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Engineering | Environmental | Testing

Report Type:

Stage 2 - Detailed Site Investigation

Project Name:

Proposed Redevelopment

Project Address:

172 Showground Road, Castle Hill NSW

Lot 102 in DP1130271

Client Name:

Northrop Consulting Engineers P/L

17 September 2019

Report No: 8325-ER-1-2

We give you the right information to make the right decisions

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EXECUTIVE SUMMARY

Alliance Geotechnical Pty Ltd (AG) was engaged by Northrop Consulting Engineers P/L, to undertake a Stage 2 Detailed Site Investigation (DSI) for 172 Showground Road, Castle Hill NSW (refer **Figure 1** with the 'site' boundaries outlined in **Figure 2**).

AG has the following project appreciation:

- The site is proposed for redevelopment, comprising a new storage facility for the Powerhouse museum;
- A previous Stage 1 preliminary site investigation (PSI) was undertaken for the site by AG in 2019; and
- A contamination assessment consisting of a Stage 2 Detailed Site Investigation (DSI) of the site is required to assess whether the site is suitable for the proposed land use scenario.

Objectives and Scope of the Investigation

The objectives of this investigation were to:

- Assess the potential nature and extent of identified contaminants of potential concern on the site, with reference to the areas of environmental concern reported in the stage 1 PSI;
- 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 relating 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 and groundwater samples;
- Laboratory analysis to compliment the in-situ testing completed during the field investigation; and
- An assessment of the contamination status of the site and to recommend any further remedial requirements associated with the redevelopment of the site.

Results of the DSI

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 all other identified contaminants of potential concern in the soils assessed are considered unlikely to present:
 - an unacceptable direct contact human health exposure risk; or
 - an unacceptable inhalation / vapour intrusion human health exposure risk;
- The detected concentrations of identified contaminants of potential concern in the soils assessed are considered unlikely to present a petroleum hydrocarbon management limit risk;

- No asbestos was detected within the soil materials analysed; and
- The detected concentrations of identified contaminants of potential concern in the soils assessed are considered unlikely to present an unacceptable ecological contamination risk.

Based on the assessments undertaken as part of this investigation, AG has concluded that the site is deemed suitable for the proposed land use setting. AG can conclude that no further investigation should be required for this development to proceed.

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LIST OF ABBREVIATIONS

A list of the common abbreviations used throughout this report is provided below:

ACM	Asbestos Containing Material
AEC	Area of Environmental Concern
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 level
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
NEPM	National Environment Protection Measure
NSW EPA	NSW Environment Protection Authority
OCP	Organochlorine Pesticide
OPP	Organophosphorus Pesticide
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PFAS	Per and polyfluoroalkyl substances
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
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
UCL	Upper Confidence Limit
USCS	Unified Soil Classification System
UST	Underground storage tank
VOC	Volatile organic carbon

1. INTRODUCTION

1.1. Background

Alliance Geotechnical Pty Ltd (AG) was engaged by Northrop Consulting Engineers P/L, to undertake a Stage 2 – Detailed Site Investigation (DSI) for 172 Showground Road, Castle Hill NSW (refer **Figure 1** with the 'site' boundaries outlined in **Figure 2**).

AG has the following project appreciation:

- The site is proposed for redevelopment, comprising a new storage facility for the Powerhouse museum;
- A previous Stage 1 preliminary site investigation (PSI) was undertaken for the site by AG in 2019; and
- A contamination assessment consisting of a Stage 2 Detailed Site Investigation (DSI) of the site is required to assess whether the site is suitable for the proposed land use scenario.

1.2. Proposed Development

It is AG's understanding that it is the intention of the client to redevelop the site as a storage facility for the Powerhouse museum. This is assessed as commercial/industrial land-use settings. Currently under the *State Environmental Planning Policy (SEPP) No. 55 – Remediation of Land*, a consent authority must not consent to the carrying out of any development unless it has considered whether the land is contaminated. This report has been prepared to satisfy Clause 7 (2) and (3) of SEPP No. 55 and The Hills Shire Council planning policies.

1.3. Objectives

The objectives of this project were to:

- Assess the potential nature and extent of identified contaminants of potential concern on the site, with reference to the areas of environmental concern reported in the stage 1 PSI;
- 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).

