OPP – Organophosphate pesticides

PAH – Polycyclic aromatic hydrocarbons

PSI – Preliminary site investigation

RPD – Relative percentage difference – difference between two values divided by the average

SAC – Site acceptance criteria

SAQP – Sampling analytical and quality plan

SOP – Standard operating procedure

TRH – Total recoverable hydrocarbons

2 Site Description

2.1 Site Location and Existing Land Use

Site information is summarised in Table 1, and site location and general surrounds shown in PS01-AZ06, Attachment A.

Table 1: Site background information.

Item	Description / Detail
Site address, lot/DP, and approximate area	119 Barton Street, Monterey, NSW (Lot 2, DP857520) – 7,202 m^2 (Approx.)
Local Government Area (LGA)	Bayside Council (BC)
Current land use	Site is currently a recreational bowling green, club house and car park.
Proposed land use	Residential.
Site description	The lot currently has two bowling greens, a bowling club in the southern portion of the site and a carpark in the northeast portion of the site.
Surrounding land uses	The site is bordered by Barton Street to the north and residential properties to the east, south and west.
Topography	Site is generally flat. Site elevations range from approximately 6 mAHD in the northeast corner of the site to approximately 5 mAHD in the western border of the site.
Expected geology	The Sydney 1:100,000 Geological Series Sheet 9130 (1983) indicates that the site is underlain by quaternary deposits comprised of quartz sand, minor shell content, interdune (swale) silt and fine sand. The NSW Environment and Heritage eSPADE website identifies the site as having soils of the Tuggerah soil landscape, consisting of deep (>200 cm) podzols on dunes and podzols/humus podzol intergrades on swales.
Site drainage	A stormwater planning assessment completed by ADG Engineers Australia Pty Ltd (2016) concluded that all stormwater runoff generated at the site is contained within the site boundaries and is discharged via infiltration into sandy soils.
Sensitive receptors	Future site residents and visitors. Site workers during future construction works. Surrounding residential site occupants.

2.2 Hydrogeology

Review of the NSW Department of Primary Industries (DPI) Water's database provided the following information for the five closest groundwater bores (with relevant information) to the site (Table 2).

Table 2: Available hydrogeological information.

Groundwater Bore Identification	Direction and Distance	Standing Water Level (m)	Intended Use	Water Bearing Zone Substrate
GW100520	On site	NE[1] (7 mBGL)	Recreation	ND[2]
GW106456	Approximately 15 m south	NE[1] (6 mBGL)	Domestic	ND[2]
GW108549	Approximately 10 m east	5.0 mBGL	Domestic	Sand
GW108550	Approximately 10 m east	5.0 mBGL	Domestic	Sand
GW108652	Approximately 15 m east	5.0 mBGL	Domestic	Sand

Notes

[1] NE – Groundwater not encountered (maximum depth of well).

[2] ND – No data available.

Borehole investigations undertaken by MA encountered groundwater at depths of 1.4 – 3.0 mBGL.

In consideration of hydrogeological information at the site, it is unlikely that groundwater is a significant potential contamination pathway.

3 Site Background Assessment

3.1 Historical Site Records Review

Four records exist at Bayside Council (BC) for development applications and building plans at the site (Table 3). BC correspondence is provided in Attachment B.

Table 3: Site history information.

Year	Record No.	Description
1995	BA-1995/696	Construction of outbuilding shed.
1995	BA-1995/736	Building application for villas and townhouses (13 units).
1996	BA-1996/134	Club additions.
2008	DA-2008/195	Minor alterations to club,

3.2 NSW EPA Records

No notices for the suburb of Monterey or nearby suburbs were listed under the Contaminated Land Management Act (1997) or the Environmentally Hazardous Chemicals Act (1985).

One record within the Monterey area is identified on the list of NSW contaminated sites notified to the EPA (Table 4).

Table 4: Available EPA contaminated lands record information.

Suburb	Address	Details	Distance/ Orientation From Site
Monterey/Kogarah	Scarborough Park South	Former landfill	Southwest, approximately 700 m

The above site is at a lower elevation than the subject site. Due to distance to the site and local hydrological characteristics, it is unlikely that the above site would have caused near surface soil contamination at the subject site.

3.3 Historical Aerial Photograph Review

Historical aerial photographs taken of the site during 1943, 1961, 1975, 1991, 2009 and 2018 were reviewed to investigate historic site land uses (Table 5). Copies of aerial photographs are provided in Attachment A. Photos indicate that the site may have used as a recreational bowling green since some time before 1961. Historical aerials did not indicate any other site use.

Table 5: Historic aerial photograph observations 1943 – 2018

Year	Site	Surrounding Land Use
1943	The site appears unused, a potential pond (approximately 1500 m^2) is present in the eastern portion of the site. Rest of the site has scattered bushes and is undeveloped.	Residential properties to the north, east and south. Cleared, vacant land to the west and south east of the site.
1961	Site has been developed into bowling greens with bowling club in the southern portion of the site and carpark in the northern portion of the site.	Lot immediately east of the site is also being used as part of the bowling green development. Continued residential development in all directions.
1975	Little change from previous.	Little change from previous.
1991	Little change from previous.	Little change from previous.
2009	Bowling green area along the eastern boundary has been redeveloped into additional carpark space.	Lot immediately east of the site (previously part of the bowling green) has been redeveloped into residential housing.
2018	Little change from previous.	Little change from previous.

3.4 Walkover Site Inspection

Site walkover was conducted on 14 February, 2018 by an experienced MA environmental engineer in conjunction with PSI investigations. Observations are summarised below.

- Timber and brick clad bowling club along the southern boundary of the site.
- Asphalt driveway and carpark in the north and eastern portions of the site.
- Two artificial turf bowling greens in the central portion of the site.

- Brick and galvanised metal sheds in the northern portion of the site, directly north of existing bowling greens.
- Stockpile of timber, plastic and glass immediately west of brick and galvanised sheds in the northern portion of the site.
- Site likely filled for levelling purposes (primarily under bowling greens and carpark).

4 Potential for Contamination

4.1 Areas of Environmental Concern/Contaminants of Potential Concern

Our assessment of site AECs and COPCs (Table 6) for the investigation area is made on the basis of available site history, aerial photograph interpretation and site walkover. A map showing locations of identified AECs is provided in Attachment C.

Table 6: Areas of environmental concern and contaminants of potential concern.

AEC [1]	Potential for Contamination	COPC
AEC A – Existing bowling club	Pesticides and heavy metals may have been used underneath building for pest control. Building may include potential asbestos containing material (PACM) and/or lead based paints.	HM, OCP/OPP and asbestos.
AEC B – Former pond	Former site pond has been filled in for construction of bowling club and encountered during geotechnical investigations (Douglas Partners, 2016). Fill of unknown origin and quality has been used.	HM, TRH, BTEXN, PAH, OCP/OPP and asbestos.
AEC C (entire site) – Site filling	Fill of unknown origin and quality was, likely used for site levelling purposes. Fill of unknown origin and quality has been used.	HM, OCP/OPP.
AEC D – Bowling greens	Prior to construction of artificial turf bowling greens, herbicides and pesticides are likely to have been used.	HM, OCP/OPP.

Notes

[1] Locations identified on AEC map in Attachment C.

4.2 Sensitive Receptors and Exposure Pathways

Table 7 provides a summary of identified sensitive receptors and potential exposure pathways connecting receptors to identified AECs and COPCs outlined in Table 6.

Table 7: Summary of receptors and potential pathways.

Receptor	Pathway
Human Receptors: o Future site residents and visitors. o Site workers during future construction works. o Surrounding residents.	o Dermal contact. o Oral ingestion of potentially contaminated soil.
Environmental Receptors o Monterey Park (approximately 400 m west). o Botany Bay (approximately 300 m east) o Existing site flora and fauna.	o Migration in contaminated runoff. o Direct contact with site flora and fauna.

4.3 Preliminary site investigation conclusions

Results of the site history review indicate that the site may have used as a recreational bowling club since some time before 1961. Historical information did not indicate any other site use. The following potential contamination sources are noted:

- Existing bowling club may have the potential to have introduced contaminants in the form of asbestos (as a construction material), pesticides (pest control), hydrocarbon (fuels and oils) and heavy metals (paints, pest control).

- Fill used across the site for levelling purposes and to fill the former pond is of unknown origin and quantity and may contain contaminants.

Overall, the investigation area is considered to have a medium risk of contamination and poses a potential risk of harm to human health and environment under proposed development conditions. As a result, assessment of the identified AECs was undertaken and a summary of results is outlined in the following sections.

5 Site Sampling Overview

5.1 Objectives

The sampling plan's development was guided by NSW EPA (1995) *Sampling Design Guidelines* and a risk based assessment. Assessment addressed each of the identified AEC and associated COPCs identified in Table 6. Results of the site testing were assessed against site acceptance criteria (SAC) developed with reference to ASC NEPM (1999, amended 2013).

The objective of site sampling is to assess the COPC (Section 4.1) and determine suitability for the proposed subdivision.

The soil sampling and borehole location map is shown in Attachment D. Borehole logs are provided in Attachment E.

5.2 Reference Guidelines

This assessment is prepared in general accordance with the following guidelines:

- ASC NEPC (1999, amended 2013) National Environmental Protection Measure, (NEPM 1999, amended 2013).
- NSW EPA (2017) 3rd Ed. Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme.
- NSW EPA (1995) *Sampling Design Guidelines.*
- NSW OEH (2011) Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites.

6 Sampling, Analytical and Quality Plan (SAQP)

A SAQP has been developed to ensure that data collected for the soil sampling regime is representative and provides a robust basis for site assessment decisions. Preparation of the SAQP has been completed in general accordance with ASC NEPM (1999, amended 2013) methodology and includes:

- Data quality objectives.
- Sampling methodologies and procedures.
- Field screening methods.
- Sample handling, preservation and storage procedures.
- Analytical QA/QC.

6.1 Data Quality Objectives (DQO)

Data quality objectives (DQO) have been prepared as statements specifying qualitative and quantitative data required to support project decisions. DQO have been prepared in general accordance with NSW EPA (2017) and US EPA (2006) guidelines and are presented in Table 8.

Table 8: Data quality objectives for the assessment of soil investigations.

Step 1 **Stating the Problem**	The proposed development will include residential land use with access to soil. Therefore the site must be deemed suitable to accommodate the proposed land use. This assessment is required to assess risk posed by AECs and COPC to onsite and offsite sensitive receptors.
Step 2 **Identifying the Decision(s)**	Historical investigations have identified AECs which may be the source of contamination including buildings, bowling greens and fill present at the site. To assess the suitability of the site for future residential use, decisions are to be made based on the following questions: o Is site soil quality suitable for the intended land use? o Has previous or current site use impacted the quality of site soils posing a human health risk during intended future land use including construction phase? o Do site soils require remediation or management to prior to onsite residential land use?
Step 3 **Identification of Inputs to the Decision**	The inputs to the assessment of site soil quality will include: o Soil sampling at nominated locations (where access is available) across the site. o Laboratory analytical results for relevant COPC. o Assessment of analytical results against site suitable human health and ecological risk criteria.

Step 4 **Study Boundary Definitions**	Study boundaries are as follows: o Lateral – Lateral boundary of the assessment is defined by the site boundary as indicated in Attachment A. o Vertical – Vertical boundary will be governed by the maximum depth reached during subsurface investigations. o Temporal – At this stage of investigation, only one round of sampling has been undertaken.
Step 5 **Development of Decision Rules**	The decision rule for this investigation are as follows: If the concentration of contaminants in the soil data exceeds the adopted assessment criteria; an assessment of the need to further investigate, remediate and / or manage the onsite impacts in relation to the proposed development will be undertaken.
Step 6 **Specification of Limits on Decision Errors**	Guidance found in ASC NEPM (1999 amended 2013) Schedule B2 regarding 95% upper confidence limit (UCL) states that the 95% UCL of the arithmetic mean provides a 95% confidence level that the true population mean will be less than or equal to this value. Therefore a decision can be made based on a probability that 95% of the data collected will satisfy the site acceptance criteria. A limit on decision error will be 5% that a conclusive statement may be incorrect.
Step 7 **Optimisation of Sampling Design**	Proposed sampling locations shall provide even coverage across identified AECs on the site. Sampling shall attempt to ensure that critical locations are assessed, sampled, and analysed for appropriate contaminants of concern. Soil sampling locations were set using a combined judgemental and grid pattern across the site.

6.2 Data Quality Indicators (DQI)

In accordance with NSW DEC (2006), the investigation data set has been compared with Data Quality Indicators (DQI) outlined in Table 9 to ensure that collected data meets the project needs and that DQOs have been meet.

Table 9: Data Quality Indicators.

Assessment Measure (DQI)	Comment
Precision – A measure of the variability (or reproducibility) of data.	Precision is assessed by reviewing blind field duplicated sample set through the calculation of relative percent difference (RPD). Data precision is deemed acceptable where results are 10 x the EQL, and where RPDs are less than 50% (10-30 x EQL) or 30% (>30 x EQL). Exceedance of this range is still considered acceptable where heterogeneous materials are sampled.
Accuracy – A measure of the closeness of reported data to the "true value".	Data accuracy is assessed by: o Method blanks. o Field spikes and blanks. o Laboratory control samples. o Matrix spikes.

