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Engineering | Environmental | Testing

Report Type:
Detailed Site Investigation

Project Address:
Charles Street Square, Parramatta, NSW
Lot 1 in DP506760, Lot 2 in DP532539, Lot 2 in DP869816, Lot 2 in DP532539 and Lot 1 in DP1172250

Client Name:
Northrop Consulting Engineers P/L

1 September 2020
Report No: 7957-ER-2-1 Rev02

We give you the right information to make the right decisions

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Title	Senior Environmental Scientist	**Title**	Principal Environmental Scientist

EXECUTIVE SUMMARY

Alliance Geotechnical Pty Ltd (AG) was engaged by Northrop Consulting Engineers P/L, to undertake a Detailed Site Investigation for Charles Street Square, Parramatta, NSW (refer **Figure 1** with the 'site' boundaries outlined in **Figure 2**).

AG has the following project appreciation:

- The site covers an area of approximately 2,800m2;
- The site is proposed for redevelopment, demolition, utility adjustments, civil infrastructure, planting and urban amenities;
- Following the completion of a Stage 1 - Preliminary Site Investigation, one (1) area of environmental concern (AEC) was identified; and
- A Detailed Site Investigation (DSI) has been undertaken to investigate potential contamination within the identified AEC.

The objectives of this project were to:

- Assess the potential for contamination to be present on the site as a result of past and current land use activities;
- Provide advice on whether the site would be suitable (in the context of land contamination) for the proposed land use setting; and
- Provide recommendations for further investigation, management and/or remediation (if warranted).

AG undertook the following scope of works to address the project objective:

- A desktop review of relevant information pertaining to the site;
- A site walkover to understand current site conditions;
- The preparation of a Sampling and Analysis Quality Plan (SAQP);
- Conduct an intrusive site investigation to establish ground conditions and to facilitate the collection of representative soil samples;
- Laboratory analysis of selected samples collected during the field investigation; and
- An assessment of the contamination status of the site and the recommendation of any further remedial requirements associated with the redevelopment of the site (if necessary).

<u>Conclusions and recommendations</u>

Based on AG's assessment of the desktop review information, fieldwork data and laboratory analytical data, in the context of the proposed redevelopment scenario, AG makes the following conclusions:

- The detected concentrations of identified contaminants of potential concern in the soils assessed are considered unlikely to present:
    - An unacceptable inhalation / vapour intrusion human health exposure risk; or
    - An unacceptable petroleum management limit risk.

- The detected concentrations of benzo(a)pyrene TEQ in the soils assessed present a direct contact human health exposure risk, at sampling locations BH3-0.1, BH4-0.1, BH5-0.1, BH5-1.0 and BH5-2.0;

- Asbestos was detected within four (4) of the eight (8) locations sampled (BH02, BH06, BH07 and BH08), and is considered to present an unacceptable human health exposure risk during the future intrusive/redevelopment works, in these locations;

- Ecological Investigation Levels were exceeded for Copper at sampling location BH7 and Zinc at sampling locations BH2, BH3 and BH7. As such, may present an unacceptable ecological exposure risk during the future intrusive/redevelopment works, in these locations;

- As the majority of the site is covered by hardstand materials and landscaped areas, and that the detected contaminants in soil were located at depth and will not be disturbed until commencement of redevelopment works, AG considers that there is no immediate human health risk to occupants of surrounding areas, as well as nearby pedestrians; and

- Based on the assessments undertaken as part of this investigation, AG has concluded that the site can be made suitable for the proposed redevelopment pending supplementary contamination assessment and subsequent remediation of the aforementioned exceedances of the adopted site assessment criteria.

Based on these conclusions, AG makes the following recommendations:

- A supplementary contamination assessment should be carried out to determine the extent of contamination within areas of detected contamination, with regard to the asbestos and PAH contamination. The PAH concentrations exceeding the adopted criteria are likely associated with black/ brown coal and coke and may pose an unacceptable exposure risk via direct contact, ingestion and inhalation. Considerations should be given to further assessment of soils for the leachability characteristics of the PAH soil contamination and assessment of groundwater that may have been potentially impacted by the overlying fill materials. An appropriate asbestos assessment should be completed in accordance with WA DOH 2009 with considerations should be made to allow for test pit exploration excavations, in order to adequately quantify the asbestos exposure risk;

- Remediation will require the completion of a Remedial Action Plan (RAP) detailing the works required to adequately delineate, remediate and validate the areas of identified contamination;

- Following remediation of the identified contamination, validation sampling and a site validation report will be required to confirm the effectiveness of the remedial works;

- Investigation of Acid Sulfate Soils (ASS) for any soil proposed for excavation / disposal at or below 2.0 metres bgl; and

- Any soil proposed for disposal should be classified and disposed of as per the NSW EPA *Waste Classification Guidelines 2014.*

This report, including its conclusions and recommendations, must be read in conjunction with the limitations presented in **Section 13**.

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LIST OF ABBREVIATIONS

AG	Alliance Geotechnical Pty Ltd
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
AST	Aboveground storage tank
Bgl	Below ground surface
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
Btoc	Below top of casing
CoC	Chain of Custody
CoT	Certificate of Title
CSM	Conceptual Site Model
DPI-W	Department of Primary Industry – Water
DSI	Detailed Site Investigation
EC	Electrical conductivity
EIL	Ecological Investigation Level
EPA	Environment Protection Authority
GS	Geological Survey of NSW
HIL	Health Investigation Levels
HSL	Health Screening Levels
IL	Investigation Levels
LOR	[Laboratory] Limit of reporting
MS	Matrix spike
NATA	National Association of Testing Laboratories
N/A	Not applicable
ND	Not detected
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NSW EPA	NSW Environment Protection Authority
OCP	Organochlorine Pesticide
OPP	Organophosphorus Pesticide
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PID	Photo-ionisation detector
PSH	Phase separated hydrocarbon
PSI	Preliminary Site Investigation
QA/QC	Quality assurance/Quality control
RPD	Relative percentage difference
SAQP	Sampling Analysis and Quality Plan
SVOC	Semi-volatile organic compound
TDS	Total dissolved solids
TPH	Total petroleum hydrocarbon
PVC	Polyvinyl Chloride

USCS	Unified Soil Classification System
UST	Underground storage tank
VOC	Volatile organic compounds

1. INTRODUCTION

1.1. Background

Alliance Geotechnical Pty Ltd (AG) was engaged by Northrop Consulting Engineers P/L, to undertake a Detailed Site Investigation for Charles Street Square, Parramatta, NSW (refer **Figure 1** with the 'site' boundaries outlined in **Figure 2**).

AG has the following project appreciation:

- The site covers an area of approximately 3,665m2;
- The site is proposed for redevelopment, demolition, utility adjustments, civil infrastructure, planting and urban amenities;
- Following the completion of a Stage 1 - Preliminary Site Investigation, one (1) area of environmental concern (AEC) was identified; and
- A Detailed Site Investigation (DSI) has been undertaken to investigate potential contamination within the identified AEC.

1.2. Objectives

The objectives of this project were to:

- Assess the potential for contamination to be present on the site as a result of past and current land use activities;
- Provide advice on whether the site would be suitable (in the context of land contamination) for the proposed land use setting; and
- Provide recommendations for further investigation, management and/or remediation (if warranted).

1.3. Scope of Work

AG undertook the following scope of works to address the project objective:

- A desktop review of relevant information pertaining to the site;
- A site walkover to understand current site conditions;
- The preparation of a Sampling and Analysis Quality Plan (SAQP);
- Conduct an intrusive site investigation to establish ground conditions and to facilitate the collection of representative soil samples;
- Laboratory analysis of selected samples collected during the field investigation; and
- An assessment of the contamination status of the site and the recommendation of any further remedial requirements associated with the redevelopment of the site (if necessary).

2. SITE IDENTIFICATION

The site is identified as portions of Lot 1 in DP506760, Lot 2 in DP532539, Lot 2 in DP869816, Lot 2 in DP532539 and Lot 1 in DP1172250

The approximate geographic coordinates of the middle of the site, inferred from Google Earth were 33º48'48" S and 151º00'35" E.

The locality of the site is set out in **Figure 1**.

The general layout and boundary of the site is set out in **Figure 2**.

The site covers an area of 3,665 m^2.

3. GEOLOGY, ACID SULFATE SOILS, TOPOGRAPHY AND HYDROGEOLOGY

3.1. Geology

A review of the Sydney 1:100,000 Geological Series Sheet 9130 (Edition 1) 1983, indicated that the site is likely to be underlain by Wianamatta Group (Rwa) Ashfield Shale, defined as black to dark grey shale and laminite.

3.2. Acid Sulfate Soils

A review of the Department of Land and Water Conservation NSW Acid Sulfate Soil Risk Map for Prospect / Parramatta (1:25,000 scale) indicated that the site two different areas mapped as:

- **Disturbed Terrain** (Section 2) which may include filled areas, which often occur during reclamation of low-lying swamps for urban development. Other disturbed terrain includes areas which have been mined or dredged, or have undergone heavy ground disturbance through general urban development or construction of dams or levees. Soil investigations are required to assess these areas for acid sulfate potential.

- **No Known Occurrence** (Section 5 and 7) for which Acid sulfate soils are not known or expected to occur in these environments. Land management activities are not likely to be affected by acid sulfate soil materials. The typical landform types include bedrock slopes, elevated Pleistocene and Holocene dunes, and elevated alluvial plains.

Further assessment of acid sulfate soils in the context of this investigation is considered by AG as warranted.

3.3. Topography

The site topography slopes from the southwest (RL7.9m) to the northeast (RL2m).

3.4. Hydrogeology

Surface water courses proximal to the site included the Parramatta River residing adjacent to the north.

Based on distances to the nearest surface water course and the site topography, groundwater flow in the vicinity of the site is considered likely to be towards the north.

A review of the NSW Office of Water groundwater database (www.http://allwaterdata.water.nsw.gov.au/water) implemented on 16 January 2019 indicated there were no registered groundwater features located within a 500m radius of the site.

A copy of the NSW Office of Water search record is presented in **Appendix B**.

4. PREVIOUS CONTAMINATION ASSESSMENTS

The following reports were considered during the undertaking of this project:

- Environmental Investigation Services (EIS) 2014, '*Asbestos Management Plan'*, dated August 2014, ref: E27279Krpt2-AMP; and

- Alliance Geotechnical (AG) 2019, '*Stage 1 Preliminary Site Investigation'* dated August 2019, ref: 7957-ER-1-1(REV 01).

4.1. EIS 2014

EIS were commissioned by City of Parramatta to prepare an asbestos management plan (AMP) for a proposed boardwalk and landscaping project along two sections of Parramatta River foreshore.

The two sections of land of which the AMP was subject to, were summarised in the AMP, and the extract is shown below:

***"East Section**: The proposed development for the east section of the site includes two main parts:*

- *An elevated boardwalk approximately 260m in length from the Charles Street weir heading east; and*

- *A track along the floodplain of the river on either side of the Gasworks Bridge, approximately 130m in length, in which ground levels are to be reduced to form a salt marsh environment.*

***West Section:** The proposed development for the west section of the site involves naturalising the banks of the Parramatta River between the Charles Street weir and the Elizabeth Street footbridge by removing the existing concrete canal and terracing the banks. Additionally, it is proposed to replace the existing stairwell on the northern embankment slightly to the west of the Elizabeth Street footbridge and to construct a new stairway from the river walk up to the bridge on the southern side of the embankment, on the eastern side of the Elizabeth Street Footbridge."*

AG notes that above sections that the AMP was subjected to are mostly outside of AG's site boundary and do not impact, in the context of land contamination, this DSI. However, boreholes BH24 and BH25 of the west section fall on the western boundary of the AG subject site.

Based on the above and review of EIS 2014, AG notes that EIS 2014 boreholes BH24 and BH25 were not reported to contain contamination. In relation to asbestos contamination, EIS 2014 made the following recommendation for locations that were not impacted by asbestos:

"For all remaining site areas of the site not impacted by asbestos we recommend a program that monitors the condition of the site soil for the potential presence of asbestos. We recommend that the monitoring program is undertaken for the duration of the site works involving excavation and disturbance of in-situ soil.

We recommend that the following monitoring program is undertaken:

- *Intermittent air monitoring during large scale earthworks. This may include one round of monitoring at the commencement of significant earthworks in a selected area. Provided the results are negative for the first round of monitoring, other monitoring events could be undertaken once a week;*

- *Site inspections should be undertaken by the licenced asbestos assessor once significant earthworks have been undertaken at a selected area and the surface soils have been exposed and are easily inspected. Inspections should also be undertaken where required, for instance if the earthworks contractor encounters potential asbestos material; and*

- *We recommend that soil sampling is undertaken at the time of the site inspection following significant earthworks in order to screen the soil for any microscopic or trace amounts of*

asbestos material within the soil matrix. The soil sampling density would be judgemental and dependent on-site conditions and the nature of proposed landscape works in the given area.

In the event any asbestos is identified by soil or air analysis the area would be subject to conditions associated with asbestos removal. Management options would be provided on an on-going basis by the licenced asbestos assessor.

The exact nature of the monitoring program should be clarified with Council prior to site works commencing.

For the areas of the site not impacted by asbestos we recommend that dust levels are suppressed, the site surface is kept damp and personal hygiene is kept to a high standard."

4.2. AG 2019

Alliance Geotechnical Pty Ltd (AG) was engaged by Northrop Consulting Engineers P/L, to undertake a Stage 1 preliminary site investigation (PSI) for Charles Street Square, Parramatta, NSW.

AG had the following project appreciation:

- The site is proposed for redevelopment, demolition, utility adjustments, civil infrastructure, planting and urban amenities; and
- A preliminary site investigation is required to inform the redevelopment design process.

The objectives of this investigation were to:

- Assess the potential for contamination to be present on the site as a result of past and current land use activities;
- Provide advice on whether the site would be suitable (in the context of land contamination) for the proposed land use setting;
- Assess the potential for acid sulfate soils to be present at the site; and
- Provide recommendations for further investigation, management and/or remediation (if warranted).

The scope of works undertaken to address the investigation objectives, included:

- A desktop review;
- A site walkover; and
- Data assessment and reporting.

The site history data collected and site walkover observations made were assessed within the objectives of this investigation and in the context of the proposed development works. That assessment identified areas of environmental concern (AEC) and contaminants of potential concern (COPC) which have the potential to be present on site. The AEC identified are presented in **Table 4.2.1.** below.

Table 4.2.1. AEC's and associated COPC's

ID	Area of Environmental Concern	Land Use Activity	Contaminants of Potential Concern
AEC01	Imported fill pad	Uncontrolled filling	Metals, PAH, TRH/BTEX, OCP, PCB, acid sulfate soils (ASS) and asbestos

Based on AG's assessment of the desktop review information and fieldwork data, in the context of the proposed redevelopment, AG makes the following conclusions:

- There is a potential for contamination to be present on site, as a result of past and present land use activities; and
- The site could be made suitable (from a land contamination perspective) for the proposed commercial/industrial development, subject to further assessment of the identified AEC, and subsequent management/remediation of any identified unacceptable land contamination risks.

Based on these conclusions, AG made the following recommendations:

- A detailed site investigation (DSI) should be undertaken for identified areas of environmental concern; and
- Further contamination assessment works should be undertaken by a suitably experienced environmental consultant.

5. CONCEPTUAL SITE MODEL

5.1. Areas of Environmental Concern

The site history data collected and site walkover observations made were assessed within the objectives of this investigation and in the context of the proposed development works. That assessment identified areas of environmental concern (AEC) and contaminants of potential concern (COPC) which have the potential to be present on site. The AEC identified and associated COPC are presented in **Table 5.1**.

Table 5.1: AEC and COPC

ID	Area of Environmental Concern	Land Use Activity	Contaminants of Potential Concern
AEC01	Imported fill	Uncontrolled filling	Metals, PAH, TRH/BTEX, OCP, PCB, acid sulfate soils (ASS) and asbestos

AG notes that the contaminant laydown mechanism for these areas of environmental concern is considered likely to be 'top down'. Based on field observations the lateral and vertical extents of these AEC are readily identifiable visually.

5.2. Land Use Setting

AG understands that the proposed development works includes demolition, utility adjustment, civil infrastructure, planting and urban amenities.

Based on the proposed development works and guidance provided in Section 2.2 of NEPM (2013), AG considers it reasonable to adopt the 'HIL C – public open space and parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths', land use setting, for the purpose of assessing land contamination exposure risks.

5.3. Direct Contact – Human Health

AG notes that the proposed development includes building footprints and hardstand pavement areas across portions of the site, which would act as a direct contact barrier between potential land contamination and onsite receptors during operation of the site. However, some open space and landscaping areas will be established on site. In these areas, it is considered that a direct contact exposure pathway may be present between potential contamination and onsite receptors.

5.4. Inhalation / Vapour Intrusion – Human Health

In order for a potentially unacceptable inhalation / vapour intrusion human health exposure risk to exist, a primary vapour source (e.g. underground storage tank) or secondary vapour source (e.g. significantly contaminated soil or groundwater).

The historical evidence reviewed indicated a low likelihood for a potential primary source to be present on the site. The same historical evidence indicated a potential land use activity to be uncontrolled filling (AEC01).

The excavation, transport, placement and spreading of imported (uncontrolled) fill material involves significant disturbance of soils which typically results in volatilisation of vapour producing contaminants. On that basis, the potential for vapours to be present in soils on site at concentrations which might present an unacceptable exposure risk, is considered to be low to negligible, however as a conservative measure inhalation / vapour intrusion was included as part of this assessment.

Potential sources of groundwater contamination in the immediate vicinity of the site (e.g. service stations) were not observed. A groundwater source of vapours was considered unlikely at the site.

5.5. Aesthetics – Human Health

Section 3.6.3 of NEPM (2013) advises that there are no specific numeric aesthetic guidelines, however site assessment requires a balanced consideration of the quantity, type and distribution of foreign material or odours in relation to the specific land use and its sensitivity.

The historical evidence indicated potential land use activities being undertaken on the site which have the potential to result in unacceptable aesthetic impacts.

AG notes that the proposed development includes building footprints and hardstand pavement areas across portions of the site, which would act as an exposure barrier between potential aesthetic impacts and onsite receptors during operation of the site. However, some open space and landscaping areas will be established on site. In these areas, it is considered that an aesthetics exposure pathway may be present between potential contamination and onsite receptors.

5.6. Terrestrial Ecosystems – Ecological Health

There was no visual evidence observed to suggest significant or widespread phytotoxic impact (in the form of dieback or plant stress) in vegetation at the site. Similar observations were made of visible vegetation on land adjacent to the site.

Section 3.4.1 of NEPM (2013) advises the protection of the environment (terrestrial and aquatic) should be a consideration for all site assessments.

Based on field observations, advice in NEPC (1999) and the sensitive nature, extent and location of the proposed development concept, the need for further ecological assessment is considered warranted.

5.7. Management Limits for Petroleum Hydrocarbon Compounds

NEPM (2013) notes that there are a number of policy considerations which reflect the nature and properties of petroleum hydrocarbons:

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

NEPM (2013) includes ‘management limits’ to avoid or minimise these potential effects. Application of the management limits requires consideration of site-specific factors such as the depth of excavation and services and depth to groundwater, to determine the maximum depth to which the limits should apply.

6. DATA QUALITY OBJECTIVES

NEPM ASC 2013 provides guidance on the development of data quality objectives (DQO) using a seven-step process.

The DQO for this project are set out in **Sections 6.1** to **6.7** of this report.

6.1. Step 1: State the problem

The first step involves summarising the contamination problem that requires new environmental data and identifying resources available to solve the problem.

The objectives of this project are to:

- Assess the potential for contamination to be present on the site as a result of past and current land use activities;
- Provide advice on whether the site would be suitable (in the context of land contamination) for the proposed land use setting; and
- Provide recommendations for further investigation, management and/or remediation (if warranted).

The project is being undertaken because:

- The site is proposed for redevelopment, demolition, utility adjustments, civil infrastructure, planting and urban amenities; and
- A contamination investigation is required to inform the redevelopment design process.

The project team identified for this project consists of suitably experienced environmental consultants from AG.

The regulatory authorities identified for this project include NSW EPA and the City of Parramatta.

6.2. Step 2: Identify the decision/goal of the study

The second step involves identifying decisions that need to be made about the contamination problem and the new environmental data required to make them.

The decisions that need to be made during this project include:

- Is the environmental data collected for the project, suitable for assessing relevant land contamination exposure risks?
- Do the concentrations of identified contaminants of potential concern (COPC) present an unacceptable exposure risk to identified receptors, for the proposed land use setting?
- Is the site suitable for the proposed land use setting, in the context of land contamination?

6.3. Step 3: Identify the information inputs

The third step involves identifying the information needed to support decisions and whether new environmental data will be needed.

The inputs required to make the decisions set out in Section 6.2 for this project, will include:

- Data obtained during searches of the site’s history;

- The nature and extent of sampling at the site, including both density and distribution;
- Samples of relevant site media;
- The measured physical and/or chemical parameters of the site media samples (including field screening and laboratory analysis, where relevant); and
- Assessment criteria adopted for each of the media sampled.

Taking into consideration the objectives of this project, and the conceptual site model and land use setting presented in **Section 5** of this project, the following assessment criteria relevant to the proposed land use setting have been adopted for this project:

- Human health direct contact – HILs in Table 1A (1) in NEPM ASC 2013 and HSLs in Table B4 of Friebel, E & Nadebaum, P (2011);
- Human health inhalation/vapour intrusion – HSLs in Table 1 (A) in NEPM ASC 2013;
- Human health (asbestos) – absence / presence for preliminary screening, and no visible ACM on surface;
- Petroleum hydrocarbon compounds (management limits) – Table 1 B (7) of NEPM ASC 2013;
- Ecological Investigation and Screening Levels as calculated per NEPM ASC 2013 Table 1 (B) 1-6;
- CRC CARE 2017, *Risk-based management and remediation guidance for benzo(a)pyrene*, CRC CARE Technical Report No.39, CRC for Contamination Assessment and Remediation of the Environment, Newcastle Australia; and
- Aesthetics – no highly malodorous site media (e.g. strong residual petroleum hydrocarbon odours, hydrogen sulphide in site media, organosulfur compounds), no hydrocarbon sheen on surface water, no discoloured chemical deposits or soil staining with chemical waste other than of a very minor nature, no large monolithic deposits of otherwise low risk material (e.g. gypsum as powder or plasterboard, cement kiln dust), no presence of putrescible refuse including material that may generate hazardous levels of methane such as a deep-fill profile of green waste or large quantities of timber waste, and no soils containing residue from animal burial (e.g. former abattoir sites).

6.4. Step 4: Define the boundaries of the study

The fourth step involves specifying the spatial and temporal aspects of the environmental media that the data must represent to support decisions.

The spatial extent of the project will be limited to the subject investigation area as defined by its boundaries (refer **Figure 2**).

The temporal boundaries of the project include:

- The project timeframe presented in the AG proposal for this project,
- Unacceptable weather conditions at the time of undertaking fieldwork, including rainfall, cold and/or heat;
- Access availability of the site (to be defined by the site owner/representative); and
- Availability of AG field staff (typically normal daylight working hours, Monday to Friday).

The lateral extent that contamination is expected to be distributed across, based on the conceptual site model, is defined by the inferred boundaries of the areas of environmental concern (AEC).

The vertical extent that contamination is expected to be distributed across, based on the conceptual site model and the project scope, is likely to be limited to fill material.

The scale of the decisions required will be based on the entire site.

Constraints which may affect the carrying out of this project may include access limitations, presence of above and below ground infrastructure, and hazards creating health and safety risks.

6.5. Step 5: Develop the analytical approach (or decision rule)

The fifth step involves defining the parameter of interest, specifying the action level, and integrating information from Steps 1 to 4 into a single statement that gives a logical basis for choosing between alternative actions.

6.5.1. Field Duplicates and Field Triplicates

Field duplicate and field triplicates will be collected at a rate of one per twenty (5%) site samples collected. The duplicates and triplicates collected will be analysed for at least one of the analytes that the parent sample of the duplicate/triplicate is being scheduled for analysis for (with the exception of asbestos).

The relative percent difference (RPD) of concentrations of relevant analytes, between the parent sample and the duplicate/triplicate will be calculated.

6.5.2. Trip blanks

One trip blank sample will be used and scheduled for analysis, for each sampling event, if site samples being collected that day are being analysed for volatile contaminants of concern (typically BTEXN and/or TRH C_6-C_{10}).

6.5.3. Laboratory Analysis Quality Assurance / Quality Control

The analytical laboratory QA/QC program will typically include laboratory method blank samples, matrix spike samples, surrogate spike samples, laboratory control samples, and laboratory duplicate samples.

6.5.4. If/Then Decision Rules

AG has adopted the following ‘if/then’ decision rules for this project:

- If the result of the assessment of field data and laboratory analytical data is considered acceptable, then that field data and laboratory analytical data is suitable for interpretation within the scope of this project; and

- If the field data and laboratory analytical data is within the constraints of the assessment criteria adopted for this project (refer **Section 6.3**), then the contamination exposure risks to identified receptors, are considered acceptable.

In the event the assessment of field data and/or laboratory analytical data results in the data being not suitable for interpretation, then AG will determine if additional data is required to allow interpretation to be undertaken.

In the event that field data and/or laboratory analytical data exceeds the assessment criteria adopted for this project (refer **Section 6.3**), AG will undertake an assessment of the exceedance in the context of the project objectives to determine if additional data is required and whether management and/or remediation is required.

6.6. Step 6: Specify the performance or acceptance criteria

The sixth step involves specifying the decision maker's acceptable limits on decision errors, which are used to establish performance goals for limiting uncertainties in the data. When assessing contaminated land, there are generally two types of errors in decision making:

- Contamination exposure risks for a specific land use setting are acceptable, when they are not; and
- Contamination exposure risks for a specific land use setting are not acceptable, when they are.

AG will mitigate the risk of decision error by:

- Calculation of the 95% upper confidence limit (UCL) statistic to assess the mean concentration of relevant contaminants of potential concern;
- Assignment of fieldwork tasks to suitably experienced AG consulting staff, and suitably experienced contractors;
- Assignment of laboratory analytical tasks to reputable NATA accredited laboratories; and
- Assignment of data interpretation tasks to suitably experienced AG consulting staff, and outsourcing to technical experts where required.

AG will also adopt a range of data quality indicators (DQI) to facilitate assessment of the completeness, comparability, representativeness, precision and accuracy (bias).

Table 6.6: Data Quality Indicators

Completeness

Field Considerations	Assessment Criterion	Laboratory Considerations	Assessment Criterion
Critical locations sampled	Refer **Section 6.7.1**	Critical samples analysed according to DQO	Refer **Section 6.7.6**
Critical samples collected	Refer **Section 6.7.1**	Analytes analysed according to DQO	Refer **Section 6.7.6**
SOPs appropriate and complied with	100%	Appropriate laboratory analytical methods and LORs	Refer **Section 6.7.6**
Field documentation complete	All sampling point logs, calibration logs and chain of custody forms	Sample documentation complete	All sample receipt advices, all certificates of analysis
		Sample extraction and holding times complied with	Refer **Section 6.7.7**

Comparability

Field Considerations	Assessment Criterion	Laboratory Considerations	Assessment Criterion
Same SOPs used on each occasion	100%	Same analytical methods used by primary laboratory	Refer **Section 6.7.7**
Climatic conditions	Samples stored in insulated containers with ice, immediately after collection	Same LORs at primary laboratory	Refer **Section 6.7.7**
Same types of samples collected, and handled/preserved in same manner	All soil samples same size, all stored in insulated containers with ice	Same laboratory for primary sample analysis	All primary samples to Eurofins | mgt
		Same analytical measurement units	Refer **Section 6.7.7**

Representativeness

Field Considerations	Assessment Criterion	Laboratory Considerations	Assessment Criterion
Appropriate media sampled according to DQO	Refer **Section 6.7.6**	Samples analysed according to DQO	Refer **Section 6.7.6**
Media identified in DQO sampled	Refer **Section 6.7.6**		

Precision

Field Considerations	Assessment Criterion	Laboratory Considerations	Assessment Criterion
Field duplicate / triplicate RPD	Minimum 5% duplicates and triplicates No limit for analytical results <10 times LOR 50% for analytical results 10-20 times LOR 30% for analytical results >10 times LOR	Laboratory duplicates	No exceedances of laboratory acceptance criteria

SOPs appropriate and complied with	100%

Accuracy (bias)

Field Considerations	Assessment Criterion	Laboratory Considerations	Assessment Criterion
Rinsate blanks	Less than laboratory limit of reporting	Laboratory method blank	No exceedances of laboratory acceptance criteria
Field trip spikes	Recoveries between 60% and 140%	Matrix spike recovery	No exceedances of laboratory acceptance criteria
Field trip blanks	Analyte concentration <LOR	Surrogate spike recovery	No exceedances of laboratory acceptance criteria
		Laboratory control sample recovery	No exceedances of laboratory acceptance criteria

6.7. Step 7: Develop the plan for obtaining data

The seventh step involves identifying the most resource effective sampling and analysis design for generating the data that is required to satisfy the DQOs.