1.4. Scope of Work

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

- A desktop review of relevant information relating 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 and groundwater samples;
- Laboratory analysis to compliment the in-situ testing completed during the field investigation; and
- An assessment of the contamination status of the site and to recommend any further remedial requirements associated with the redevelopment of the site.

This DSI was undertaken in accordance with the NSW OEH *Guidelines for Consultants Reporting on Contaminated Sites, 2011*, NSW EPA *Sampling Design Guidelines 1995* and was also in accordance with the ASC NEPM 2013, including:

- Ecological Investigation Levels;
- Ecological Screening Levels;
- Health Investigation Levels;
- Health Screening Levels; and
- Groundwater Investigation Levels.

2. SITE IDENTIFICATION

The site is identified as Lot 102 in DP1130271.

The approximate geographic coordinates of the middle of the site, inferred from Google Earth were 33°43'29" S and 150°58'26" 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 approximately 5,000m².

A copy of a detail and level survey is presented in **Appendix A**.

3. SITE SETTING

3.1. Geology

AG (2019) indicated that the site is likely to be underlain by Middle Triassic Ashfield Shale (Rwa), comprising dark-grey to black claystone- siltstone and fine sandstone-siltstone laminite.

3.2. Acid Sulphate Soils

AG (2019) indicated that the site lies in an area mapped as '*No Known Occurrence*' with respect to acid sulfate soils. This infers that land management activities are not likely to be affected by acid sulfate soil materials.

Further assessment of acid sulfate soils in the context of this investigation is considered by AG as not warranted.

3.3. Topography

The site topography is generally flat, with a very shallow slope towards the west. AG understands that the site is located at an elevation of approximately 116m Australian Height Datum.

3.4. Hydrology and Hydrogeology

Surface water courses proximal to the site included Cattai Creek, approximately 730m to the east.

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 east.

A review of the NSW Office of Water groundwater database ([www.http://allwaterdata.water.nsw.gov.au/water](http://allwaterdata.water.nsw.gov.au/water)) implemented on 12 September 2019 indicated there was no registered groundwater features located within a 500m radius of the site

A copy of the WaterNSW search record and associated groundwater features are presented in **Appendix B**.

3.5. Adjacent Ecological Receptors

No significant ecological receptors were identified in the vicinity of the site. Specifically, the site is situated in a commercial area with a significant portion of the surrounding area covered in either concrete hardstand or asphaltic road. Limited flora and fauna were observed in the area, generally consisting of small verges adjacent to roadways.

4. PREVIOUS CONTAMINATION ASSESSMENTS

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

- Alliance Geotechnical 2019, 'Stage 1 Preliminary Site Investigation, 172 Showground Road, Castle Hill NSW' dated 16th September 2019, ref: 8325-ER-1-1

A summary of the findings of this investigation is presented as Section **Error! Reference source not found.**

4.1. AG (2019)

The objectives of the 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 proposed land use setting; and
- Provide recommendations for further investigation, management and/or remediation (if warranted).

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

- a desktop review;
- a site inspection; and
- data assessment and reporting.

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

- Areas of environmental concern (AEC) have been identified for the site; and
- Further assessment of the identified AEC, and subsequent management / remediation of identified unacceptable land contamination risks (if warranted), would be required to confirm land use suitability (in the context of land contamination) for the proposed redevelopment works.

Based on these conclusions, AG makes the following recommendations:

- A stage 2 detailed site investigation (DSI) should be undertaken for the identified areas of environmental concern;
- In the event that the identified areas of environmental concern are not accessible during the undertaking of the stage 2 DSI, consideration should be given to preparation of a remedial action plan (RAP), setting out what supplementary assessment works would be required; and
- Further contamination assessment works should be undertaken by a suitably experienced environmental consultant.

5. CONCEPTUAL SITE MODEL

5.1. Areas of Environmental Concern

Site history data and site walkover observations 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 is presented in attached **Figure 3** and associated COPC are presented in **Table 5.2.1**

5.2. Conceptual Site Model

The above assessment identified areas of environmental concern (AEC) and contaminants of potential concern (COPC) which have the potential to be (or are) present on site. The AEC identified is presented in **Table 5.2.1**.