Assessment Measure (DQI)	Comment
Representativeness – The confidence that data are representative of each media present on the site.	To ensure data representativeness the following field and laboratory procedures are followed: o Ensure that the design and implementation of the sampling program has been completed in accordance with MA standard operating procedures (SOP). o Blank samples shall be used during field sampling to ensure no cross contamination or laboratory artefacts. o Ensure that all laboratory hold times are meet and that sample handling and transport is completed in accordance with MA SOP.
Completeness – A measure of the amount of usable data from a data collection activity.	To ensure data set completeness, the following is required: o Confirmation that all sampling methodology was completed in general accordance with MA SOP. o COC and receipt forms. o Results from all Laboratory QA/QC samples (Lab blanks, matrix spikes, lab duplicates). o NATA accreditation stamp on all laboratory reports.
Comparability - The confidence that data may be considered to be equivalent for each sampling and analytical event.	Data comparability is maintained by ensuring that: o All site sampling events are undertaken following methodologies outlined in MA SOP and published guidelines. o NATA accredited laboratory methodologies shall be followed on all laboratory testing.

6.3 Investigation and Sampling Methodology and Quality Assurance / Quality Control

Site investigation and soil sampling methodology (Table 10) was completed to meet the project DQOs.

Table 10: Investigation and sampling methodology.

Activity	Detail / Comments
Fieldworks	Contamination investigations were completed on 14 February 2018, and involved: o Excavation of 10 boreholes using a 4WD ute-mounted hydraulic rig (in carpark and driveway) and hand-operated push tube (bowling greens and grassed area). o Collection of soil samples from the auger or push tube for laboratory testing and future reference. o Collection of surface soil samples by hand for laboratory testing and future reference. Testing and sample locations are provided in Attachment D.
Soil and sediment sampling	Soil sampling was completed by the supervising MA environmental engineer using a new nitrile glove covered hand. All equipment was decontaminated between sampling locations where required. Each sample was placed into a laboratory-supplied, acid-rinsed 250mL glass jar, labelled with a unique identification number and no headspace

Activity	Detail / Comments
	to limit volatile loss. A clean pair of gloves was used for each sample.
QA / QC sampling	Duplicate samples were collected for intra-laboratory analysis at a rate of approximately 1 per 10 primary samples. 2 soil duplicate samples were collected during investigations. A trip blank and trip spike sample was used during sampling.
Sample handling and transportation	Sample collection, storage and transport were conducted according to MA SOP. Collected samples were placed immediately into an ice chilled cooler-box. Samples were dispatched to NATA-accredited laboratories under chain of custody documentation within holding times.

A review of QA/QC procedure has been completed and is presented in the data validation report (Attachment F). The report concludes that data is suitable for the purposes of the assessment.

6.4 Laboratory Analytical Suite

Laboratory analysis was carried out by Envirolab Pty Ltd a NATA accredited laboratory. Laboratory analytical documentation is presented in Attachment G.

Site AEC areas were tested for the COPC in Table 11.

Table 11: Summary of primary soil laboratory analyses.

COPC	Number of Primary Samples Analysed
BTEXN	11
TRH	11
PAH	11
Heavy metals[1]	11
OCP/OPP	11
pH[2]	3
CEC[2]	3

Notes:
[1] Heavy metals – arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc.
[2] pH and CEC are not COPCs but were assessed to allow for calculation of site specific EILs.

7 Site Assessment Criteria

7.1 Overview

The site assessment criteria (SAC) adopted for this assessment have been derived from the following source:

- ASC NEPM (1999, amended 2013) National Environmental Protection (Assessment of Site Contamination) Measure (NEPM).

Guideline values for individual contaminants analysed for this assessment are presented in laboratory tables in Attachment H.

Table 12 summarises the applicability of the SAC adopted for this investigation.

Table 12: Summary of SAC.

Media	Adopted Guidelines	Applicability
Soil	ASC NEPM (1999, amended 2013)	Health Investigation Levels (HILs) HIL A – residential land use with access to soil. Ecological Investigation Levels (EIL)[1] Site EILs have been calculated using methodology outlined in ASC NEPM (1999, amended 2013). Conservative values for soil physiochemical properties (pH and CEC) have been used in EIL calculations. Ambient background concentrations (ABC) have been taken from Olszowy et al. (1995) for aged contamination in low traffic areas in NSW. Environmental Screening Levels (ESLs) Urban residential and public open spaces. Health Screening Levels (HSLs) HSL A – Low density residential land use for sand (ASC NEPM 1999, amended 2013) have been adopted as a conservative measure. Management Limits TRH management levels have been adopted based on the proposed future land use.

Notes:
[1] See Section 7.2 for discussion on adopted EILs.

7.2 Adopted EILs

3 soil samples were analysed for physiochemical properties (pH and CEC) as part of the laboratory analytical suite. Site specific EILs for heavy metals calculated for the site were found to be above the ambient background concentrations observed within natural soil samples sent for laboratory analysis. As a majority of the site was observed to contain fill material between depths of 0.3 – 1.9 mBGL and no natural topsoil was observed onsite, calculated site specific EILs for subsoil are considered overly conservative as SAC.

Adopted EILs for the site are calculated based on conservative physiochemical properties (pH of 4.0 and CEC of 5 $cmol_c/kg$) adopted from NEPM (1999, amended 2013) Table 1B(1).

8 Laboratory Analytical Results

Table 13 summarises the results of soil laboratory analysis. Detailed tabulated results showing individual sample concentrations compared to adopted SACs are shown in Attachment H. Laboratory analytical documentation is available in Attachment G.

Table 13: Summary of soil laboratory results.

Analyte	Results Compared to SAC
Heavy Metals	HILs Lead exceeded the adopted HIL (300 mg/kg) at **6332/BH101/1.5 (1,700 mg/kg).** EIL Lead exceeded the adopted EIL (1,100 mg/kg) at **6332/BH101/1.5 (1,700 mg/kg).** Copper exceeded the adopted EIL (55 mg/kg) at **6332/BH101/1.5 (860 mg/kg)** and **6332/BH103/0.2 (57 mg/kg).** Nickel exceeded the adopted EIL (35 mg/kg) at **6332/BH106/0.4 (46 mg/kg).** Zinc exceeded adopted EIL (350 mg/kg) at **6332/BH101/1.5 (1,200 mg/kg).**
TPH/BTEXN	HILs All results below SAC. EIL All results below SAC. ESL All results below SAC. HSL All results below SAC. Management Limits All results below SAC.
OCP/OPP	HILs All results below SAC. EIL All results below SAC.

Analyte	Results Compared to SAC
TRH	HILs All results below SAC. EIL All results below SAC. ESL All results below SAC. HSL All results below SAC. Management Limits All results below SAC.
PAH	HILs Carcinogenic PAHs exceeded the adopted HIL (3 mg/kg) at **6332/BH101/1.5 (4.05 mg/kg).** EIL All results below SAC. ESL Benzo(a)pyrene exceeded the adopted ESL (0.7 mg/kg) at **6332/BH101/1.5 (3.1 mg/kg).** HSL All results below SAC.

9 Discussions

9.1 Samples Exceeding SAC

Soil sample 6332/BH101/1.5 (with SAC exceedances for heavy metals and PAH) was located within fill material underlying the existing carpark. Elevated contaminant concentrations are likely a result of anthropogenic material within the uncontrolled fill. Based on site testing, contamination was observed to be limited to this fill layer underlying the carpark. Soil sample 6332/BH101/2.0, located within natural soils beneath the contaminated layer was found to be below all adopted SAC.

Minor EIL exceedances at 6332/BH103/0.2 and 6332/BH106/0.4 are likely a result of anthropogenic material within fill. These SAC exceedances are addressed via a 95% upper confidence limit (UCL) analysis (Section 9.2).

No other exceedances of SAC were observed within fill material underlying the existing bowling greens or grassed area to the west of the bowling club.

9.2 95% UCL Analysis

To assess minor EIL exceedances of nickel and copper within fill material at the site, a 95% UCL analysis has been undertaken for samples taken from the site. Sample 6332/BH101/1.5 has not been included in UCL calculations as contaminant concentrations exceed 250% of the adopted EIL for nickel. UCL calculations are provided in Attachment I and are summarised below.

Table 14: Summary of UCL analysis.

COPC	Maximum Value (mg/kg)	EIL (mg/kg)	95% UCL (mg/kg)
Nickel	46	35	27.4
Copper	57	55	37.6

95% UCL for nickel and copper provide concentrations below the adopted EIL for the site. As a result, these exceedances are not considered a significant risk and do not require further remediation or management.

9.3 Data Gaps

It is noted that, due to access restrictions, soils underlying the existing bowling club at the site (AEC A) have not been tested. It is recommended that additional assessment and sampling of this AEC is undertaken following demolition of the existing structures. This can be completed during the remediation stage.

9.4 Acid Sulphate Soils (ASS)

The NSW Environment and Heritage eSPADE website identifies the site as Class 4 acid sulphate soil (ASS) risk. Boreholes undertaken as part of a geotechnical investigations (Douglas Partners, 2016) observed fill to a maximum depth of 1.2 mBGL and groundwater entering between 2.5 and 3.0 mBGL.

If the proposed development is to be constructed on-grade, it is unlikely that ASS soils are to be encountered during construction or excavation of fill material (if required). However, if any excavation beyond 2.0 mBGL (i.e. for a basement) or lowering of the water table is proposed as part of the development, ASS soils may pose a potential risk and are to be considered.

10 Conclusion and Discussions

SAC exceedances for heavy metals (lead, copper and zinc) and PAHs (benzo(a)pyrene and carcinogenic PAHs) were observed within fill material at one sampling location (6332/BH101/1.5), which may pose a potential risk to future human and environmental receptors at the site. It is recommended that a remedial action plan (RAP) be prepared for the site to address SAC exceedances within fill underlying the existing carpark at the site.

It is recommended that, following demolition of existing site structures, additional soil testing be conducted to address identified investigation constraints (Section 9.3) and data gaps within the CSM. Furthermore, analysis of all data (including new data from dwelling footprint) is to be undertaken using 95 % UCL confirmation limit to assess significance of ESL and EIL exceedances.

We consider that the site can be made suitable for proposed residential development provided that a RAP is developed and implemented accordingly. A likely remediation strategy may involve the removal and offsite disposal of identified contaminated soil considered to pose an unacceptable site risk. The RAP is to outline waste management requirements in light of any additional investigations or unexpected finds.

Following remediation works, a validation report is required to be prepared to confirm site suitability for the proposed development.

Prior to any soil being removed from site, a formal waste classification assessment in accordance with NSW EPA Waste Classification Guidelines (2014) is required.

11 Limitations Statement

This contamination assessment was undertaken in line with current industry standards.

It is important, however, to note that no land contamination study can be considered to be a complete and exhaustive characterisation of a site nor can it be guaranteed that any assessment shall identify and characterise all areas of potential contamination or all past potentially contaminating land-uses. This is particularly the case on sites where additional assessment work and remediation is identified as being required. Therefore, this report should not be read as a guarantee that no further contamination shall be found on the site. Should material be exposed in future which appears to be contaminated or inconsistent with natural site soils, additional testing may be required to determine the implications for the site.

Martens & Associates Pty Ltd has undertaken this assessment for the purposes of the current development proposal. No reliance on this report should be made for any other investigation or proposal. Martens & Associates accepts no responsibility, and provides no guarantee regarding the characteristics of areas of the site not specifically studied in this investigation.

References

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Herbert C. (1983) *Sydney 1:100,000 Geological Sheet 9130, 1st edition, Geological Survey of New South Wales, Sydney.*

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NSW EPA (1995) *Sampling Design Guidelines.*

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NSW SIX – *Spatial Information Exchange – Land & Property Information* Aerial photograph (2017). *https://six.nsw.gov.au/wps/portal/*

SEPP 55 Remediation of Land.

12 Attachment A – Historic Aerial Photographs and Site Location

KEY

APPROXIMATE SITE BOUNDARY

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD
B	CHECK AND APPROVED	13/3/2018	KW	RM	GT	GT
A	INITIAL RELEASE	07/03/2018	KW	RM		

SCALE

0 5 10 15 20 25 30 35 40 45 50 METRES

A1 (A3) 1:500 (1:1,000)

GRID | DATUM | PROJECT MANAGER: JF

CLIENT: MONTEREY EQUITY PTY LTD.

PROJECT NAME/PLANSET TITLE

DETAILED SITE INVESTIGATION

CONTAMINATION ASSESSMENT

119 BARTON STREET, MONTEREY, NSW

martens & Associates Pty Ltd

Consulting Engineers

Environment
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Geotechnical
Civil

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DRAWING TITLE

HISTORICAL AERIAL 1943
SOURCE: LPI

PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P1706332	PS01	R02	PS01-AZ01	B

DRAWING ID: P1706332-PS01-R02-AZ01

PRINTED: 13.3.2018 - USER: KWONG

A1 / A3 LANDSCAPE (A1LC_v02.0.01)

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD
B	CHECK AND APPROVED	13/3/2018	KW	RM	GT	GT
A	INITIAL RELEASE	07/03/2018	KW	RM		

SCALE
0 5 10 15 20 25 30 35 40 45 50 METRES
A1 (A3) 1:500 (1:1,000)

GRID | DATUM | PROJECT MANAGER: JF

CLIENT: MONTEREY EQUITY PTY LTD.