6.7.1. Sampling Point Density and Locations

Table A in NSW EPA *Sampling Design Guidelines* (1995) provides guidance on minimum sampling point densities required for site characterisation, based on detecting circular hot spots by using a systematic sampling pattern. This guidance assumes the investigator has little knowledge about the probable locations of the contamination, the distribution of the contamination is expected to be random (e.g. land fill sites) or the distribution of the contamination is expected to be fairly homogenous (e.g. agricultural lands).

However, Section 3.1 of NSW EPA *Sampling Design Guidelines* (1995) states that a judgemental sampling pattern can be used where there is enough information on the probable locations of contamination. Further to this, Section 6.2.1 of ASC NEPM 2013 states that the number and location or sampling points is based on knowledge of the site and professional judgement. Sampling should be localised to known or potentially contaminated areas identified from knowledge of the site either from site history or an earlier phase of site investigation. Judgemental sampling can be used to investigate sub-surface contamination issues in site assessment.

Table 1 in the *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia, May 2009*, Western Australia Department of Health (DOH (2009)) indicates that where the 'likelihood of asbestos' is assessed as "possible" or "suspect", the investigation regimen should include a sampling density that is either judgemental or the same as that set out in Table A of NSW EPA *Sampling Design Guidelines* (1995) for assessing asbestos.

As this project has included gathering data which provides a reasonable understanding of site history (in the context of potential areas of environmental concern on the site) and taking into consideration Table 1 in WA DOH (2009), it is considered reasonable to adopt a systematic sampling pattern, with up to 8 sampling points.

The locations of the sampling points are set out in **Figure 3**.

6.7.2. Sampling Methodology

The sampling point methodology presented in **Table 6.7.2** will be used for this project. The methodology is based on a range of factors considered relevant to this project, including:

- The identified contaminants of potential concern;
- The suspected laydown mechanisms for those contaminants of concern;
- The suspected likely depth of contamination; and
- Site specific constraints which affect the type of sampling techniques suited to the site.

Table 6.7.2 Proposed Sampling Methodology

AEC	Sampling Point ID	Method	Target Depth of Sampling Point (m bgl)
AEC01	BH01 to BH08	Solid Flight Auger	2.0m, practical refusal or 0.3m into natural material, whichever occurs first

Reference will also be made to Table 5 in WA DOH (2009) for the sampling and screening of fill soils for the presence of asbestos, where practical. The application of asbestos screening criteria published in NEPM ASC 2013 may be limited.

6.7.3. Identification, Storage and Handling of Samples

Sample identifiers will be used for each sample collected, based on the sampling point number and the depth/interval the sample was collected from, e.g. a sample collected from BH03 at a depth of 0.2m below ground level or bottom of slab, would be identified as BH03-0.2.

Project samples will be stored in laboratory prepared glass jars (and zip lock bags if collected for asbestos or acid sulfate soil assessment).

Soil samples in glass jars (and acid sulfate soil samples) will be placed in insulated container/s with ice.

Samples will be transported to the relevant analytical laboratory, with chain of custody (COC) documentation that includes the following information:

- AG project identification number
- Each sample identifier
- Date each sample was collected
- Sample type (e.g. soil or water)
- Container type/s for each sample collected
- Preservation method used for each sample (e.g. ice)
- Analytical requirements for each sample and turnaround times
- Date and time of dispatch and receipt of samples (including signatures)

6.7.4. Decontamination

All sampling equipment used during the investigation consisted of location specific nitrile gloves, as such decontamination was deemed unnecessary. To avoid cross contamination via the auger, samples were collected from the centre of the soil formation, ensuring to avoid sampling materials which had come into contact with the auger.

6.7.5. Laboratory Selection

The analytical laboratories used for this project will be NATA accredited for the analysis undertaken.

6.7.6. Laboratory Analytical Schedule

Project samples will be scheduled for NATA accredited laboratory analysis, using a combination of:

- Observations made in the field of the media sampled; and
- The contaminants of potential concern (COPC) identified for the area of environmental concern that the sample was collected from.

Based on site history, AG has adopted the laboratory analytical schedule (and associated upper limiting quantities) presented in **Table 6.7.6** for this project.

6.7.7. Laboratory Holding Times, Analytical Methods and Limits of Reporting

The laboratory holding times, analytical methods and limits of reporting (LOR) being used for this project, are presented in **Table 6.7.7**.

Table 6.7.7 Laboratory Holding Times, Analytical Methods and Limits of Reporting

Analyte	Holding Time	Analytical Method	Limit of Reporting (mg/kg)
BTEX and TRH C_6-C_{10}	14 days	USEPA 5030, 8260B and 8020	0.2-0.5
TRH >C_{10}-C_{40}	14 days	USEPA 8015B & C	20-100
VOC	14 days	USEPA 8260	0.1-0.5
PAH	14 days	USEPA 8270	0.1-0.5
OCP	14 days	USEPA 8081	0.2
Nitrate	28 days	APHA 4500	5.0
Metals	6 months	USEPA 8015B & C	0.05 – 2
Asbestos	No limit	AS4964:2004	Absence / presence

Analyte	Holding Time	Analytical Method	Limit of Reporting (mg/kg)
Asbestos	No limit	Inhouse Method	0.001% w/w

7. DETAILED SITE INVESTIGATION METHODOLOGY

Soil sampling and analysis were undertaken with reference to the following documents:

- NSW EPA 1995. *Contaminated Sites Sampling Design Guidelines,* NSW Environment Protection Authority.
- NEPM 1999. *'National Environment Protection (Assessment of Site Contamination) Measure. Schedule B (2) Guideline on Data Collection, Sample Design and Reporting.'* National Environmental Protection Council, Adelaide.
- Standards Australia. 2005*.' AS 4482.1. Guide to the Sampling and Investigation of Potentially Contaminated Soil. Part 1: Non-volatile and Semi-volatile Compounds.'* *www.standards.com.au.*
- Standards Australia. 1999. *'AS 4482.2. Guide to the Sampling and Investigation of Potentially Contaminated Soil Part 2: Volatile Compounds'. www.standards.com.au.*
- Standards Australia. 1998. *'AS/NZS 5667.11:1998. Water Quality – Sampling. Part 11: Guidance on Sampling of Groundwater.' www.standards.com.au.*
- Standards Australia. 1998. *'AS/NZS 5667.1:1998. Water Quality – Sampling. Part 1: Guidance on the Design of Sampling Programs, Sampling Techniques and the Preservation and Handling of Samples'. www.standards.com.au.*
- ACS NEPM. 2013 *National Environment Protection (Assessment of Site Contamination) Measure 2013 Schedule B (1) Investigation Levels for Soil and Groundwater.*

7.1. Scope of Fieldworks

To clarify and quantify the existence of the potential contaminants, a sampling analysis and quality plan (SAQP) was developed. The site works were performed on the 21st May and 7th June 2019, in accordance with the SAQP and supervised by AG environmental scientists at all times.

The scope of the investigation was developed based upon the findings of the desktop investigation and the site walkover and the SAQP subsequently developed. Based upon this approach the following scope of works was performed:

- Completion of a site-specific Safe Work Method Statement in accordance with AG health and safety policy;
- Completion of eight (8) soil sampling locations (via intrusive boreholes);
- Collection of asbestos samples from any surface sample locations;
- Collection of discrete soil samples every 1.0 m recovered or change of strata from the test pits;
- Collection and analysis of quality assurance/quality control (QA/QC) samples in accordance with NEPM requirements; and
- Analysis of twenty-four (24) primary soil and four (4) quality control samples.

7.2. Soil Sampling Methodology

A total of eight (8) boreholes (BH01-BH08) are to be advanced across the site using a track mounted drill rig until a target depth of 2.0m or inferred natural soils. Samples for potential analysis were collected from the near surface, at 1.0 m interval within the soil profile or with change of strata, and in

areas of observed contamination. Each soil sample is to be collected using a new clean pair of nitrile gloves and placed in the appropriate sample containers provided by the laboratory.

The selection of samples for laboratory analyses will be based upon visual and olfactory observations. Soil jars are to be labelled with sample identification (sample location and depth), date and name of sampler.

Upon completion of the soil boreholes, the holes are to be backfilled with the drill cuttings.

Soil bore logs will be maintained in the field by an AG environmental scientist for all exploratory holes. Field observations such as lithology, odours, staining, depth of water etc. are to be noted on the logs.

7.3. Laboratory Analysis

All soil samples will be forwarded to a NATA accredited laboratory for analysis of the analytes listed below. Eurofins | Environment Testing shall be used for the analysis of primary samples and ALS for the analysis of interlaboratory samples.

8. FIELDWORK

8.1. Soil Sampling

Soil sampling was undertaken by AG on 21 May and 7 June 2019. A total of eight (8) boreholes (BH01-BH08) were advanced across the site using a track mounted excavator to a target depth of 2.0m bgl. Samples for potential analysis were collected from the near surface, at 1.0 m intervals within the soil profile or with change of strata, and in areas of observed contamination. Each soil sample was collected using a new clean pair of nitrile gloves and placed in the appropriate acid rinsed sample containers provided by the laboratory.

Upon completion of the soil boreholes, each location was backfilled with drill cuttings at the completion of the sampling task. Soil bore logs were maintained in the field by an AG environmental scientist for all exploratory holes. Field observations such as lithology, odours, staining, depth of water etc. were noted on the logs. The logs are presented within **Appendix C**.

Each sampling point established was marked on a site plan. The locations of these sampling points are presented in **Figure 3**.

Image 8.1.1 View of sampling technique as observed in BH08

8.2. Site Geology

Observations were made of soils encountered during sampling work. These observations were recorded on borehole logs. A copy of these logs is presented in **Appendix C**.

Anthropogenic materials observed in some of the fill material encountered included road base, bitumen, concrete and ceramic tiles.

Inferred natural material was encountered at three locations (BH01, BH02 and BH04), prior to the target depth of 2.0mbgl.

Image 8.2.1 Example of natural soils, as observed within BH01

8.3. Odours

Olfactory evidence of contamination was not detected in the soil samples collected during the investigation

8.4. Staining

Visual evidence of contamination was not detected in the soil samples collected during the investigation.

8.5. Potential Asbestos Containing Materials

Visual evidence of potential asbestos containing materials (ACM) was observed in BH06, BH07 and BH08 at depths beneath 0.3m. The materials were observed to be in fair to poor condition.

Although no record of asbestos contamination was listed on the Section 10.7 certificates associated with the site, based on the quantity and depth of the potential ACM as well as geofabric materials noted during the borehole drilling, there is a possibility that the area characterised by BH06, BH07 and BH08 is an area of capped asbestos contamination.

Image 8.5.1 View of potential asbestos containing materials (ACM) as observed in BH06

9. LABORATORY ANALYSIS

The samples collected were transported to the analytical laboratory, using chain of custody (COC) protocols. A selection of these samples was scheduled for analysis, with reference to the relevant COPC identified for the AEC that the samples were collected from.

All soil and groundwater samples were forwarded to the NATA accredited laboratory for analysis of the analytes listed below. Eurofins | Mgt were used for the analysis of primary samples and SGS for the analysis of interlaboratory samples.

Table 9.1 Details the analysis undertaken for soil samples.

Table 9.1 Soil Analytical Schedule

	Analytical Suite								
Sample ID	**TRH**	**BTEX**	**PAH**	**Heavy Metals** (As, Cd, Cr, Cu, Hg, Ni, Pb, Zn)	**Asbestos ID**	**OCPs**	**PCBs**	**pH-pHFOX**	**pH + CEC**
BH05-0.1, BH04-0.1, BH03-0.1, BH01-0.1	x	x	x	x	x	x	x		
BH07-2.0	x	x	x	x	x	x	x	x	
BH08-0.1	x	x	x	x		x	x		
BH08-1.0,			x	x	x			x	
BH07-0.1,	x	x	x	x					
BH02-0.1, BH02-1.0, BH06-2.0, BH06-0.1, BH08-2.0,	x	x	x	x	x				
BH04-2.0, BH05-2.0,	x	x	x	x	x			x	
BH07-1.0,			x	x	x				
BH06-1.0,			x	x				x	
BH01-1.5				x				x	x
BH01-1.0, BH03-1.0,	x	x		x	x				
BH02-2.0, BH04-1.0, BH05-1.0,			x	x					
BH03-2.5								x	
BD1, SD1	x			x					
Trip Blank, Trip Spike	x	x							

A copy of the analytical laboratory certificates of analysis, is presented in **Appendix D.**

The sample analytical results were tabulated and presented in the attached **Table LAR1, LAR2** and **LAR3**.

10. DATA QUALITY INDICATOR ASSESSMENT

10.1. Completeness

An assessment of the completeness of data collected was undertaken, and the results presented in **Table 10.1**.

Table 10.1 Completeness DQI

Field Considerations	Target	Actual	Comment
Critical locations sampled	8	8	Performance against indicator considered acceptable.
Critical samples collected	25	25	Performance against indicator considered acceptable.
SOPs appropriate and complied with	100%	100%	Performance against indicator considered acceptable.
Field documentation complete	All sampling point logs, calibration logs and chain of custody forms	All sampling point logs, calibration logs and chain of custody forms	Performance against indicator considered acceptable.
Laboratory Considerations	**Target**	**Actual**	**Comment**
Critical samples analysed according to DQO	Refer **Section 6.7.6**	Refer Section 5.7.7	Performance against indicator considered acceptable.
Analytes analysed according to DQO	Refer **Section 6.7.6**	100%	Performance against indicator considered acceptable.
Appropriate laboratory analytical methods and LORs	Refer **Section 6.7.7**	100%	Performance against indicator considered acceptable.
Sample documentation complete	All sample receipt advices, all certificates of analysis	100%	Performance against indicator considered acceptable.
Sample extraction and holding times complied with	Refer **Section 6.7.7**	Refer comments	Performance against indicator considered acceptable.

The data collected is considered to be adequately complete within the objectives and constraints of the project.

10.2. Comparability

An assessment of the comparability of data collected was undertaken, and the results presented in **Table 10.2**.

Table 10.2 Comparability DQI

Field Considerations	Target	Actual	Comment
Same SOPs used on each occasion	100%	100%	Performance against indicator considered acceptable.
Climatic conditions	Samples stored in insulated containers with ice, immediately after collection	100%	Performance against indicator considered acceptable.
Same types of samples collected, and handled/preserved in same manner	All soil samples same size, all stored in insulated containers with ice	100%	Performance against indicator considered acceptable.
Laboratory Considerations	**Target**	**Actual**	**Comment**
Same analytical methods used by primary laboratory	Refer **Section 6.7.7**	100%	Performance against indicator considered acceptable.
Same LORs at primary laboratory	Refer **Section 6.7.7**	100%	Performance against indicator considered acceptable.
Same laboratory for primary sample analysis	All primary samples to Eurofins | mgt	100%	Performance against indicator considered acceptable.
Same analytical measurement units	Refer **Section 6.7.7**	100%	Performance against indicator considered acceptable.

The data collected is considered to be adequately comparable within the objectives and constraints of the project.

10.3. Representativeness

An assessment of the representativeness of data collected was undertaken, and the results presented in **Table 10.3**.

Table 10.3 Representativeness DQI

Field Considerations	**Target**	**Actual**	**Comment**
Appropriate media sampled according to DQO	Refer **Section 6.7.2**	100%	Performance against indicator considered acceptable.
Media identified in DQO sampled	Refer **Section 6.7.2**	100%	Performance against indicator considered acceptable.
Laboratory Considerations	**Target**	**Actual**	**Comment**
Samples analysed according to DQO	Refer **Section 6.7.6**	Refer comments	Performance against indicator considered acceptable.

The data collected is considered to be adequately complete within the objectives and constraints of the project.

10.4. Precision

An assessment of the precision of data collected was undertaken, and the results presented in **Table 10.4.**

Table 10.4 Precision DQI

Field Considerations	**Target**	**Actual**	**Comment**
Field duplicate / triplicate RPD	Minimum 5% duplicates and triplicates	5 % duplicates and 5 % triplicates	Parent duplicate/triplicate relationships are as follows: BD1/SD1– BH03-1.0
	No limit for analytical results <10 times LOR	Nil	Only RPD exceeding 50% was less than 5 times the LOR. Performance against indicator was considered acceptable.
	50% for analytical results 10-20 times LOR	Nil	
	30% for analytical results >20 times LOR	Nil	
SOPs appropriate and complied with	100%	100%	Performance against indicator considered acceptable.
Laboratory Considerations	**Target**	**Actual**	**Comment**
Laboratory duplicates	No exceedances of laboratory acceptance criteria	No exceedances	Performance against indicator considered acceptable.

The data collected is considered to be adequately precise within the objectives and constraints of the project.

10.5. Accuracy

An assessment of the precision of data collected was undertaken, and the results presented in **Table 10.5**.

Table 10.5 Accuracy DQI

Laboratory Considerations	Target	Actual	Comment
Laboratory method blank	No exceedances of laboratory acceptance criteria	No exceedances of laboratory acceptance criteria	Performance against indicator considered acceptable.
Matrix spike recovery	No exceedances of laboratory acceptance criteria	No exceedances of laboratory acceptance criteria	Performance against indicator considered acceptable.
Surrogate spike recovery	No exceedances of laboratory acceptance criteria	No exceedances of laboratory acceptance criteria	Performance against indicator considered acceptable.
Laboratory control sample recovery	No exceedances of laboratory acceptance criteria	No exceedances of laboratory acceptance criteria	Performance against indicator considered acceptable.

The data collected is considered to be adequately accurate within the objectives and constraints of the project.

11. DISCUSSION

A discussion on comparison of laboratory analytical results and field observations, in the context of the assessment criteria adopted for this project, is presented in **Sections 11.1** to **11.4**. Refer to **Figure 3** for sample locations exceeding adopted criteria.

11.1. Human Health - Direct Contact (HIL – C Public Open Space)

TRH

Sixteen (16) soil samples were analysed for TRH. The concentrations of TRH C_6-C_{10}, >C_{10}-C_{16}, >C_{16}-C_{34} and >C_{34}-C_{40} detected in the soil samples analysed, were less than the applicable adopted direct contact human health exposure criteria. Eight (8) of the samples recorded concentrations of TRH fractions F3 and F4 that were below the adopted HSL criteria. The results are summarised below:

Table 11.1 Summary of TRH results

Sample ID/ Depth (m)	TRH C_{16}-C_{34} (F3) (mg/kg)	TRH C_{34}-C_{40} (F4) (mg/kg)
	HSL Criteria: 1,300 mg/kg	HSL Criteria: 10,000 mg/kg
BH3/ 0.1	660	130
BH3/ 1.0	460	<100
BH4/ 0.1	210	<100
BH5/ 0.1	360	140
BH5/ 2.0	500	150
BH7/ 0.1	170	<100
BH7/ 2.0	290	<100
BH8/ 2.0	280	<100

BTEX

The results of benzene, toluene, ethyl benzene and xylenes (BTEX) were below laboratory detection levels.

PAHs

The concentrations of naphthalene detected in the soil samples analysed, were less than the applicable adopted direct contact human health exposure criteria.

A total of twenty (20) soil samples were analysed for PAHs. Seven (7) of the samples recorded concentrations of benzo(a)pyrene TEQ above the detection level, five (5) of which recorded

concentrations above the adopted criteria. Total PAHs concentrations recorded were all below the adopted criteria. The results have been summarised in **Table 11.2**.

Table 11.2 Summary of PAH results

Sample ID/ Depth (m)	Carcinogenic PAHs, Benzo(a)Pyrene TEQ (mg/kg)	Total PAHs (mg/kg)
	HIL Criteria: 3mg/kg	HIL Criteria: 300mg/kg
BH2/ 0.1	1.6	12.3
*BH3/ 0.1	**30**	275.3
BH4/ 0.1	**3.1**	26.2
BH5/ 0.1	**4.1**	26.6
BH5/ 1.0	**15**	111.9
*BH5/ 2.0	**10**	69.9
BH7/ 0.1	2.2	17.1

*Note: PAH correlation coefficients retrieved from www.pahsourceanalyst.com.au

Given the concentrations detected were >250% of the adopted site criteria, statistical analysis via 95% Upper Confidence Limit (UCL) calculations could not be completed.

Based on review of the PAH results and PAH correlation coefficients retrieved from www.pahsource analyst.com.au for selected samples exceeding the adopted criteria, and visual observations onsite, it is likely that the materials contain ‘ash from black and brown coal’ and ‘coke’. A copy of the data assessment summary sheet in provided in **Appendix E**.

OCP

The concentration of relevant OCP compounds detected in the soil samples analysed, were less than the applicable adopted direct contact human health exposure criteria or less than laboratory limits of reporting. Most samples were all below laboratory detection levels, with the exception of soil sample BH4 (0.1) m, which recorded DDE concentration of 0.77mg/kg.

PCBs

The concentration of PCBs detected in the soil samples analysed, were less than laboratory limits of reporting.

Heavy Metals

The concentrations of arsenic, cadmium, chromium, copper, lead, nickel, zinc and mercury detected in the soil samples analysed, were less than the applicable adopted direct contact human health exposure criteria.

Asbestos Fines/ Friable Asbestos (AF/FA)

A total of sixteen (16) samples were analysed for Asbestos (absence/presence) and five (5) samples recorded asbestos. The results of asbestos detected samples are summarised in **Table 11.3**.

Table 11.3 Summary of asbestos results

Sample ID/ Depth (m)	Result	Comments
BH2/ 1.0 (soil)	**0.00019 % w/w**	AF/FA
BH8/ 1.0 (fragment)	**Chrysotile and amosite asbestos**	-
BH8/ 2.0 (fragment)	**Chrysotile and amosite asbestos**	-
BH7/ 2.0	**Chrysotile and amosite asbestos**	-
BH6/ 0.1 (soil)	**0.34 % w/w**	Bonded

Asbestos was not detected in any of the other samples analysed.

11.2. Human Health – Inhalation / Vapour Intrusion (Public Open Space)

TRH

The concentrations of TRH C_6-C_{10} (minus BTEX) and >C_{10}-C_{16} (minus naphthalene) detected in the soil samples analysed, were below laboratory detection levels.

BTEX

The concentrations of benzene, toluene, ethyl benzene and xylenes detected in the soil samples analysed, were below laboratory detection levels.

PAHs

The concentrations of naphthalene detected in the soil samples analysed, were below laboratory detection levels.

11.3. TRH Management Limits (Public Open Space)

The concentrations of TRH C_6-C_{10}, >C_{10}-C_{16}, >C_{16}-C_{34} and >C_{34}-C_{40} detected in the soil samples analysed were less than the applicable adopted TRH management limits or less than laboratory limits of reporting.

11.4. Aesthetics

There was significant evidence of foreign materials including ACM identified within BH06-BH08. The aesthetics assessment criteria adopted for this project, indicate that further assessment/management is required.

11.5. Terrestrial Ecosystems

Ecological Screening Levels (ESLs)

Due to the heterogeneity of the fill material encountered during AG investigation, it was not practical to analyse all soil samples for the specific analytes required (CEC and clay content) and therefore generic EILs have been adopted from CRC CARE 2017.

The concentrations of all analytes detected in the soil samples analysed were below less than the applicable adopted site criteria for the site EIL/ESL with the exception of Benzo(a)Pyrene. A summary of the EIL/ ESL exceedances for Benzo(a)pyrene (B(a)P) and the associated adopted criteria are presented in below **Table 11.**

Table 11.4 Summary of EIL/ ESL exceedances

Sample ID/ Depth (m)	Analyte	Result (mg/kg)	ESL Criteria (mg/kg)
BH2/ 0.1	Benzo(a)Pyrene	**1.2**	0.7
BH3/ 0.1	Benzo(a)Pyrene	**21**	0.7
BH4/ 0.1	Benzo(a)Pyrene	**2.3**	0.7
BH5/ 0.1	Benzo(a)Pyrene	**2.6**	0.7
BH5/ 1.0	Benzo(a)Pyrene	**9.6**	0.7
BH5/ 2.0	Benzo(a)Pyrene	**6.5**	0.7
BH7/ 0.1	Benzo(a)Pyrene	**1.7**	0.7

AG considers that, although the results reported are above the ASC NEPC 2013 ESL/EIL, the CRC CARE Technical Report 39 on Risk-based management and remediation guidance for benzo(a)pyrene (2017) states that:

> "*…the ESLs in the NEPM are classified as low reliability, it is useful to consider whether there is additional and more recent information that allows higher reliability values to be estimated. Note that values derived in this way are intended to assist in informing an assessment of B(a)P following NEPM ecological risk assessment guidelines, but as they have not been developed through the NEPM review process, they should not be cited as NEPM ESLs*."

Therefore, AG considers that since the NEPM ESL values for (B(a)P) are considered to be conservative and of low reliability, it is possible to adapt a conservative higher reliability ecological

guideline for the site for fresh B(a)P as per the CRC CARE (2017) guidelines. **Table 11** below has been extracted from CRC CARE Technical Report 39 (2017):

Table 11.5 High reliability ecological guideline for fresh B(a)P

Land use	% protection	Derived ecological guideline (95% confidence limits) mg/kg	NEPM low reliability ESL mg/kg	Canadian SQGE
Commercial and industrial	65	172 (57–371) (High reliability)	1.4	72
Urban residential and public open space	85	33 (21–135) (High reliability)	0.7	20
National parks/areas with high ecological values	99	0.2 (0.1–21) (High reliability)	0.7	NA

SQG_E = soil quality guidelines for environmental health (CCME 2010).

AG considers the ecological screening level value detailed in **Table 11.5.2** above for urban residential and public open space sites (33 mg/kg) to be more accurate for characterisation of the site. Using the CRC CARE (2017) adapted screen level, all samples analysed for B(a)P are below the applicable site screening level.

As such, AG considers that further assessment is not required.

Ecological Investigations Levels (EILs)

The concentrations of relevant contaminants of concern detected in the soil samples analysed were less than the applicable adopted site-specific ecological investigation levels (EIL) with the exception of copper, nickel and zinc.

Soil samples BH1 (0.1) m, BH2 (0.1) m, BH3 (0.1) m and BH3 (1.0)m recorded Nickel concentrations of 40mg/kg, 44mg/kg, 49mg/kg and 34mg/kg, respectively, exceeding the adopted site assessment criteria of 35mg/kg. The detected concentrations of Nickel were further subjected to a statistical analysis using the US EPA Pro Upper Confidence Limit (UCL) 95%. Following the UCL 95% analysis, all samples analysed were deemed suitable under the adopted site assessment criteria.

Soil samples BH7 (1.0) m and BH7 (2.0) m recorded Copper concentrations of 820mg/kg and 230mg/kg, respectively, exceeding the adopted site assessment criteria of 102mg/kg. The detected concentrations of Copper could not be risked away using the US EPA Pro Upper Confidence Limit (UCL) 95%, as the concentration were greater than 250% of the adopted criteria.

Soil samples BH2 (0.1)m, BH2 (1.0)m, BH3 (0.1)m, BH3 (1.0)m, BH7 (0.1)m and BH7 (1.0)m recorded Zinc concentrations of 900mg/kg, 290mg/kg, 400mg/kg , 260mg/kg, 270mg/kg and 760mg/kg respectively, exceeding the adopted site assessment criteria of 239mg/kg. The detected concentrations of Zinc could not be risked away using the US EPA Pro Upper Confidence Limit (UCL) 95%, as the concentration were greater than 250% of the adopted criteria.