Overall, the site setting is considered to be of low environmental sensitivity, due to the following reasons:

- The site is not within close proximity to any major watercourses;
- The site is underlain by an unconfined aquifer. The aquifer is not used as a water source in the general area; and
- The general area is zoned as B4 Mixed Use and surrounding developments are considered to be a mix of medium commercial and residential, as such the redevelopment is in-line with surrounding land-uses and thus is not a significant change from the surrounding area.

AG notes that the contaminant laydown mechanism for these areas of environmental concern is considered likely to be ‘top down’.

Table. 5.2.1: AEC and CSM

<p>ID</p> <p>AEC01</p>	<p><u>Potential Sources:</u></p> <p>Onsite sources identified:</p> <ul style="list-style-type: none"> ▪ Imported fill materials. <p><u>Offsite sources identified:</u></p> <p>No significant sources identified offsite.</p> <p><u>Potential Pathways:</u></p> <p>The potential contamination pathways are considered to be as follows:</p> <ul style="list-style-type: none"> ▪ Inhalation/ingestion of contaminants released in dust during redevelopment by Site workers; ▪ Direct contact, ingestion or inhalation of soil or groundwater contaminants by future site inhabitants;
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	<ul style="list-style-type: none">▪ Migration of volatile compounds into proposed buildings/basements causing toxic effects, asphyxiation or risk of explosion; and▪ Permeation of hydrocarbons / organic contamination into unprotected water pipes on site. <p><u>Potential Receptors:</u></p> <p>Relevant potential receptors are considered to include:</p> <ul style="list-style-type: none">▪ Onsite construction and maintenance workers;▪ Third parties during construction (adjacent site users and adjacent residents);▪ Flora and Fauna;▪ Future residents/end users;▪ Neighbouring commercial land users; and▪ Cattai Creek.
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5.3. Land Use Setting

AG understands that the site is proposed for a redevelopment, new storage facility for the Powerhouse museum.

5.4. Drinking Water Use

There are no groundwater bores onsite or down-gradient of the site, registered for drinking water use. It is noted that a reticulated mains potable water supply is available in the area. Therefore, further assessment of this groundwater drinking water value is considered not warranted.

5.5. Recreational Water Use

Surface water courses proximal to the site included Cattai Creek, approximately 730m to the east. Waters in this creek, particularly the downstream reaches, are considered to be highly disturbed as a result of historical commercial / industrial activity. A review of aerial photography suggests that the nearby water courses are not used recreationally. Further assessment of this value is therefore considered not warranted.

5.6. Aquatic Ecosystems

Surface water courses proximal to the site included Cattai Creek, approximately 730m to the east. This creek is considered to be a freshwater environment and consideration to freshwater guideline values is warranted.

5.8. Human Health – Direct Contact

Based on the ongoing land use scenario and guidance provided in Section 2.2 of ASC NEPM 2013, AG considers it reasonable to adopt the 'HIL B – residential with minimal opportunities for soil access' land use setting, for the purpose of assessing land contamination exposure risks.

AG notes that the proposed development includes building structures and hardstand pavement areas across most 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.

5.9. Human Health – Inhalation / Vapour Intrusion

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) is required.

The historical evidence reviewed indicated a low potential for a primary source to be present on the site.

The same historical evidence indicated a potential land use activity to be uncontrolled filling. 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.

A source of vapours from groundwater was not identified for the site.

The potential for vapours to be present in soils on site at concentrations which might present an unacceptable exposure risk, is considered to be likely. AG considers further assessment warranted.

5.10. Aesthetics

Section 3.6.3 of ASC 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 most 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.

5.11. Ecological Health - Terrestrial Ecosystems

Section 3.4.2 of ASC NEPM 2013 provides a pragmatic risk-based approach should be taken when assessing ecological risks in residential and commercial / industrial land use settings. Section 3.4.2 also advises that when sites have large buildings and extensive areas covered with concrete, other pavement or hardstand materials, environmental values requiring consideration while in operational use may be limited.

AG (2019) reported that 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 and that similar observations were made of visible vegetation on land adjacent to the site. These remarks were reaffirmed during the current investigation undertaken by AG.