PROJECT NAME/PLANSET TITLE
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DRAWING TITLE
HISTORICAL AERIAL 1961
SOURCE: LPI

PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P1706332	PS01	R02	PS01-AZ02	B

DRAWING ID: P1706332-PS01-R02-AZ02

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD
B	CHECK AND APPROVED	13/3/2018	KW	RM	GT	GT
A	INITIAL RELEASE	07/03/2018	KW	RM		

SCALE
0 5 10 15 20 25 30 35 40 45 50 METRES
A1 (A3) 1:500 (1:1,000)

GRID | DATUM | PROJECT MANAGER: JF

CLIENT: MONTEREY EQUITY PTY LTD.

PROJECT NAME/PLANSET TITLE
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DRAWING TITLE
HISTORICAL AERIAL 1975
SOURCE: LPI

PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P1706332	PS01	R02	PS01-AZ03	B

PRINTED: 13.03.2018 - USER: KWONG
A1 / A3 LANDSCAPE (A1LC_v02.0.01)
DRAWING ID: P1706332-PS01-R02-AZ03

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD
B	CHECK AND APPROVED	13/3/2018	KW	RM	GT	GT
A	INITIAL RELEASE	07/03/2018	KW	RM		

SCALE
0 5 10 15 20 25 30 35 40 45 50 METRES
A1 (A3) 1:500 (1:1,000)

GRID | DATUM | PROJECT MANAGER: JF

CLIENT: MONTEREY EQUITY PTY LTD.

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DRAWING TITLE
HISTORICAL AERIAL 1991
SOURCE: LPI

PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P1706332	PS01	R02	PS01-AZ04	B

DRAWING ID: P1706332-PS01-R02-AZ04

PRINTED: 13/3/2018 - USER: KWONG
A1 / A3 LANDSCAPE (A1LC_v02.01)

KEY

APPROXIMATE SITE BOUNDARY

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD
B	**CHECK AND APPROVED**	**13/3/2018**	**KW**	**RM**	**GT**	**GT**
A	INITIAL RELEASE	07/03/2018	KW	RM		

SCALE
0 5 10 15 20 25 30 35 40 45 50 METRES
A1 (A3) 1:500 (1:1,000)

GRID | DATUM | PROJECT MANAGER: JF

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DRAWING TITLE
HISTORICAL AERIAL 2009
SOURCE: NEARMAP

PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P1706332	PS01	R02	PS01-AZ05	B

DRAWING ID: P1706332-PS01-R02-AZ05

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A1 / A3 LANDSCAPE (A1LC_v02.0.01)

KEY

APPROXIMATE SITE BOUNDARY

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD
B	CHECK AND APPROVED	13/3/2018	KW	RM	GT	GT
A	INITIAL RELEASE	07/03/2018	KW	RM		

SCALE: 0 5 10 15 20 25 30 35 40 45 50 METRES
A1 (A3) 1:500 (1:1,000)

GRID | DATUM | PROJECT MANAGER: JF

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DRAWING TITLE
HISTORICAL AERIAL 2018
SOURCE: NEARMAP

PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P1706332	PS01	R02	PS01-AZ06	B

DRAWING ID: P1706332-PS01-R02-AZ06

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A1 / A3 LANDSCAPE (A1LC_v02.0.01)

13 Attachment B – Bayside Council Correspondence

Robert Mehaffey

From: Andrew Mesthos
Sent: Wednesday, 7 February 2018 4:05 PM
To: Robert Mehaffey
Subject: FW: 119 Barton Street Monterey

From: Leanne McKinnon [mailto:Leanne.McKinnon@bayside.nsw.gov.au]
Sent: Wednesday, 7 February 2018 3:41 PM
To: Andrew Mesthos <amesthos@martens.com.au>
Subject: 119 Barton Street Monterey

Dear Andrew

In response to your recent request regarding 119 Barton Street Monterey. I advise these are the relevant files:

DA-2008/195 Carry out minor alterations and additions to change room, handicap entry ramp and upgrade kitchen and bar.

BA-1995/696 Outbuilding shed Class 10

BA-1996/134 Club additions to club Class 6

BA-1995/736 Building Application villas & townhouses 13 units class 2

Regards

Leanne McKinnon Information Officer
444-446 Princes Highway, Rockdale NSW 2216
T 02 9562 1682
E leanne.mckinnon@bayside.nsw.gov.au **W** www.bayside.nsw.gov.au

14 Attachment C – AEC Map

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD
B	**CHECK AND APPROVED**	**13/3/2018**	**KW**	**RM**	**GT**	**GT**
A	INITIAL RELEASE	07/03/2018	KW	RM		

SCALE
0 2.5 5.0 7.5 10.0 12.5 15.0 17.5 20.0 22.5 25.0 METRES
A1 (A3) 1:250 (1:500)

GRID	DATUM	PROJECT MANAGER
		JF

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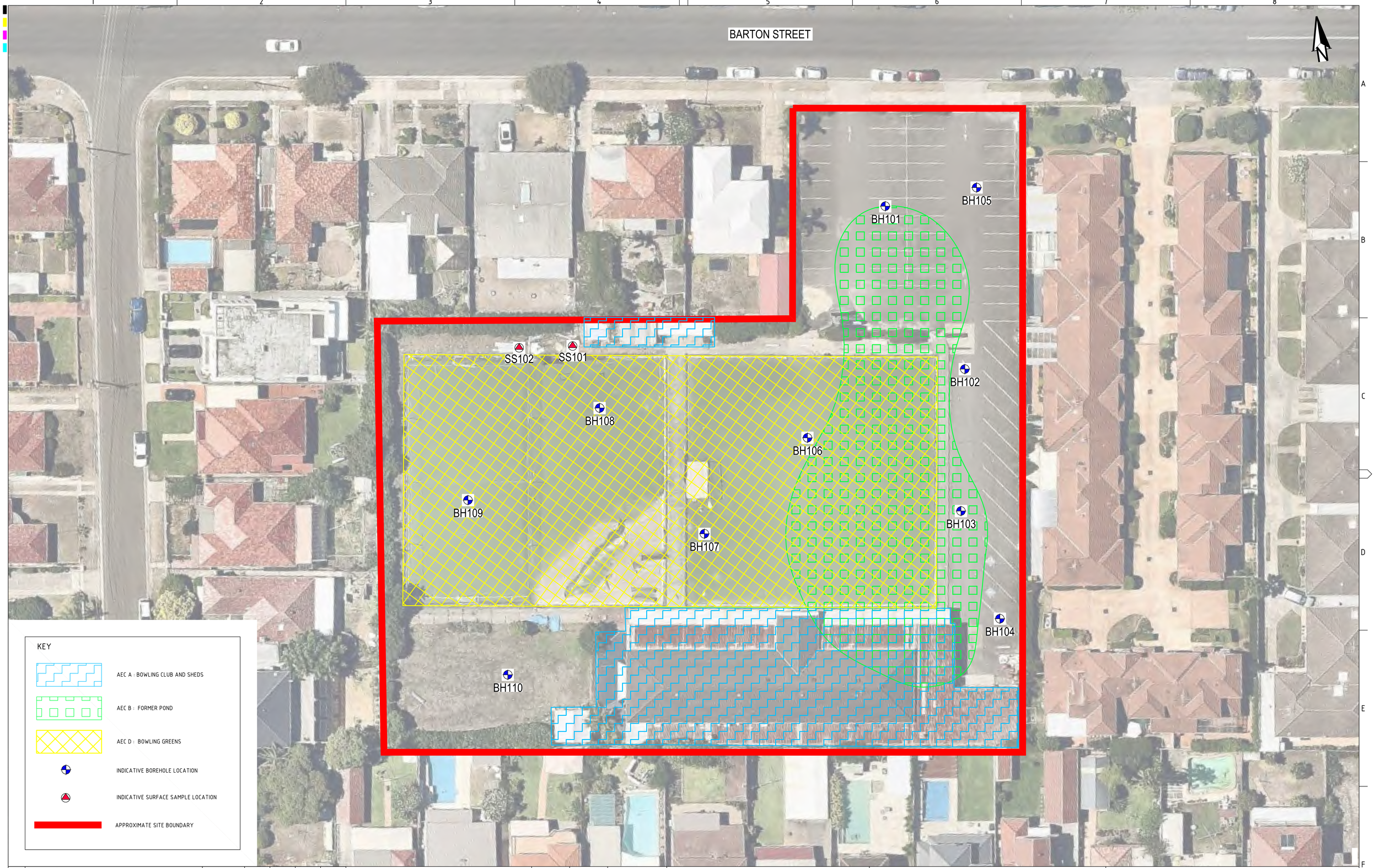
DRAWING TITLE
AEC MAP
SOURCE: NEARMAP

PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P1706332	PS01	R02	PS01-AZ07	B

DRAWING ID: P1706332-PS01-R02-AZ07

PRINTED: 13.03.2018 USER: KWONG
A1 / A3 LANDSCAPE (A1LC_v02.0.01)

15 Attachment D – Sampling Plan



REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD
B	CHECK AND APPROVED	13/3/2018	KW	RM	GT	GT
A	INITIAL RELEASE	07/03/2018	KW	RM		

SCALE
0 2.5 5.0 7.5 10.0 12.5 15.0 17.5 20.0 22.5 25.0 METRES
A1 (A3) 1:250 (1:500)

GRID	DATUM	PROJECT MANAGER
		JF

CLIENT
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DRAWING TITLE
SAMPLING PLAN
SOURCE: NEARMAP

PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P1706332	PS01	R02	PS01-JZ00	B

PRINTED: --- USER: KWONG
A1 / A3 LANDSCAPE (A1LC_v02.0.01)
DRAWING ID: P1706332-PS01-R02-JZ00

16 Attachment E – Borehole Logs

CLIENT	Monterey Equity Pty Ltd		COMMENCED	14/02/2018	COMPLETED	14/02/2018	**REF BH101**
PROJECT	Contamination Assessment		LOGGED	RM	CHECKED		Sheet 1 OF 1
SITE	119 Barton St, Monterey, NSW		GEOLOGY	Hawkesbury Sandstone	VEGETATION	N/A	PROJECT NO. P1706332
EQUIPMENT		4WD ute-mounted hydraulic dril rig	EASTING		RL SURFACE	4.1 m	DATUM AHD
EXCAVATION DIMENSIONS		Ø100 mm x 2.50 m depth	NORTHING		ASPECT	-	SLOPE <2%

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
				0.10					ASPHALT.			PAVEMENT
				4.00	6332/BH101/0.15/DUP/1 D 0.15 m 6332/BH101/0.15/S/1 D 0.15 m			SP	FILL: Gravelly SAND, dark brown, medium grained, with trace concrete.			FILL
				0.50 3.60					Trace slag.		L	
	M				6332/BH101/0.7/S/1 D 0.70 m							
			1	*1.15* 2.95				CI	FILL: CLAY, medium plasticity, light brown.	M	S	
AD/T		Not Encountered		*1.30* 2.80	6332/BH101/1.2/S/1 D 1.20 m			SP	FILL: SAND, brown, medium grained, with trace brick.			
					6332/BH101/1.5/S/1 D 1.50 m							
	L			*1.90* 2.20				SP	SAND, white, medium grained.		MD	RESIDUAL SOIL
			2		6332/BH101/2.0/S/1 D 2.00 m							
				2.50					Hole Terminated at 2.50 m			2.50: Investigation limited.
			3									
			4									
			5									

EXCAVATION LOG TO BE READ IN CONJUCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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Engineering Log - BOREHOLE

CLIENT	Monterey Equity Pty Ltd		COMMENCED	14/02/2018	COMPLETED	14/02/2018	**REF BH102**
PROJECT	Contamination Assessment		LOGGED	RM	CHECKED		Sheet 1 OF 1
SITE	119 Barton St, Monterey, NSW		GEOLOGY	Hawkesbury Sandstone	VEGETATION	N/A	PROJECT NO. P1706332
EQUIPMENT		4WD ute-mounted hydraulic dril rig	EASTING		RL SURFACE	3.7 m	DATUM AHD
EXCAVATION DIMENSIONS		Ø100 mm x 2.00 m depth	NORTHING		ASPECT	-	SLOPE <2%

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
				0.10					ASPHALT.			PAVEMENT
				3.60								FILL
AD/T	M	Not Encountered			6332/BH102/0.2/S/1 D 0.20 m			SP	FILL: Gravelly SAND, dark brown, medium grained, with trace concrete.			
				0.40								
				3.30							L	
					6332/BH102/0.5/S/1 D 0.50 m			SP	FILL: SAND, grey, fine to medium grained.			
				0.80								
				2.90				SP	SAND, yellow/white, medium grained.			RESIDUAL SOIL
	L		1		6332/BH102/0.9/S/1 D 0.90 m					M		
											MD	
					6332/BH102/1.8/S/1 D 1.80 m							
				2.00								
			2						Hole Terminated at 2.00 m			2.00: Investigation limited.
			3									
			4									
			5									