12. CONCLUSIONS AND RECOMMENDATIONS

Based on AG's assessment of the desktop review information, fieldwork data and laboratory analytical data, in the context of the proposed redevelopment scenario, AG makes the following conclusions:

- The detected concentrations of identified contaminants of potential concern in the soils assessed are considered unlikely to present:
    - An unacceptable inhalation / vapour intrusion human health exposure risk; or
    - An unacceptable petroleum management limit risk.
- The detected concentrations of benzo(a)pyrene TEQ in the soils assessed present a direct contact human health exposure risk, at sampling locations BH3-0.1, BH4-0.1, BH5-0.1, BH5-1.0 and BH5-2.0;
- Asbestos was detected within four (4) of the eight (8) locations sampled (BH02, BH06, BH07 and BH08), and is considered to present an unacceptable human health exposure risk during the future intrusive/redevelopment works, in these locations;
- Ecological Investigation Levels were exceeded for Copper at sampling location BH7 and Zinc at sampling locations BH2, BH3 and BH7. As such, may present an unacceptable ecological exposure risk during the future intrusive/redevelopment works, in these locations;
- As the majority of the site is covered by hardstand materials and landscaped areas, and that the detected contaminants in soil were located at depth and will not be disturbed until commencement of redevelopment works, AG considers that there is no immediate human health risk to occupants of surrounding areas, as well as nearby pedestrians; and
- Based on the assessments undertaken as part of this investigation, AG has concluded that the site can be made suitable for the proposed redevelopment pending supplementary contamination assessment and subsequent remediation of the aforementioned exceedances of the adopted site assessment criteria.

Based on these conclusions, AG makes the following recommendations:

- A supplementary contamination assessment should be carried out to determine the extent of contamination within areas of detected contamination, with regard to the asbestos and PAH contamination. The PAH concentrations exceeding the adopted criteria are likely associated with black/ brown coal and coke and may pose an unacceptable exposure risk via direct contact, ingestion and inhalation. Considerations should be given to further assessment of soils for the leachability characteristics of the PAH soil contamination and assessment of groundwater that may have been potentially impacted by the overlying fill materials. An appropriate asbestos assessment should be completed in accordance with WA DOH 2009 with considerations should be made to allow for test pit exploration excavations, in order to adequately quantify the asbestos exposure risk;
- Remediation will require the completion of a Remedial Action Plan (RAP) detailing the works required to adequately delineate, remediate and validate the areas of identified contamination;
- Following remediation of the identified contamination, validation sampling and a site validation report will be required to confirm the effectiveness of the remedial works;
- Investigation of Acid Sulfate Soils (ASS) for any soil proposed for excavation / disposal at or below 2.0 metres bgl; and
- Any soil proposed for disposal should be classified and disposed of as per the NSW EPA *Waste Classification Guidelines 2014.*

This report, including its conclusions and recommendations, must be read in conjunction with the limitations presented in **Section 13**.

13. STATEMENT OF LIMITATIONS

The findings presented in this report are based on specific searches of relevant, government historical databases and anecdotal information that were made available during the course of this investigation. To the best of our knowledge, these observations represent a reasonable interpretation of the general condition of the site at the time of report completion.

This report has been prepared solely for the use of the client to whom it is addressed and no other party is entitled to rely on its findings.

No warranties are made as to the information provided in this report. All conclusions and recommendations made in this report are of the professional opinions of personnel involved with the project and while normal checking of the accuracy of data has been conducted, any circumstances outside the scope of this report or which are not made known to personnel and which may impact on those opinions is not the responsibility of Alliance Geotechnical Pty Ltd. Should information become available regarding conditions at the site including previously unknown sources of contamination, AG reserves the right to review the report in the context of the additional information.

This report must be reviewed in its entirety and in conjunction with the objectives, scope and terms applicable to AG's engagement. The report must not be used for any purpose other than the purpose specified at the time AG was engaged to prepare the report.

Logs, figures, and drawings are generated for this report based on individual AG consultant interpretations of nominated data, as well as observations made at the time site walkover/s were completed.

Data and/or information presented in this report must not be redrawn for its inclusion in other reports, plans or documents, nor should that data and/or information be separated from this report in any way.

Should additional information that may impact on the findings of this report be encountered or site conditions change, AG reserves the right to review and amend this report.

14. REFERENCES

National Environment Protection Council (NEPC) 1999a, '*Schedule B(1) Guideline on Investigation Levels for Soil and Groundwater, National Environment Protection (Assessment of Site Contamination) Measure (NEPM) as amended in May 2013'*.

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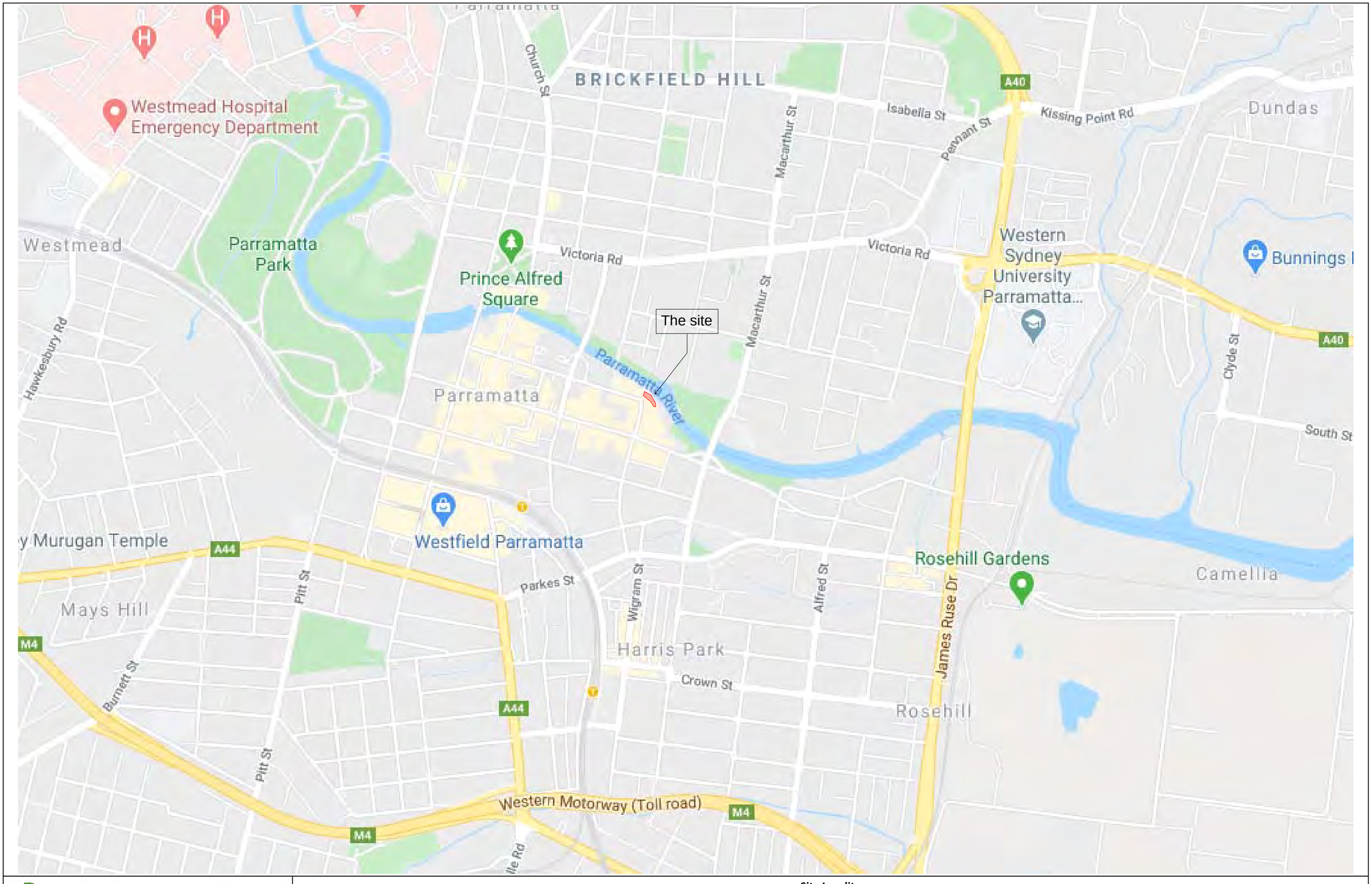
SITE FIGURES



Alliance Geotechnical ENGINEERING | ENVIRONMENTAL | TESTING Manage the earth, eliminate the risk	**Site Locality**			
Client Name:	Northrop Consulting Engineers P/L	N	Figure Number:	1
Project Name:	Detailed Site Investigation		Figure Date:	18 June 2020
Project Location:	Charles Street Square, Parramatta NSW		Report Number:	7957-ER-2-1

Source: NearMap (Nearmap.com)

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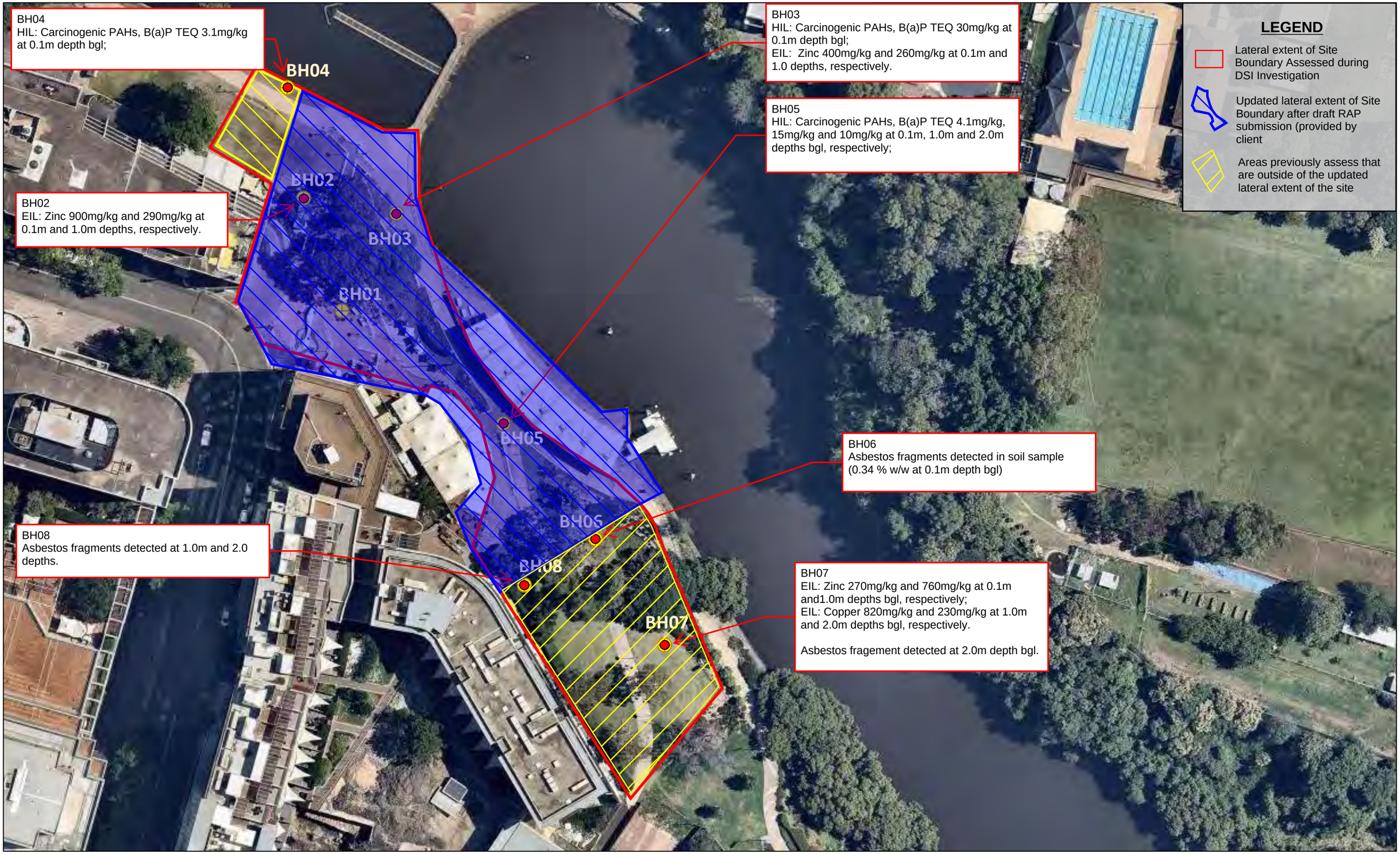
Site Layout

Client Name:	Northrop Consulting Engineers P/L	Figure Number:	2
Project Name:	Detailed Site Investigation	Figure Date:	18 June 2020
Project Location:	Charles Street Square, Parramatta NSW	Report Number:	7957-ER-2-1

N



Exceedances Recorded

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Client Name:	Northrop Consulting Engineers P/L	N	Figure Number:	3
Project Name:	Stage 2 Detailed Site Investigation		Figure Date:	15 June 2020
Project Location:	Charles Street Square, Parramatta, NSW		Report Number:	7957-ER-2-1

TABLES

Table LAR1
Charles Street Square, Parramatta NSW
Soil Results & Adopted Site Criteria
7957-ER-2-1

Group	Analyte	Units	PQL	Screening Levels for Direct Contact (mg/kg) CRC Care 2011	Inhalation / Vapour Intrusion HSLs (mg/kg) - NEPC 2013 (CLAY)		Management Limits for TPH Fractions F1 - F4 in soil (mg/kg) - NEPC 2013	ESLs for TPH Fractions F1 - F4, BTEX and Benzo(a)pyrene - NEPC 2013	Ecological Investigation Levels (EILs) in soil (mg/Kg)	Health Investigation Levels for Soil Contaminants - NEPC 2013	Data Set Minimum	Data Set Maximum
				HSL - C Recreational / open space	HSL recreational / open space	Soil Saturation Concentration (Csat)	Residential, Parkland and Public Open Space	Urban Residential and Public Open Space	Urban Residential Public Open Space	Public open space		
					0 m to <1 m		Fine Soil Texture	Fine Soil Texture	Site Specific Criteria			
Metals	Arsenic, As	mg/kg	2	-	-	-	-	-	100	900	2	85
	Cadmium, Cd	mg/kg	0.4	-	-	-	-	-	-	90	0	3
	Chromium, Cr	mg/kg	5.0	-	-	-	-	-	412	300	8	85
	Copper, Cu	mg/kg	5.0	-	-	-	-	-	102	17,000	7	820
	Lead, Pb	mg/kg	5	-	-	-	-	-	1100	600	7	260
	Mercury (inorganic)	mg/kg	0.10	-	-	-	-	-	-	80	0	0
	Nickel, Ni	mg/kg	5.0	-	-	-	-	-	35	1200	6	49
	Zinc, Zn	mg/kg	5.0	-	-	-	-	-	239	30,000	9	900
PAH	Acenaphthene	mg/kg	0.5	-	-	-	-	-	-	-	1	1
	Acenaphthylene	mg/kg	0.5	-	-	-	-	-	-	-	1	2
	Anthracene	mg/kg	0.5	-	-	-	-	-	-	-	1	7
	Benzo(a)anthracene	mg/kg	0.5	-	-	-	-	-	-	-	1	17
	Benzo(a)pyrene	mg/kg	0.5	-	-	-	-	0.7	-	-	1	21
	Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ (mg/kg)	0.5	-	-	-	-	-	-	3	2	30
	Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.5	-	-	-	-	-	-	-	1	30
	Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.5	-	-	-	-	-	-	-	1	30
	Benzo(b&j)fluoranthene	mg/kg	0.5	-	-	-	-	-	-	-	1	13
	Benzo(ghi)perylene	mg/kg	0.5	-	-	-	-	-	-	-	1	16
	Benzo(k)fluoranthene	mg/kg	0.5	-	-	-	-	-	-	-	1	16
	Chrysene	mg/kg	0.5	-	-	-	-	-	-	-	1	17
	Dibenzo(ah)anthracene	mg/kg	0.5	-	-	-	-	-	-	-	1	3
	Fluoranthene	mg/kg	0.5	-	-	-	-	-	-	-	1	56
	Fluorene	mg/kg	0.5	-	-	-	-	-	-	-	4	4
	Indeno(1,2,3-cd)pyrene	mg/kg	0.5	-	-	-	-	-	-	-	1	12
	Naphthalene	mg/kg	0.5	1,900	NL	10	-	-	170	-	2	2
	Phenanthrene	mg/kg	0.5	-	-	-	-	-	-	-	1	38
	Pyrene	mg/kg	0.5	-	-	-	-	-	-	-	1	51
	Total PAH (18)	mg/kg	0.5	-	-	-	-	-	-	300	1	275
TRH	TRH C10-C36 Total	mg/kg	50	-	-	-	-	-	-	-	106	849
	TRH C10-C14	mg/kg	20	-	-	-	-	-	-	-	27	37
	TRH C15-C28	mg/kg	50	-	-	-	-	-	-	-	50	560
	TRH C29-C36	mg/kg	50	-	-	-	-	-	-	-	56	270
	TRH C6-C9	mg/kg	20	-	-	-	-	-	-	-	0	0
	Naphthalene	mg/kg	0.5	1,900	NL	10	-	-	170	-	0	0
	TRH >C10-C16 (F2)	mg/kg	50	-	-	-	-	-	-	-	0	0
	TRH >C10-C16 (F2) - Naphthalene	mg/kg	50	3,800	NL	560	1,000	120	-	-	0	0
	TRH C10-C40 Total (F bands)	mg/kg	100	-	-	-	-	-	-	-	170	790
	TRH >C16-C34 (F3)	mg/kg	100	5,300	-	-	3,500	1,300	-	-	170	660
	TRH >C34-C40 (F4)	mg/kg	100	7,400	-	-	10,000	5,600	-	-	130	150
	TRH C6-C10	mg/kg	20	-	-	-	-	-	-	-	0	0
	TRH C6-C10 minus BTEX (F1)	mg/kg	20	5,100	NL	850	800	180	-	-	0	0
BTEX	Benzene	mg/kg	0.1	120	NL	430	-	65	-	-	0	0
	Ethylbenzene	mg/kg	0.1	5,300	NL	68	-	125	-	-	0	0
	m/p-xylene	mg/kg	0.2	-	-	-	-	-	-	-	0	0
	o-xylene	mg/kg	0.1	-	-	-	-	-	-	-	0	0
	Toluene	mg/kg	0.1	1,800	NL	630	-	105	-	-	0	0
	Total Xylenes	mg/kg	0.3	15,000	NL	330	-	45	-	-	0	0
OCP	4.4 - DDD	mg/kg	0.05	-	-	-	-	-	-	-	0	0
	4.4 - DDE	mg/kg	0.05	-	-	-	-	-	-	-	1	1
	4.4 - DDT	mg/kg	0.05	-	-	-	-	-	-	-	0	0
	a - BHC	mg/kg	0.05	-	-	-	-	-	-	-	0	0
	Aldrin	mg/kg	0.05	-	-	-	-	-	-	-	0	0
	Aldrin + Dieldrin (total)	mg/kg	0.05	-	-	-	-	-	-	10	0	0
	b - BHC	mg/kg	0.05	-	-	-	-	-	-	-	0	0
	Chlordanes (total)	mg/kg	0.05	-	-	-	-	-	-	70	0	0
	d - BHC	mg/kg	0.05	-	-	-	-	-	-	-	0	0
	DDT + DDE + DDD (total)	mg/kg	0.05	-	-	-	-	-	-	400	1	1
	Dieldrin	mg/kg	0.05	-	-	-	-	-	-	-	0	0
	Endosulfan 1	mg/kg	0.05	-	-	-	-	-	-	-	0	0
	Endosulfan 2	mg/kg	0.05	-	-	-	-	-	-	-	0	0
	Endosulfan sulphate	mg/kg	0.05	-	-	-	-	-	-	-	0	0
	Endrin	mg/kg	0.05	-	-	-	-	-	-	20	0	0
	Endrin Aldehyde	mg/kg	0.05	-	-	-	-	-	-	-	0	0
	Endrin Ketone	mg/kg	0.05	-	-	-	-	-	-	-	0	0
	g-BHC (Lindane)	mg/kg	0.05	-	-	-	-	-	-	-	0	0
	Heptachlor	mg/kg	0.05	-	-	-	-	-	-	10	0	0
	Heptachlor epoxide	mg/kg	0.05	-	-	-	-	-	-	-	0	0
	Hexachlorobenzene	mg/kg	0.05	-	-	-	-	-	-	10	0	0
	Methoxychlor	mg/kg	0.05	-	-	-	-	-	-	400	0	0
	Toxaphene	mg/kg	1.0	-	-	-	-	-	-	-	0	0
	Vic EPA IWRG 621 OCP (total)	mg/kg	0.1	-	-	-	-	-	-	-	1	1
	Vic EPA IWRG 621 Other OCP (total)	mg/kg	0.1	-	-	-	-	-	-	-	0	0
	Alpha + Beta Endosulfan	mg/kg	0.05	-	-	-	-	-	-	340	0	0
PCBs	Total PCB	mg/kg	5.0	-	-	-	-	-	-	1	0	0