Based on the field observations, guidance in ASC NEPM 2013, and the nature and extent of the proposed development concept, the need for further ecological assessment is considered not warranted.

5.12. Management Limits for Petroleum Hydrocarbon Compounds

ASC 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).

ASC 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 building basements and services and depth to groundwater, to determine the maximum depth to which the limits should apply. NEPM ASC 2013 also notes that management limits may have less relevance at operating industrial sites which have no or limited sensitive receptors in the area of potential impact, and when management limits are exceeded, further site-specific assessment and management may enable any identified risk to be addressed.

5.12. Contaminants of Potential Concern

With reference to the activities identified within Appendix A of the *State Environment Planning Policy (SEPP) No.55 – Remediation of Land* and based on information uncovered in the desktop investigation, the following items were considered potential sources of contamination:

Onsite

Uncontrolled fill:

- Heavy Metals;
- Asbestos;
- TRH;
- BTEX;
- PCBs;
- VOCs/SVOCs; and
- OCP/OPP.

No significant offsite sources were identified during the investigation undertaken by AG.

6. DATA QUALITY OBJECTIVES

Appendix B of ASC NEPM 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 nature and extent of identified contaminants of potential concern on the site, with reference to the areas of environmental concern reported in the stage 1 PSI;
- Provide advice on whether the site would be suitable (in the context of land contamination) for the proposed land use setting;
- Provide recommendations for further investigation, management and/or remediation (if warranted).

The project is being undertaken because:

- The site is proposed for a redevelopment, comprising new storage facility for the Powerhouse museum; and
- A stage 2 detailed site investigation (DSI) to address the findings of the stage 1 PSI undertaken by AG (2019) for the site.

The project team identified for this project is comprised primarily of suitably experienced environmental consultants from Alliance Geotechnical Pty Ltd.

The regulatory authorities identified for this project include NSW EPA and the local Council.

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 ASC NEPM 2013 and HSLs in Table B4 of Friebel, E & Nadebaum, P (2011);
- Human health inhalation/vapour intrusion – HSLs in Table 1 (A) in ASC NEPM 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 ASC NEPM 2013; 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 site as defined by its boundaries.

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 shallow soils and 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. Rinsate Blanks

One rinsate blank will be collected and scheduled for analysis, for each day of sampling undertaken, if non-disposable sampling equipment was used on that day. The rinsate blank will be analysed for at least one of the analytes the sample/s collected that day are being scheduled for analysis for (with the exception of asbestos).

6.5.2. Trip Spikes and Trip Blank Samples

One trip spike and trip blank sample will be used and scheduled for analysis, for each day of sampling undertaken, if site samples being collected that day are being analysed for volatile contaminants of concern (typically BTEX and/or TRH).

6.5.3. 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.

6.5.4. 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.

6.5.5. 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).

Completeness			
Field Considerations	Assessment Criterion	Laboratory Considerations	Assessment Criterion
Critical locations sampled	Refer Section 6.6	Critical samples analysed according to SAQP	Refer Section 6.7.7
Critical samples collected	Refer Section 6.6	Analytes analysed according to SAQP	Refer Section 6.7.7
SOPs appropriate and complied with	100%	Appropriate laboratory analytical methods and LORs	Refer Section 6.7.7
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 6.7.8

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 6.7.8
Climatic conditions	Samples stored in insulated containers with ice, immediately after collection	Same LORs at primary laboratory	Refer Section 6.7.8
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 6.7.8
Representativeness			
Field Considerations	Assessment Criterion	Laboratory Considerations	Assessment Criterion
Appropriate media sampled according to SAQP	Refer Section 6.4	Samples analysed according to SAQP	Refer Section 6.7.7
Media identified in SAQP sampled	Refer Section 6.4		
Precision			
Field Considerations	Assessment Criterion	Laboratory Considerations	Assessment Criterion

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

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 (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 (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 of 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* (WA 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 (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 judgemental sampling pattern, with up to 13 sampling points.

The locations of the sampling points are set out in **Figure 4**. The location of actual sampling points will be recorded by hand on a site plan.