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Engineering Log - BOREHOLE

CLIENT	Monterey Equity Pty Ltd		COMMENCED	14/02/2018	COMPLETED	14/02/2018	**REF BH103**
PROJECT	Contamination Assessment		LOGGED	RM	CHECKED		Sheet 1 OF 1
SITE	119 Barton St, Monterey, NSW		GEOLOGY	Hawkesbury Sandstone	VEGETATION	N/A	PROJECT NO. P1706332
EQUIPMENT		4WD ute-mounted hydraulic dril rig	EASTING		RL SURFACE	3.7 m	DATUM AHD
EXCAVATION DIMENSIONS		Ø100 mm x 2.50 m depth	NORTHING		ASPECT	-	SLOPE <2%

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
				0.10					ASPHALT.			PAVEMENT
				3.60								
	M				6332/BH103/0.2/S/1 D 0.20 m			SP	FILL: Gravelly SAND, dark brown, medium grained, with trace concrete.		L	FILL
				0.40								
				3.30								
					6332/BH103/0.5/S/1 D 0.50 m			SP	SAND, grey, fine to medium grained.			RESIDUAL SOIL
				1.00								
AD/T		Not Encountered	1	2.70								
					6332/BH103/1.1/S/1 D 1.10 m			SP	SAND, grey/white, medium grained.	M		
	L										MD	
			2									
				2.50								
									Hole Terminated at 2.50 m			2.50: Investigation limited.
			3									
			4									
			5									

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Engineering Log - BOREHOLE

CLIENT	Monterey Equity Pty Ltd		COMMENCED	14/02/2018	COMPLETED	14/02/2018	**REF BH104**
PROJECT	Contamination Assessment		LOGGED	RM	CHECKED		Sheet 1 OF 1
SITE	119 Barton St, Monterey, NSW		GEOLOGY	Hawkesbury Sandstone	VEGETATION	N/A	PROJECT NO. P1706332
EQUIPMENT		4WD ute-mounted hydraulic dril rig	EASTING		RL SURFACE	3.8 m	DATUM AHD
EXCAVATION DIMENSIONS		Ø100 mm x 5.50 m depth	NORTHING		ASPECT	-	SLOPE <2%

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	M			3.75	6332/BH104/0.2/S/1 D 0.20 m			SP	ASPHALT. FILL: SAND, grey, with trace gravels.		L	PAVEMENT FILL
				0.50								
	L	13/02/18	1	3.30	6332/BH104/0.7/S/1 D 0.70 m			SP	SAND, grey, fine to medium grained.	M	MD	RESIDUAL SOIL
			2									
			3									
	M		4							W		
			5									
				5.50					Hole Terminated at 5.50 m			5.50: Investigation limited.

EXCAVATION LOG TO BE READ IN CONJUCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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Engineering Log - BOREHOLE

CLIENT	Monterey Equity Pty Ltd		COMMENCED	14/02/2018	COMPLETED	14/02/2018	**REF BH105**
PROJECT	Contamination Assessment		LOGGED	RM	CHECKED		Sheet 1 OF 1
SITE	119 Barton St, Monterey, NSW		GEOLOGY	Hawkesbury Sandstone	VEGETATION	N/A	PROJECT NO. P1706332
EQUIPMENT		4WD ute-mounted hydraulic dril rig	EASTING		RL SURFACE	4.3 m	DATUM AHD
EXCAVATION DIMENSIONS		Ø100 mm x 2.50 m depth	NORTHING		ASPECT	-	SLOPE <2%

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T		13/02/18	1 2 3 4 5	4.25 *0.30* 4.00 *1.50* 2.80 *2.50*	6332/BH105/0.15/S/1 D 0.15 m 6332/BH105/0.4/S/1 D 0.40 m			SP SP	ASPHALT. FILL: Gravelly SAND, brown/grey, fine grained. SAND, grey, fine grained. Grading to yellow. Hole Terminated at 2.50 m	M	L	PAVEMENT FILL RESIDUAL SOIL 2.50: Investigation limited.

EXCAVATION LOG TO BE READ IN CONJUCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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Engineering Log - BOREHOLE

CLIENT	Monterey Equity Pty Ltd		COMMENCED	14/02/2018	COMPLETED	14/02/2018	**REF BH106**
PROJECT	Contamination Assessment		LOGGED	RM	CHECKED		Sheet 1 OF 1
SITE	119 Barton St, Monterey, NSW		GEOLOGY	Hawkesbury Sandstone	VEGETATION	N/A	PROJECT NO. P1706332
EQUIPMENT	Push Tube		EASTING		RL SURFACE	3.7 m	DATUM AHD
EXCAVATION DIMENSIONS	1.50 m depth		NORTHING		ASPECT	-	SLOPE <2%

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
PT	L	13/02/18	1	*0.15* 3.55	6332/BH106/0.1/S/1 D 0.10 m			SC	FILL: Clayey SAND, grey/brown, coarse.	D	MD	FILL
								SP	FILL: SAND, white, coarse.			
					6332/BH106/0.25/S/1 D 0.25 m			SP	FILL: Gravelly SAND, grey, coarse.			
				0.35 3.35	6332/BH106/0.4/S/1 D 0.40 m			SP	FILL: Gravelly SAND, dark grey/black, medium grained.		L	
				0.55 3.15	6332/BH106/0.65/S/1 D 0.65 m			SP	SAND, white/yellow, fine to medium grained.	M	MD	RESIDUAL SOIL
				1.50					Hole Terminated at 1.50 m			1.50: Investigation limited.

EXCAVATION LOG TO BE READ IN CONJUCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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Engineering Log - BOREHOLE

CLIENT	Monterey Equity Pty Ltd		COMMENCED	14/02/2018	COMPLETED	14/02/2018	**REF BH107**
PROJECT	Contamination Assessment		LOGGED	RM	CHECKED		Sheet 1 OF 1
SITE	119 Barton St, Monterey, NSW		GEOLOGY	Hawkesbury Sandstone	VEGETATION	N/A	PROJECT NO. P1706332
EQUIPMENT		Push Tube	EASTING		RL SURFACE	3.7 m	DATUM AHD
EXCAVATION DIMENSIONS		1.50 m depth	NORTHING		ASPECT	-	SLOPE <2%

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
PT	L	Not Encountered	1	3.65	6332/BH107/0.1/S/1 D 0.10 m			SC	FILL: Clayey SAND, grey/brown, coarse.	D	MD	FILL
				0.25				SP	FILL: SAND, white, coarse.			
				0.35	6332/BH107/0.3-0.4/S/1 D 0.30 m			SP	FILL: Gravelly SAND, grey, coarse.		L	
				0.45				SP	FILL: Gravelly SAND, dark grey/black, medium grained.			
				3.25				SP	SAND, white/yellow, fine to medium grained.	M	MD	RESIDUAL SOIL
					6332/BH107/0.6/S/1 D 0.60 m							
				1.50					Hole Terminated at 1.50 m			1.50: Investigation limited.
			2									
			3									
			4									
			5									

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Engineering Log - BOREHOLE

CLIENT	Monterey Equity Pty Ltd		COMMENCED	14/02/2018	COMPLETED	14/02/2018	**REF BH108**
PROJECT	Contamination Assessment		LOGGED	RM	CHECKED		Sheet 1 OF 1
SITE	119 Barton St, Monterey, NSW		GEOLOGY	Hawkesbury Sandstone	VEGETATION	N/A	PROJECT NO. P1706332
EQUIPMENT		Push Tube	EASTING		RL SURFACE	3.7 m	DATUM AHD
EXCAVATION DIMENSIONS		1.50 m depth	NORTHING		ASPECT	-	SLOPE <2%

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
PT	L	Not Encountered	1	3.60	6332/BH108/0.05/S/1 D 0.05 m			SC	FILL: Clayey SAND, grey/brown, coarse.	D	MD	FILL
								SP	FILL: SAND, white, coarse.			
								SP	FILL: Gravelly SAND, grey, coarse.		L	
				0.40	6332/BH108/0.3/S/1 D 0.30 m							
				3.25				SP	FILL: Gravelly SAND, dark grey/black, medium grained.			RESIDUAL SOIL
					6332/BH108/0.6/S/1 D 0.60 m			SP	SAND, white/yellow, fine to medium grained.	M	MD	
				1.50					Hole Terminated at 1.50 m			1.50: Investigation limited.
			2									
			3									
			4									
			5									

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Engineering Log - BOREHOLE

CLIENT	Monterey Equity Pty Ltd		COMMENCED	14/02/2018	COMPLETED	14/02/2018	**REF BH109**
PROJECT	Contamination Assessment		LOGGED	RM	CHECKED		Sheet 1 OF 1
SITE	119 Barton St, Monterey, NSW		GEOLOGY	Hawkesbury Sandstone	VEGETATION	N/A	PROJECT NO. P1706332
EQUIPMENT	Push Tube		EASTING		RL SURFACE	3.7 m	DATUM AHD
EXCAVATION DIMENSIONS	1.50 m depth		NORTHING		ASPECT	-	SLOPE <2%

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
PT	L	Not Encountered	1	***0.15*** 3.55 ***0.30*** 3.35 *1.50*	6332/BH109/0.1/S/1 D 0.10 m 6332/BH109/0.25/S/1 D 0.25 m 6332/BH109/0.5/S/1 D 0.50 m			SC SP SP SP SP	FILL: Clayey SAND, grey/brown, coarse. FILL: SAND, white, coarse. FILL: Gravelly SAND, grey, coarse. FILL: Gravelly SAND, dark grey/black, medium grained. SAND, white/yellow, fine to medium grained.	D M	MD L MD	FILL RESIDUAL SOIL
			2 3 4 5						Hole Terminated at 1.50 m			1.50: Investigation limited.

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Engineering Log - BOREHOLE

CLIENT	Monterey Equity Pty Ltd		COMMENCED	14/02/2018	COMPLETED	14/02/2018	**REF BH110**
PROJECT	Contamination Assessment		LOGGED	RM	CHECKED		Sheet 1 OF 1
SITE	119 Barton St, Monterey, NSW		GEOLOGY	Hawkesbury Sandstone	VEGETATION	N/A	PROJECT NO. P1706332
EQUIPMENT	Push Tube		EASTING		RL SURFACE	4.3 m	DATUM AHD
EXCAVATION DIMENSIONS	1.50 m depth		NORTHING		ASPECT	-	SLOPE <2%

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
PT	L	Not Encountered		4.30	6332/BH110/0.05/S/1 D 0.05 m			SP	FILL: SAND, brown, fine grained, with rootlets, gravels.		L	FILL / TOPSOIL
				0.50								
				3.80	6332/BH110/0.6/S/1 D 0.60 m			SP	FILL: Gravelly SAND, dark grey/black, medium grained, with trace brick fragments.			FILL
				0.75						M		
				3.55	6332/BH110/0.8/S/1 D 0.80 m			SP	SAND, yellow, medium grained.		MD	RESIDUAL SOIL
			1	***1.50***					Hole Terminated at 1.50 m			1.50: Investigation limited.
			2									
			3									
			4									
			5									

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Engineering Log - BOREHOLE

17 Attachment F – Data Validation Report

DATA VALIDATION REPORT: 119 Barton Rd, Monterey, NSW

1. Sample Handling

	Yes	No (Comments below)
a. Were sample holding times met?	✓	
b. Were samples in proper custody between the field and reaching the laboratory?	✓	
c. Were the samples properly and adequately preserved?	✓	
d. Were the samples received by the laboratory in good condition?	✓	

COMMENTS

Sample handling is:

- ✓ **Satisfactory**
- **Partially Satisfactory**
- **Unsatisfactory**

DATA VALIDATION REPORT: 119 Barton Rd, Monterey, NSW

2. Precision / Accuracy Statement

	Yes	No (Comments below)
a. Was a NATA registered laboratory used?	✓	
b. Did the laboratory perform the requested tests?	✓	
c. Were laboratory methods adopted NATA endorsed?	✓	
d. Were appropriate test procedures followed?	✓	
e. Were reporting limits satisfactory?	✓	
f. Was the NATA Seal on the reports?	✓	
g. Were reports signed by an authorised person?	✓	

COMMENTS

Precision / Accuracy of the Laboratory Report:

✓ **Satisfactory**

Partially Satisfactory

Unsatisfactory

3. Field Quality Assurance / Quality Control (QA/QC)

	Media	Number
a. Number of Primary Samples analysed *(does not include duplicates)*	Soil:	14
	Water:	-
	Material	-
b. Number of days of sampling	1	

c. Number and Type of QA/QC Samples analysed	Soil	Water
Intra-Laboratory Field Duplicates	2	
Inter-Laboratory Field triplicates	-	
Trip Blanks	1	
Field Rinsate	-	
Other (Field Blanks, Spikes, etc.)	1	

Comments

Trip spike/blank used

DATA VALIDATION REPORT: 119 Barton Rd, Monterey, NSW

Field Duplicates

	Yes	No (Comments below)
Adequate Numbers of intra-laboratory field duplicates analysed?	✓	
Adequate Numbers of inter-laboratory field duplicates analysed?	-	-
Were field duplicate RPDs within Control Limits?		
i. Organics	N/A	
ii. Metals / Inorganics		✓
iii. Nutrients	N/A	

COMMENTS

RPDs were exceeded in duplicate samples 6332/DUP101 (copper) and 6332/DUP102 (lead, arsenic, mercury and zinc) . This is likely attributed to heterogenous fill material being sampled. All RPD sample exceedances are below the adopted SAC with the exception of 6332/BH101 for copper. For copper that exceeds the EIL, the higher value (35 mg/kg) has been adopted for 95% UCL analysis to ensure data validation.