Sample ID	BH01-0.1	BH01-1.0	BH01-1.5	BH02-0.1	BH02-1.0	BH02-2.0	BH03-0.1	BH03-1.0	BH04-0.1	BH04-1.0	BH04-2.0	BH05-0.1	BH05-1.0	BH05-2.0	BH06-0.1	BH06-1.0	BH06-2.0	BH07-0.1	BH07-1.0	BH07-2.0	BH08-0.1	BH08-1.0	BH08-2.0
Reference	S19-Jn08524	S19-Jn08525	S19-Jn08526	S19-Jn08527	S19-Jn08528	S19-Jn08529	S19-Jn08530	S19-Jn08531	S19-My38769	S19-My38770	S19-My38771	S19-My38766	S19-My38767	S19-My38768	S19-My38763	S19-My38764	S19-My38765	S19-My38759	S19-My38760	S19-My38761	S19-My38756	S19-My38757	S19-My38758
Date Sampled	7/6/2019	7/6/2019	7/6/2019	7/6/2019	7/6/2019	7/6/2019	7/6/2019	7/6/2019	21/5/2019	21/5/2019	21/5/2019	21/5/2019	21/5/2019	21/5/2019	21/5/2019	21/5/2019	21/5/2019	21/5/2019	21/5/2019	21/5/2019	21/5/2019	21/5/2019	21/5/2019
Sample Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Arsenic, As	2.9	4.5	2.4	13	3	62	30	23	5.4	3.3	< 2	6.1	85	5.9	5.3	3.8	3.2	5.4	10	6.8	6	6.8	5.9
Cadmium, Cd	< 0.4	< 0.4	< 0.4	2.9	< 0.4	< 0.4	0.9	0.5	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	2.8	1	< 0.4	0.4	0.4
Chromium, Cr	17	15	12	11	9.2	9.5	39	29	19	8.7	< 5	19	18	14	10	10	7.6	16	18	85	9.1	11	12
Copper, Cu	31	19	6.9	57	13	19	90	54	59	23	8.5	32	14	16	33	34	21	57	820	230	31	30	27
Lead, Pb	15	13	6.5	140	170	23	260	170	87	41	7.2	83	110	75	71	62	54	97	230	74	54	88	77
Mercury (inorganic)	< 0.1	< 0.1	< 0.1	0.3	0.2	< 0.1	0.1	< 0.1	0.1	0.1	< 0.1	0.1	0.2	0.2	0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	0.1	0.1
Nickel, Ni	40	16	< 5	44	6.4	< 5	49	34	28	6.1	< 5	15	8.2	6.4	11	17	6.6	19	24	34	7.1	9.6	11
Zinc, Zn	39	21	8.7	900	290	32	400	260	180	100	16	220	59	85	120	160	110	270	760	220	130	140	120
Acenaphthene	< 0.5	---	---	< 0.5	< 0.5	< 0.5	1.4	---	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	< 0.5	---	---	< 0.5	< 0.5	< 0.5	2	---	< 0.5	< 0.5	< 0.5	< 0.5	1.8	0.9	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	< 0.5	---	---	< 0.5	< 0.5	< 0.5	7.2	---	0.8	< 0.5	< 0.5	< 0.5	2.4	1.1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)anthracene	1.1	---	---	1.1	< 0.5	< 0.5	17	---	2.4	< 0.5	< 0.5	2.2	11	5.6	< 0.5	< 0.5	< 0.5	1.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	< 0.5	---	---	1.2	< 0.5	< 0.5	21	---	2.3	< 0.5	< 0.5	2.6	9.6	6.5	< 0.5	< 0.5	< 0.5	1.7	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Carcinogenic PAHs, BaP TEQ <LOR=0	1.6	---	---	1.6	< 0.5	< 0.5	30	---	3.1	< 0.5	< 0.5	4.1	15	10	< 0.5	< 0.5	< 0.5	2.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Carcinogenic PAHs, BaP TEQ <LOR=LOR	1.9	0.6	0.6	30	---	---	3.3	0.6	0.6	4.1	15	10	0.6	0.6	0.6	2.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	2.1	1.2	1.2	30	---	---	3.6	1.2	1.2	4.1	15	10	1.2	1.2	1.2	2.7	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Benzo(b&j)fluoranthene	1.8	< 0.5	< 0.5	13	---	---	1.8	< 0.5	< 0.5	2.4	6.1	5.7	< 0.5	< 0.5	< 0.5	1.4	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(ghi)perylene	1.3	< 0.5	< 0.5	16	---	---	1.3	< 0.5	< 0.5	1.8	5.5	4.3	< 0.5	< 0.5	< 0.5	1.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	1.9	< 0.5	< 0.5	16	---	---	1.9	< 0.5	< 0.5	1.9	8.6	5.1	< 0.5	< 0.5	< 0.5	1.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	2.1	< 0.5	< 0.5	17	---	---	2.1	< 0.5	< 0.5	2.3	9.8	5.9	< 0.5	< 0.5	< 0.5	1.4	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dibenzo(ah)anthracene	< 0.5	---	---	< 0.5	< 0.5	< 0.5	2.6	---	< 0.5	< 0.5	< 0.5	0.6	2	1.4	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	2.2	< 0.5	< 0.5	56	---	---	5.5	< 0.5	< 0.5	4.9	21	13	< 0.5	< 0.5	< 0.5	3.4	< 0.5	0.6	< 0.5	< 0.5	0.7	< 0.5	< 0.5	< 0.5
Fluorene	< 0.5	---	---	< 0.5	< 0.5	< 0.5	3.6	---	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1,2,3-cd)pyrene	0.7	< 0.5	< 0.5	12	---	---	1.1	< 0.5	< 0.5	1.6	4.8	3.8	< 0.5	< 0.5	< 0.5	0.9	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	< 0.5	< 0.5	< 0.5	1.5	---	---	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.9	< 0.5	< 0.5	38	---	---	2.2	< 0.5	< 0.5	1.8	8.3	4.6	< 0.5	< 0.5	< 0.5	1.1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	2.2	< 0.5	< 0.5	51	---	---	4.8	< 0.5	< 0.5	4.5	21	12	< 0.5	< 0.5	< 0.5	3.3	< 0.5	0.6	< 0.5	0.7	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH (18)	12.3	< 0.5	< 0.5	275.3	---	---	26.2	< 0.5	< 0.5	26.6	111.9	69.9	< 0.5	< 0.5	< 0.5	17.1	< 0.5	1.2	< 0.5	1.4	< 0.5	< 0.5	< 0.5	< 0.5
TRH C10-C36 Total	< 50	< 50	---	849	618	274	---	---	< 50	467	< 50	570	106	---	< 50	198	---	330	< 50	315	< 50	---	330	< 50	---	315
TRH C10-C14	< 20	< 20	---	29	28	27	---	---	< 20	37	---	< 20	< 20	---	< 20	< 20	---	< 20	< 20	---	< 20	---	< 20	< 20	---	< 20
TRH C15-C28	< 50	< 50	---	560	400	160	---	---	< 50	220	---	300	50	---	< 50	110	---	190	< 50	---	220	---	190	< 50	---	220
TRH C29-C36	< 50	< 50	---	260	190	87	---	---	< 50	210	---	270	56	---	< 50	88	---	140	< 50	---	95	---	140	< 50	---	95
TRH C6-C9	< 20	< 20	---	< 20	< 20	---	< 20	< 20	< 20	---	< 20	< 20	---	< 20	< 20	---	< 20	< 20	---	< 20	< 20	---	< 20	< 20	---	< 20
Naphthalene	< 0.5	< 0.5	---	< 0.5	< 0.5	---	< 0.5	< 0.5	< 0.5	---	< 0.5	< 0.5	< 0.5	---	< 0.5	< 0.5	---	< 0.5	< 0.5	---	< 0.5	---	< 0.5	< 0.5	---	< 0.5
TRH >C10-C16 (F2)	< 50	< 50	---	< 50	< 50	---	< 50	< 50	< 50	---	< 50	< 50	---	< 50	< 50	---	< 50	< 50	---	< 50	< 50	---	< 50	< 50	---	< 50
TRH >C10-C16 (F2) - Naphthalene	< 50	< 50	---	< 50	< 50	---	< 50	< 50	< 50	---	< 50	< 50	---	< 50	< 50	---	< 50	< 50	---	< 50	< 50	---	< 50	< 50	---	< 50
TRH C10-C40 Total (F bands)	< 100	< 100	---	< 100	< 100	---	790	460	210	---	< 100	500	---	650	< 100	---	< 100	170	---	290	< 100	---	290	< 100	---	280
TRH >C16-C34 (F3)	< 100	< 100	---	< 100	< 100	---	660	460	210	---	< 100	360	---	500	< 100	---	< 100	170	---	290	< 100	---	290	< 100	---	280
TRH >C34-C40 (F4)	< 100	< 100	---	< 100	< 100	---	130	< 100	< 100	---	< 100	140	---	150	< 100	---	< 100	< 100	---	< 100	< 100	---	< 100	< 100	---	< 100
TRH C6-C10	< 20	< 20	---	< 20	< 20	---	< 20	< 20	< 20	---	< 20	< 20	---	< 20	< 20	---	< 20	< 20	---	< 20	< 20	---	< 20	< 20	---	< 20
TRH C6-C10 minus BTEX (F1)	< 20	< 20	---	< 20	< 20	---	< 20	< 20	< 20	---	< 20	< 20	---	< 20	< 20	---	< 20	< 20	---	< 20	< 20	---	< 20	< 20	---	< 20
Benzene	< 0.1	< 0.1	---	< 0.1	< 0.1	---	< 0.1	< 0.1	< 0.1	---	< 0.1	< 0.1	---	< 0.1	< 0.1	---	< 0.1	< 0.1	---	< 0.1	< 0.1	---	< 0.1	< 0.1	---	< 0.1
Ethylbenzene	< 0.1	< 0.1	---	< 0.1	< 0.1	---	< 0.1	< 0.1	< 0.1	---	< 0.1	< 0.1	---	< 0.1	< 0.1	---	< 0.1	< 0.1	---	< 0.1	< 0.1	---	< 0.1	< 0.1	---	< 0.1
m/p-xylene	< 0.2	< 0.2	---	< 0.2	< 0.2	---	< 0.2	< 0.2	< 0.2	---	< 0.2	< 0.2	---	< 0.2	< 0.2	---	< 0.2	< 0.2	---	< 0.2	< 0.2	---	< 0.2	< 0.2	---	< 0.2
o-xylene	< 0.1	< 0.1	---	< 0.1	< 0.1	---	< 0.1	< 0.1	< 0.1	---	< 0.1	< 0.1	---	< 0.1	< 0.1	---	< 0.1	< 0.1	---	< 0.1	< 0.1	---	< 0.1	< 0.1	---	< 0.1
Toluene	< 0.1	< 0.1	---	< 0.1	< 0.1	---	< 0.1	< 0.1	< 0.1	---	< 0.1	< 0.1	---	< 0.1	< 0.1	---	< 0.1	< 0.1	---	< 0.1	< 0.1	---	< 0.1	< 0.1	---	< 0.1
Total Xylenes	< 0.3	< 0.3	---	< 0.3	< 0.3	---	< 0.3	< 0.3	< 0.3	---	< 0.3	< 0.3	---	< 0.3	< 0.3	---	< 0.3	< 0.3	---	< 0.3	< 0.3	---	< 0.3	< 0.3	---	< 0.3
4.4 - DDD	< 0.05	---	---	---	---	---	< 0.05	---	< 0.05	---	---	< 0.05	---	---	---	---	---	---	---	---	< 0.05	< 0.05	---	---	---	---
4.4 - DDE	< 0.05	---	---	---	---	---	< 0.05	---	0.77	---	---	< 0.05	---	---	---	---	---	---	---	---	< 0.05	< 0.05	---	---	---	---
4.4 - DDT	< 0.05	---	---	---	---	---	< 0.05	---	< 0.1	---	---	< 0.05	---	---	---	---	---	---	---	---	< 0.05	< 0.05	---	---	---	---
a - BHC	< 0.05	---	---	---	---	---	< 0.05	---	< 0.05	---	---	< 0.05	---	---	---	---	---	---	---	---	< 0.05	< 0.05	---	---	---	---
Aldrin	< 0.05	---	---	---	---	---	< 0.05	---	< 0.05	---	---	< 0.05	---	---	---	---	---	---	---	---	< 0.05	< 0.05	---	---	---	---
Aldrin + Dieldrin (total)	< 0.05	---	---	---	---	---	< 0.05	---	< 0.05	---	---	0.08	---	---	---	---	---	---	---	---	< 0.05	< 0.05	---	---	---	---
b - BHC	< 0.05	---	---	---	---	---	< 0.05	---	< 0.05	---	---	< 0.05	---	---	---	---	---	---	---	---	< 0.05	< 0.05	---	---	---	---
Chlordanes (total)	< 0.1	---	---	---	---	---	< 0.1	---	< 0.1	---	---	< 0.1	---	---	---	---	---	---	---	---	< 0.1	< 0.1	---	---	---	---
d - BHC	< 0.05	---	---	---	---	---	< 0.05	---	< 0.05	---	---	< 0.05	---	---	---	---	---	---	---	---	< 0.05	< 0.05	---	---	---	---
DDT + DDE + DDD (total)	< 0.05	---	---	---	---	---	< 0.05	---	0.77	---	---	< 0.05	---	---	---	---	---	---	---	---	< 0.05	< 0.05	---	---	---	---
Dieldrin	< 0.05	---	---	---	---	---	< 0.05	---	< 0.05	---	---	0.08	---	---	---	---	---	---	---	---	< 0.05	< 0.05	---	---	---	---
Endosulfan 1	< 0.05	---	---	---	---	---	< 0.05	---	< 0.05	---	---	< 0.05	---	---	---	---	---	---	---	---	< 0.05	< 0.05	---	---	---	---
Endosulfan 2	< 0.05	---	---	---	---	---	< 0.05	---	< 0.05	---	---	< 0.05	---	---	---	---	---	---	---	---	< 0.05	< 0.05	---	---	---	---
Endosulfan sulphate	< 0.05	---	---	---	---	---	< 0.05	---	< 0.05	---	---	< 0.05	---	---	---	---	---	---	---	---	< 0.05	< 0.05	---	---	---	---
Endrin	< 0.05	---	---	---	---	---	< 0.05	---	< 0.05	---	---	< 0.05	---	---	---	---	---	---	---	---	< 0.05	< 0.05	---	---	---	---
Endrin Aldehyde	< 0.05	---	---	---	---	---	< 0.05	---	< 0.05	---	---	< 0.05	---	---	---	---	---	---	---	---	< 0.05	< 0.05	---	---	---	---
Endrin Ketone	< 0.05	---	---	---	---	---	< 0.05	---	< 0.05	---	---	< 0.05	---	---	---	---	---	---	---	---	< 0.05	< 0.05	---	---	---	---
g-BHC (Lindane)	< 0.05	---	---	---	---	---	< 0.05	---	< 0.05	---	---	< 0.05	---	---	---	---	---	---	---	---	< 0.05	< 0.05	---	---	---	---
Heptachlor	< 0.05	---	---	---	---	---	< 0.05	---	< 0.05	---	---	< 0.05	---	---	---	---	---	---	---	---	< 0.05	< 0.05	---	---	---	---
Heptachlor epoxide	< 0.05	---	---	---	---	---	< 0.05	---	< 0.05	---	---	0.07	---	---	---	---	---	---	---	---	< 0.05	< 0.05	---	---	---	---
Hexachlorobenzene	< 0.05	---	---	---	---	---	< 0.05	---	< 0.05	---	---	< 0.05	---	---	---	---	---	---	---	---	< 0.05	< 0.05	---	---	---	---
Methoxychlor	< 0.2	---	---	---	---	---	< 0.2	---	< 0.2	---	---	< 0.2	---	---	---	---	---	---	---	---	< 0.2	< 0.2	---	---	---	---
Toxaphene	< 1	---	---	---	---	---	< 1	---	< 1	---	---	< 1	---	---	---	---	---	---	---	---	< 1	< 1	---	---	---	---
Vic EPA IWRG 621 OCP (total)	< 0.2	---	---	---	---	---	< 0.2	---	0.77	---	---	< 0.2	---	---	---	---	---	---	---	---	< 0.2	< 0.2	---	---	---	---
Vic EPA IWRG 621 Other OCP (total)	< 0.2	---	---	---	---	---	< 0.2	---	< 0.2	---	---	< 0.2	---	---	---	---	---	---	---	---	< 0.2	< 0.2	---	---	---	---
Alpha + Beta Endosulfan	< 0.05	---	---	---	---	---	< 0.05	---	< 0.05	---	---	< 0.05	---	---	---	---	---	---	---	---	< 0.05	< 0.05	---	---	---	---
Total PCB	< 0.5	---	---	---	---	---	< 0.5	---	< 0.5	---	---	< 0.5	---	---	---	---	---	---	---	---	< 0.5	<0.5	---	---	---	---

Highlighted concentration exceeds the adopted site criteria - Screening Levels for Direct Contact (mg/kg) - CRC Care 2011
Highlighted concentration exceeds the adopted site criteria - Inhalation / Vapour Intrusion HSLs (mg/kg) - NEPC 2013 (CLAY)
Highlighted concentration exceeds the adopted site criteria - Management Limits for TPH Fractions F1 - F4 in soil (mg/Kg) - NEPC 2013
Highlighted concentration exceeds the adopted site criteria - ESLs for TPH Fractions F1 - F4, BTEX and Benzo(a)pyrene - NEPC 2013
Highlighted concentration exceeds the adopted site criteria - Health Investigation Levels for Soil Contaminants - NEPC 2013

- No published criteria
NL Not Limiting
--- Not tested
* TPH Fractions Following Silica Gel Cleanup

LAR2
Charles Street Square, Parramatta NSW
Preliminary Acid Sulfate Soil Analysis
7957-ER-2-1

							Reference	BH01-1.5	BH03-2.5	BH04-2.0	BH05-2.0	BH06-1.0	BH07-2.0	BH08-1.0
							Sample ID	S19-Jn08526	S19-Jn08534	S19-My38771	S19-My38768	S19-My38764	S19-My38761	S19-My38757
Group	**Analyte**	**Units**	**PQL**	**ASSMAC (1998)**	**DATASET AVERAGE**	**DATASET MINIMUM**	**DATASET MAXIMUM**							
Field Screen	phf	pH Units	0	<4	**8.6**	**7.4**	**9.8**	7.5	8.4	8.2	7.4	9.1	9.8	9.5
	pHfox	pH Units	0	<3.5	**6.1**	**3.3**	**8.2**	6.2	**3.3**	**5.2**	**4.9**	**7.3**	**8.2**	**7.4**
	Reaction Rating	pH Units	0	2	**4.0**	**4**	**4**	4	4	4	4	4	4	4

Concentration exceed/less than the preliminary acid sulphate screening criteria.
Concentration exceeding the adopted action criteria (Table 4.4 ASSMAC Manual)
*** =** **No currently available criterion**
- = **No sample analysed**

Table LAR3 Charles Street Square, Parramatta NSW Soil Results & Adopted Site Criteria 7957-ER-2-1																					
					Sample ID		BH01-0.1	BH01-1.0	BH02-0.1	BH02-1.0	BH03-0.1	BH03-1.0	BH04-0.1	BH04-2.0	BH05-0.1	BH05-2.0	BH06-0.1	BH06-2.0	BH07-1.0	BH07-2.0	BH08-1.0	BH08-2.0
					Reference		S19-Jn08524	S19-Jn08525	S19-Jn08527	S19-Jn08528	S19-Jn08530	S19-Jn08531	S19-My38769	S19-My38771	S19-My38766	S19-My38768	S19-My38763	S19-My38765	S19-My38760	S19-My38761	S19-My38757	S19-My38758
					Date Sampled		7/6/2019	7/6/2019	7/6/2019	7/6/2019	7/6/2019	7/6/2019	21/5/2019	22/5/2019	23/5/2019	24/5/2019	25/5/2019	26/5/2019	27/5/2019	28/5/2019	29/5/2019	30/5/2019
					Sample Matrix		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Group	Analyte	Units	PQL	Asbestos Health Screening Level (w/w) - NEPC 2013																	
				HSL - C Recreational / Open Space	Data Set Minimum	Data Set Maximum																
Asbestos	Asbestos I.D	% w/w	0.001	0.001			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.34	<0.01	<0.01	Yes	Yes	Yes

Highlighted concentration exceeds the adopted site criteria - Asbestos Health Screening Level (w/w) - NEPC 2013

ACM	Asbestos Containing Material
FA and AF	Fibrous Asbestos and Asbestos Fines
-	No published criteria or sample not analysed
NL	Not Limiting
*****	Detected at below the limit of reporting

Table LAR4
Charles Street Square, Parramatta NSW
RPD Table
7957-ER-1-1

			Sample ID	BH03-1.0	BD1		BH03-1.0	SD1	
			Reference	S19-Jn08531	S19-Jn08535		S19-Jn08531	SE188519.001	
			Date Sampled	7/6/2019	7/6/2019		7/6/2019	7/6/2019	
			Sample Matrix	Soil	Soil		Soil	Soil	
Group	**Analyte**	**Units**	**LOR**			RPD (%)			RPD (%)
Metals	Arsenic	mg/kg	2	23	30	26	23	28	20
	Cadmium	mg/kg	0.4	0.5	0.5	0	0.5	<1	#VALUE!
	Chromium	mg/kg	5.0	29	32	10	29	26	11
	Copper	mg/kg	5.0	54	54	0	54	68	23
	Lead	mg/kg	5	170	200	16	170	203	18
	Mercury	mg/kg	0.1	< 0.1	< 0.1	#VALUE!	< 0.1	< 0.1	#VALUE!
	Nickel	mg/kg	5	34	30	13	34	38.0	11
	Zinc	mg/kg	5	260	290	11	260	340.0	27
TRH	F1	mg/kg	20	<20	<20	#VALUE!	<20	<10	#VALUE!
	F2	mg/kg	50	<50	<50	#VALUE!	<50	<50	#VALUE!
	F3	mg/kg	100	460	540	16	460	970	71
	F4	mg/kg	100	<100	<100	#VALUE!	<100	230	#VALUE!

RPD exceeding criteria
 # VALUE **Primary, Duplicate or Triplicate less than LOR and/or not analysed**

APPENDIX A

PROPOSED DEVELOPMENT PLANS

LEGEND

PAVING FINISH
- P1 Exposed aggregate concrete
- P2 Not used
- P3 Granite pavers

STAIRS
- S1 Solid precast concrete steps
- S2 Solid granite steps
- HR Stainless steel double handrail
- TI Tactile ground surface indicators
- Note: All steps to include 50mm insert safety stair bar

RAMPS
- R1 1:14 ramp (to DSAPT/AS1428.2 standard) Exposed aggregate concrete finish Stainless steel handrails both sides
- R2 1:20 walkway (to DSAPT/AS1428.2 standard) Exposed aggregate concrete finish Stainless steel handrail one side
- R3 1:20 walkway (to DSAPT/AS1428.2 standard) Granite pavers Stainless steel handrail one side

TERRACES
- T1 Precast concrete terraces
- T2 Timber terraces Recycled class 1 Australian hardwood
- T3 Concrete deck Exposed aggregate concrete finish
- TG Tree grate

STRUCTURES
- EO Exeloo 'Orbit' relocated existing automated toilets with new graphic 'skin'
- FO Ferry site office and artwork projectors to architect's detail
- SS Shade structure to architect's detail includes CCTV and PA system (relocated)

BALUSTRADES
- B1 Weathering steel pleated balustrade with integrated SS handrail
- B2 Flat steel balustrade, painted finish with integrated stainless steel handrails
- B3 Flat steel balustrade, painted finish

WALLS
- W1 Cast in situ concrete retaining wall
- W2 Cast in situ concrete retaining/seat wall
- W3 Cast in situ concrete terrace walls
- W4 Reinforced blockwork wall, stone clad
- W5 Reinforced blockwork wall, granite clad
- WE Precast concrete wedge block

SEATING
- SE1 Timber seat insert to precast terrace Recycled class 1 Australian hardwood
- SE2 Timber seat on steel frame Recycled class 1 Australian hardwood
- SE3 Precast concrete seat/low wall with timber seat insert Recycled class 1 Australian hardwood
- SE4 Precast concrete seat/low wall

ARTWORK
- PA New public artwork (by others) Static sculptural component (not part of current REF)

BIKE PARKING
- BE Bike rack - existing relocated Stainless steel bike hoops
- BH Bike hire (by others)
- BL Bike lockers (single, front opening) Powder coated finish
- BN Bike rack - new Stainless steel bike hoops

FURNITURE & FIXTURES
- BIN Rubbish bin
- BO Bollard
- DF Drinking fountain
- ELP Existing light pole
- FH Fire hydrant
- LP Light Pole – proposed
- OT Opal Top Up machine
- SIGN Plan Your Trip sign
- SMH Sewer manhole levels to be adjusted

PLANTING
- GB Garden bed with mass planting

TREES
- New tree
- Existing tree retained
- Existing tree removed

CONTOURS
- Existing contours @200mm
- Proposed contours @500mm
- Proposed contours @100mm

BOUNDARIES
- Project boundary
- Property boundary

NOTES
1. Sewer vent pipe to be relocated
2. Existing fire hydrant relocated

NOT FOR CONSTRUCTION

ORIGINAL IN COLOUR

Filename: Charles St Sq - DD-REF PLAN.vwx

REV	DESCRIPTION	DATE	APPROVED
1	REF PACKAGE	18/8/20	MS

REVISION HISTORY

GENERAL NOTES
1. Do not scale from this drawing. Use figured dimensions only.
2. Verify all dimensions on site. Refer any discrepencies to the Principal's Representative for resolution before proceeding.
3. If this drawing is unclear, ask for direction from the Principal's Representative.
4. Site check the location of utilities and services prior to the commencement of works. Refer any discrepencies to the Principal's Representative for resolution.

SURVEY
YSCO GEOMATICS
Suite 4, 114 Hampden Road
Artarmon NSW 2064
www.yscogeomatics.com.au
T 9419 8222

Survey drawing date	Grid	Datum
07/05/2019	MGA	AHD

DIMENSION STANDARD
Unless noted otherwise:
- All levels are shown in metres
- All dimensions are computer generated to 1mm

DESIGN TEAM
Architect
LAHZNIMMO ARCHITECTS
Suite 404, Flourmill Studios
3 Gladstone St, Newtown NSW 2042
T 02 9550 5200

Engineers
NORTHROP CONSULTING ENGINEERS
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Lighting & electrical • Hydraulic
Northrop Parramatta | T 02 9241 4188
Flood
Northrop Newcastle | T 02 4943 1777
Traffic
Northrop Canberra | T 02 6285 1822

CLIENT
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City of Parramatta
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Parramatta NSW 2150
PO Box 3
Parramatta NSW 2124

LANDSCAPE ARCHITECT | HEAD CONSULTANT
smm
Spackman Mossop Michaels Pty Ltd
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info@sm2group.com.au | T 02 9361 4549

SMM Project no: 18074

Approval	Director	Date
Tender		xx/xx/xx
Construction		xx/xx/xx

DRAWING STATUS
PART 5 ASSESSMENT

Designed	Drawing date	North
CD	August 2020	
Drawn	Plot date	
CD	18/8/20	
Checked		Scale
MS		1:200 @ A1

Sheet size: A1
Size on original: 0 10 20 30 40 50mm

PROJECT
CHARLES STREET SQUARE
CHARLES STREET, PARRAMATTA

Drawing name
GENERAL ARRANGEMENT PLAN

Drawing number: L-REF-102
Rev: 1

APPENDIX B

GROUNDWATER

help · contact · customise

State Overview
State Overvi...

Rivers and Streams
favourites · search · download sites · find a site
Real Time Da...

Daily River Reports
Daily River R...

Dams
favourites · search · download sites · find a site
Real Time Da...

Groundwater (Telemetered data)
favourites · search · download sites · find a site
Real Time Da...

All Groundwater Site details
search · download sites · find a site
All Groundw...
North Coa...
Hunter Re...
Greater S...
South Coa...
Northwest...
Central W...
Southwest...
Far West R...
Great Arte...
Coal Basins

Meteorology
favourites ·

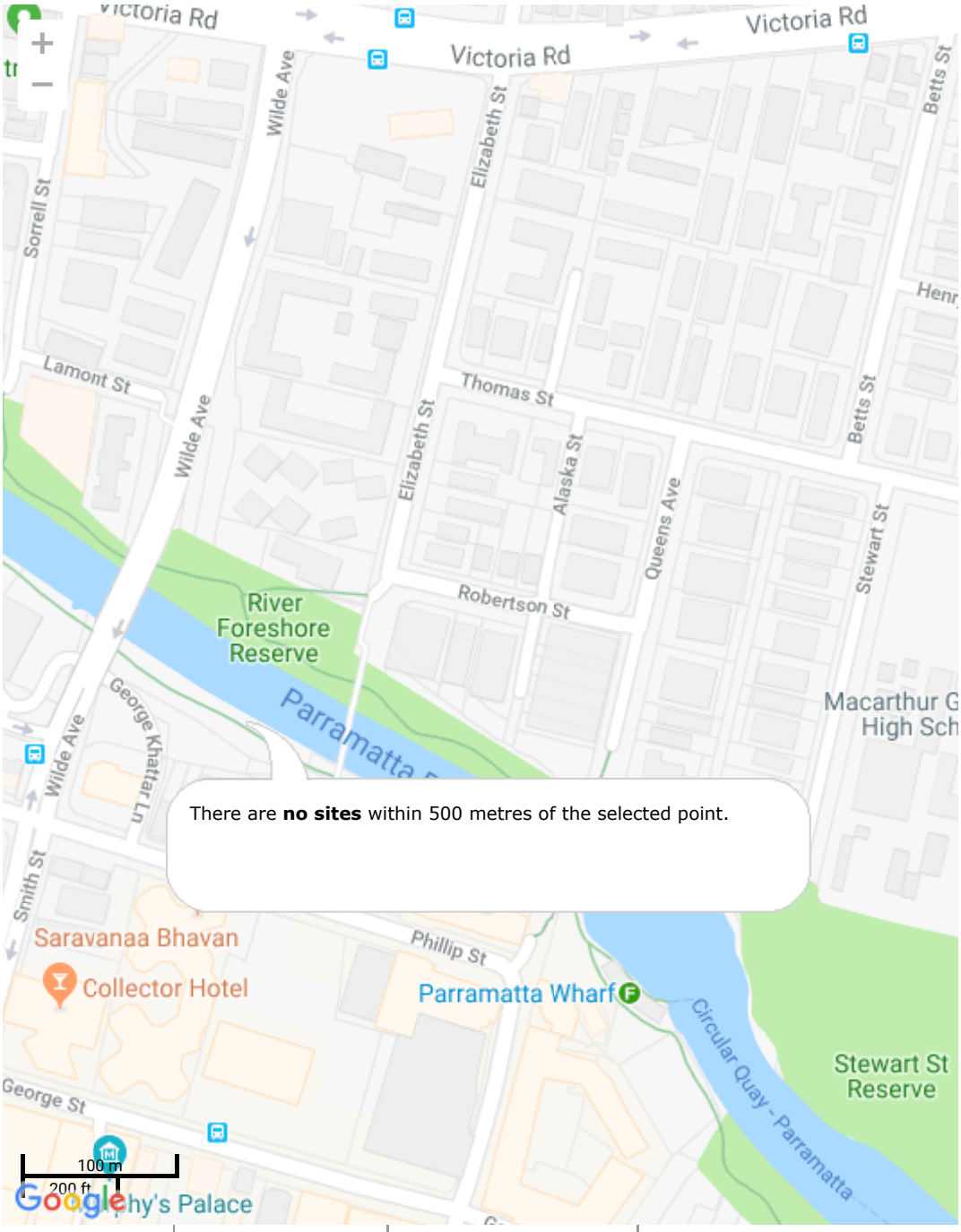
All Groundwater Site Details » All Groundwater Map

Greater Sydney Region

bookmark this page

All data times are Eastern Standard Time

Map



APPENDIX C

BOREHOLE LOGS

Alliance Geotechnical
ENGINEERING | ENVIRONMENTAL | TESTING
Your On-Site Geotechnical & Environmental Specialists

Alliance Geotechnical Pty Ltd
T: 1800 288 188
E: office@allgeo.com.au
W: www.allgeo.com.au

BH No: BH 1
Sheet: 1 of 1
Job No: 7957

Borehole Log

Client: Northrtop Consulting Engineers Pty. Ltd.
Project: Charles Street Square Upgrade
Location: Charles Street Square, Parramatta NSW 2150
Started: 7/6/19
Finished: 7/6/19
Borehole Size: 100mm Diameter

Rig Type: CE 180 R7 **Hole Location:** Refer Drawing 7957-GR-1-A **Driller:** M. Wilkins **Logged:** DJ
RL Surface: **Contractor:** BG Drilling **Bearing:** --- **Checked:** MS

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/ Density Index	Additional Observations
DT					--	PAVERS, thickness 50mm.		--	--	PAVERS
ADT					--	CONCRETE SLAB, thickness 70mm.		--	--	CONCRETE SUBBASE
					--	FILL: Silty clay, low plasticity, dark brown, with fine to medium subangular gravel, appears moderately compacted.		D	--	FILL
					CL	Sandy CLAY, low plasticity, brown to orange-brown, fine to medium grained sand, trace fine to medium subangular gravel.		D	(S - F)	ALLUVIAL
			1		SC	Clayey SAND, orange-brown, fine to medium grained, low plasticity fines.		D	L - MD	
							SPT 8, 11, 10 N=21			
			2		SP	SAND, poorly graded and fine to medium grained, light brown, trace low plasticity fines.		D	MD	
			3				SPT 8, 10, 8 N=18			
					SP	As above, but brown transitioning to light grey.		D	MD	
			4		--	SHALE, highly weathered, very low to low strength, dark grey, fine grained, very thinly bedded.		--	--	BEDROCK
							SPT 24, 25/50mm			
			5			Borehole BH 1 terminated at 4.65m				Borehole terminated at TC bit refusal.
			6							

Groundwater Not Encountered

BOREHOLE / TEST PIT 7957 LOGS.GPJ GINT STD AUSTRALIA.GDT 27/6/19

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BH No: BH 2
Sheet: 1 of 1
Job No: 7957

Borehole Log

Client: Northrtop Consulting Engineers Pty. Ltd.
Project: Charles Street Square Upgrade
Location: Charles Street Square, Parramatta NSW 2150
Started: 7/6/19
Finished: 7/6/19
Borehole Size: 100mm Diameter

Rig Type: CE 180 R7 **Hole Location:** Refer Drawing 7957-GR-1-A **Driller:** M. Wilkins **Logged:** DJ
RL Surface: **Contractor:** BG Drilling **Bearing:** --- **Checked:** MS

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/ Density Index	Additional Observations
DT					--	CONCRETE, thickness 220mm.		--	--	CONCRETE
ADT	Groundwater Not Encountered		1		--	FILL: Sand, brown to red-brown, poorly graded, fine to medium grained, appears poorly compacted.		D	--	FILL
			2		--	FILL: Clayey Sand, brown to red brown, poorly graded, fine to medium grained, low plasticity fines, trace organics (root fibres), appears poorly compacted.	SPT 2, 4, 4 N=8	D	--	
			3		CL	CLAY, low plasticity, brown to dark brown.		D	(VSt - H)	RESIDUAL
						Interbedded layers of SHALE (~50%) and CLAY (~50%), extremely weathered, very low strength, dark grey, fine grained.	SPT 11, 12, 13 N=25	D	H	BEDROCK
			4		--	SHALE, highly weathered, very low to low strength, dark grey, thinly bedded, fine grained, some ironstaining observed in select bedding planes.	SPT 25/100mm	--	--	
			5			Borehole BH 2 terminated at 4.8m				Borehole terminated at TC bit refusal.
			6							