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 BH13	Handheld mechanical push tube	1.0m, 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. It is noted however, that project constraints will likely limit intrusive investigation methodologies (including the use of excavation equipment for test pitting and/or minimum 150mm diameter soil coring equipment). Subsequently, application of asbestos screening criteria published in ASC NEPM 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 to 0.4m below ground level, would be identified as BH03/0.2-0.4.

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. Headspace Screening

Where the contaminants of potential concern include volatiles (e.g. TRH, BTEX), project soil samples will be subjected to field screening for ionisable volatile organic compounds (VOC), using a photo-ionisation detector (PID). The results of field screening will be recorded on sampling point log.

6.7.5. Decontamination

In the event that non-disposable sampling equipment is used, that equipment will be decontaminated before and in between sampling events, to mitigate potential for cross contamination between samples collected. The decontamination methodology to be adopted for this project will include:

- Washing relevant sampling equipment using potable water with a phosphate free detergent (i.e. Decon 90 or similar) mixed into the water;
- Rinsing the washed non-disposable sampling equipment with distilled or de-ionised water; and
- Air drying as required.

6.7.6. Laboratory Selection

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

6.7.7. 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;
- Headspace screening results (where available);
- 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 6.7.7** for this project.

Table 6.7.7 Laboratory Analytical Schedule

AEC	Sampling Point ID	TRH/BTEX	PAH	OCP / PCB	8 Metals	Asbestos
AEC01	BH01 to BH13	13/13	13	7/7	13	13

6.7.8. 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 6.7.8**.

Table 6.7.8 Laboratory Holding Times, Analytical Methods and Limits of Reporting

Analyte	Holding Time	Analytical Method	Limit of Reporting
Soil			
BTEX and TRH C ₆ -C ₁₀	14 days	USEPA 5030, 8260B and 8020	0.2-0.5 (mg/kg)
TRH >C ₁₀ -C ₄₀	14 days	USEPA 8015B & C	20-100 (mg/kg)
VOC	14 days	USEPA 8260	0.1-0.5 (mg/kg)
PAH	14 days	USEPA 8270	0.1-0.5 (mg/kg)
OCP/OPP	14 days	USEPA 8081	0.2 (mg/kg)
PCB	28 days	USEPA 8270	0.2 (mg/kg)
PFAS	14 days	Inhouse based on USEPA 537 V1.1	0.005 (mg/kg)
Metals (ex. Hg & Cr ^{VI})	6 months	USEPA 8015B & C	0.05 – 2 (mg/kg)
Hg & Cr ^{VI}	28 days	USEPA 8015B & C	0.05 – 2 (mg/kg)
Asbestos	No limit	AS4964:2004	Absence / presence
Asbestos	No limit	Inhouse Method	0.001% w/w
Water			
BTEX and TRH C ₆ -C ₁₀	14 days	NEPM Schedule B3	0.02-0.1 (mg/L)
TRH >C ₁₀ -C ₄₀	14 days	NEPM Schedule B3	0.1 (mg/L)
VOC	714days	USEPA 8260	0.1-0.5 (mg/L)
PAH	7 days	USEPA 8270, 8100, NEPM Schedule B3	0.001 (mg/L)
OCP/OPP	7 days	USEPA 8141, USEPA 8081, USEPA 8270, NEPM Schedule B3	0.002-0.0005 (mg/L)
PCB	7 days	USEPA 8082, NEPM Schedule B3	0.001-0.005 (mg/L)
PFAS	14 days	Inhouse based on USEPA 537 V1.1	0.01-0.05 (µg/L)
Metals (ex. Hg & Cr ^{VI})	6 months	USEPA 6010, 6020	0.05 – 2 (mg/L)
Hg & Cr ^{VI}	28 days	USEPA 6010, 6020	0.05 – 2 (mg/L)

7. FIELDWORK METHODOLOGY

7.1. Soil Sampling

Soil sampling was undertaken by AG on 11th September 2019. A total of thirteen (13) boreholes (BH01-BH13) were advanced across the site using a handheld mechanical push tube until reaching inferred natural materials between 0.3-0.8m bgl. Subsurface drilling was undertaken by an appropriate AG environmental scientist. Samples for analysis for potential contaminants of concern were collected from the near surface, at 0.5 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 sample containers provided by the laboratory. A small subsample was transferred into a plastic bag for additional on-site PID analysis. The PID calibration certificate is provided in **Appendix C**.