DATA VALIDATION REPORT: 119 Barton Rd, Monterey, NSW

Summary of Quality Assurance / Quality Control (QA/QC)

QA/QC Type	Satisfactory	Partially Satisfactory	Unsatisfactory
Sample handling	✓		
Precision / Accuracy of the Laboratory Report	✓		
Field QA / QC	✓		
Laboratory Internal QA / QC	✓		

Data Usability

1. Data directly usable ✓

2. Data usable with the following corrections/modifications
   (see comment below)

3. Data not usable.

COMMENTS

Field Duplicates (SOIL)	SDG	ENVIROLAB 2018-02-14T00:00:00	ENVIROLAB 2018-02-14T00:00:00		ENVIROLAB 2018-02-14T00:00:00	ENVIROLAB 2018-02-14T00:00:00	
Filter: SDG in('ENVIR(	Field ID	6332/BH101	6332/DUP101	RPD	6332/BH110	6332/DUP102	RPD
	Sampled Date/Time	13/02/2018	13/02/2018		13/02/2018	13/02/2018	
Chem_Gr	ChemNam	Units	EQL						
Inorganics	Moisture	%	0.1	11.0	9.7	13	2.3	2.6	12
Lead	Lead	mg/kg	1	28.0	26.0	7	**32.0**	**13.0**	**84**
Metals	Arsenic	mg/kg	4	<4.0	<4.0	0	**<4.0**	**12.0**	**100**
	Cadmium	mg/kg	0.4	<0.4	<0.4	0	<0.4	<0.4	0
	Chromium	mg/kg	1	8.0	9.0	12	9.0	8.0	12
	Copper	mg/kg	1	**35.0**	**24.0**	**37**	8.0	10.0	22
	Mercury	mg/kg	0.1	<0.1	<0.1	0	**1.7**	**3.5**	**69**
	Nickel	mg/kg	1	14.0	12.0	15	3.0	3.0	0
	Zinc	mg/kg	1	26.0	28.0	7	**40.0**	**89.0**	**76**

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 80 (1-10 x EQL); 50 (10-30 x EQL); 30 (> 30 x EQL))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

18 Attachment G – Laboratory Analytical Documentation

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12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
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CERTIFICATE OF ANALYSIS 185170

Client Details

Client	Martens & Associates Pty Ltd
Attention	Robert Mehaffey, Gray Taylor
Address	Suite 201, 20 George St, Hornsby, NSW, 2077

Sample Details

Your Reference	**P1706332 - 119 Barton St Monterey DSI**
Number of Samples	41 soil
Date samples received	14/02/2018
Date completed instructions received	14/02/2018

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	21/02/2018
Date of Issue	20/02/2018

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Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By
Dragana Tomas, Senior Chemist
Jeremy Faircloth, Organics Supervisor
Long Pham, Team Leader, Metals

Authorised By

David Springer, General Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		185170-1	185170-4	185170-10	185170-11	185170-18
Your Reference	UNITS	6332/BH101	6332/BH101	6332/BH103	6332/BH103	6332/BH106
Depth		0.15	1.5	0.2	0.5	0.25
Date Sampled		13/02/2018	13/02/2018	13/02/2018	13/02/2018	13/02/2018
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	15/02/2018	15/02/2018	15/02/2018	15/02/2018	15/02/2018
Date analysed	-	19/02/2018	19/02/2018	19/02/2018	19/02/2018	19/02/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_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
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	99	100	99	107	104

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		185170-19	185170-21	185170-28	185170-32	185170-33
Your Reference	UNITS	6332/BH106	6332/BH107	6332/BH109	6332/BH110	6332/BH110
Depth		0.4	0.1	0.1	0.05	0.60.8
Date Sampled		13/02/2018	13/02/2018	13/02/2018	13/02/2018	13/02/2018
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	15/02/2018	15/02/2018	15/02/2018	15/02/2018	15/02/2018
Date analysed	-	19/02/2018	19/02/2018	19/02/2018	19/02/2018	19/02/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_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
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	106	109	104	112	105

vTRH(C6-C10)/BTEXN in Soil			
Our Reference		185170-39	185170-40
Your Reference	UNITS	Trip Blank	Trip Spike
Depth		-	-
Date Sampled		13/02/2018	13/02/2018
Type of sample		soil	soil
Date extracted	-	15/02/2018	15/02/2018
Date analysed	-	19/02/2018	19/02/2018
TRH C_6 - C_9	mg/kg	<25	[NA]
TRH C_6 - C_{10}	mg/kg	<25	[NA]
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	[NA]
Benzene	mg/kg	<0.2	95%
Toluene	mg/kg	<0.5	95%
Ethylbenzene	mg/kg	<1	98%
m+p-xylene	mg/kg	<2	96%
o-Xylene	mg/kg	<1	97%
naphthalene	mg/kg	<1	[NA]
Total +ve Xylenes	mg/kg	<1	[NA]
Surrogate aaa-Trifluorotoluene	%	102	102

svTRH (C10-C40) in Soil						
Our Reference		185170-1	185170-4	185170-10	185170-11	185170-18
Your Reference	UNITS	6332/BH101	6332/BH101	6332/BH103	6332/BH103	6332/BH106
Depth		0.15	1.5	0.2	0.5	0.25
Date Sampled		13/02/2018	13/02/2018	13/02/2018	13/02/2018	13/02/2018
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	15/02/2018	15/02/2018	15/02/2018	15/02/2018	15/02/2018
Date analysed	-	18/02/2018	18/02/2018	18/02/2018	18/02/2018	18/02/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	140	170	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	120	140	<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	240	260	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	240	260	<50	<50
Surrogate o-Terphenyl	%	79	82	85	79	79

svTRH (C10-C40) in Soil						
Our Reference		185170-19	185170-21	185170-28	185170-32	185170-33
Your Reference	UNITS	6332/BH106	6332/BH107	6332/BH109	6332/BH110	6332/BH110
Depth		0.4	0.1	0.1	0.05	0.60.8
Date Sampled		13/02/2018	13/02/2018	13/02/2018	13/02/2018	13/02/2018
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	15/02/2018	15/02/2018	15/02/2018	15/02/2018	15/02/2018
Date analysed	-	18/02/2018	18/02/2018	18/02/2018	18/02/2018	18/02/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{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	%	80	80	78	82	83

PAHs in Soil						
Our Reference		185170-1	185170-4	185170-10	185170-11	185170-18
Your Reference	UNITS	6332/BH101	6332/BH101	6332/BH103	6332/BH103	6332/BH106
Depth		0.15	1.5	0.2	0.5	0.25
Date Sampled		13/02/2018	13/02/2018	13/02/2018	13/02/2018	13/02/2018
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	15/02/2018	15/02/2018	15/02/2018	15/02/2018	15/02/2018
Date analysed	-	16/02/2018	16/02/2018	16/02/2018	16/02/2018	16/02/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	0.5	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	0.2	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.8	4.3	0.3	<0.1	<0.1
Anthracene	mg/kg	0.2	0.8	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	1.3	8.3	0.3	<0.1	<0.1
Pyrene	mg/kg	1.3	7.9	0.3	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.5	2.3	0.2	<0.1	<0.1
Chrysene	mg/kg	0.7	3.2	0.2	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	0.9	4.9	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.53	3.1	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	0.3	2.6	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	0.4	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.3	2.9	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	7.1	41	1.3	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	0.7	4.6	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	0.8	4.6	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	0.8	4.6	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	97	96	88	94	95

PAHs in Soil						
Our Reference		185170-19	185170-21	185170-28	185170-32	185170-33
Your Reference	UNITS	6332/BH106	6332/BH107	6332/BH109	6332/BH110	6332/BH110
Depth		0.4	0.1	0.1	0.05	0.60.8
Date Sampled		13/02/2018	13/02/2018	13/02/2018	13/02/2018	13/02/2018
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	15/02/2018	15/02/2018	15/02/2018	15/02/2018	15/02/2018
Date analysed	-	16/02/2018	16/02/2018	16/02/2018	16/02/2018	16/02/2018
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	0.6	<0.1	<0.1	<0.1	0.3
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.3	<0.1	<0.1	<0.1	0.1
Pyrene	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.2	<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	<0.05	<0.05	<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
Total +ve PAH's	mg/kg	1.6	<0.05	<0.05	<0.05	0.4
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
Surrogate p-Terphenyl-d14	%	91	93	94	95	85

Organochlorine Pesticides in soil						
Our Reference		185170-1	185170-4	185170-10	185170-11	185170-18
Your Reference	UNITS	6332/BH101	6332/BH101	6332/BH103	6332/BH103	6332/BH106
Depth		0.15	1.5	0.2	0.5	0.25
Date Sampled		13/02/2018	13/02/2018	13/02/2018	13/02/2018	13/02/2018
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	15/02/2018	15/02/2018	15/02/2018	15/02/2018	15/02/2018
Date analysed	-	16/02/2018	16/02/2018	16/02/2018	16/02/2018	16/02/2018
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	%	98	96	88	93	95

Organochlorine Pesticides in soil						
Our Reference		185170-19	185170-21	185170-28	185170-32	185170-33
Your Reference	UNITS	6332/BH106	6332/BH107	6332/BH109	6332/BH110	6332/BH110
Depth		0.4	0.1	0.1	0.05	0.60.8
Date Sampled		13/02/2018	13/02/2018	13/02/2018	13/02/2018	13/02/2018
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	15/02/2018	15/02/2018	15/02/2018	15/02/2018	15/02/2018
Date analysed	-	16/02/2018	16/02/2018	16/02/2018	16/02/2018	16/02/2018
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	0.2	<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	0.2	<0.1
Surrogate TCMX	%	91	95	95	96	96

Organophosphorus Pesticides						
Our Reference		185170-1	185170-4	185170-10	185170-11	185170-18
Your Reference	UNITS	6332/BH101	6332/BH101	6332/BH103	6332/BH103	6332/BH106
Depth		0.15	1.5	0.2	0.5	0.25
Date Sampled		13/02/2018	13/02/2018	13/02/2018	13/02/2018	13/02/2018
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	15/02/2018	15/02/2018	15/02/2018	15/02/2018	15/02/2018
Date analysed	-	16/02/2018	16/02/2018	16/02/2018	16/02/2018	16/02/2018
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	%	98	96	88	93	95

Organophosphorus Pesticides						
Our Reference		185170-19	185170-21	185170-28	185170-32	185170-33
Your Reference	UNITS	6332/BH106	6332/BH107	6332/BH109	6332/BH110	6332/BH110
Depth		0.4	0.1	0.1	0.05	0.60.8
Date Sampled		13/02/2018	13/02/2018	13/02/2018	13/02/2018	13/02/2018
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	15/02/2018	15/02/2018	15/02/2018	15/02/2018	15/02/2018
Date analysed	-	16/02/2018	16/02/2018	16/02/2018	16/02/2018	16/02/2018
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	%	91	95	95	96	96

Acid Extractable metals in soil						
Our Reference		185170-1	185170-4	185170-10	185170-11	185170-18
Your Reference	UNITS	6332/BH101	6332/BH101	6332/BH103	6332/BH103	6332/BH106
Depth		0.15	1.5	0.2	0.5	0.25
Date Sampled		13/02/2018	13/02/2018	13/02/2018	13/02/2018	13/02/2018
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	15/02/2018	15/02/2018	15/02/2018	15/02/2018	15/02/2018
Date analysed	-	15/02/2018	15/02/2018	15/02/2018	15/02/2018	15/02/2018
Arsenic	mg/kg	<4	13	<4	<4	<4
Cadmium	mg/kg	<0.4	3	<0.4	<0.4	<0.4
Chromium	mg/kg	8	29	6	<1	2
Copper	mg/kg	35	860	57	1	3
Lead	mg/kg	28	1,700	15	1	4
Mercury	mg/kg	<0.1	0.5	<0.1	<0.1	0.2
Nickel	mg/kg	14	25	21	<1	4
Zinc	mg/kg	26	1,200	12	<1	6

Acid Extractable metals in soil						
Our Reference		185170-19	185170-21	185170-28	185170-32	185170-33
Your Reference	UNITS	6332/BH106	6332/BH107	6332/BH109	6332/BH110	6332/BH110
Depth		0.4	0.1	0.1	0.05	0.60.8
Date Sampled		13/02/2018	13/02/2018	13/02/2018	13/02/2018	13/02/2018
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	15/02/2018	15/02/2018	15/02/2018	15/02/2018	15/02/2018
Date analysed	-	15/02/2018	15/02/2018	15/02/2018	15/02/2018	15/02/2018
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	6	7	5	9	4
Copper	mg/kg	15	<1	2	8	4
Lead	mg/kg	19	1	3	32	75
Mercury	mg/kg	<0.1	<0.1	<0.1	1.7	0.2
Nickel	mg/kg	46	1	2	3	5
Zinc	mg/kg	15	5	17	40	9