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BH No: BH 3
Sheet: 1 of 1
Job No: 7957

Borehole Log

Client: Northrtop Consulting Engineers Pty. Ltd.
Project: Charles Street Square Upgrade
Location: Charles Street Square, Parramatta NSW 2150

Started: 7/6/19
Finished: 7/6/19
Borehole Size: 100mm Diameter

Rig Type: CE 180 R7 **Hole Location:** Refer Drawing 7957-GR-1-A **Driller:** M. Wilkins **Logged:** DJ
RL Surface: **Contractor:** BG Drilling **Bearing:** --- **Checked:** MS

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/ Density Index	Additional Observations
DT					--	CONCRETE, thickness 140mm.		--	--	CONCRETE
ADT			1		--	FILL: Clay, low to medium plasticity, dark brown, with fine to medium grained sand, with fine to medium subangular gravel, appears moderately compacted.		D	--	FILL
	GW Table at 1.5m				--	FILL: Sandy gravel, light grey, fine to coarse snadstone gravel (sandstone gravel is highly to moderately weathered, low to medium strength),fine to medium grained sand, appears well compacted.	SPT 12, 25, HB	S	--	
			2		--	FILL: Clay with gravel, low plasticity, dark brown, fine to medium sandstone gravel (sandstone gravel is highly weathered, low to meidum strength). appears well compacted.		S	--	
			3		--	FILL: Cobble and Boulers, grey, (cobbles and boulders are sandstone, highly weathered, low to medium strength), appears well compacted.	SPT 25/10mm	--	--	
			4			Borehole BH 3 terminated at 3.1m				Borehole terminated on TC bit refusal.
			5							
			6							

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BH No: BH 4
Sheet: 1 of 1
Job No: 7957

Borehole Log

Client: Northrtop Consulting Engineers Pty. Ltd.
Project: Charles Street Square Upgrade
Location: Charles Street Square, Parramatta NSW 2150
Started: 21/5/19
Finished: 21/5/19
Borehole Size: 100mm Diameter

Rig Type: Hanjin D&B 8D
Hole Location: Refer Drawing 7957-GR-1-A
Driller: C. Haddad
Logged: DJ
RL Surface:
Contractor: BG Drilling
Bearing: ---
Checked: MS

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/ Density Index	Additional Observations
DT	Groundwater Not Encountered				--	CONCRETE, thickness 600mm.		--	--	CONCRETE
ADT			1		--	FILL: Silty sandy clay, low plasticity, dark grey, trace fine to medium angular gravel, appears poorly compacted.		D	--	FILL
					CL	CLAY, low to medium plasticity, dark grey.	SPT 5, 4, 6 N=10	D	F - St	ALLUVIAL
			2		SC	Clayey SAND, fine to medium grained, brown to dark brown, low plasticity fines.		D	L - MD	ALLUVIAL/ RESIDUAL
			3		--	Interbedded layers of CLAY (~50%) and shale (~50%), extremely weathered, very low to low strength, dark grey, fine grained.	SPT 25, HB	D	H	BEDROCK
			4			Borehole BH 4 terminated at 3.3m				Borehole terminated at TC bit refusal
			5							
			6							

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BH No: BH 5
Sheet: 1 of 1
Job No: 7957

Borehole Log

Client: Northrtop Consulting Engineers Pty. Ltd.
Project: Charles Street Square Upgrade
Location: Charles Street Square, Parramatta NSW 2150
Started: 21/5/19
Finished: 21/5/19
Borehole Size: 100mm Diameter

Rig Type: Hanjin D&B 8D
Hole Location: Refer Drawing 7957-GR-1-A
Driller: C. Haddad
Logged: TD
RL Surface:
Contractor: BG Drilling
Bearing: ---
Checked: MS

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/ Density Index	Additional Observations
ADT					--	TOPSOIL: Silty sand, fine grained, brown, trace organics (root fibres).		M	--	TOPSOIL
	GW Table at 1.3m		1		--	FILL: Sandy clay, low plasticity, brown mottled red, medium to coarse subangular gravel, trace brick fragments, appears poorly to moderately compacted.		M	--	FILL
			2		--	FILL: Gravelly silty sand, medium to coarse grained, dark grey, fine gravel, appears poorly to moderately compacted.	SPT 5, 3, 3 N=6	W	--	
					--	CONCRETE SLAB		--	--	CONCRETE (high auger penetration resistance)
			3			Borehole BH 5 terminated at 2.8m				Borehole terminated at TC bit refusal.
			4							
			5							
			6							

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Sample Point No: BH6
Sheet: 1 of 1
Job No:7957

Borehole Log

Client: Northrtop Consulting Engineers Pty. Ltd.
Project: Charles Street Square Upgrade
Location: Charles Street Square Parramatta NSW

Started: 21/5/19
Finished: 7/6/19
Borehole Size: 100mm Diameter

Rig Type: Hanjin DB8 **Hole Location:** Refer Drawing 7957-GR-1-A **Driller:** C. Haddad **Logged:** TO
RL Surface: **Contractor:** BG Drilling **Bearing:** --- **Checked:** SW

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/ Density Index	Additional Observations
ADT	Groundwater Not Encountered				CL	FILL: Clayey SAND, fine sand, very loose, light brown		D	--	
			1		--	FILL: Clayey SAND w/ gravels, loose, brown		--	--	
					--	FILL: Sandy GRAVEL; medium gravels, loose, dark brown / grey		--	--	Geo-textile layer
			2		--	Increasing gravels		--	--	ACM fragment
						Borehole BH6 terminated at 2m				
			3							
			4							
			5							
			6							

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Sample Point No: BH7
Sheet: 1 of 1
Job No:7957

Borehole Log

Client: Northrtop Consulting Engineers Pty. Ltd.
Project: Charles Street Square Upgrade
Location: Charles Street Square Parramatta NSW

Started: 21/5/19
Finished: 21/5/19
Borehole Size: 100mm Diameter

Rig Type: Hanjin DB8 **Hole Location:** Refer Drawing 7957-GR-1-A **Driller:** C. Haddad **Logged:** TO
RL Surface: **Contractor:** BG Drilling **Bearing:** --- **Checked:** SW

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/ Density Index	Additional Observations
ADT	Groundwater Not Encountered		0		SW-SC	FILL: Clayey SAND w/ silt, very loose, light brown		D	--	
			1		SW-SC	FILL: Clayey SAND, loose, dark brown		D	--	Significant ACM
			2							
			3							
			4							
			5							
			6							

Borehole BH7 terminated at 2m

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Sample Point No: BH8
Sheet: 1 of 1
Job No:7957

Borehole Log

Client: Northrtop Consulting Engineers Pty. Ltd.
Project: Charles Street Square Upgrade
Location: Charles Street Square Parramatta NSW

Started: 21/5/19
Finished: 21/5/19
Borehole Size: 100mm Diameter

Rig Type: Hanjin DB8 **Hole Location:** Refer Drawing 7957-GR-1-A **Driller:** C. Haddad **Logged:** TO
RL Surface: **Contractor:** BG Drilling **Bearing:** --- **Checked:** SW

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/ Density Index	Additional Observations
ADT	Groundwater Not Encountered		1		SW-SC	FILL: Clayey Sand, medium sand, dry with coarse gravels		--	--	Significant ACM encountered
			2			Borehole BH8 terminated at 2m				Significant ACM encountered
			3							
			4							
			5							
			6							

BOREHOLE / TEST PIT 7957 LOGS - TODD.GPJ GINT STD AUSTRALIA.GDT 19/6/19

APPENDIX D

LABORATORY DOCUMENTS

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NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Steven Wallace**

Report **657558-S**
Project name PARRAMATTA
Project ID 7957
Received Date May 23, 2019

Client Sample ID			**BH08-0.1**	**BH08-1.0**	**BH08-2.0**	**BH07-0.1**
Sample Matrix			**Soil**	**Solid**	**Solid**	**Soil**
Eurofins | mgt Sample No.			**S19-My38756**	**S19-My38757**	**S19-My38758**	**S19-My38759**
Date Sampled			**May 21, 2019**	**May 21, 2019**	**May 21, 2019**	**May 21, 2019**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	-	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	-	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	-	220	110
TRH C29-C36	50	mg/kg	< 50	-	95	88
TRH C10-36 (Total)	50	mg/kg	< 50	-	315	198
BTEX						
Benzene	0.1	mg/kg	< 0.1	-	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	-	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	-	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	-	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	-	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	-	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	80	-	88	89
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	-	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	-	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	-	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	-	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	-	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	-	280	170
TRH >C34-C40	100	mg/kg	< 100	-	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	-	280	170
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	2.2
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	2.5
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	2.7
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	1.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	1.7
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	1.4
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	1.2
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	1.2
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	1.4

Client Sample ID			BH08-0.1	BH08-1.0	BH08-2.0	BH07-0.1
Sample Matrix			Soil	Solid	Solid	Soil
Eurofins | mgt Sample No.			S19-My38756	S19-My38757	S19-My38758	S19-My38759
Date Sampled			May 21, 2019	May 21, 2019	May 21, 2019	May 21, 2019
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	0.7	< 0.5	3.4
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	0.9
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	1.1
Pyrene	0.5	mg/kg	< 0.5	0.7	< 0.5	3.3
Total PAH*	0.5	mg/kg	< 0.5	1.4	< 0.5	17.1
2-Fluorobiphenyl (surr.)	1	%	92	107	103	98
p-Terphenyl-d14 (surr.)	1	%	98	111	106	101
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	-	-	-
4.4'-DDD	0.05	mg/kg	< 0.05	-	-	-
4.4'-DDE	0.05	mg/kg	< 0.05	-	-	-
4.4'-DDT	0.05	mg/kg	< 0.05	-	-	-
a-BHC	0.05	mg/kg	< 0.05	-	-	-
Aldrin	0.05	mg/kg	< 0.05	-	-	-
b-BHC	0.05	mg/kg	< 0.05	-	-	-
d-BHC	0.05	mg/kg	< 0.05	-	-	-
Dieldrin	0.05	mg/kg	< 0.05	-	-	-
Endosulfan I	0.05	mg/kg	< 0.05	-	-	-
Endosulfan II	0.05	mg/kg	< 0.05	-	-	-
Endosulfan sulphate	0.05	mg/kg	< 0.05	-	-	-
Endrin	0.05	mg/kg	< 0.05	-	-	-
Endrin aldehyde	0.05	mg/kg	< 0.05	-	-	-
Endrin ketone	0.05	mg/kg	< 0.05	-	-	-
g-BHC (Lindane)	0.05	mg/kg	< 0.05	-	-	-
Heptachlor	0.05	mg/kg	< 0.05	-	-	-
Heptachlor epoxide	0.05	mg/kg	< 0.05	-	-	-
Hexachlorobenzene	0.05	mg/kg	< 0.05	-	-	-
Methoxychlor	0.2	mg/kg	< 0.2	-	-	-
Toxaphene	1	mg/kg	< 1	-	-	-
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	-	-	-
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	-	-	-
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.2	-	-	-
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.2	-	-	-
Dibutylchlorendate (surr.)	1	%	80	-	-	-
Tetrachloro-m-xylene (surr.)	1	%	73	-	-	-
Polychlorinated Biphenyls						
Aroclor-1016	0.5	mg/kg	< 5	-	-	-
Aroclor-1221	0.1	mg/kg	< 1	-	-	-
Aroclor-1232	0.5	mg/kg	< 5	-	-	-
Aroclor-1242	0.5	mg/kg	< 5	-	-	-
Aroclor-1248	0.5	mg/kg	< 5	-	-	-
Aroclor-1254	0.5	mg/kg	< 5	-	-	-
Aroclor-1260	0.5	mg/kg	< 5	-	-	-
Total PCB*	0.5	mg/kg	<5	-	-	-
Dibutylchlorendate (surr.)	1	%	80	-	-	-
Tetrachloro-m-xylene (surr.)	1	%	73	-	-	-

Client Sample ID			BH08-0.1	BH08-1.0	BH08-2.0	BH07-0.1
Sample Matrix			Soil	Solid	Solid	Soil
Eurofins | mgt Sample No.			S19-My38756	S19-My38757	S19-My38758	S19-My38759
Date Sampled			May 21, 2019	May 21, 2019	May 21, 2019	May 21, 2019
Test/Reference	LOR	Unit				
% Moisture	1	%	7.4	9.1	8.1	4.3
Heavy Metals						
Arsenic	2	mg/kg	6.0	6.8	5.9	5.4
Cadmium	0.4	mg/kg	< 0.4	0.4	0.4	< 0.4
Chromium	5	mg/kg	9.1	11	12	16
Copper	5	mg/kg	31	30	27	57
Lead	5	mg/kg	54	88	77	97
Mercury	0.1	mg/kg	< 0.1	0.1	0.1	0.1
Nickel	5	mg/kg	7.1	9.6	11	19
Zinc	5	mg/kg	130	140	120	270
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	-	9.5	-	-
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	-	7.4	-	-
Reaction Ratings*[S05]		comment	-	4.0	-	-

Client Sample ID			BH07-1.0	BH07-2.0	BH06-0.1	BH06-1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S19-My38760	S19-My38761	S19-My38763	S19-My38764
Date Sampled			May 21, 2019	May 21, 2019	May 21, 2019	May 21, 2019
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	-	< 20	< 20	-
TRH C10-C14	20	mg/kg	-	< 20	< 20	-
TRH C15-C28	50	mg/kg	-	190	50	-
TRH C29-C36	50	mg/kg	-	140	56	-
TRH C10-36 (Total)	50	mg/kg	-	330	106	-
BTEX						
Benzene	0.1	mg/kg	-	< 0.1	< 0.1	-
Toluene	0.1	mg/kg	-	< 0.1	< 0.1	-
Ethylbenzene	0.1	mg/kg	-	< 0.1	< 0.1	-
m&p-Xylenes	0.2	mg/kg	-	< 0.2	< 0.2	-
o-Xylene	0.1	mg/kg	-	< 0.1	< 0.1	-
Xylenes - Total	0.3	mg/kg	-	< 0.3	< 0.3	-
4-Bromofluorobenzene (surr.)	1	%	-	74	90	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	-	< 0.5	< 0.5	-
TRH C6-C10	20	mg/kg	-	< 20	< 20	-
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	-	< 20	< 20	-
TRH >C10-C16	50	mg/kg	-	< 50	< 50	-
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	-	< 50	< 50	-
TRH >C16-C34	100	mg/kg	-	290	< 100	-
TRH >C34-C40	100	mg/kg	-	< 100	< 100	-
TRH >C10-C40 (total)*	100	mg/kg	-	290	< 100	-

Client Sample ID			BH07-1.0	BH07-2.0	BH06-0.1	BH06-1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S19-My38760	S19-My38761	S19-My38763	S19-My38764
Date Sampled			May 21, 2019	May 21, 2019	May 21, 2019	May 21, 2019
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	0.6	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	0.6	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	1.2	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	99	102	99	107
p-Terphenyl-d14 (surr.)	1	%	103	107	104	114
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	-	< 0.1	-	-
4.4'-DDD	0.05	mg/kg	-	< 0.05	-	-
4.4'-DDE	0.05	mg/kg	-	< 0.05	-	-
4.4'-DDT	0.05	mg/kg	-	< 0.05	-	-
a-BHC	0.05	mg/kg	-	< 0.05	-	-
Aldrin	0.05	mg/kg	-	< 0.05	-	-
b-BHC	0.05	mg/kg	-	< 0.05	-	-
d-BHC	0.05	mg/kg	-	< 0.05	-	-
Dieldrin	0.05	mg/kg	-	< 0.05	-	-
Endosulfan I	0.05	mg/kg	-	< 0.05	-	-
Endosulfan II	0.05	mg/kg	-	< 0.05	-	-
Endosulfan sulphate	0.05	mg/kg	-	< 0.05	-	-
Endrin	0.05	mg/kg	-	< 0.05	-	-
Endrin aldehyde	0.05	mg/kg	-	< 0.05	-	-
Endrin ketone	0.05	mg/kg	-	< 0.05	-	-
g-BHC (Lindane)	0.05	mg/kg	-	< 0.05	-	-
Heptachlor	0.05	mg/kg	-	< 0.05	-	-
Heptachlor epoxide	0.05	mg/kg	-	< 0.05	-	-
Hexachlorobenzene	0.05	mg/kg	-	< 0.05	-	-
Methoxychlor	0.2	mg/kg	-	< 0.2	-	-
Toxaphene	1	mg/kg	-	< 1	-	-
Aldrin and Dieldrin (Total)*	0.05	mg/kg	-	< 0.05	-	-
DDT + DDE + DDD (Total)*	0.05	mg/kg	-	< 0.05	-	-
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	-	< 0.2	-	-
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	-	< 0.2	-	-
Dibutylchlorendate (surr.)	1	%	-	71	-	-
Tetrachloro-m-xylene (surr.)	1	%	-	67	-	-

Client Sample ID			BH07-1.0	BH07-2.0	BH06-0.1	BH06-1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S19-My38760	S19-My38761	S19-My38763	S19-My38764
Date Sampled			May 21, 2019	May 21, 2019	May 21, 2019	May 21, 2019
Test/Reference	LOR	Unit				
Polychlorinated Biphenyls						
Aroclor-1016	0.5	mg/kg	-	< 0.5	-	-
Aroclor-1221	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1232	0.5	mg/kg	-	< 0.5	-	-
Aroclor-1242	0.5	mg/kg	-	< 0.5	-	-
Aroclor-1248	0.5	mg/kg	-	< 0.5	-	-
Aroclor-1254	0.5	mg/kg	-	< 0.5	-	-
Aroclor-1260	0.5	mg/kg	-	< 0.5	-	-
Total PCB*	0.5	mg/kg	-	< 0.5	-	-
Dibutylchlorendate (surr.)	1	%	-	71	-	-
Tetrachloro-m-xylene (surr.)	1	%	-	67	-	-
% Moisture	1	%	12	20	4.3	6.2
Heavy Metals						
Arsenic	2	mg/kg	10	6.8	5.3	3.8
Cadmium	0.4	mg/kg	2.8	1.0	< 0.4	< 0.4
Chromium	5	mg/kg	18	85	10	10
Copper	5	mg/kg	820	230	33	34
Lead	5	mg/kg	230	74	71	62
Mercury	0.1	mg/kg	< 0.1	< 0.1	0.1	< 0.1
Nickel	5	mg/kg	24	34	11	17
Zinc	5	mg/kg	760	220	120	160
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	-	9.8	-	9.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	-	8.2	-	7.3
Reaction Ratings*[S05]		comment	-	4.0	-	4.0

Client Sample ID			BH06-2.0	BH05-0.1	BH05-1.0	BH05-2.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S19-My38765	S19-My38766	S19-My38767	S19-My38768
Date Sampled			May 21, 2019	May 21, 2019	May 21, 2019	May 21, 2019
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	-	< 20
TRH C10-C14	20	mg/kg	< 20	37	-	< 20
TRH C15-C28	50	mg/kg	< 50	220	-	300
TRH C29-C36	50	mg/kg	< 50	210	-	270
TRH C10-36 (Total)	50	mg/kg	< 50	467	-	570
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	-	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	-	< 0.3
4-Bromofluorobenzene (surr.)	1	%	90	83	-	79

Client Sample ID			BH06-2.0	BH05-0.1	BH05-1.0	BH05-2.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S19-My38765	S19-My38766	S19-My38767	S19-My38768
Date Sampled			May 21, 2019	May 21, 2019	May 21, 2019	May 21, 2019
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	-	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	-	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	-	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	-	< 50
TRH >C16-C34	100	mg/kg	< 100	360	-	500
TRH >C34-C40	100	mg/kg	< 100	140	-	150
TRH >C10-C40 (total)*	100	mg/kg	< 100	500	-	650
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	4.1	15	10
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	4.1	15	10
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	4.1	15	10
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	1.8	0.9
Anthracene	0.5	mg/kg	< 0.5	< 0.5	2.4	1.1
Benz(a)anthracene	0.5	mg/kg	< 0.5	2.2	11	5.6
Benzo(a)pyrene	0.5	mg/kg	< 0.5	2.6	9.6	6.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	2.4	6.1	5.7
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	1.8	5.5	4.3
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	1.9	8.6	5.1
Chrysene	0.5	mg/kg	< 0.5	2.3	9.8	5.9
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	0.6	2.0	1.4
Fluoranthene	0.5	mg/kg	< 0.5	4.9	21	13
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	1.6	4.8	3.8
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	1.8	8.3	4.6
Pyrene	0.5	mg/kg	< 0.5	4.5	21	12
Total PAH*	0.5	mg/kg	< 0.5	26.6	111.9	69.9
2-Fluorobiphenyl (surr.)	1	%	96	109	104	102
p-Terphenyl-d14 (surr.)	1	%	101	108	112	103
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	-	< 0.1	-	-
4.4'-DDD	0.05	mg/kg	-	< 0.05	-	-
4.4'-DDE	0.05	mg/kg	-	< 0.05	-	-
4.4'-DDT	0.05	mg/kg	-	< 0.05	-	-
a-BHC	0.05	mg/kg	-	< 0.05	-	-
Aldrin	0.05	mg/kg	-	< 0.05	-	-
b-BHC	0.05	mg/kg	-	< 0.05	-	-
d-BHC	0.05	mg/kg	-	< 0.05	-	-
Dieldrin	0.05	mg/kg	-	0.08	-	-
Endosulfan I	0.05	mg/kg	-	< 0.05	-	-
Endosulfan II	0.05	mg/kg	-	< 0.05	-	-
Endosulfan sulphate	0.05	mg/kg	-	< 0.05	-	-
Endrin	0.05	mg/kg	-	< 0.05	-	-
Endrin aldehyde	0.05	mg/kg	-	< 0.05	-	-
Endrin ketone	0.05	mg/kg	-	< 0.05	-	-
g-BHC (Lindane)	0.05	mg/kg	-	< 0.05	-	-
Heptachlor	0.05	mg/kg	-	< 0.05	-	-

Client Sample ID			BH06-2.0	BH05-0.1	BH05-1.0	BH05-2.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S19-My38765	S19-My38766	S19-My38767	S19-My38768
Date Sampled			May 21, 2019	May 21, 2019	May 21, 2019	May 21, 2019
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Heptachlor epoxide	0.05	mg/kg	-	0.07	-	-
Hexachlorobenzene	0.05	mg/kg	-	< 0.05	-	-
Methoxychlor	0.2	mg/kg	-	< 0.2	-	-
Toxaphene	1	mg/kg	-	< 1	-	-
Aldrin and Dieldrin (Total)*	0.05	mg/kg	-	0.08	-	-
DDT + DDE + DDD (Total)*	0.05	mg/kg	-	< 0.05	-	-
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	-	< 0.2	-	-
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	-	< 0.2	-	-
Dibutylchlorendate (surr.)	1	%	-	83	-	-
Tetrachloro-m-xylene (surr.)	1	%	-	68	-	-
Polychlorinated Biphenyls						
Aroclor-1016	0.5	mg/kg	-	< 0.5	-	-
Aroclor-1221	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1232	0.5	mg/kg	-	< 0.5	-	-
Aroclor-1242	0.5	mg/kg	-	< 0.5	-	-
Aroclor-1248	0.5	mg/kg	-	< 0.5	-	-
Aroclor-1254	0.5	mg/kg	-	< 0.5	-	-
Aroclor-1260	0.5	mg/kg	-	< 0.5	-	-
Total PCB*	0.5	mg/kg	-	< 0.5	-	-
Dibutylchlorendate (surr.)	1	%	-	83	-	-
Tetrachloro-m-xylene (surr.)	1	%	-	68	-	-
% Moisture	1	%	8.6	15	22	22
Heavy Metals						
Arsenic	2	mg/kg	3.2	6.1	85	5.9
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	7.6	19	18	14
Copper	5	mg/kg	21	32	14	16
Lead	5	mg/kg	54	83	110	75
Mercury	0.1	mg/kg	< 0.1	0.1	0.2	0.2
Nickel	5	mg/kg	6.6	15	8.2	6.4
Zinc	5	mg/kg	110	220	59	85
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	-	-	-	7.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	-	-	-	4.9
Reaction Ratings*[S05]		comment	-	-	-	4.0

Client Sample ID			BH04-0.1	BH04-1.0	BH04-2.0	BH5-2.6
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S19-My38769	S19-My38770	S19-My38771	S19-My38773
Date Sampled			May 21, 2019	May 21, 2019	May 21, 2019	May 21, 2019
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	-	< 20	-
TRH C10-C14	20	mg/kg	27	-	< 20	-
TRH C15-C28	50	mg/kg	160	-	< 50	-
TRH C29-C36	50	mg/kg	87	-	< 50	-
TRH C10-36 (Total)	50	mg/kg	274	-	< 50	-

Client Sample ID			BH04-0.1	BH04-1.0	BH04-2.0	BH5-2.6
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S19-My38769	S19-My38770	S19-My38771	S19-My38773
Date Sampled			May 21, 2019	May 21, 2019	May 21, 2019	May 21, 2019
Test/Reference	LOR	Unit				
BTEX						
Benzene	0.1	mg/kg	< 0.1	-	< 0.1	-
Toluene	0.1	mg/kg	< 0.1	-	< 0.1	-
Ethylbenzene	0.1	mg/kg	< 0.1	-	< 0.1	-
m&p-Xylenes	0.2	mg/kg	< 0.2	-	< 0.2	-
o-Xylene	0.1	mg/kg	< 0.1	-	< 0.1	-
Xylenes - Total	0.3	mg/kg	< 0.3	-	< 0.3	-
4-Bromofluorobenzene (surr.)	1	%	82	-	88	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	-	< 0.5	-
TRH C6-C10	20	mg/kg	< 20	-	< 20	-
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	-	< 20	-
TRH >C10-C16	50	mg/kg	< 50	-	< 50	-
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	-	< 50	-
TRH >C16-C34	100	mg/kg	210	-	< 100	-
TRH >C34-C40	100	mg/kg	< 100	-	< 100	-
TRH >C10-C40 (total)*	100	mg/kg	210	-	< 100	-
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	3.1	< 0.5	< 0.5	-
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	3.3	0.6	0.6	-
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	3.6	1.2	1.2	-
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Anthracene	0.5	mg/kg	0.8	< 0.5	< 0.5	-
Benz(a)anthracene	0.5	mg/kg	2.4	< 0.5	< 0.5	-
Benzo(a)pyrene	0.5	mg/kg	2.3	< 0.5	< 0.5	-
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	1.8	< 0.5	< 0.5	-
Benzo(g.h.i)perylene	0.5	mg/kg	1.3	< 0.5	< 0.5	-
Benzo(k)fluoranthene	0.5	mg/kg	1.9	< 0.5	< 0.5	-
Chrysene	0.5	mg/kg	2.1	< 0.5	< 0.5	-
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Fluoranthene	0.5	mg/kg	5.5	< 0.5	< 0.5	-
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	1.1	< 0.5	< 0.5	-
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Phenanthrene	0.5	mg/kg	2.2	< 0.5	< 0.5	-
Pyrene	0.5	mg/kg	4.8	< 0.5	< 0.5	-
Total PAH*	0.5	mg/kg	26.2	< 0.5	< 0.5	-
2-Fluorobiphenyl (surr.)	1	%	109	103	105	-
p-Terphenyl-d14 (surr.)	1	%	106	105	107	-
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	-	-	-
4.4'-DDD	0.05	mg/kg	< 0.05	-	-	-
4.4'-DDE	0.05	mg/kg	0.77	-	-	-
4.4'-DDT	0.05	mg/kg	< 0.1	-	-	-
a-BHC	0.05	mg/kg	< 0.05	-	-	-
Aldrin	0.05	mg/kg	< 0.05	-	-	-
b-BHC	0.05	mg/kg	< 0.05	-	-	-
d-BHC	0.05	mg/kg	< 0.05	-	-	-
Dieldrin	0.05	mg/kg	< 0.05	-	-	-