The selection of samples for laboratory analyses was based upon olfactory observations and results of field screening using a photo-ionisation detector (PID) for the presence of volatile organic compounds (VOCs). The soil jars were labelled with sample identification (sample location and depth), date and name of sampler.

Upon completion of the soil boring, the holes were backfilled with the drill cuttings and sealed off with the concrete core cutting and additional concrete mix.

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 B**.

Each sampling point established was marked on a site plan. The locations of these sampling points are presented in **Figure 4**.

7.2. Site Geology

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

Inferred natural material was encountered at each location.



Image 7.2.1 Example of soil profile at BH04, from surface (right) to underlain natural material (left)

7.3. Headspace Screening

Samples collected were subjected to headspace screening. A sub sample from each sampling point was placed in a zip lock bag, sealed and shaken. Each bag was then pierced with the probe tip of a calibrated photoionization detector (PID) and the screening results recorded. These results are recorded on the borehole logs presented in **Appendix B**.

The overall results of the headspace screening indicated a low potential for ionisable volatile organic compounds (VOC) to be present in the samples.

A copy of the calibration record for the PID is presented in **Appendix C**.

7.4. Odours

Olfactory evidence of odours in the soil samples collected, was not detected.

7.5. Staining

Visual evidence of staining in the soil samples collected, was not observed.

7.6. Potential Asbestos Containing Materials

No visual evidence of potential asbestos containing materials (ACM) was observed at any of the soil sampling point locations or throughout the site walkover.

8. 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 8.1 details the analysis undertaken for soil samples and **Table 8.2** details the laboratory suite of analysis undertaken for groundwater samples.

Table 8.1 Soil Analytical Schedule

AEC	Sampling Point ID	TRH/BTEX	PAH	OCP / PCB	8 Metals	Asbestos
AEC01	BH01 to BH13	13/13	13	7/7	13	13
DUP1	BH01	-	-	-	1	-

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 and LAR2**.

9. DATA QUALITY INDICATOR ASSESSMENT

9.1. Completeness

An assessment of the completeness of data collected was undertaken, and the results presented in **Table 9.1**.

Table 9.1 Completeness DQI

Field Considerations	Target	Actual	Comment
Critical locations sampled	13	13	Performance against indicator considered acceptable.
Critical samples collected	13	13	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 6.7.7	Refer Section 6.7.7	Performance against indicator considered acceptable.
Analytes analysed according to DQO	Refer Section 6.7.7	100%	Performance against indicator considered acceptable.
Appropriate laboratory analytical methods and LORs	Refer Section 6.7.8	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 6.7.8	100%	Performance against indicator considered acceptable.

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

9.2. Comparability

An assessment of the comparability of data collected was undertaken, and the results presented in **Table 9.2**.

Table 9.2 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 6.7.8	100%	Performance against indicator considered acceptable.
Same LORs at primary laboratory	Refer Section 6.7.8	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 6.7.8	100%	Performance against indicator considered acceptable.

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

9.3. Representativeness

An assessment of the representativeness of data collected was undertaken, and the results presented in **Table 9.3**

Table 9.3 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 6.7.7	Refer comments	Performance against indicator considered acceptable.

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

9.4. Precision

An assessment of the precision of data collected was undertaken, and the results presented in **Table 9.4**.

Table 9.4 Precision DQI

Field Considerations	Target	Actual	Comment
Field duplicate / triplicate RPD	Minimum 5% duplicates and triplicates	7.7 % duplicates Nil Nil Nil	Parent duplicate/triplicate relationships are as follows: Soil: DUP01 = BH01-0.1-0.3 No RPD exceedances were observed for duplicate soil samples. Performance against indicator considered acceptable.
	No limit for analytical results <10 times LOR		
	50% for analytical results 10-20 times LOR		
	30% for analytical results >20 times LOR		
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.

9.5. Accuracy

An assessment of the precision of data collected was undertaken, and the results presented in **Table 9.5**.