Acid Extractable metals in soil			
Our Reference		185170-37	185170-38
Your Reference	UNITS	6332/DUP101	6332/DUP102
Depth		-	-
Date Sampled		13/02/2018	13/02/2018
Type of sample		soil	soil
Date prepared	-	15/02/2018	15/02/2018
Date analysed	-	15/02/2018	15/02/2018
Arsenic	mg/kg	<4	12
Cadmium	mg/kg	<0.4	<0.4
Chromium	mg/kg	9	8
Copper	mg/kg	24	10
Lead	mg/kg	26	13
Mercury	mg/kg	<0.1	3.5
Nickel	mg/kg	12	3
Zinc	mg/kg	28	89

Moisture						
Our Reference		185170-1	185170-4	185170-10	185170-11	185170-18
Your Reference	UNITS	6332/BH101	6332/BH101	6332/BH103	6332/BH103	6332/BH106
Depth		0.15	1.5	0.2	0.5	0.25
Date Sampled		13/02/2018	13/02/2018	13/02/2018	13/02/2018	13/02/2018
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	15/02/2018	15/02/2018	15/02/2018	15/02/2018	15/02/2018
Date analysed	-	16/02/2018	16/02/2018	16/02/2018	16/02/2018	16/02/2018
Moisture	%	11	23	13	9.0	9.5

Moisture						
Our Reference		185170-19	185170-21	185170-28	185170-32	185170-33
Your Reference	UNITS	6332/BH106	6332/BH107	6332/BH109	6332/BH110	6332/BH110
Depth		0.4	0.1	0.1	0.05	0.60.8
Date Sampled		13/02/2018	13/02/2018	13/02/2018	13/02/2018	13/02/2018
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	15/02/2018	15/02/2018	15/02/2018	15/02/2018	15/02/2018
Date analysed	-	16/02/2018	16/02/2018	16/02/2018	16/02/2018	16/02/2018
Moisture	%	16	7.3	8.6	2.3	2.5

Moisture			
Our Reference		185170-37	185170-38
Your Reference	UNITS	6332/DUP101	6332/DUP102
Depth		-	-
Date Sampled		13/02/2018	13/02/2018
Type of sample		soil	soil
Date prepared	-	15/02/2018	15/02/2018
Date analysed	-	16/02/2018	16/02/2018
Moisture	%	9.7	2.6

Method ID	Methodology Summary
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
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-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-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. 'EQ 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. 'EQ 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. 'EQ 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.

Method ID	Methodology Summary
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
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.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date extracted	-			15/02/2018	1	15/02/2018	15/02/2018		15/02/2018	[NT]
Date analysed	-			19/02/2018	1	19/02/2018	19/02/2018		19/02/2018	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	<25	1	<25	<25	0	104	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	1	<25	<25	0	104	[NT]
Benzene	mg/kg	0.2	Org-016	<0.2	1	<0.2	<0.2	0	116	[NT]
Toluene	mg/kg	0.5	Org-016	<0.5	1	<0.5	<0.5	0	101	[NT]
Ethylbenzene	mg/kg	1	Org-016	<1	1	<1	<1	0	88	[NT]
m+p-xylene	mg/kg	2	Org-016	<2	1	<2	<2	0	108	[NT]
o-Xylene	mg/kg	1	Org-016	<1	1	<1	<1	0	95	[NT]
naphthalene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	105	1	99	102	3	104	[NT]

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	33	15/02/2018	15/02/2018		[NT]	[NT]
Date analysed	-			[NT]	33	19/02/2018	19/02/2018		[NT]	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	[NT]	33	<25	<25	0	[NT]	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	[NT]	33	<25	<25	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-016	[NT]	33	<0.2	<0.2	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-016	[NT]	33	<0.5	<0.5	0	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-016	[NT]	33	<1	<1	0	[NT]	[NT]
m+p-xylene	mg/kg	2	Org-016	[NT]	33	<2	<2	0	[NT]	[NT]
o-Xylene	mg/kg	1	Org-016	[NT]	33	<1	<1	0	[NT]	[NT]
naphthalene	mg/kg	1	Org-014	[NT]	33	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	[NT]	33	105	110	5	[NT]	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date extracted	-			14/02/2018	1	15/02/2018	15/02/2018		14/02/2018	[NT]
Date analysed	-			18/02/2018	1	18/02/2018	18/02/2018		18/02/2018	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	1	<50	<50	0	108	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	1	<100	<100	0	92	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	1	<100	<100	0	123	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	1	<50	<50	0	108	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	1	<100	<100	0	92	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	1	<100	<100	0	123	[NT]
Surrogate o-Terphenyl	%		Org-003	82	1	79	79	0	85	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	33	15/02/2018	15/02/2018		[NT]	[NT]
Date analysed	-			[NT]	33	18/02/2018	18/02/2018		[NT]	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	[NT]	33	<50	<50	0	[NT]	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	[NT]	33	<100	<100	0	[NT]	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	[NT]	33	<100	<100	0	[NT]	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	[NT]	33	<50	<50	0	[NT]	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	[NT]	33	<100	<100	0	[NT]	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	[NT]	33	<100	<100	0	[NT]	[NT]
Surrogate o-Terphenyl	%		Org-003	[NT]	33	83	83	0	[NT]	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date extracted	-			15/02/2018	1	15/02/2018	15/02/2018		15/02/2018	[NT]
Date analysed	-			16/02/2018	1	16/02/2018	16/02/2018		16/02/2018	[NT]
Naphthalene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	92	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	1	0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	97	[NT]
Phenanthrene	mg/kg	0.1	Org-012	<0.1	1	0.8	0.6	29	97	[NT]
Anthracene	mg/kg	0.1	Org-012	<0.1	1	0.2	0.1	67	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	1	1.3	0.8	48	97	[NT]
Pyrene	mg/kg	0.1	Org-012	<0.1	1	1.3	0.8	48	97	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	1	0.5	0.3	50	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	1	0.7	0.4	55	115	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	<0.2	1	0.9	0.6	40	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	1	0.53	0.3	55	89	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	1	0.3	0.2	40	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	1	0.3	0.2	40	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	94	1	97	92	5	91	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	33	15/02/2018	15/02/2018		[NT]	[NT]
Date analysed	-			[NT]	33	16/02/2018	16/02/2018		[NT]	[NT]
Naphthalene	mg/kg	0.1	Org-012	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Phenanthrene	mg/kg	0.1	Org-012	[NT]	33	0.3	0.2	40	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-012	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	[NT]	33	0.1	<0.1	0	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-012	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	[NT]	33	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	[NT]	33	<0.05	<0.05	0	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	[NT]	33	85	86	1	[NT]	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date extracted	-			15/02/2018	1	15/02/2018	15/02/2018		15/02/2018	[NT]
Date analysed	-			16/02/2018	1	16/02/2018	16/02/2018		16/02/2018	[NT]
HCB	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	99	[NT]
gamma-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	78	[NT]
Heptachlor	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	70	[NT]
delta-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	91	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	85	[NT]
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	98	[NT]
Dieldrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	86	[NT]
Endrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	84	[NT]
pp-DDD	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	65	[NT]
Endosulfan II	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	81	[NT]
Methoxychlor	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	98	1	98	93	5	101	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	33	15/02/2018	15/02/2018		[NT]	[NT]
Date analysed	-			[NT]	33	16/02/2018	16/02/2018		[NT]	[NT]
HCB	mg/kg	0.1	Org-005	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
gamma-BHC	mg/kg	0.1	Org-005	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-005	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
delta-BHC	mg/kg	0.1	Org-005	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-005	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
gamma-Chlordane	mg/kg	0.1	Org-005	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Dieldrin	mg/kg	0.1	Org-005	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Endrin	mg/kg	0.1	Org-005	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-005	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Endosulfan II	mg/kg	0.1	Org-005	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Methoxychlor	mg/kg	0.1	Org-005	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	[NT]	33	96	95	1	[NT]	[NT]

QUALITY CONTROL: Organophosphorus Pesticides						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date extracted	-			15/02/2018	1	15/02/2018	15/02/2018		15/02/2018	[NT]
Date analysed	-			16/02/2018	1	16/02/2018	16/02/2018		16/02/2018	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	98	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	88	[NT]
Dimethoate	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	107	[NT]
Fenitrothion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	93	[NT]
Malathion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	116	[NT]
Parathion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	92	[NT]
Ronnel	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	98	[NT]
Surrogate TCMX	%		Org-008	98	1	98	93	5	101	[NT]

QUALITY CONTROL: Organophosphorus Pesticides						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	33	15/02/2018	15/02/2018		[NT]	[NT]
Date analysed	-			[NT]	33	16/02/2018	16/02/2018		[NT]	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-008	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-008	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-008	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Dimethoate	mg/kg	0.1	Org-008	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-008	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Fenitrothion	mg/kg	0.1	Org-008	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Malathion	mg/kg	0.1	Org-008	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Parathion	mg/kg	0.1	Org-008	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-008	[NT]	33	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-008	[NT]	33	96	95	1	[NT]	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date prepared	-			15/02/2018	1	15/02/2018	15/02/2018		15/02/2018	[NT]
Date analysed	-			15/02/2018	1	15/02/2018	15/02/2018		15/02/2018	[NT]
Arsenic	mg/kg	4	Metals-020	<4	1	<4	<4	0	102	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	99	[NT]
Chromium	mg/kg	1	Metals-020	<1	1	8	6	29	101	[NT]
Copper	mg/kg	1	Metals-020	<1	1	35	29	19	101	[NT]
Lead	mg/kg	1	Metals-020	<1	1	28	27	4	97	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	91	[NT]
Nickel	mg/kg	1	Metals-020	<1	1	14	14	0	94	[NT]
Zinc	mg/kg	1	Metals-020	<1	1	26	25	4	97	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	33	15/02/2018	15/02/2018		[NT]	[NT]
Date analysed	-			[NT]	33	15/02/2018	15/02/2018		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	33	<4	<4	0	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	33	<0.4	<0.4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	33	4	4	0	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	33	4	4	0	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	33	75	77	3	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	33	0.2	0.3	40	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	33	5	4	22	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	33	9	11	20	[NT]	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	4	15/02/2018	15/02/2018		[NT]	[NT]
Date analysed	-			[NT]	4	15/02/2018	15/02/2018		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	4	13	11	17	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	4	3	2	40	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	4	29	30	3	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	4	860	880	2	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	4	1700	1800	6	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	4	0.5	0.4	22	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	4	25	31	21	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	4	1200	1300	8	[NT]	[NT]

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	32	15/02/2018	15/02/2018		[NT]	[NT]
Date analysed	-			[NT]	32	15/02/2018	15/02/2018		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	32	<4	<4	0	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	32	<0.4	<0.4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	32	9	11	20	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	32	8	9	12	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	32	32	44	32	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	32	1.7	1.8	6	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	32	3	3	0	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	32	40	39	3	[NT]	[NT]

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	38	15/02/2018	15/02/2018		[NT]	[NT]
Date analysed	-			[NT]	38	15/02/2018	15/02/2018		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	38	12	12	0	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	38	<0.4	<0.4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	38	8	8	0	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	38	10	10	0	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	38	13	15	14	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	38	3.5	3.3	6	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	38	3	3	0	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	38	89	97	9	[NT]	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

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.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

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.

Report Comments

PAHs in Soil 1/1d: - The RPD for duplicate results is accepted due to the non homogenous nature of the sample/s.

martens
consulting engineers since 1989

SOIL ANALYSIS CHAIN OF CUSTODY FORM

Additional Testing													
Name	P1706332 - 119 Barton St, Monterey DSI												
Martens Contact Officer	Robert Mehaffey					**Contact Email**	rmehaffey@martens.com.au						
Sampling and Shipping	**Sample Date**	13 February 2018		**Dispatch Date**	14 February 2018		**Turnaround Time**			standard			
	Our Reference	P1706332COC01V01				**Shipping Method (X)**	**Hand**		**Post**		**Courier**	X	
	On Ice (X)	X	**No Ice (X)**		**Other (X)**								
Laboratory													
Name	EnviroLab												
Sample Delivery Address	12 Ashley Street, Chatswood												
Delivery Contact	**Name**	Aileen		**Phone**	9910 6200	**Fax**		**Email**	ahie@envirolabservices.com.au				
Please Send Report By (X)	**Post**		**Fax**		**Email**	X	**Reporting Email Address**	rmehaffey@martens.com.au, gtaylor@martens.com.au					

	Sample ID	Combo 5b	8HM	BTEX	TRH	HOLD
1	6332/BH101/0.15	X				
2	6332/BH101/0.7					X
3	6332/BH101/1.2					X
4	6332/BH101/1.5	X				
5	6332/BH101/2.0					X
6	6332/BH102/0.2					X
7	6332/BH102/0.5					X
8	6332/BH102/0.9					X
9	6332/BH102/1.8					X
10	6332/BH103/0.2	X				
11	6332/BH103/0.5	X				
12	6332/BH103/1.1					X
13	6332/BH104/0.2					X
14	6332/BH104/0.7					X
15	6332/BH105/0.15					X
16	6332/BH105/0.4					X
17	6332/BH106/0.1					X
18	6332/BH106/0.25	X				
19	6332/BH106/0.4	X				
20	6332/BH106/0.65					X

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

Job No: 185170
Date Received: 14.2.18
Time Received: 11:45
Received by: JE 19.1°C
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Rec'd ELS JE
14.2.18 11:45

Head Office
Suite 201, Level 2, 20 George Street
Hornsby NSW 2077, Australia
Ph 02 9476 9999 **Fax** 02 9476 8767

> mail@martens.com.au
> www.martens.com.au
MARTENS & ASSOCIATES P/L
ABN 85 070 240 890 ACN 070 240 890

185170

SOIL ANALYSIS CHAIN OF CUSTODY

	Sample ID	Combo 5b	8HM	BTEX	TRH	HOLD
21	6332/BH107/0.1	X				
22	6332/BH107/0.3-0.4					X
23	6332/BH107/0.6					X
24	6332/BH107/1.45					X
25	6332/BH108/0.05					X
26	6332/BH108/0.3					X
27	6332/BH108/0.6					X
28	6332/BH109/0.1	X				
29	6332/BH109/0.25					X
30	6332/BH109/0.5					X
31	6332/BH109/1.0					X
32	6332/BH110/0.05	X				
33	6332/BH110/0.6	X				
34	6332/BH110/0.8					X
35	6332/SS101					X
36	6332/SS102					X
37	6332/DUP101		X			
38	6332/DUP102		X			
39	Trip Blank				X	
40	Trip Spike			X		

Extra 41 BH105/2.0
JE

Rec: JE 14/2/18

Aileen Hie

From: Robert Mehaffey <rmehaffey@martens.com.au>
Sent: Wednesday, 21 February 2018 2:40 PM
To: Ken Nguyen
Cc: Gray Taylor; Aileen Hie
Subject: RE: Results for Registration 185170 P1706332 - 119 Barton St Monterey DSI
Attachments: 185170-coc.pdf

Hi Ken,

Can we please get some additional testing completed:

5 ○ 6332/BH101/2.0 – Tested for Combo 5b

Standard turnaround time please.