Client Sample ID			BH04-0.1	BH04-1.0	BH04-2.0	BH5-2.6
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S19-My38769	S19-My38770	S19-My38771	S19-My38773
Date Sampled			May 21, 2019	May 21, 2019	May 21, 2019	May 21, 2019
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Endosulfan I	0.05	mg/kg	< 0.05	-	-	-
Endosulfan II	0.05	mg/kg	< 0.05	-	-	-
Endosulfan sulphate	0.05	mg/kg	< 0.05	-	-	-
Endrin	0.05	mg/kg	< 0.05	-	-	-
Endrin aldehyde	0.05	mg/kg	< 0.05	-	-	-
Endrin ketone	0.05	mg/kg	< 0.05	-	-	-
g-BHC (Lindane)	0.05	mg/kg	< 0.05	-	-	-
Heptachlor	0.05	mg/kg	< 0.05	-	-	-
Heptachlor epoxide	0.05	mg/kg	< 0.05	-	-	-
Hexachlorobenzene	0.05	mg/kg	< 0.05	-	-	-
Methoxychlor	0.2	mg/kg	< 0.2	-	-	-
Toxaphene	1	mg/kg	< 1	-	-	-
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	-	-	-
DDT + DDE + DDD (Total)*	0.05	mg/kg	0.77	-	-	-
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	0.77	-	-	-
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.2	-	-	-
Dibutylchlorendate (surr.)	1	%	68	-	-	-
Tetrachloro-m-xylene (surr.)	1	%	69	-	-	-
Polychlorinated Biphenyls						
Aroclor-1016	0.5	mg/kg	< 0.5	-	-	-
Aroclor-1221	0.1	mg/kg	< 0.1	-	-	-
Aroclor-1232	0.5	mg/kg	< 0.5	-	-	-
Aroclor-1242	0.5	mg/kg	< 0.5	-	-	-
Aroclor-1248	0.5	mg/kg	< 0.5	-	-	-
Aroclor-1254	0.5	mg/kg	< 0.5	-	-	-
Aroclor-1260	0.5	mg/kg	< 0.5	-	-	-
Total PCB*	0.5	mg/kg	< 0.5	-	-	-
Dibutylchlorendate (surr.)	1	%	68	-	-	-
Tetrachloro-m-xylene (surr.)	1	%	69	-	-	-
Chloride	10	mg/kg	-	-	-	35
Conductivity (1:5 aqueous extract at 25°C as rec.)	5	uS/cm	-	-	-	150
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	-	-	-	7.1
Resistivity*	0.5	ohm.m	-	-	-	330
Sulphate (as SO4)	10	mg/kg	-	-	-	210
% Moisture	1	%	19	12	11	21
Heavy Metals						
Arsenic	2	mg/kg	5.4	3.3	< 2	-
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	-
Chromium	5	mg/kg	19	8.7	< 5	-
Copper	5	mg/kg	59	23	8.5	-
Lead	5	mg/kg	87	41	7.2	-
Mercury	0.1	mg/kg	0.1	0.1	< 0.1	-
Nickel	5	mg/kg	28	6.1	< 5	-
Zinc	5	mg/kg	180	100	16	-
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	-	-	8.2	-
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	-	-	5.2	-
Reaction Ratings*[S05]		comment	-	-	4.0	-

Client Sample ID			BH4(1.0)
Sample Matrix			**Soil**
Eurofins | mgt Sample No.			**S19-My38774**
Date Sampled			**May 21, 2019**
Test/Reference	LOR	Unit	
Chloride	10	mg/kg	21
Conductivity (1:5 aqueous extract at 25°C as rec.)	5	uS/cm	230
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	7.5
Resistivity*	0.5	ohm.m	220
Sulphate (as SO4)	10	mg/kg	140
% Moisture	1	%	12

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Sydney	May 29, 2019	14 Day
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Sydney	May 29, 2019	14 Day
- Method: LTM-ORG-2150 VOCs in Soils Liquid and other Aqueous Matrices			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	May 29, 2019	14 Day
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	May 29, 2019	14 Day
- Method: LTM-ORG-2010 TRH C6-C40			
Polycyclic Aromatic Hydrocarbons	Sydney	May 29, 2019	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Metals M8	Sydney	May 29, 2019	28 Day
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Organochlorine Pesticides	Sydney	May 29, 2019	14 Day
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water			
Polychlorinated Biphenyls	Sydney	May 29, 2019	28 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water			
Chloride	Sydney	May 29, 2019	28 Day
- Method: E045 /E047 Chloride			
Conductivity (1:5 aqueous extract at 25°C as rec.)	Sydney	May 29, 2019	7 Day
- Method: LTM-INO-4030 Conductivity			
pH (1:5 Aqueous extract at 25°C as rec.)	Sydney	May 29, 2019	7 Day
- Method: LTM-GEN-7090 pH in soil by ISE			
Sulphate (as SO4)	Sydney	May 29, 2019	28 Day
- Method: E045 Anions by Ion Chromatography			
% Moisture	Sydney	May 27, 2019	14 Day
- Method: LTM-GEN-7080 Moisture			
Acid Sulfate Soils Field pH Test	Brisbane	May 29, 2019	7 Days
- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			

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NATA # 1261
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Company Name: Alliance Geotechnical
Address: 10 Welder Road
Seven Hills
NSW 2147

Project Name: PARRAMATTA
Project ID: 7957

Order No.:
Report #: 657558
Phone: 1800 288 188
Fax: 02 9675 1888

Received: May 23, 2019 10:29 AM
Due: May 30, 2019
Priority: 5 Day
Contact Name: Steven Wallace

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Asbestos - AS4964	Asbestos Absence /Presence	HOLD	Polycyclic Aromatic Hydrocarbons	Acid Sulfate Soils Field pH Test	Metals M8	Eurofins | mgt Suite B13	Aggressivity Soil Set	Moisture Set	Eurofins | mgt Suite B7
Melbourne Laboratory - NATA Site # 1254 & 14271															
Sydney Laboratory - NATA Site # 18217						X	X	X	X		X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794										X					
Perth Laboratory - NATA Site # 23736															
External Laboratory															
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**										
1	BH08-0.1	May 21, 2019		Soil	S19-My38756							X		X	X
2	BH08-1.0	May 21, 2019		Soil	S19-My38757	X			X	X	X			X	
3	BH08-2.0	May 21, 2019		Soil	S19-My38758	X								X	X
4	BH07-0.1	May 21, 2019		Soil	S19-My38759									X	X
5	BH07-1.0	May 21, 2019		Soil	S19-My38760	X			X		X			X	
6	BH07-2.0	May 21, 2019		Soil	S19-My38761					X		X		X	X
7	BH07-2.0	May 21, 2019		Building Materials	S19-My38762		X								
8	BH06-0.1	May 21, 2019		Soil	S19-My38763	X								X	X
9	BH06-1.0	May 21, 2019		Soil	S19-My38764				X	X	X			X	

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Melbourne Laboratory - NATA Site # 1254 & 14271															
Sydney Laboratory - NATA Site # 18217						X	X	X	X		X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794										X					
Perth Laboratory - NATA Site # 23736															
10	BH06-2.0	May 21, 2019		Soil	S19-My38765	X								X	X
11	BH05-0.1	May 21, 2019		Soil	S19-My38766	X						X		X	X
12	BH05-1.0	May 21, 2019		Soil	S19-My38767				X		X			X	
13	BH05-2.0	May 21, 2019		Soil	S19-My38768	X				X				X	X
14	BH04-0.1	May 21, 2019		Soil	S19-My38769	X						X		X	X
15	BH04-1.0	May 21, 2019		Soil	S19-My38770				X		X			X	
16	BH04-2.0	May 21, 2019		Soil	S19-My38771	X				X				X	X
17	BH08-0.1	May 21, 2019		Building Materials	S19-My38772			X							
18	BH5-2.6	May 21, 2019		Soil	S19-My38773								X	X	
19	BH4(1.0)	May 21, 2019		Soil	S19-My38774								X	X	
Test Counts						9	1	1	5	5	5	4	2	17	10

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure, April 2011 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.2 2018
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.2 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/kg	< 20			20	Pass	
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.5			0.5	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/kg	< 0.1			0.1	Pass	
4.4'-DDD	mg/kg	< 0.05			0.05	Pass	
4.4'-DDE	mg/kg	< 0.05			0.05	Pass	
4.4'-DDT	mg/kg	< 0.05			0.05	Pass	
a-BHC	mg/kg	< 0.05			0.05	Pass	
Aldrin	mg/kg	< 0.05			0.05	Pass	
b-BHC	mg/kg	< 0.05			0.05	Pass	
d-BHC	mg/kg	< 0.05			0.05	Pass	
Dieldrin	mg/kg	< 0.05			0.05	Pass	
Endosulfan I	mg/kg	< 0.05			0.05	Pass	
Endosulfan II	mg/kg	< 0.05			0.05	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Endosulfan sulphate	mg/kg	< 0.05			0.05	Pass	
Endrin	mg/kg	< 0.05			0.05	Pass	
Endrin aldehyde	mg/kg	< 0.05			0.05	Pass	
Endrin ketone	mg/kg	< 0.05			0.05	Pass	
g-BHC (Lindane)	mg/kg	< 0.05			0.05	Pass	
Heptachlor	mg/kg	< 0.05			0.05	Pass	
Heptachlor epoxide	mg/kg	< 0.05			0.05	Pass	
Hexachlorobenzene	mg/kg	< 0.05			0.05	Pass	
Methoxychlor	mg/kg	< 0.2			0.2	Pass	
Toxaphene	mg/kg	< 1			1	Pass	
Method Blank							
Polychlorinated Biphenyls							
Aroclor-1016	mg/kg	< 0.5			0.5	Pass	
Aroclor-1221	mg/kg	< 0.1			0.1	Pass	
Aroclor-1232	mg/kg	< 0.5			0.5	Pass	
Aroclor-1242	mg/kg	< 0.5			0.5	Pass	
Aroclor-1248	mg/kg	< 0.5			0.5	Pass	
Aroclor-1254	mg/kg	< 0.5			0.5	Pass	
Aroclor-1260	mg/kg	< 0.5			0.5	Pass	
Total PCB*	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Chloride	mg/kg	< 10			10	Pass	
Conductivity (1:5 aqueous extract at 25°C as rec.)	uS/cm	< 5			5	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	87			70-130	Pass	
TRH C10-C14	%	106			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	101			70-130	Pass	
Toluene	%	98			70-130	Pass	
Ethylbenzene	%	100			70-130	Pass	
m&p-Xylenes	%	101			70-130	Pass	
o-Xylene	%	100			70-130	Pass	
Xylenes - Total	%	101			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	119			70-130	Pass	
TRH C6-C10	%	84			70-130	Pass	
TRH >C10-C16	%	111			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	103			70-130	Pass	
Acenaphthylene	%	100			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Anthracene	%	102			70-130	Pass	
Benz(a)anthracene	%	98			70-130	Pass	
Benzo(a)pyrene	%	99			70-130	Pass	
Benzo(b&j)fluoranthene	%	92			70-130	Pass	
Benzo(g.h.i)perylene	%	92			70-130	Pass	
Benzo(k)fluoranthene	%	112			70-130	Pass	
Chrysene	%	101			70-130	Pass	
Dibenz(a.h)anthracene	%	95			70-130	Pass	
Fluoranthene	%	103			70-130	Pass	
Fluorene	%	103			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	96			70-130	Pass	
Naphthalene	%	98			70-130	Pass	
Phenanthrene	%	101			70-130	Pass	
Pyrene	%	101			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
Chlordanes - Total	%	120			70-130	Pass	
4.4'-DDD	%	117			70-130	Pass	
4.4'-DDE	%	112			70-130	Pass	
4.4'-DDT	%	92			70-130	Pass	
a-BHC	%	121			70-130	Pass	
Aldrin	%	115			70-130	Pass	
b-BHC	%	106			70-130	Pass	
d-BHC	%	117			70-130	Pass	
Dieldrin	%	114			70-130	Pass	
Endosulfan I	%	114			70-130	Pass	
Endosulfan II	%	108			70-130	Pass	
Endosulfan sulphate	%	101			70-130	Pass	
Endrin	%	103			70-130	Pass	
Endrin aldehyde	%	86			70-130	Pass	
Endrin ketone	%	80			70-130	Pass	
g-BHC (Lindane)	%	118			70-130	Pass	
Heptachlor	%	111			70-130	Pass	
Heptachlor epoxide	%	120			70-130	Pass	
Hexachlorobenzene	%	119			70-130	Pass	
Methoxychlor	%	71			70-130	Pass	
Toxaphene	%	84			70-130	Pass	
LCS - % Recovery							
Polychlorinated Biphenyls							
Aroclor-1260	%	70			70-130	Pass	
LCS - % Recovery							
Chloride	%	104			70-130	Pass	
Conductivity (1:5 aqueous extract at 25°C as rec.)	%	102			70-130	Pass	
Resistivity*	%	102			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	106			70-130	Pass	
Cadmium	%	107			70-130	Pass	
Chromium	%	107			70-130	Pass	
Copper	%	105			70-130	Pass	
Lead	%	109			70-130	Pass	
Mercury	%	105			70-130	Pass	
Nickel	%	107			70-130	Pass	
Zinc	%	106			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	S19-My33053	NCP	%	87			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	S19-My33053	NCP	%	100			70-130	Pass	
Toluene	S19-My33053	NCP	%	97			70-130	Pass	
Ethylbenzene	S19-My33053	NCP	%	97			70-130	Pass	
m&p-Xylenes	S19-My33053	NCP	%	98			70-130	Pass	
o-Xylene	S19-My33053	NCP	%	97			70-130	Pass	
Xylenes - Total	S19-My33053	NCP	%	98			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S19-My33053	NCP	%	70			70-130	Pass	
TRH C6-C10	S19-My33053	NCP	%	85			70-130	Pass	
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
4.4'-DDD	S19-My45671	NCP	%	122			70-130	Pass	
Methoxychlor	S19-My45671	NCP	%	70			70-130	Pass	
Toxaphene	S19-My15842	NCP	%	95			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Copper	S19-My42075	NCP	%	95			70-130	Pass	
Lead	S19-My42075	NCP	%	100			70-130	Pass	
Zinc	S19-My42075	NCP	%	84			70-130	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	S19-My38760	CP	%	97			70-130	Pass	
Acenaphthylene	S19-My38760	CP	%	97			70-130	Pass	
Anthracene	S19-My38760	CP	%	98			70-130	Pass	
Benz(a)anthracene	S19-My38760	CP	%	103			70-130	Pass	
Benzo(a)pyrene	S19-My38760	CP	%	97			70-130	Pass	
Benzo(b&j)fluoranthene	S19-My38760	CP	%	93			70-130	Pass	
Benzo(g.h.i)perylene	S19-My38760	CP	%	92			70-130	Pass	
Benzo(k)fluoranthene	S19-My38760	CP	%	101			70-130	Pass	
Chrysene	S19-My38760	CP	%	99			70-130	Pass	
Dibenz(a.h)anthracene	S19-My38760	CP	%	94			70-130	Pass	
Fluoranthene	S19-My38760	CP	%	108			70-130	Pass	
Fluorene	S19-My38760	CP	%	99			70-130	Pass	
Indeno(1.2.3-cd)pyrene	S19-My38760	CP	%	93			70-130	Pass	
Naphthalene	S19-My38760	CP	%	94			70-130	Pass	
Phenanthrene	S19-My38760	CP	%	101			70-130	Pass	
Pyrene	S19-My38760	CP	%	105			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S19-My38760	CP	%	91			70-130	Pass	
Cadmium	S19-My38760	CP	%	105			70-130	Pass	
Chromium	S19-My38760	CP	%	92			70-130	Pass	
Mercury	S19-My38760	CP	%	90			70-130	Pass	
Nickel	S19-My38760	CP	%	88			70-130	Pass	
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
Chlordanes - Total	S19-My38761	CP	%	97			70-130	Pass	
4.4'-DDE	S19-My38761	CP	%	103			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
4.4'-DDT	S19-My38761	CP	%	75			70-130	Pass	
a-BHC	S19-My38761	CP	%	113			70-130	Pass	
Aldrin	S19-My38761	CP	%	107			70-130	Pass	
b-BHC	S19-My38761	CP	%	98			70-130	Pass	
d-BHC	S19-My38761	CP	%	108			70-130	Pass	
Dieldrin	S19-My38761	CP	%	105			70-130	Pass	
Endosulfan I	S19-My38761	CP	%	98			70-130	Pass	
Endosulfan II	S19-My38761	CP	%	98			70-130	Pass	
Endosulfan sulphate	S19-My38761	CP	%	99			70-130	Pass	
Endrin	S19-My38761	CP	%	97			70-130	Pass	
Endrin aldehyde	S19-My38761	CP	%	79			70-130	Pass	
Endrin ketone	S19-My38761	CP	%	85			70-130	Pass	
g-BHC (Lindane)	S19-My38761	CP	%	109			70-130	Pass	
Heptachlor	S19-My38761	CP	%	104			70-130	Pass	
Heptachlor epoxide	S19-My38761	CP	%	110			70-130	Pass	
Hexachlorobenzene	S19-My38761	CP	%	115			70-130	Pass	
Spike - % Recovery									
Polychlorinated Biphenyls				Result 1					
Aroclor-1260	S19-My38761	CP	%	80			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C10-C14	S19-My38763	CP	%	99			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	S19-My38763	CP	%	103			70-130	Pass	
Spike - % Recovery									
				Result 1					
Chloride	S19-My38773	CP	%	100			70-130	Pass	
Spike - % Recovery									
				Result 1					
Sulphate (as SO4)	S19-My38774	CP	%	73			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	S19-My38756	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
4.4'-DDD	S19-My38756	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDE	S19-My38756	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDT	S19-My38756	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
a-BHC	S19-My38756	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Aldrin	S19-My38756	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
b-BHC	S19-My38756	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
d-BHC	S19-My38756	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dieldrin	S19-My38756	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan I	S19-My38756	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan II	S19-My38756	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan sulphate	S19-My38756	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin	S19-My38756	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin aldehyde	S19-My38756	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin ketone	S19-My38756	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
g-BHC (Lindane)	S19-My38756	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor	S19-My38756	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor epoxide	S19-My38756	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Hexachlorobenzene	S19-My38756	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Methoxychlor	S19-My38756	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Toxaphene	S19-My38756	CP	mg/kg	< 1	< 1	<1	30%	Pass	

Duplicate									
Polychlorinated Biphenyls				Result 1	Result 2	RPD			
Aroclor-1016	S19-My38756	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Aroclor-1221	S19-My38756	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Aroclor-1232	S19-My38756	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Aroclor-1242	S19-My38756	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Aroclor-1248	S19-My38756	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Aroclor-1254	S19-My38756	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Aroclor-1260	S19-My38756	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S19-My36262	NCP	%	25	24	2.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Mercury	S19-My42054	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Zinc	S19-My42054	NCP	mg/kg	20	22	9.0	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C10-C14	S19-My38759	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	S19-My38759	CP	mg/kg	110	100	6.0	30%	Pass	
TRH C29-C36	S19-My38759	CP	mg/kg	88	79	11	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	S19-My38759	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	S19-My38759	CP	mg/kg	170	150	10	30%	Pass	
TRH >C34-C40	S19-My38759	CP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	S19-My38759	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	S19-My38759	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	S19-My38759	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	S19-My38759	CP	mg/kg	1.5	1.4	4.0	30%	Pass	
Benzo(a)pyrene	S19-My38759	CP	mg/kg	1.7	1.5	12	30%	Pass	
Benzo(b&j)fluoranthene	S19-My38759	CP	mg/kg	1.4	1.1	17	30%	Pass	
Benzo(g.h.i)perylene	S19-My38759	CP	mg/kg	1.2	1.1	9.0	30%	Pass	
Benzo(k)fluoranthene	S19-My38759	CP	mg/kg	1.2	1.3	3.0	30%	Pass	
Chrysene	S19-My38759	CP	mg/kg	1.4	1.4	3.0	30%	Pass	
Dibenz(a.h)anthracene	S19-My38759	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	S19-My38759	CP	mg/kg	3.4	3.3	3.0	30%	Pass	
Fluorene	S19-My38759	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	S19-My38759	CP	mg/kg	0.9	0.9	6.0	30%	Pass	
Naphthalene	S19-My38759	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	S19-My38759	CP	mg/kg	1.1	1.6	32	30%	Fail	Q15
Pyrene	S19-My38759	CP	mg/kg	3.3	3.1	6.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S19-My38759	CP	mg/kg	5.4	4.4	20	30%	Pass	
Cadmium	S19-My38759	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S19-My38759	CP	mg/kg	16	19	13	30%	Pass	
Copper	S19-My38759	CP	mg/kg	57	47	18	30%	Pass	
Lead	S19-My38759	CP	mg/kg	97	84	14	30%	Pass	
Nickel	S19-My38759	CP	mg/kg	19	20	6.0	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S19-My38761	CP	mg/kg	< 20	< 20	<1	30%	Pass	

Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S19-My38761	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	S19-My38761	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	S19-My38761	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	S19-My38761	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	S19-My38761	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	S19-My38761	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S19-My38761	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	S19-My38761	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	S19-My38771	CP	pH Units	8.2	8.0	pass	30%	Pass	
Reaction Ratings*	S19-My38771	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chloride	S19-My38773	CP	mg/kg	35	36	3.0	30%	Pass	
Conductivity (1:5 aqueous extract at 25°C as rec.)	S19-My42057	NCP	uS/cm	49	50	<1	30%	Pass	
pH (1:5 Aqueous extract at 25°C as rec.)	S19-My40520	NCP	pH Units	7.0	7.1	1.0	30%	Pass	
Resistivity*	S19-My42057	NCP	ohm.m	1000	1000	<1	30%	Pass	
Sulphate (as SO4)	S19-My38773	CP	mg/kg	210	210	2.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
Q15	The RPD reported passes Eurofins | mgt's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised By

Andrew Black	Analytical Services Manager
Andrew Sullivan	Senior Analyst-Organic (NSW)
Gabriele Cordero	Senior Analyst-Inorganic (NSW)
Gabriele Cordero	Senior Analyst-Metal (NSW)
Myles Clark	Senior Analyst-SPOCAS (QLD)
Nibha Vaidya	Senior Analyst-Asbestos (NSW)

Glenn Jackson

General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025–Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Alliance Geotechnical
10 Welder Road
Seven Hills
NSW 2147

Attention:	Steven Wallace
Report	657558-AID
Project Name	PARRAMATTA
Project ID	7957
Received Date	May 23, 2019
Date Reported	May 30, 2019

Methodology:

Asbestos Fibre Identification	Conducted in accordance with the Australian Standard AS 4964 – 2004: Method for the Qualitative Identification of Asbestos in Bulk Samples and in-house Method LTM-ASB-8020 by polarised light microscopy (PLM) and dispersion staining (DS) techniques. *NOTE: Positive Trace Analysis results indicate the sample contains detectable respirable fibres.*
Unknown Mineral Fibres	Mineral fibres of unknown type, as determined by PLM with DS, may require another analytical technique, such as Electron Microscopy, to confirm unequivocal identity. *NOTE: While Actinolite, Anthophyllite and Tremolite asbestos may be detected by PLM with DS, due to variability in the optical properties of these materials, AS4964 requires that these are reported as UMF unless confirmed by an independent technique.*
Subsampling Soil Samples	The whole sample submitted is first dried and then passed through a 10mm sieve followed by a 2mm sieve. All fibrous matter greater than 10mm, greater than 2mm as well as the material passing through the 2mm sieve are retained and analysed for the presence of asbestos. If the sub 2mm fraction is greater than approximately 30 to 60g then a sub-sampling routine based on ISO 3082:2009(E) is employed. *NOTE: Depending on the nature and size of the soil sample, the sub-2 mm residue material may need to be sub-sampled for trace analysis, in accordance with AS 4964-2004.*
Bonded asbestos-containing material (ACM)	The material is first examined and any fibres isolated for identification by PLM and DS. Where required, interfering matrices may be removed by disintegration using a range of heat, chemical or physical treatments, possibly in combination.The resultant material is then further examined in accordance with AS 4964 - 2004. *NOTE: Even after disintegration it may be difficult to detect the presence of asbestos in some asbestos-containing bulk materials using PLM and DS. This is due to the low grade or small length or diameter of the asbestos fibres present in the material, or to the fact that very fine fibres have been distributed intimately throughout the materials. Vinyl/asbestos floor tiles, some asbestos-containing sealants and mastics, asbestos-containing epoxy resins and some ore samples are examples of these types of material, which are difficult to analyse.*
Limit of Reporting	The performance limitation of the AS 4964 (2004) method for non-homogeneous samples is around 0.1 g/kg (equivalent to 0.01% (w/w)). Where no asbestos is found by PLM and DS, including Trace Analysis, this is considered to be at the nominal reporting limit of 0.01% (w/w). The NEPM screening level of 0.001% (w/w) is intended as an on-site determination, not a laboratory Limit of Reporting (LOR), per se. Examination of a large sample size (e.g. 500 mL) may improve the likelihood of detecting asbestos, particularly AF, to aid assessment against the NEPM criteria. Gravimetric determinations to this level of accuracy are outside of AS 4964 and hence NATA Accreditation does not cover the performance of this service (non-NATA results shown with an asterisk). *NOTE: NATA News March 2014, p.7, states in relation to AS 4964: "This is a qualitative method with a nominal reporting limit of 0.01 % " and that currently in Australia "there is no validated method available for the quantification of asbestos".This report is consistent with the analytical procedures and reporting recommendations in the NEPM and the WA DoH.*

Project Name PARRAMATTA
Project ID 7957
Date Sampled May 21, 2019
Report 657558-AID

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
BH08-1.0	19-My38757	May 21, 2019	Approximate Sample 109g / 125x25x20mm Sample consisted of: White plaster cement-like material	Chrysotile and amosite asbestos detected.
BH08-2.0	19-My38758	May 21, 2019	Approximate Sample 64g / 135x60x10mm Sample consisted of: White plaster cement-like material	Chrysotile and amosite asbestos detected.
BH07-1.0	19-My38760	May 21, 2019	Approximate Sample 215g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
BH07-2.0	19-My38762	May 21, 2019	Approximate Sample 4g / 20x15x4mm Sample consisted of: Grey compressed fibre cement fragments	Chrysotile and amosite asbestos detected.
BH06-0.1	19-My38763	May 21, 2019	Approximate Sample 56g Sample consisted of: Brown coarse-grained soil and rocks	Chrysotile and crocidolite asbestos detected in fibre cement fragments. Approximate raw weight of asbestos containing material = 1.9g Total estimated asbestos content in the sample = 0.19g* Total estimated asbestos concentration = 0.34% w/w* Organic fibre detected.
BH06-2.0	19-My38765	May 21, 2019	Approximate Sample 54g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
BH05-0.1	19-My38766	May 21, 2019	Approximate Sample 54g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
BH05-2.0	19-My38768	May 21, 2019	Approximate Sample 118g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
BH04-0.1	19-My38769	May 21, 2019	Approximate Sample 244g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
BH04-2.0	19-My38771	May 21, 2019	Approximate Sample 50g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Asbestos - LTM-ASB-8020	Sydney	May 30, 2019	Indefinite
Asbestos - LTM-ASB-8020	Sydney	May 30, 2019	Indefinite

ABN – 50 005 085 521
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NATA # 1261 Site # 20794

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NATA # 1261
Site # 23736

Company Name: Alliance Geotechnical
Address: 10 Welder Road
Seven Hills
NSW 2147

Project Name: PARRAMATTA
Project ID: 7957

Order No.:
Report #: 657558
Phone: 1800 288 188
Fax: 02 9675 1888

Received: May 23, 2019 10:29 AM
Due: May 30, 2019
Priority: 5 Day
Contact Name: Steven Wallace

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail	Asbestos - AS4964	Asbestos Absence /Presence	HOLD	Polycyclic Aromatic Hydrocarbons	Acid Sulfate Soils Field pH Test	Metals M8	Eurofins | mgt Suite B13	Aggressivity Soil Set	Moisture Set	Eurofins | mgt Suite B7
Melbourne Laboratory - NATA Site # 1254 & 14271										
Sydney Laboratory - NATA Site # 18217	X	X	X	X		X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794					X					
Perth Laboratory - NATA Site # 23736										
External Laboratory										