Let me know if there are any issues.

Best regards,

Envirolab Ref: 185170A
Due: 28/2/18
Std TAT.

Robert Mehaffey
Environmental Engineer
BEng (Civil/Environmental)

martens
& Associates Pty Ltd

Martens & Associates Pty Ltd
Suite 201, 20 George St
Hornsby, NSW 2077
P + 61 2 9476 9999
F + 61 2 9476 8767
www.martens.com.au

From: Ken Nguyen [mailto:KNguyen@envirolab.com.au]
Sent: Tuesday, 20 February 2018 8:00 PM
To: Lara Tintinger; Robert Mehaffey; Gray Taylor
Subject: Results for Registration 185170 P1706332 - 119 Barton St Monterey DSI

Please refer to attached for:
a copy of the Certificate of Analysis
a copy of the COC/paperwork received from you
ESDAT Extracts
an Excel or .csv file containing the results
a copy of the Invoice
Please note that a hard copy will not be posted.

We have a new reporting format and would welcome your feedback. Sydney@envirolab.com.au

Enquiries should be made directly to:
customerservice@envirolab.com.au

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 185170-A

Client Details

Client	Martens & Associates Pty Ltd
Attention	Robert Mehaffey
Address	Suite 201, 20 George St, Hornsby, NSW, 2077

Sample Details

Your Reference	**P1706332 - 119 Barton St Monterey DSI**
Number of Samples	Additional Testing on 1 Soil
Date samples received	14/02/2018
Date completed instructions received	21/02/2018

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.

Report Details

Date results requested by	28/02/2018
Date of Issue	26/02/2018

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Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By
Dragana Tomas, Senior Chemist
Long Pham, Team Leader, Metals
Steven Luong, Senior Chemist

Authorised By

David Springer, General Manager

vTRH(C6-C10)/BTEXN in Soil		
Our Reference		185170-A-5
Your Reference	UNITS	6332/BH101
Depth		2.0
Date Sampled		13/02/2018
Type of sample		soil
Date extracted	-	22/02/2018
Date analysed	-	22/02/2018
TRH C_6 - C_9	mg/kg	<25
TRH C_6 - C_{10}	mg/kg	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
naphthalene	mg/kg	<1
Total +ve Xylenes	mg/kg	<1
Surrogate aaa-Trifluorotoluene	%	99

svTRH (C10-C40) in Soil		
Our Reference		185170-A-5
Your Reference	UNITS	6332/BH101
Depth		2.0
Date Sampled		13/02/2018
Type of sample		soil
Date extracted	-	22/02/2018
Date analysed	-	23/02/2018
TRH C_{10} - C_{14}	mg/kg	<50
TRH C_{15} - C_{28}	mg/kg	<100
TRH C_{29} - C_{36}	mg/kg	<100
TRH >C_{10} -C_{16}	mg/kg	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50
TRH >C_{16} -C_{34}	mg/kg	<100
TRH >C_{34} -C_{40}	mg/kg	<100
Total +ve TRH (>C10-C40)	mg/kg	<50
Surrogate o-Terphenyl	%	77

PAHs in Soil		
Our Reference		185170-A-5
Your Reference	UNITS	6332/BH101
Depth		2.0
Date Sampled		13/02/2018
Type of sample		soil
Date extracted	-	22/02/2018
Date analysed	-	22/02/2018
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	<0.1
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	<0.1
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.1
Fluoranthene	mg/kg	<0.1
Pyrene	mg/kg	<0.1
Benzo(a)anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2
Benzo(a)pyrene	mg/kg	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1
Total +ve PAH's	mg/kg	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5
Surrogate p-Terphenyl-d14	%	97

Organochlorine Pesticides in soil		
Our Reference		185170-A-5
Your Reference	UNITS	6332/BH101
Depth		2.0
Date Sampled		13/02/2018
Type of sample		soil
Date extracted	-	22/02/2018
Date analysed	-	23/02/2018
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	%	94

Organophosphorus Pesticides		
Our Reference		185170-A-5
Your Reference	UNITS	6332/BH101
Depth		2.0
Date Sampled		13/02/2018
Type of sample		soil
Date extracted	-	22/02/2018
Date analysed	-	23/02/2018
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	%	94

Acid Extractable metals in soil		
Our Reference		185170-A-5
Your Reference	UNITS	6332/BH101
Depth		2.0
Date Sampled		13/02/2018
Type of sample		soil
Date prepared	-	22/02/2018
Date analysed	-	22/02/2018
Arsenic	mg/kg	<4
Cadmium	mg/kg	<0.4
Chromium	mg/kg	2
Copper	mg/kg	11
Lead	mg/kg	30
Mercury	mg/kg	<0.1
Nickel	mg/kg	<1
Zinc	mg/kg	16

Moisture		
Our Reference		185170-A-5
Your Reference	UNITS	6332/BH101
Depth		2.0
Date Sampled		13/02/2018
Type of sample		soil
Date prepared	-	22/02/2018
Date analysed	-	22/02/2018
Moisture	%	5.7

Method ID	Methodology Summary
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
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-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-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. 'EQ 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. 'EQ 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. 'EQ 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.

Method ID	Methodology Summary
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
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.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			22/02/2018	[NT]	[NT]	[NT]	[NT]	22/02/2018	[NT]
Date analysed	-			22/02/2018	[NT]	[NT]	[NT]	[NT]	22/02/2018	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	106	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	106	[NT]
Benzene	mg/kg	0.2	Org-016	<0.2	[NT]	[NT]	[NT]	[NT]	111	[NT]
Toluene	mg/kg	0.5	Org-016	<0.5	[NT]	[NT]	[NT]	[NT]	108	[NT]
Ethylbenzene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	99	[NT]
m+p-xylene	mg/kg	2	Org-016	<2	[NT]	[NT]	[NT]	[NT]	105	[NT]
o-Xylene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	96	[NT]
naphthalene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	110	[NT]	[NT]	[NT]	[NT]	105	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			22/02/2018	[NT]	[NT]	[NT]	[NT]	22/02/2018	[NT]
Date analysed	-			23/02/2018	[NT]	[NT]	[NT]	[NT]	23/02/2018	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	120	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	97	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	92	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	120	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	97	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	92	[NT]
Surrogate o-Terphenyl	%		Org-003	82	[NT]	[NT]	[NT]	[NT]	90	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			22/02/2018	[NT]	[NT]	[NT]	[NT]	22/02/2018	[NT]
Date analysed	-			22/02/2018	[NT]	[NT]	[NT]	[NT]	22/02/2018	[NT]
Naphthalene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	113	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	125	[NT]
Phenanthrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	109	[NT]
Anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	111	[NT]
Pyrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	118	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	114	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	[NT]	[NT]	[NT]	[NT]	113	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	104	[NT]	[NT]	[NT]	[NT]	124	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			22/02/2018	[NT]	[NT]	[NT]	[NT]	22/02/2018	[NT]
Date analysed	-			23/02/2018	[NT]	[NT]	[NT]	[NT]	23/02/2018	[NT]
HCB	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	85	[NT]
gamma-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	88	[NT]
Heptachlor	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	94	[NT]
delta-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	89	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	95	[NT]
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Dieldrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Endrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
pp-DDD	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	124	[NT]
Endosulfan II	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	105	[NT]
Methoxychlor	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-005	97	[NT]	[NT]	[NT]	[NT]	113	[NT]

QUALITY CONTROL: Organophosphorus Pesticides						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			22/02/2018	[NT]	[NT]	[NT]	[NT]	22/02/2018	[NT]
Date analysed	-			23/02/2018	[NT]	[NT]	[NT]	[NT]	23/02/2018	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Dimethoate	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ethion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	112	[NT]
Fenitrothion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	114	[NT]
Malathion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	110	[NT]
Parathion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	118	[NT]
Ronnel	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	115	[NT]
Surrogate TCMX	%		Org-008	97	[NT]	[NT]	[NT]	[NT]	102	[NT]

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			22/02/2018	[NT]	[NT]	[NT]	[NT]	22/02/2018	[NT]
Date analysed	-			22/02/2018	[NT]	[NT]	[NT]	[NT]	22/02/2018	[NT]
Arsenic	mg/kg	4	Metals-020	<4	[NT]	[NT]	[NT]	[NT]	108	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	[NT]	[NT]	[NT]	[NT]	99	[NT]
Chromium	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Copper	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	111	[NT]
Lead	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	105	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Nickel	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Zinc	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	108	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

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.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

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.

Aileen Hie

From: Robert Mehaffey <rmehaffey@martens.com.au>
Sent: Friday, 16 February 2018 3:29 PM
To: Aileen Hie
Cc: Gray Taylor
Subject: RE: 6332 COC
Attachments: P1706332JCOC01V01.pdf

Hi Aileen,

Could we please also get the following additional testing completed for these samples:

12 ○ 6332/BH103/1.1 – tested for CEC and pH.
20 ○ 6332/BH106/0.65 – tested for CEC and pH.
~~3A~~ ○ 6332/BH110/0.8 – tested for CEC and pH.

Please let me know If there are any issues.

Envirolab Ref: 185170 B
Due: 28/2/18

Best regards,

Robert Mehaffey
Environmental Engineer
BEng (Civil/Environmental)

martens
& Associates Pty Ltd

Martens & Associates Pty Ltd
Suite 201, 20 George St
Hornsby, NSW 2077
P + 61 2 9476 9999
F + 61 2 9476 8767
www.martens.com.au

From: Robert Mehaffey
Sent: Tuesday, 13 February 2018 3:37 PM
To: 'Aileen Hie'
Cc: Gray Taylor
Subject: 6332 COC

Hi Aileen,

Please find attached COC for job P6332, samples will be sent to Envirolab tomorrow morning.

Let me know if there are any issues.

Best regards,

Robert Mehaffey
Environmental Engineer
BEng (Civil/Environmental)

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 185170-B

Client Details

Client	Martens & Associates Pty Ltd
Attention	Robert Mehaffey
Address	Suite 201, 20 George St, Hornsby, NSW, 2077

Sample Details

Your Reference	**P1706332 - 119 Barton St Monterey DSI**
Number of Samples	Additional Testing on 3 Soils
Date samples received	14/02/2018
Date completed instructions received	16/02/2018

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.

Report Details

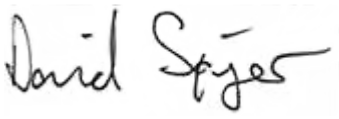
Date results requested by	28/02/2018
Date of Issue	28/02/2018

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
Leon Ow, Chemist
Nick Sarlamis, Inorganics Supervisor

Authorised By



David Springer, General Manager

CEC				
Our Reference		185170-B-12	185170-B-20	185170-B-34
Your Reference	UNITS	6332/BH103	6332/BH106	6332/BH110
Depth		1.1	0.65	0.8
Date Sampled		13/02/2018	13/02/2018	13/02/2018
Type of sample		soil	soil	soil
Date prepared	-	27/02/2018	27/02/2018	27/02/2018
Date analysed	-	27/02/2018	27/02/2018	27/02/2018
Exchangeable Ca	meq/100g	<0.1	0.3	0.3
Exchangeable K	meq/100g	<0.1	<0.1	<0.1
Exchangeable Mg	meq/100g	<0.1	<0.1	<0.1
Exchangeable Na	meq/100g	<0.1	<0.1	<0.1
Cation Exchange Capacity	meq/100g	<1	<1	<1

Misc Inorg - Soil				
Our Reference		185170-B-12	185170-B-20	185170-B-34
Your Reference	UNITS	6332/BH103	6332/BH106	6332/BH110
Depth		1.1	0.65	0.8
Date Sampled		13/02/2018	13/02/2018	13/02/2018
Type of sample		soil	soil	soil
Date prepared	-	27/02/2018	27/02/2018	27/02/2018
Date analysed	-	27/02/2018	27/02/2018	27/02/2018
pH 1:5 soil:water	pH Units	5.3	7.2	6.8

Method ID	Methodology Summary
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.
Metals-009	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-AES analytical finish.

QUALITY CONTROL: CEC						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			27/02/2018	[NT]	[NT]	[NT]	[NT]	27/02/2018	[NT]
Date analysed	-			27/02/2018	[NT]	[NT]	[NT]	[NT]	27/02/2018	[NT]
Exchangeable Ca	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	[NT]	[NT]	105	[NT]
Exchangeable K	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	[NT]	[NT]	113	[NT]
Exchangeable Mg	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Exchangeable Na	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	[NT]	[NT]	107	[NT]

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			27/02/2018	[NT]	[NT]	[NT]	[NT]	27/02/2018	[NT]
Date analysed	-			27/02/2018	[NT]	[NT]	[NT]	[NT]	27/02/2018	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	[NT]	[NT]	103	[NT]

Result Definitions

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Measurement Uncertainty estimates are available for most tests upon request.

19 Attachment H – Laboratory Summary Tables

martens consulting engineers

		Halogenated Benzenes	Organochlorine Pesticides																			Organophosphorous Pesticides										Pesticides
		Hexachlorobenzene	4,4-DDE	a-BHC	Aldrin	b- BHC	Chlordane (cis)	Chlordane (trans)	d- BHC	DDD	DDT	DDT+DDE+DDD	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Methoxychlor	Azinophos methyl	Bromophos-ethyl	Chlorpyrifos	Chlorpyrifos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenitrothion	Malathion	Ronnel	Parathion
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
NEPM 2013 Table 1A(1) HILs Res A Soil		**10**										**240**					**10**				**6**		**300**				**160**								
Site Specific EIL											**180**																							
Field_ID	**Sample_Depth_Avg**																																	
6332/BH101	0.15	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
6332/BH101	1.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
6332/BH101	2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
6332/BH103	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
6332/BH103	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
6332/BH106	0.25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
6332/BH106	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
6332/BH107	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
6332/BH109	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
6332/BH110	0.05	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
6332/BH110	0.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Statistical Summary																																		
Number of Results		11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
Number of Detects		0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Minimum Detect		ND	0.2	ND	ND	ND	ND	ND	ND	ND	ND	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration		<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Maximum Detect		ND	0.2	ND	ND	ND	ND	ND	ND	ND	ND	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration		0.05	0.064	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.064	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Median Concentration		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Standard Deviation		0	0.045	0	0	0	0	0	0	0	0	0.045	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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	BTEX							PAH/Phenols															TPH									
	Benzene	Ethylbenzene	Toluene	Xylene (m & p)	Xylene (o)	Xylene Total	C6-C10 less BTEX (F1)	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo(b,j)perylene	Chrysene	Dibenz(a,h)anthracene	Carcinogenic PAHs (as B(a)P TPE)	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	C10-C16	C16-C34	C34-C40	F2-NAPHTHALENE	C6 - C9	C10 - C14	C15 - C28	C29-C36	C10 - C40 (Sum of total)	C6-C10
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0.2	1	0.5	2	1	1	25	0.1	0.1	0.1	0.1	0.05	0.1	0.1	0.1		0.1	0.1	0.1	0.1	0.1	0.1	50	100	100	50	25	50	100	100	50	25
NEPM 2013 Table 1A(1) HILs Res A Soil																**3**																
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand																																
0-1m	**0.5**	**55**	**160**			**40**	**45**													**3**					**110**						
1-2m	**0.5**	**NL**	**220**			**60**	**70**													**NL**					**240**						
2-4m	**0.5**	**NL**	**310**			**95**	**110**													**NL**					**440**						
>4m	**0.5**	**NL**	**540**			**170**	**200**													**NL**					**NL**						
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil																																
0-2m	**50**	**70**	**85**			**105**	**180**					**0.7**												**300**	**2800**	**120**						
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Coarse Soil																							**1000**	**2500**	**10000**							**700**
Site Specific EIL																				**170**												

Field_ID	Sample_Depth_Avg																																
6332/BH101	0.15	<0.2	<1	<0.5	<2	<1	<1	<25	0.1	<0.1	0.2	0.5	0.53	0.3	0.7	<0.1	0.67	1.3	<0.1	0.3	<0.1	0.8	1.3	<50	<100	<100	<50	<25	<50	<100	<100	<50	<25
6332/BH101	1.5	<0.2	<1	<0.5	<2	<1	<1	<25	<0.1	0.5	0.8	2.3	3.1	2.9	3.2	0.4	4.051	8.3	0.2	2.6	<0.1	4.3	7.9	<50	240	<100	<50	<25	<50	140	120	240	<25
6332/BH101	2	<0.2	<1	<0.5	<2	<1	<1	<25	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<50	<25
6332/BH103	0.2	<0.2	<1	<0.5	<2	<1	<1	<25	<0.1	<0.1	<0.1	0.2	<0.05	<0.1	0.2	<0.1	0.1025	0.3	<0.1	<0.1	<0.1	0.3	0.3	<50	260	<100	<50	<25	<50	170	140	260	<25
6332/BH103	0.5	<0.2	<1	<0.5	<2	<1	<1	<25	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<50	<25
6332/BH106	0.25	<0.2	<1	<0.5	<2	<1	<1	<25	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<50	<25
6332/BH106	0.4	<0.2	<1	<0.5	<2	<1	<1	<25	<0.1	<0.1	<0.1	0.1	<0.05	<0.1	0.2	<0.1	0.0925	0.3	<0.1	<0.1	<1 - 0.1	0.6	0.2	<50	<100	<100	<50	<25	<50	<100	<100	<50	<25
6332/BH107	0.1	<0.2	<1	<0.5	<2	<1	<1	<25	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<50	<25
6332/BH109	0.1	<0.2	<1	<0.5	<2	<1	<1	<25	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<50	<25
6332/BH110	0.05	<0.2	<1	<0.5	<2	<1	<1	<25	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.172	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<50	<25
6332/BH110	0.6	<0.2	<1	<0.5	<2	<1	<1	<25	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.172	0.1	<0.1	<0.1	<0.1	0.3	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<50	<25

Statistical Summary																																
Number of Results	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
Number of Detects	0	0	0	0	0	0	0	1	1	2	4	2	2	4	1	4	5	1	2	1	5	4	0	2	0	0	0	0	2	2	2	0
Minimum Concentration	<0.2	<1	<0.5	<2	<1	<1	<25	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	0.0925	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<50	<25
Minimum Detect	ND	ND	ND	ND	ND	ND	ND	0.1	0.5	0.2	0.1	0.53	0.3	0.2	0.4	0.0925	0.1	0.2	0.3	ND	0.3	0.2	ND	240	ND	ND	ND	ND	140	120	240	ND
Maximum Concentration	<0.2	<1	<0.5	<2	<1	<1	<25	0.1	0.5	0.8	2.3	3.1	2.9	3.2	0.4	4.051	8.3	0.2	2.6	0.1	4.3	7.9	<50	260	<100	<50	<25	<50	170	140	260	<25
Maximum Detect	ND	ND	ND	ND	ND	ND	ND	0.1	0.5	0.8	2.3	3.1	2.9	3.2	0.4	4.051	8.3	0.2	2.6	0.1	4.3	7.9	ND	260	ND	ND	ND	ND	170	140	260	ND
Average Concentration	0.1	0.5	0.25	1	0.5	0.5	13	0.055	0.091	0.13	0.31	0.35	0.33	0.42	0.082	0.5	0.96	0.064	0.3	0.073	0.6	0.91	25	86	50	25	13	25	69	65	66	13
Median Concentration	0.1	0.5	0.25	1	0.5	0.5	12.5	0.05	0.05	0.05	0.05	0.025	0.05	0.05	0.05	0.086	0.05	0.05	0.05	0.05	0.05	0.05	25	50	50	25	12.5	25	50	50	25	12.5
Standard Deviation	0	0	0	0	0	0	0	0.015	0.14	0.23	0.67	0.92	0.86	0.94	0.11	1.2	2.5	0.045	0.77	0.075	1.3	2.3	0	81	0	0	0	0	43	33	91	0
Number of Guideline Exceedances	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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	Lead	Metals						
	Lead	Arsenic	Cadmium	Chromium (III+VI)	Copper	Mercury	Nickel	Zinc
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	1	4	0.4	1	1	0.1	1	1
NEPM 2013 Table 1A(1) HILs Res A Soil	**300**	**100**	**20**		**6000**	**40**	**400**	**7400**
Site Specific EIL	**1100**	**100**		**410**	**55**		**35**	**350**

Field_ID	Sample_Depth_Avg								
6332/BH101	0.15	28	<4	<0.4	8	35	<0.1	14	26
6332/BH101	1.5	**1700**	13	3	29	**860**	0.5	25	**1200**
6332/BH101	2	30	<4	<0.4	2	11	<0.1	<1	16
6332/BH103	0.2	15	<4	<0.4	6	**57**	<0.1	21	12
6332/BH103	0.5	1	<4	<0.4	<1	1	<0.1	<1	<1
6332/BH106	0.25	4	<4	<0.4	2	3	0.2	4	6
6332/BH106	0.4	19	<4	<0.4	6	15	<0.1	**46**	15
6332/BH107	0.1	1	<4	<0.4	7	<1	<0.1	1	5
6332/BH109	0.1	3	<4	<0.4	5	2	<0.1	2	17
6332/BH110	0.05	32	<4	<0.4	9	8	1.7	3	40
6332/BH110	0.6	75	<4	<0.4	4	4	0.2	5	9

Statistical Summary

Number of Results	11	11	11	11	11	11	11	11
Number of Detects	11	1	1	10	10	4	9	10
Minimum Concentration	1	<4	<0.4	<1	<1	<0.1	<1	<1
Minimum Detect	1	13	3	2	1	0.2	1	5
Maximum Concentration	1700	13	3	29	860	1.7	46	1200
Maximum Detect	1700	13	3	29	860	1.7	46	1200
Average Concentration	173	3	0.45	7.1	91	0.27	11	122
Median Concentration	19	2	0.2	6	8	0.05	4	15
Standard Deviation	507	3.3	0.84	7.7	256	0.49	14	358
Number of Guideline Exceedances	1	0	0	0	2	0	1	1
Number of Guideline Exceedances(Detects Only)	1	0	0	0	2	0	1	1

20 Attachment I – UCL Calculations

Gamma UCL Statistics for Uncensored Full Data Sets

User Selected Options	
Date/Time of Computation	ProUCL 5.15/03/2018 12:09:50 PM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

C0

General Statistics

Total Number of Observations	10	Number of Distinct Observations	9
		Number of Missing Observations	0
Minimum	1	Mean	13.7
Maximum	57	Median	6
SD	18.37	SD of logged Data	1.404
Coefficient of Variation	1.341	Skewness	1.854

Gamma GOF Test

A-D Test Statistic	0.362	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.758	Data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.177	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.276	Data appear Gamma Distributed at 5% Significance Level

Data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.731	k star (bias corrected MLE)	0.579
Theta hat (MLE)	18.73	Theta star (bias corrected MLE)	23.67
nu hat (MLE)	14.63	nu star (bias corrected)	11.57
MLE Mean (bias corrected)	13.7	MLE Sd (bias corrected)	18.01
		Approximate Chi Square Value (0.05)	4.948
Adjusted Level of Significance	0.0267	Adjusted Chi Square Value	4.22

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	32.05	95% Adjusted Gamma UCL (use when n<50)	37.57

Suggested UCL to Use

95% Adjusted Gamma UCL	37.57		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Gamma UCL Statistics for Uncensored Full Data Sets

User Selected Options	
Date/Time of Computation	ProUCL 5.15/03/2018 12:10:09 PM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

C1

General Statistics

Total Number of Observations	10	Number of Distinct Observations	8
		Number of Missing Observations	0
Minimum	1	Mean	9.8
Maximum	46	Median	3.5
SD	14.34	SD of logged Data	1.36
Coefficient of Variation	1.463	Skewness	2.158

Gamma GOF Test

A-D Test Statistic	0.605	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.76	Data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.237	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.277	Data appear Gamma Distributed at 5% Significance Level

Data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.708	k star (bias corrected MLE)	0.562
Theta hat (MLE)	13.84	Theta star (bias corrected MLE)	17.43
nu hat (MLE)	14.16	nu star (bias corrected)	11.24
MLE Mean (bias corrected)	9.8	MLE Sd (bias corrected)	13.07
		Approximate Chi Square Value (0.05)	4.733
Adjusted Level of Significance	0.0267	Adjusted Chi Square Value	4.025

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	23.28	95% Adjusted Gamma UCL (use when n<50)	27.38

Suggested UCL to Use

95% Adjusted Gamma UCL	27.38		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.