No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID									
1	BH08-0.1	May 21, 2019		Soil	S19-My38756							X		X	X
2	BH08-1.0	May 21, 2019		Solid	S19-My38757		X		X	X	X			X	
3	BH08-2.0	May 21, 2019		Solid	S19-My38758		X							X	X
4	BH07-0.1	May 21, 2019		Soil	S19-My38759									X	X
5	BH07-1.0	May 21, 2019		Soil	S19-My38760	X			X		X			X	
6	BH07-2.0	May 21, 2019		Soil	S19-My38761					X		X		X	X
7	BH07-2.0	May 21, 2019		Building Materials	S19-My38762		X								
8	BH06-0.1	May 21, 2019		Soil	S19-My38763	X								X	X
9	BH06-1.0	May 21, 2019		Soil	S19-My38764				X	X	X			X	

ABN – 50 005 085 521
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Melbourne
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Company Name: Alliance Geotechnical
Address: 10 Welder Road
Seven Hills
NSW 2147

Project Name: PARRAMATTA
Project ID: 7957

Order No.:
Report #: 657558
Phone: 1800 288 188
Fax: 02 9675 1888

Received: May 23, 2019 10:29 AM
Due: May 30, 2019
Priority: 5 Day
Contact Name: Steven Wallace

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Asbestos - AS4964	Asbestos Absence /Presence	HOLD	Polycyclic Aromatic Hydrocarbons	Acid Sulfate Soils Field pH Test	Metals M8	Eurofins | mgt Suite B13	Aggressivity Soil Set	Moisture Set	Eurofins | mgt Suite B7
Melbourne Laboratory - NATA Site # 1254 & 14271															
Sydney Laboratory - NATA Site # 18217						X	X	X	X		X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794										X					
Perth Laboratory - NATA Site # 23736															
10	BH06-2.0	May 21, 2019		Soil	S19-My38765	X								X	X
11	BH05-0.1	May 21, 2019		Soil	S19-My38766	X						X		X	X
12	BH05-1.0	May 21, 2019		Soil	S19-My38767				X		X			X	
13	BH05-2.0	May 21, 2019		Soil	S19-My38768	X				X				X	X
14	BH04-0.1	May 21, 2019		Soil	S19-My38769	X						X		X	X
15	BH04-1.0	May 21, 2019		Soil	S19-My38770				X		X			X	
16	BH04-2.0	May 21, 2019		Soil	S19-My38771	X				X				X	X
17	BH08-0.1	May 21, 2019		Building Materials	S19-My38772			X							
18	BH5-2.6	May 21, 2019		Soil	S19-My38773								X	X	
19	BH4(1.0)	May 21, 2019		Soil	S19-My38774								X	X	
Test Counts						7	3	1	5	5	5	4	2	17	10

Internal Quality Control Review and Glossary

General

1. QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Samples were analysed on an 'as received' basis.
4. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Advice.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

Units

% w/w: weight for weight basis	grams per kilogram
Filter loading:	fibres/100 graticule areas
Reported Concentration:	fibres/mL
Flowrate:	L/min

Terms

Dry	Sample is dried by heating prior to analysis
LOR	Limit of Reporting
COC	Chain of Custody
SRA	Sample Receipt Advice
ISO	International Standards Organisation
AS	Australian Standards
WA DOH	Reference document for the NEPM. Government of Western Australia, Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (2009), including supporting document Recommended Procedures for Laboratory Analysis of Asbestos in Soil (2011)
NEPM	National Environment Protection (Assessment of Site Contamination) Measure, 2013 (as amended)
ACM	Asbestos Containing Materials. Asbestos contained within a non-asbestos matrix, typically presented in bonded and/or sound condition. For the purposes of the NEPM, ACM is generally restricted to those materials that do not pass a 7mm x 7mm sieve.
AF	Asbestos Fines. Asbestos containing materials, including friable, weathered and bonded materials, able to pass a 7mm x 7mm sieve. Considered under the NEPM as equivalent to “non-bonded / friable”.
FA	Fibrous Asbestos. Asbestos containing materials in a friable and/or severely weathered condition. For the purposes of the NEPM, FA is generally restricted to those materials that do not pass a 7mm x 7mm sieve.
Friable	Asbestos-containing materials of any size that may be broken or crumbled by hand pressure. For the purposes of the NEPM, this includes both AF and FA. It is outside of the laboratory’s remit to assess degree of friability.
Trace Analysis	Analytical procedure used to detect the presence of respirable fibres in the matrix.

Comments

S19-My38763, S19-My38765, S19-My38768, S19-My38771: The samples received were not collected in an approved asbestos bag and was therefore sub-sampled from the 250mL glass jar. Valid sub-sampling procedures were applied so as to ensure that the sub-samples to be analysed accurately represented the samples received.

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N/A	Not applicable

Asbestos Counter/Identifier:

Sayeed Abu	Senior Analyst-Asbestos (NSW)

Authorised by:

Laxman Dias	Senior Analyst-Asbestos (NSW)

Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

Alliance Geotechnical
10 Welder Road
Seven Hills
NSW 2147

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Steven Wallace**

Report **659901-S**
Project name PARRAMATTA
Project ID 7957
Received Date Jun 07, 2019

Client Sample ID			**BH01-0.1**	**BH01-1.0**	**BH01-1.5**	**BH02-0.1**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**S19-Jn08524**	**S19-Jn08525**	**S19-Jn08526**	**S19-Jn08527**
Date Sampled			**Not Provided**	**Not Provided**	**Not Provided**	**Not Provided**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	-	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	-	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	-	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	-	< 50
TRH C10-36 (Total)	50	mg/kg	< 50	< 50	-	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	-	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	-	< 0.3
4-Bromofluorobenzene (surr.)	1	%	108	118	-	118
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	-	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	-	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	-	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	-	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	-	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	-	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	-	< 100
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	-	-	1.6
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	-	-	1.9
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	-	-	2.1
Acenaphthene	0.5	mg/kg	< 0.5	-	-	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	-	-	< 0.5
Anthracene	0.5	mg/kg	< 0.5	-	-	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	-	-	1.1
Benzo(a)pyrene	0.5	mg/kg	< 0.5	-	-	1.2
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	-	-	0.8
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	-	-	0.9
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	-	-	1.2
Chrysene	0.5	mg/kg	< 0.5	-	-	1.1

Client Sample ID			BH01-0.1	BH01-1.0	BH01-1.5	BH02-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S19-Jn08524	S19-Jn08525	S19-Jn08526	S19-Jn08527
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	-	-	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	-	-	2.2
Fluorene	0.5	mg/kg	< 0.5	-	-	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	-	-	0.7
Naphthalene	0.5	mg/kg	< 0.5	-	-	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	-	-	0.9
Pyrene	0.5	mg/kg	< 0.5	-	-	2.2
Total PAH*	0.5	mg/kg	< 0.5	-	-	12.3
2-Fluorobiphenyl (surr.)	1	%	100	-	-	118
p-Terphenyl-d14 (surr.)	1	%	105	-	-	122
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	-	-	-
4.4'-DDD	0.05	mg/kg	< 0.05	-	-	-
4.4'-DDE	0.05	mg/kg	< 0.05	-	-	-
4.4'-DDT	0.05	mg/kg	< 0.05	-	-	-
a-BHC	0.05	mg/kg	< 0.05	-	-	-
Aldrin	0.05	mg/kg	< 0.05	-	-	-
b-BHC	0.05	mg/kg	< 0.05	-	-	-
d-BHC	0.05	mg/kg	< 0.05	-	-	-
Dieldrin	0.05	mg/kg	< 0.05	-	-	-
Endosulfan I	0.05	mg/kg	< 0.05	-	-	-
Endosulfan II	0.05	mg/kg	< 0.05	-	-	-
Endosulfan sulphate	0.05	mg/kg	< 0.05	-	-	-
Endrin	0.05	mg/kg	< 0.05	-	-	-
Endrin aldehyde	0.05	mg/kg	< 0.05	-	-	-
Endrin ketone	0.05	mg/kg	< 0.05	-	-	-
g-BHC (Lindane)	0.05	mg/kg	< 0.05	-	-	-
Heptachlor	0.05	mg/kg	< 0.05	-	-	-
Heptachlor epoxide	0.05	mg/kg	< 0.05	-	-	-
Hexachlorobenzene	0.05	mg/kg	< 0.05	-	-	-
Methoxychlor	0.2	mg/kg	< 0.2	-	-	-
Toxaphene	1	mg/kg	< 1	-	-	-
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	-	-	-
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	-	-	-
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.2	-	-	-
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.2	-	-	-
Dibutylchlorendate (surr.)	1	%	73	-	-	-
Tetrachloro-m-xylene (surr.)	1	%	86	-	-	-
Polychlorinated Biphenyls						
Aroclor-1016	0.5	mg/kg	< 0.5	-	-	-
Aroclor-1221	0.1	mg/kg	< 0.1	-	-	-
Aroclor-1232	0.5	mg/kg	< 0.5	-	-	-
Aroclor-1242	0.5	mg/kg	< 0.5	-	-	-
Aroclor-1248	0.5	mg/kg	< 0.5	-	-	-
Aroclor-1254	0.5	mg/kg	< 0.5	-	-	-
Aroclor-1260	0.5	mg/kg	< 0.5	-	-	-
Total PCB*	0.5	mg/kg	< 0.5	-	-	-
Dibutylchlorendate (surr.)	1	%	73	-	-	-
Tetrachloro-m-xylene (surr.)	1	%	86	-	-	-

Client Sample ID			BH01-0.1	BH01-1.0	BH01-1.5	BH02-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S19-Jn08524	S19-Jn08525	S19-Jn08526	S19-Jn08527
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	-	-	100	-
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	-	-	7.5	-
% Moisture	1	%	17	16	5.9	9.5
Heavy Metals						
Arsenic	2	mg/kg	2.9	4.5	2.4	13
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	2.9
Chromium	5	mg/kg	17	15	12	11
Copper	5	mg/kg	31	19	6.9	57
Lead	5	mg/kg	15	13	6.5	140
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	0.3
Nickel	5	mg/kg	40	16	< 5	44
Zinc	5	mg/kg	39	21	8.7	900
Cation Exchange Capacity						
Cation Exchange Capacity	0.05	meq/100g	-	-	3.8	-
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	-	-	7.5	-
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	-	-	6.2	-
Reaction Ratings*[S05]		comment	-	-	4.0	-

Client Sample ID			BH02-1.0	BH02-2.0	BH03-0.1	BH03-1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S19-Jn08528	S19-Jn08529	S19-Jn08530	S19-Jn08531
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	-	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	-	29	28
TRH C15-C28	50	mg/kg	< 50	-	560	400
TRH C29-C36	50	mg/kg	< 50	-	260	190
TRH C10-36 (Total)	50	mg/kg	< 50	-	849	618
BTEX						
Benzene	0.1	mg/kg	< 0.1	-	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	-	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	-	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	-	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	-	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	-	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	117	-	113	107
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	-	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	-	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	-	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	-	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	-	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	-	660	460
TRH >C34-C40	100	mg/kg	< 100	-	130	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	-	790	460

Client Sample ID			BH02-1.0	BH02-2.0	BH03-0.1	BH03-1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S19-Jn08528	S19-Jn08529	S19-Jn08530	S19-Jn08531
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	30	-
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	30	-
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	30	-
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	1.4	-
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	2.0	-
Anthracene	0.5	mg/kg	< 0.5	< 0.5	7.2	-
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	17	-
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	21	-
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	13	-
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	16	-
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	16	-
Chrysene	0.5	mg/kg	< 0.5	< 0.5	17	-
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	2.6	-
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	56	-
Fluorene	0.5	mg/kg	< 0.5	< 0.5	3.6	-
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	12	-
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	1.5	-
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	38	-
Pyrene	0.5	mg/kg	< 0.5	< 0.5	51	-
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	275.3	-
2-Fluorobiphenyl (surr.)	1	%	111	96	96	-
p-Terphenyl-d14 (surr.)	1	%	113	101	97	-
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	-	-	< 0.1	-
4.4'-DDD	0.05	mg/kg	-	-	< 0.05	-
4.4'-DDE	0.05	mg/kg	-	-	< 0.05	-
4.4'-DDT	0.05	mg/kg	-	-	< 0.05	-
a-BHC	0.05	mg/kg	-	-	< 0.05	-
Aldrin	0.05	mg/kg	-	-	< 0.05	-
b-BHC	0.05	mg/kg	-	-	< 0.05	-
d-BHC	0.05	mg/kg	-	-	< 0.05	-
Dieldrin	0.05	mg/kg	-	-	< 0.05	-
Endosulfan I	0.05	mg/kg	-	-	< 0.05	-
Endosulfan II	0.05	mg/kg	-	-	< 0.05	-
Endosulfan sulphate	0.05	mg/kg	-	-	< 0.05	-
Endrin	0.05	mg/kg	-	-	< 0.05	-
Endrin aldehyde	0.05	mg/kg	-	-	< 0.05	-
Endrin ketone	0.05	mg/kg	-	-	< 0.05	-
g-BHC (Lindane)	0.05	mg/kg	-	-	< 0.05	-
Heptachlor	0.05	mg/kg	-	-	< 0.05	-
Heptachlor epoxide	0.05	mg/kg	-	-	< 0.05	-
Hexachlorobenzene	0.05	mg/kg	-	-	< 0.05	-
Methoxychlor	0.2	mg/kg	-	-	< 0.2	-
Toxaphene	1	mg/kg	-	-	< 1	-
Aldrin and Dieldrin (Total)*	0.05	mg/kg	-	-	< 0.05	-
DDT + DDE + DDD (Total)*	0.05	mg/kg	-	-	< 0.05	-
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	-	-	< 0.2	-
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	-	-	< 0.2	-
Dibutylchlorendate (surr.)	1	%	-	-	86	-
Tetrachloro-m-xylene (surr.)	1	%	-	-	109	-

Client Sample ID			BH02-1.0	BH02-2.0	BH03-0.1	BH03-1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S19-Jn08528	S19-Jn08529	S19-Jn08530	S19-Jn08531
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Polychlorinated Biphenyls						
Aroclor-1016	0.5	mg/kg	-	-	< 0.5	-
Aroclor-1221	0.1	mg/kg	-	-	< 0.1	-
Aroclor-1232	0.5	mg/kg	-	-	< 0.5	-
Aroclor-1242	0.5	mg/kg	-	-	< 0.5	-
Aroclor-1248	0.5	mg/kg	-	-	< 0.5	-
Aroclor-1254	0.5	mg/kg	-	-	< 0.5	-
Aroclor-1260	0.5	mg/kg	-	-	< 0.5	-
Total PCB*	0.5	mg/kg	-	-	< 0.5	-
Dibutylchlorendate (surr.)	1	%	-	-	86	-
Tetrachloro-m-xylene (surr.)	1	%	-	-	109	-
% Moisture	1	%	9.6	12	14	14
Heavy Metals						
Arsenic	2	mg/kg	3.0	62	30	23
Cadmium	0.4	mg/kg	< 0.4	< 0.4	0.9	0.5
Chromium	5	mg/kg	9.2	9.5	39	29
Copper	5	mg/kg	13	19	90	54
Lead	5	mg/kg	170	23	260	170
Mercury	0.1	mg/kg	0.2	< 0.1	0.1	< 0.1
Nickel	5	mg/kg	6.4	< 5	49	34
Zinc	5	mg/kg	290	32	400	260

Client Sample ID			BH01-2.5	BH02-2.5	BH03-2.5	BD1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S19-Jn08532	S19-Jn08533	S19-Jn08534	S19-Jn08535
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	-	-	-	< 20
TRH C10-C14	20	mg/kg	-	-	-	27
TRH C15-C28	50	mg/kg	-	-	-	480
TRH C29-C36	50	mg/kg	-	-	-	200
TRH C10-36 (Total)	50	mg/kg	-	-	-	707
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	-	-	-	< 0.5
TRH C6-C10	20	mg/kg	-	-	-	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	-	-	-	< 20
TRH >C10-C16	50	mg/kg	-	-	-	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	-	-	-	< 50
TRH >C16-C34	100	mg/kg	-	-	-	540
TRH >C34-C40	100	mg/kg	-	-	-	< 100
TRH >C10-C40 (total)*	100	mg/kg	-	-	-	540
Chloride	10	mg/kg	17	81	3900	-
Conductivity (1:5 aqueous extract at 25°C as rec.)	5	uS/cm	67	170	2100	-
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	7.0	7.6	4.7	-
Resistivity*	0.5	ohm.m	750	290	23	-
Sulphate (as SO4)	10	mg/kg	21	190	800	-
% Moisture	1	%	6.5	13	21	15

Client Sample ID			BH01-2.5	BH02-2.5	BH03-2.5	BD1
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**S19-Jn08532**	**S19-Jn08533**	**S19-Jn08534**	**S19-Jn08535**
Date Sampled			**Not Provided**	**Not Provided**	**Not Provided**	**Not Provided**
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	-	-	-	30
Cadmium	0.4	mg/kg	-	-	-	0.5
Chromium	5	mg/kg	-	-	-	32
Copper	5	mg/kg	-	-	-	54
Lead	5	mg/kg	-	-	-	200
Mercury	0.1	mg/kg	-	-	-	< 0.1
Nickel	5	mg/kg	-	-	-	30
Zinc	5	mg/kg	-	-	-	290
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	-	-	8.4	-
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	-	-	3.3	-
Reaction Ratings*[S05]		comment	-	-	4.0	-

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Eurofins | mgt Suite B6			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Sydney	Jun 13, 2019	14 Day
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Sydney	Jun 13, 2019	14 Day
- Method: LTM-ORG-2150 VOCs in Soils Liquid and other Aqueous Matrices			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Jun 13, 2019	14 Day
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Jun 13, 2019	
- Method: LTM-ORG-2010 TRH C6-C40			
Metals M8	Sydney	Jun 13, 2019	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Polycyclic Aromatic Hydrocarbons	Sydney	Jun 13, 2019	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Organochlorine Pesticides	Sydney	Jun 13, 2019	14 Day
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water			
Polychlorinated Biphenyls	Sydney	Jun 13, 2019	28 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water			
Chloride	Sydney	Jun 13, 2019	28 Day
- Method: E045 /E047 Chloride			
pH (1:5 Aqueous extract at 25°C as rec.)	Sydney	Jun 13, 2019	7 Day
- Method: LTM-GEN-7090 pH in soil by ISE			
Sulphate (as SO4)	Sydney	Jun 13, 2019	28 Day
- Method: E045 Anions by Ion Chromatography			
Conductivity (1:5 aqueous extract at 25°C as rec.)	Melbourne	Jun 14, 2019	7 Day
- Method: LTM-INO-4030 Conductivity			
Cation Exchange Capacity	Melbourne	Jun 14, 2019	180 Days
- Method: LTM-MET-3060 Cation Exchange Capacity by bases & Exchangeable Sodium Percentage			
% Moisture	Sydney	Jun 08, 2019	14 Day
- Method: LTM-GEN-7080 Moisture			
Acid Sulfate Soils Field pH Test	Sydney	Jun 13, 2019	7 Days
- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			

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NATA # 1261
Site # 23736

Company Name: Alliance Geotechnical
Address: 10 Welder Road
Seven Hills
NSW 2147

Project Name: PARRAMATTA
Project ID: 7957

Order No.:
Report #: 659901
Phone: 1800 288 188
Fax: 02 9675 1888

Received: Jun 7, 2019 5:03 PM
Due: Jun 19, 2019
Priority: 7 Day
Contact Name: Steven Wallace

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Asbestos - AS4964	pH (1:5 Aqueous extract at 25°C as rec.)	Polycyclic Aromatic Hydrocarbons	Acid Sulfate Soils Field pH Test	Metals M8	Eurofins | mgt Suite B13	Aggressivity Soil Set	Moisture Set	Cation Exchange Capacity	Total Recoverable Hydrocarbons	Eurofins | mgt Suite B7	Eurofins | mgt Suite B6
Melbourne Laboratory - NATA Site # 1254 & 14271												X		X			
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794																	
Perth Laboratory - NATA Site # 23736																	
External Laboratory																	
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**												
1	BH01-0.1	Not Provided		Soil	S19-Jn08524	X					X		X			X	
2	BH01-1.0	Not Provided		Soil	S19-Jn08525	X							X				X
3	BH01-1.5	Not Provided		Soil	S19-Jn08526		X		X	X			X	X			
4	BH02-0.1	Not Provided		Soil	S19-Jn08527	X							X			X	
5	BH02-1.0	Not Provided		Soil	S19-Jn08528	X							X			X	
6	BH02-2.0	Not Provided		Soil	S19-Jn08529			X		X			X				
7	BH03-0.1	Not Provided		Soil	S19-Jn08530	X					X		X			X	
8	BH03-1.0	Not Provided		Soil	S19-Jn08531	X							X				X
9	BH01-2.5	Not Provided		Soil	S19-Jn08532							X	X				

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Sample Detail						Asbestos - AS4964	pH (1:5 Aqueous extract at 25°C as rec.)	Polycyclic Aromatic Hydrocarbons	Acid Sulfate Soils Field pH Test	Metals M8	Eurofins | mgt Suite B13	Aggressivity Soil Set	Moisture Set	Cation Exchange Capacity	Total Recoverable Hydrocarbons	Eurofins | mgt Suite B7	Eurofins | mgt Suite B6
Melbourne Laboratory - NATA Site # 1254 & 14271												X		X			
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794																	
Perth Laboratory - NATA Site # 23736																	
10	BH02-2.5	Not Provided		Soil	S19-Jn08533							X	X				
11	BH03-2.5	Not Provided		Soil	S19-Jn08534				X			X	X				
12	BD1	Not Provided		Soil	S19-Jn08535					X			X		X		
Test Counts						6	1	1	2	3	2	3	12	1	1	4	2

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure, April 2011 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.2 2018
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.2 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/kg	< 20			20	Pass	
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.5			0.5	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/kg	< 0.1			0.1	Pass	
4.4'-DDD	mg/kg	< 0.05			0.05	Pass	
4.4'-DDE	mg/kg	< 0.05			0.05	Pass	
4.4'-DDT	mg/kg	< 0.05			0.05	Pass	
a-BHC	mg/kg	< 0.05			0.05	Pass	
Aldrin	mg/kg	< 0.05			0.05	Pass	
b-BHC	mg/kg	< 0.05			0.05	Pass	
d-BHC	mg/kg	< 0.05			0.05	Pass	
Dieldrin	mg/kg	< 0.05			0.05	Pass	
Endosulfan I	mg/kg	< 0.05			0.05	Pass	
Endosulfan II	mg/kg	< 0.05			0.05	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Endosulfan sulphate	mg/kg	< 0.05			0.05	Pass	
Endrin	mg/kg	< 0.05			0.05	Pass	
Endrin aldehyde	mg/kg	< 0.05			0.05	Pass	
Endrin ketone	mg/kg	< 0.05			0.05	Pass	
g-BHC (Lindane)	mg/kg	< 0.05			0.05	Pass	
Heptachlor	mg/kg	< 0.05			0.05	Pass	
Heptachlor epoxide	mg/kg	< 0.05			0.05	Pass	
Hexachlorobenzene	mg/kg	< 0.05			0.05	Pass	
Methoxychlor	mg/kg	< 0.2			0.2	Pass	
Toxaphene	mg/kg	< 1			1	Pass	
Method Blank							
Polychlorinated Biphenyls							
Aroclor-1016	mg/kg	< 0.5			0.5	Pass	
Aroclor-1221	mg/kg	< 0.1			0.1	Pass	
Aroclor-1232	mg/kg	< 0.5			0.5	Pass	
Aroclor-1242	mg/kg	< 0.5			0.5	Pass	
Aroclor-1248	mg/kg	< 0.5			0.5	Pass	
Aroclor-1254	mg/kg	< 0.5			0.5	Pass	
Aroclor-1260	mg/kg	< 0.5			0.5	Pass	
Total PCB*	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Chloride	mg/kg	< 10			10	Pass	
Conductivity (1:5 aqueous extract at 25°C as rec.)	uS/cm	< 5			5	Pass	
Sulphate (as SO4)	mg/kg	< 10			10	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
Method Blank							
Cation Exchange Capacity							
Cation Exchange Capacity	meq/100g	< 0.05			0.05	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	91			70-130	Pass	
TRH C10-C14	%	101			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	98			70-130	Pass	
Toluene	%	97			70-130	Pass	
Ethylbenzene	%	95			70-130	Pass	
m&p-Xylenes	%	100			70-130	Pass	
o-Xylene	%	93			70-130	Pass	
Xylenes - Total	%	97			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	107			70-130	Pass	
TRH C6-C10	%	86			70-130	Pass	
TRH >C10-C16	%	97			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	88			70-130	Pass	
Acenaphthylene	%	89			70-130	Pass	
Anthracene	%	89			70-130	Pass	
Benz(a)anthracene	%	86			70-130	Pass	
Benzo(a)pyrene	%	85			70-130	Pass	
Benzo(b&j)fluoranthene	%	87			70-130	Pass	
Benzo(g.h.i)perylene	%	87			70-130	Pass	
Benzo(k)fluoranthene	%	87			70-130	Pass	
Chrysene	%	88			70-130	Pass	
Dibenz(a.h)anthracene	%	85			70-130	Pass	
Fluoranthene	%	89			70-130	Pass	
Fluorene	%	89			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	85			70-130	Pass	
Naphthalene	%	88			70-130	Pass	
Phenanthrene	%	88			70-130	Pass	
Pyrene	%	89			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
Chlordanes - Total	%	102			70-130	Pass	
4.4'-DDD	%	122			70-130	Pass	
4.4'-DDE	%	113			70-130	Pass	
4.4'-DDT	%	109			70-130	Pass	
a-BHC	%	115			70-130	Pass	
Aldrin	%	110			70-130	Pass	
b-BHC	%	106			70-130	Pass	
d-BHC	%	119			70-130	Pass	
Dieldrin	%	110			70-130	Pass	
Endosulfan I	%	107			70-130	Pass	
Endosulfan II	%	112			70-130	Pass	
Endosulfan sulphate	%	113			70-130	Pass	
Endrin	%	102			70-130	Pass	
Endrin aldehyde	%	115			70-130	Pass	
Endrin ketone	%	108			70-130	Pass	
g-BHC (Lindane)	%	113			70-130	Pass	
Heptachlor	%	111			70-130	Pass	
Heptachlor epoxide	%	111			70-130	Pass	
Hexachlorobenzene	%	105			70-130	Pass	
Methoxychlor	%	97			70-130	Pass	
Toxaphene	%	90			70-130	Pass	
LCS - % Recovery							
Polychlorinated Biphenyls							
Aroclor-1260	%	102			70-130	Pass	
LCS - % Recovery							
Chloride	%	112			70-130	Pass	
Conductivity (1:5 aqueous extract at 25°C as rec.)	%	93			70-130	Pass	
Resistivity*	%	93			70-130	Pass	
Sulphate (as SO4)	%	119			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	98			70-130	Pass	
Cadmium	%	95			70-130	Pass	
Chromium	%	100			70-130	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Copper			%	96			70-130	Pass	
Lead			%	101			70-130	Pass	
Mercury			%	99			70-130	Pass	
Nickel			%	97			70-130	Pass	
Zinc			%	96			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	S19-Jn15981	NCP	%	79			70-130	Pass	
TRH C10-C14	S19-Jn14400	NCP	%	118			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	S19-Jn15981	NCP	%	87			70-130	Pass	
Toluene	S19-Jn15981	NCP	%	87			70-130	Pass	
Ethylbenzene	S19-Jn15981	NCP	%	86			70-130	Pass	
m&p-Xylenes	S19-Jn15981	NCP	%	91			70-130	Pass	
o-Xylene	S19-Jn15981	NCP	%	88			70-130	Pass	
Xylenes - Total	S19-Jn15981	NCP	%	90			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S19-Jn15981	NCP	%	80			70-130	Pass	
TRH C6-C10	S19-Jn15981	NCP	%	78			70-130	Pass	
TRH >C10-C16	S19-Jn14400	NCP	%	112			70-130	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	S19-Jn14662	NCP	%	92			70-130	Pass	
Acenaphthylene	S19-Jn14662	NCP	%	90			70-130	Pass	
Anthracene	S19-Jn14662	NCP	%	90			70-130	Pass	
Benz(a)anthracene	S19-Jn14662	NCP	%	86			70-130	Pass	
Benzo(a)pyrene	S19-Jn14662	NCP	%	87			70-130	Pass	
Benzo(b&j)fluoranthene	S19-Jn14662	NCP	%	82			70-130	Pass	
Benzo(g.h.i)perylene	S19-Jn14662	NCP	%	90			70-130	Pass	
Benzo(k)fluoranthene	S19-Jn14662	NCP	%	94			70-130	Pass	
Chrysene	S19-Jn14662	NCP	%	91			70-130	Pass	
Dibenz(a.h)anthracene	S19-Jn14662	NCP	%	88			70-130	Pass	
Fluoranthene	S19-Jn14662	NCP	%	92			70-130	Pass	
Fluorene	S19-Jn14662	NCP	%	91			70-130	Pass	
Indeno(1.2.3-cd)pyrene	S19-Jn14662	NCP	%	89			70-130	Pass	
Naphthalene	S19-Jn14662	NCP	%	89			70-130	Pass	
Phenanthrene	S19-Jn14662	NCP	%	91			70-130	Pass	
Pyrene	S19-Jn14662	NCP	%	92			70-130	Pass	
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
Chlordanes - Total	S19-Jn12829	NCP	%	119			70-130	Pass	
4.4'-DDD	S19-Jn12416	NCP	%	96			70-130	Pass	
4.4'-DDE	S19-Jn12829	NCP	%	125			70-130	Pass	
4.4'-DDT	S19-Jn12416	NCP	%	96			70-130	Pass	
a-BHC	S19-Jn12829	NCP	%	128			70-130	Pass	
Aldrin	S19-Jn12829	NCP	%	128			70-130	Pass	
b-BHC	S19-Jn12829	NCP	%	115			70-130	Pass	
d-BHC	S19-Jn12829	NCP	%	128			70-130	Pass	
Dieldrin	S19-Jn12829	NCP	%	122			70-130	Pass	
Endosulfan I	S19-Jn12829	NCP	%	123			70-130	Pass	
Endosulfan II	S19-Jn12829	NCP	%	127			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Endosulfan sulphate	S19-Jn12829	NCP	%	116			70-130	Pass	
Endrin	S19-Jn12829	NCP	%	104			70-130	Pass	
Endrin aldehyde	S19-Jn12829	NCP	%	97			70-130	Pass	
Endrin ketone	S19-Jn12829	NCP	%	114			70-130	Pass	
g-BHC (Lindane)	S19-Jn12829	NCP	%	112			70-130	Pass	
Heptachlor	S19-Jn12829	NCP	%	103			70-130	Pass	
Heptachlor epoxide	S19-Jn12829	NCP	%	120			70-130	Pass	
Hexachlorobenzene	S19-Jn12829	NCP	%	120			70-130	Pass	
Methoxychlor	S19-Jn12416	NCP	%	96			70-130	Pass	
Toxaphene	S19-Jn14263	NCP	%	104			70-130	Pass	
Spike - % Recovery									
Polychlorinated Biphenyls				Result 1					
Aroclor-1260	S19-Jn12829	NCP	%	106			70-130	Pass	
Total PCB*	S19-My49750	NCP	%	93			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S19-Jn16000	NCP	%	105			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Cadmium	S19-Jn08529	CP	%	95			70-130	Pass	
Chromium	S19-Jn08529	CP	%	93			70-130	Pass	
Copper	S19-Jn08529	CP	%	100			70-130	Pass	
Lead	S19-Jn08529	CP	%	103			70-130	Pass	
Mercury	S19-Jn08529	CP	%	98			70-130	Pass	
Nickel	S19-Jn08529	CP	%	94			70-130	Pass	
Zinc	S19-Jn08529	CP	%	93			70-130	Pass	
Spike - % Recovery									
				Result 1					
Chloride	S19-Jn08534	CP	%	94			70-130	Pass	
Sulphate (as SO4)	S19-Jn08534	CP	%	117			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S19-Jn15970	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	S19-Jn14399	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	S19-Jn14399	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	S19-Jn14399	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S19-Jn15970	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	S19-Jn15970	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	S19-Jn15970	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	S19-Jn15970	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	S19-Jn15970	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	S19-Jn15970	NCP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S19-Jn15970	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	S19-Jn15970	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH >C10-C16	S19-Jn14399	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	S19-Jn14399	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	S19-Jn14399	NCP	mg/kg	< 100	< 100	<1	30%	Pass	

Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	S19-Jn08327	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	S19-Jn08327	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	S19-Jn08327	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	S19-Jn08327	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	S19-Jn08327	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	S19-Jn08327	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	S19-Jn08327	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	S19-Jn08327	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	S19-Jn08327	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	S19-Jn08327	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	S19-Jn08327	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	S19-Jn08327	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	S19-Jn08327	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	S19-Jn08327	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	S19-Jn08327	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	S19-Jn08327	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	S19-Jn12825	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
4.4'-DDD	S19-Jn12825	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDE	S19-Jn12825	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDT	S19-Jn12825	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
a-BHC	S19-Jn12825	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Aldrin	S19-Jn12825	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
b-BHC	S19-Jn12825	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
d-BHC	S19-Jn12825	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dieldrin	S19-Jn12825	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan I	S19-Jn12825	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan II	S19-Jn12825	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan sulphate	S19-Jn12825	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin	S19-Jn12825	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin aldehyde	S19-Jn12825	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin ketone	S19-Jn12825	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
g-BHC (Lindane)	S19-Jn12825	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor	S19-Jn12825	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor epoxide	S19-Jn12825	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Hexachlorobenzene	S19-Jn12825	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Methoxychlor	S19-Jn12825	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Toxaphene	S19-Jn12825	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
Duplicate									
Polychlorinated Biphenyls				Result 1	Result 2	RPD			
Aroclor-1016	S19-Jn12825	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Aroclor-1221	S19-Jn12825	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1232	S19-Jn12825	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Aroclor-1242	S19-Jn12825	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Aroclor-1248	S19-Jn12825	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Aroclor-1254	S19-Jn12825	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Aroclor-1260	S19-Jn12825	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Cation Exchange Capacity				Result 1	Result 2	RPD			
Cation Exchange Capacity	M19-Jn05076	NCP	meq/100g	12	12	1.0	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S19-Jn08528	CP	mg/kg	3.0	3.2	8.0	30%	Pass	
Cadmium	S19-Jn08528	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S19-Jn08528	CP	mg/kg	9.2	9.3	<1	30%	Pass	
Copper	S19-Jn08528	CP	mg/kg	13	13	<1	30%	Pass	
Lead	S19-Jn08528	CP	mg/kg	170	170	5.0	30%	Pass	
Mercury	S19-Jn08528	CP	mg/kg	0.2	0.2	12	30%	Pass	
Nickel	S19-Jn08528	CP	mg/kg	6.4	6.5	2.0	30%	Pass	
Zinc	S19-Jn08528	CP	mg/kg	290	290	2.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S19-Jn08529	CP	%	12	15	22	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chloride	S19-Jn07275	NCP	mg/kg	29	29	<1	30%	Pass	
Resistivity*	S19-Jn07275	NCP	ohm.m	200	190	6.3	30%	Pass	
Sulphate (as SO4)	S19-Jn07275	NCP	mg/kg	< 10	< 10	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
pH (1:5 Aqueous extract at 25°C as rec.)	S19-Jn08533	CP	pH Units	7.6	7.6	Pass	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised By

Andrew Black	Analytical Services Manager
Andrew Sullivan	Senior Analyst-Organic (NSW)
Emily Rosenberg	Senior Analyst-Metal (VIC)
Gabriele Cordero	Senior Analyst-Inorganic (NSW)
Gabriele Cordero	Senior Analyst-Metal (NSW)
Julie Kay	Senior Analyst-Inorganic (VIC)
Nibha Vaidya	Senior Analyst-Asbestos (NSW)

Glenn Jackson

General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025–Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Alliance Geotechnical
10 Welder Road
Seven Hills
NSW 2147

Attention:	Steven Wallace
Report	659901-AID
Project Name	PARRAMATTA
Project ID	7957
Received Date	Jun 07, 2019
Date Reported	Jun 18, 2019

Methodology:

Asbestos Fibre Identification	Conducted in accordance with the Australian Standard AS 4964 – 2004: Method for the Qualitative Identification of Asbestos in Bulk Samples and in-house Method LTM-ASB-8020 by polarised light microscopy (PLM) and dispersion staining (DS) techniques. *NOTE: Positive Trace Analysis results indicate the sample contains detectable respirable fibres.*
Unknown Mineral Fibres	Mineral fibres of unknown type, as determined by PLM with DS, may require another analytical technique, such as Electron Microscopy, to confirm unequivocal identity. *NOTE: While Actinolite, Anthophyllite and Tremolite asbestos may be detected by PLM with DS, due to variability in the optical properties of these materials, AS4964 requires that these are reported as UMF unless confirmed by an independent technique.*
Subsampling Soil Samples	The whole sample submitted is first dried and then passed through a 10mm sieve followed by a 2mm sieve. All fibrous matter greater than 10mm, greater than 2mm as well as the material passing through the 2mm sieve are retained and analysed for the presence of asbestos. If the sub 2mm fraction is greater than approximately 30 to 60g then a sub-sampling routine based on ISO 3082:2009(E) is employed. *NOTE: Depending on the nature and size of the soil sample, the sub-2 mm residue material may need to be sub-sampled for trace analysis, in accordance with AS 4964-2004.*
Bonded asbestos-containing material (ACM)	The material is first examined and any fibres isolated for identification by PLM and DS. Where required, interfering matrices may be removed by disintegration using a range of heat, chemical or physical treatments, possibly in combination.The resultant material is then further examined in accordance with AS 4964 - 2004. *NOTE: Even after disintegration it may be difficult to detect the presence of asbestos in some asbestos-containing bulk materials using PLM and DS. This is due to the low grade or small length or diameter of the asbestos fibres present in the material, or to the fact that very fine fibres have been distributed intimately throughout the materials. Vinyl/asbestos floor tiles, some asbestos-containing sealants and mastics, asbestos-containing epoxy resins and some ore samples are examples of these types of material, which are difficult to analyse.*
Limit of Reporting	The performance limitation of the AS 4964 (2004) method for non-homogeneous samples is around 0.1 g/kg (equivalent to 0.01% (w/w)). Where no asbestos is found by PLM and DS, including Trace Analysis, this is considered to be at the nominal reporting limit of 0.01% (w/w). The NEPM screening level of 0.001% (w/w) is intended as an on-site determination, not a laboratory Limit of Reporting (LOR), per se. Examination of a large sample size (e.g. 500 mL) may improve the likelihood of detecting asbestos, particularly AF, to aid assessment against the NEPM criteria. Gravimetric determinations to this level of accuracy are outside of AS 4964 and hence NATA Accreditation does not cover the performance of this service (non-NATA results shown with an asterisk). *NOTE: NATA News March 2014, p.7, states in relation to AS 4964: "This is a qualitative method with a nominal reporting limit of 0.01 % " and that currently in Australia "there is no validated method available for the quantification of asbestos".This report is consistent with the analytical procedures and reporting recommendations in the NEPM and the WA DoH.*

Project Name PARRAMATTA
Project ID 7957
Date Sampled
Report 659901-AID

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
BH01-0.1	19-Jn08524	not provided	Approximate Sample 48g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
BH01-1.0	19-Jn08525	not provided	Approximate Sample 18g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
BH02-0.1	19-Jn08527	not provided	Approximate Sample 54g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
BH02-1.0	19-Jn08528	not provided	Approximate Sample 54g Sample consisted of: Brown coarse-grained soil and rocks	Chrysotile asbestos detected in the form of loose fibre bundles. Approximate raw weight of asbestos = 0.00010g* Total estimated asbestos content in the sample = 0.00010g* Total estimated asbestos concentration = 0.00019% w/w* No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
BH03-0.1	19-Jn08530	not provided	Approximate Sample 52g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
BH03-1.0	19-Jn08531	not provided	Approximate Sample 57g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Asbestos - LTM-ASB-8020	Sydney	Jun 08, 2019	Indefinite

eurofins | mgt

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NATA # 1261 Site # 20794

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NATA # 1261
Site # 23736

Company Name: Alliance Geotechnical
Address: 10 Welder Road
Seven Hills
NSW 2147

Project Name: PARRAMATTA
Project ID: 7957

Order No.:
Report #: 659901
Phone: 1800 288 188
Fax: 02 9675 1888

Received: Jun 7, 2019 5:03 PM
Due: Jun 17, 2019
Priority: 5 Day
Contact Name: Steven Wallace

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Asbestos - AS4964	pH (1:5 Aqueous extract at 25°C as rec.)	Polycyclic Aromatic Hydrocarbons	Acid Sulfate Soils Field pH Test	Metals M8	Eurofins | mgt Suite B13	Aggressivity Soil Set	Moisture Set	Cation Exchange Capacity	Total Recoverable Hydrocarbons	Eurofins | mgt Suite B7	Eurofins | mgt Suite B6
Melbourne Laboratory - NATA Site # 1254 & 14271												X		X			
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794																	
Perth Laboratory - NATA Site # 23736																	
External Laboratory																	
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**												
1	BH01-0.1	Not Provided		Soil	S19-Jn08524	X					X		X			X	
2	BH01-1.0	Not Provided		Soil	S19-Jn08525	X							X				X
3	BH01-1.5	Not Provided		Soil	S19-Jn08526		X		X	X			X	X			
4	BH02-0.1	Not Provided		Soil	S19-Jn08527	X							X			X	
5	BH02-1.0	Not Provided		Soil	S19-Jn08528	X							X			X	
6	BH02-2.0	Not Provided		Soil	S19-Jn08529			X		X			X				
7	BH03-0.1	Not Provided		Soil	S19-Jn08530	X					X		X			X	
8	BH03-1.0	Not Provided		Soil	S19-Jn08531	X							X				X
9	BH01-2.5	Not Provided		Soil	S19-Jn08532							X	X				

ABN – 50 005 085 521
e.mail : EnviroSales@eurofins.com
web : www.eurofins.com.au

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Phone : +61 3 8564 5000
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Site # 1254 & 14271

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Brisbane
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Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Company Name: Alliance Geotechnical
Address: 10 Welder Road
Seven Hills
NSW 2147

Project Name: PARRAMATTA
Project ID: 7957

Order No.:
Report #: 659901
Phone: 1800 288 188
Fax: 02 9675 1888

Received: Jun 7, 2019 5:03 PM
Due: Jun 17, 2019
Priority: 5 Day
Contact Name: Steven Wallace

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Asbestos - AS4964	pH (1:5 Aqueous extract at 25°C as rec.)	Polycyclic Aromatic Hydrocarbons	Acid Sulfate Soils Field pH Test	Metals M8	Eurofins | mgt Suite B13	Aggressivity Soil Set	Moisture Set	Cation Exchange Capacity	Total Recoverable Hydrocarbons	Eurofins | mgt Suite B7	Eurofins | mgt Suite B6
Melbourne Laboratory - NATA Site # 1254 & 14271												X		X			
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794																	
Perth Laboratory - NATA Site # 23736																	
10	BH02-2.5	Not Provided		Soil	S19-Jn08533							X	X				
11	BH03-2.5	Not Provided		Soil	S19-Jn08534				X			X	X				
12	BD1	Not Provided		Soil	S19-Jn08535					X			X		X		
Test Counts						6	1	1	2	3	2	3	12	1	1	4	2

Internal Quality Control Review and Glossary

General

1. QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Samples were analysed on an 'as received' basis.
4. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Advice.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

Units

% w/w: weight for weight basis	grams per kilogram
Filter loading:	fibres/100 graticule areas
Reported Concentration:	fibres/mL
Flowrate:	L/min

Terms

Dry	Sample is dried by heating prior to analysis
LOR	Limit of Reporting
COC	Chain of Custody
SRA	Sample Receipt Advice
ISO	International Standards Organisation
AS	Australian Standards
WA DOH	Reference document for the NEPM. Government of Western Australia, Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (2009), including supporting document Recommended Procedures for Laboratory Analysis of Asbestos in Soil (2011)
NEPM	National Environment Protection (Assessment of Site Contamination) Measure, 2013 (as amended)
ACM	Asbestos Containing Materials. Asbestos contained within a non-asbestos matrix, typically presented in bonded and/or sound condition. For the purposes of the NEPM, ACM is generally restricted to those materials that do not pass a 7mm x 7mm sieve.
AF	Asbestos Fines. Asbestos containing materials, including friable, weathered and bonded materials, able to pass a 7mm x 7mm sieve. Considered under the NEPM as equivalent to “non-bonded / friable”.
FA	Fibrous Asbestos. Asbestos containing materials in a friable and/or severely weathered condition. For the purposes of the NEPM, FA is generally restricted to those materials that do not pass a 7mm x 7mm sieve.
Friable	Asbestos-containing materials of any size that may be broken or crumbled by hand pressure. For the purposes of the NEPM, this includes both AF and FA. It is outside of the laboratory’s remit to assess degree of friability.
Trace Analysis	Analytical procedure used to detect the presence of respirable fibres in the matrix.

Comments

The samples received were not collected in an approved asbestos bag and was therefore sub-sampled from the 250mL glass jar. Valid sub-sampling procedures were applied so as to ensure that the sub-samples to be analysed accurately represented the samples received.

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N/A	Not applicable

Asbestos Counter/Identifier:

Chamath JHM Annakkage	Senior Analyst-Asbestos (NSW)

Authorised by:

Sayeed Abu	Senior Analyst-Asbestos (NSW)

Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1917825**	Page	: 1 of 5
Client	: **ALLIANCE GEOTECHNICAL**	Laboratory	: Environmental Division Sydney
Contact	: Enviro ALLIANCE GEO	Contact	: Customer Services ES
Address	: Unit 3 / 155 Glendenning Road Glendenning NSW 2761	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 7957 PARRAMATTA	Date Samples Received	: 11-Jun-2019 15:00
Order number	:	Date Analysis Commenced	: 13-Jun-2019
C-O-C number	: ----	Issue Date	: 18-Jun-2019 16:33
Sampler	: TODD OBRIEN		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 1		
No. of samples analysed	: 1		

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Peter Wu		Sydney Inorganics, Smithfield, NSW

General Comments

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

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

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

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

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

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

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

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SD1	----	----	----	----
			Client sampling date / time	11-Jun-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1917825-001	--------	--------	--------	--------
				Result	----	----	----	----
EA055: Moisture Content								
Moisture Content	----	1.0	%	**14.6**	----	----	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	**28**	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg	**26**	----	----	----	----
Copper	7440-50-8	5	mg/kg	**68**	----	----	----	----
Lead	7439-92-1	5	mg/kg	**203**	----	----	----	----
Nickel	7440-02-0	2	mg/kg	**38**	----	----	----	----
Zinc	7440-66-6	5	mg/kg	**340**	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	**0.1**	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	----	----	----	----
C10 - C14 Fraction	----	50	mg/kg	<50	----	----	----	----
C15 - C28 Fraction	----	100	mg/kg	**640**	----	----	----	----
C29 - C36 Fraction	----	100	mg/kg	**460**	----	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	**1100**	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg	<10	----	----	----	----
>C10 - C16 Fraction	----	50	mg/kg	<50	----	----	----	----
>C16 - C34 Fraction	----	100	mg/kg	**970**	----	----	----	----
>C34 - C40 Fraction	----	100	mg/kg	**230**	----	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg	**1200**	----	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg	<50	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	----	----	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	----	----	----	----
^ **Sum of BTEX**	----	0.2	mg/kg	<0.2	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SD1	----	----	----	----
				Client sampling date / time	11-Jun-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1917825-001	--------	--------	--------	--------
					Result	----	----	----	----
EP080: BTEXN - Continued									
^ **Total Xylenes**	----	0.5	mg/kg		<0.5	----	----	----	----
Naphthalene	91-20-3	1	mg/kg		<1	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**90.1**	----	----	----	----
Toluene-D8	2037-26-5	0.2	%		**99.0**	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		**96.0**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

CHAIN OF CUSTODY RECORD

ABN 50 005 085 521

- Sydney Laboratory: Unit F3 Bld F, 16 Mars Rd, Lane Cove West, NSW 2066; 02 9900 8400; EnviroSampleNSW@eurofins.com
- Brisbane Laboratory: Unit 1, 21 Smallwood Pl, Murarrie, QLD 4172; 07 3902 4600; EnviroSampleQLD@eurofins.com
- Perth Laboratory: Unit 2, 91 Leach Highway, Kewdale WA 6105; 08 9251 9600; EnviroSampleWA@eurofins.com
- Melbourne Laboratory: 2 Kingston Town Close, Oakleigh, VIC 3166; 03 8564 5000; EnviroSampleVic@eurofins.com

Company	ALLIANCE GEOTECHNICAL	Project №	7957	Project Manager	Steven Wallace
Address	10 WELDER ROAD, SEVEN HILLS NSW	Project Name	Parramatta	EDD Format (ESdat, EQuIS, Custom)	
Contact Name					
Phone №					
Special Directions					
Purchase Order					
Quote ID №					

Sampler(s)	Todd Obrien	
Handed over by	Todd Obrien	
Email for Invoice	enviro@allgeo.com.au	
Email for Results		

Analyses (Note: Where metals are required, please specify Total or Filtered. Suite codes must be listed to ensure correct analytes are performed)

Containers: 1L Plastic; 250mL Plastic; 125mL Plastic; 200mL Amber Glass; 40mL VOA vial; 500mL PFAS Bottle; Jar (Glass or HDPE); Other (Advanced ASANPFA, WA Guidelines)

Turnaround Time (TAT) Requirements (Default will be 3 days if not ticked)

- ☐ Overnight (9am)*
- ☐ 1 Day* ☐ 2 Day*
- ☐ 3 Day* ☒ 5 Day
- * Surcharges apply
- ☐ Other ( )

№	Client Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix (Solid (S) Water (W))	Asbestos presence absence	TRH	BTEX	PAH	Metals	OCP	PCB	phlphtlox	Sample Comments / Dangerous Goods Hazard Warning
1	BH08-0.1	21/05/19	S		X	X	X	X	X	X		
2	BH08-1.0	21/05/19	S	X			X	X			X	Friable Asbestos within sample
3	BH08-2.0	21/05/19	S	X	X	X	X	X				Friable Asbestos within sample
4	BH07-0.1	21/05/19	S		X	X	X	X				
5	BH07-1.0	21/05/19	S	X			X	X				Friable Asbestos within sample
6	BH07-2.0	21/05/19	S	X	X	X	X	X	X	X	X	Friable Asbestos within sample
7	BH06-0.1	21/05/19	S	X	X	X	X	X				
8	BH06-1.0	21/05/19	S				X	X			X	
9	BH06-2.0	21/05/19	S	X	X	X	X	X				
10	BH05-0.1	21/05/19	S	X	X	X	X	X	X	X		
11	BH05-1.0	21/05/19	S				X	X				
12	BH05-2.0	21/05/19	S	X	X	X	X	X			X	
13	BH04-0.1	21/05/19	S	X	X	X	X	X	X	X		
14	BH04-1.0	21/05/19	S				X	X				
15	BH04-2.0	21/05/19	S	X	X	X	X	X			X	
	Total Counts			10	10	10	15	15	4	4	5	

Method of Shipment	☐ Courier (#)	☐ Hand Delivered	☐ Postal	Name		Signature	Date ___/___/___ Time ___:___
Eurofins | mgt Laboratory Use Only	Received By	SYD | BNE | MEL | PER | ADL | NTL | DRW		Signature		Date 23.5.19	Time 10:29AM Temperature 7.8°C
	Received By	SYD | BNE | MEL | PER | ADL | NTL | DRW		Signature		Date ___/___/___	Time ___:___ Report № 657558

Submission of samples to the laboratory will be deemed as acceptance of Eurofins | mgt Standard Terms and Conditions unless agreed otherwise. A copy of Eurofins | mgt Standard Terms and Conditions is available on request.

Eurofins Environment Testing Australia Pty Ltd trading as Eurofins | mgt

QS3009_R7 Modified by: Dr. R Symons Approved by: T. Lakeland Approved on: 17 August 2017

CHAIN OF CUSTODY RECORD

ABN 50 005 085 521

☐ Sydney Laboratory
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02 9900 8400 EnviroSampleNSW@eurofins.com

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☐ Perth Laboratory
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08 9251 9600 EnviroSampleWA@eurofins.com

☐ Melbourne Laboratory
2 Kingston Town Close, Oakleigh, VIC 3166
03 8564 5000 EnviroSampleVic@eurofins.com

Company	ALLIANCE GEOTECHNICAL	Project №	7957	Project Manager	Steven Wallace	Sampler(s)	Todd Obrien
Address	10 WELDER ROAD, SEVEN HILLS NSW	Project Name	Parramatta	EDD Format (ESdat, EQuIS, Custom)		Handed over by	Todd Obrien
Contact Name						Email for Invoice	enviro@allgeo.com.au
Phone №						Email for Results	
Special Directions							
Purchase Order							
Quote ID №							

Analyses (Note: Where metals are requested, please specify "Total" or "Filtered". SUITE code must be used to attract SUITE pricing)

№	Client Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix (Solid (S) Water (W))	Asbestos presence absence	TRH	BTEX	PAH	Metals	OCP	PCB	CEC	pH	Aggressivity	ph phfox	1L Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	BH01-0.1			X	X	X	X	X	X	X													
2	BH01-.1.0			X	X	X		X															
3	BH01-.1.5							X			X	X		X									
4	BH02-0.1			X	X	X	X	X															
5	BH02-.1.0			X	X	X	X	X															
6	BH02.2.0						X	X															
7	BH03-0.1			X	X	X	X	X	X	X													
8	BH03-.1.0			X	X	X		X															
9	BH01-2.5												X										
10	BH02-2.5												X										
11	BH03-2.5												X	X									
12	SD1				X			X															Sent to ALS for split analysis
13	BD'1				X			X															
	Total Counts			6	8	6	5	10	2	2	1	1	3	2									

Turnaround Time (TAT) Requirements (Default will be 5 days if not ticked)
- ☐ Overnight (9am)*
- ☐ 1 Day* ☐ 2 Day*
- ☐ 3 Day* ☑ 5 Day
- * Surcharges apply
- ☐ Other ( )

Method of Shipment	☐ Courier (#)	☐ Hand Delivered	☐ Postal	Name		Signature		Date	__/__/__	Time	__:__
Eurofins | mgt Laboratory Use Only	Received By	Grace Tuckwell	(SYD) | BNE | MEL | PER | ADL | NTL | DRW	Signature	GTuckwell	Date	7.6.19	Time	5:03	Temperature	13.70
	Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date	__/__/__	Time	__:__	Report №	659901

Submission of samples to the laboratory will be deemed as acceptance of Eurofins | mgt Standard Terms and Conditions unless agreed otherwise. A copy of Eurofins | mgt Standard Terms and Conditions is available on request.

Eurofins Environment Testing Australia Pty Ltd trading as Eurofins | mgt

APPENDIX E

PAH SOURCE ANALYST RESULT SUMMARY

PAH Source Analyst

- Home
- Background Documentation
- PAH Source Properties
- Upload PAH Data
- Method 1 Output
- Method 2 Output
- Terms and Conditions
- Contact Us

Method 2:

Pyrene Normalised, Summed Difference

Key:
- **Very Good** (<1)
- **Good** (1-2)
- **Reasonable** (2-3)
- **Poor** (>3)

Reference Material	BH03_0.1m	BH05_2.0
Black Coal Tar 1	9.83	9.91
Black Coal Tar 2	3.36	3.58
Black Coal Tar 3	**2.44**	**2.69**
Brown Coal Tar	15.69	16.52
Steelworks Tar 1	4.03	4.46
Steelworks Tar 2	4.24	4.16
Weathered Coal Tar	4.62	5.21
Creosote 1	5.7	7.07
Creosote 2	8.68	10.06
Weathered Creosote	3.91	5.29
Ash form Black Coal 1	**1.22**	**0.98**
Ash from Black Coal 2	**1.02**	**1.41**

Ash from Black Coal 3	**1.71**	**1.53**
Ash from Brown Coal	**1.75**	**0.73**
Bitumen	12.06	11.71
Coke	**1.59**	**0.88**
Waste Oil Petrol	5.34	4.34
Waste Oil Diesel	**2.62**	**2.52**
Roadseal	**1.95**	**2.37**