Table 9.5 Accuracy DQI

Field Considerations	Target	Actual	Comment
Rinsate blanks	Less than laboratory limit of reporting	Not applicable	Performance against indicator considered acceptable.
Field trip spikes	Recoveries between 60% and 140%	Not applicable	Performance against indicator considered acceptable.
Field trip blanks	Analyte concentration <LOR	Not applicable	Performance against indicator considered acceptable.
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	One failure due to sample matrix interference	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.

10. 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 below.

12.1. Human Health - Direct Contact (HIL B – residential with minimal opportunities for soil access)

TRH

The concentrations of TRH C₆-C₁₀, >C₁₀-C₁₆, >C₁₆-C₃₄ and >C₃₄-C₄₀ detected in the soil samples analysed were less than the applicable adopted direct contact human health exposure criteria.

BTEX

The concentrations of benzene, toluene, ethyl benzene and xylenes detected in soil samples analysed were less than the applicable adopted direct contact human health exposure criteria.

OCP

The concentration of Organochlorine and Organophosphate Pesticides detected in soil samples analysed were less than the applicable adopted direct contact human health exposure criteria.

PAHs

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

The concentrations of benzo(a)pyrene TEQ detected in the soil samples analysed were less than the applicable adopted direct contact human health exposure criteria.

The concentration of total PAH detected in the soil samples analysed were less than the applicable adopted direct contact human health exposure criteria.

PCBs

The concentration of total PCBs detected in the soil samples analysed were less than the applicable adopted direct contact human health exposure criteria.

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 Containing Materials

No asbestos was detected within any of the soil samples analysed.

12.2. Human Health – Inhalation / Vapour Intrusion (HIL B – residential with minimal opportunities for soil access)

TRH

The concentrations of TRH C₆-C₁₀ (minus BTEX) and >C₁₀-C₁₆ (minus naphthalene) detected in the soil samples analysed, were less than the applicable adopted inhalation / vapour intrusion human health exposure criteria.

BTEX

The concentrations of benzene, toluene, ethyl benzene and xylenes detected in the soil samples analysed, were less than the applicable adopted inhalation / vapour intrusion human health exposure criteria.

PAHs

The concentrations of naphthalene detected in the soil samples analysed, were less than the applicable adopted inhalation / vapour intrusion human health exposure criteria.

12.3. Aesthetics

There was no visual evidence of waste storage onsite. The aesthetics assessment criteria adopted for this project, indicate that no further assessment/management of these wastes would be required.

12.4. Terrestrial Ecosystems

Ecological Screening Levels (ESLs)

The concentrations of relevant contaminants of concern detected in the soil samples analysed were less than the applicable adopted ecological screening levels (ESL) with the exception of PFOS (A PFAS compound) within soil samples P4 and P6. Although these samples exceeded the interim indirect exposure guidelines, it is noted that soil from sampling locations where PFAS compounds were identified will be excavated as part of the basement construction thereby removing what limited risk to the limited ecological receptors surrounding the site. Furthermore, due to the nature of the construction, any soil leftover will be covered by concrete including the basement and the ground floor thus removing terrestrial ecological exposure pathways. It is thus the opinion of AG that the detected concentration of PFAS does not pose a significant risk to surrounding ecological receptors.

11. 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 all other identified contaminants of potential concern in the soils assessed are considered unlikely to present:
 - an unacceptable direct contact human health exposure risk; or
 - an unacceptable inhalation / vapour intrusion human health exposure risk;
- The detected concentrations of identified contaminants of potential concern in the soils assessed are considered unlikely to present a petroleum hydrocarbon management limit risk;
- No asbestos was detected within the soil materials analysed; and
- The detected concentrations of identified contaminants of potential concern in the soils assessed are considered unlikely to present an unacceptable ecological contamination risk.

Based on the assessments undertaken as part of this investigation, AG has concluded that the site is deemed suitable for the proposed land use setting. AG can conclude that no further investigation should be required for this development to proceed.

This report, including its conclusions and recommendations, must be read in conjunction with the limitations presented in **Section 12**.

12. 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.

13. REFERENCES

AG 2019, '*Stage 1 Preliminary Site Investigation, 172 Showground Road, Castle Hill NSW*', dated 16th September 2019, ref: 8325-ER-1-1

HEPA 2018, '*PFAS National Environmental management Plan*'

NEPM (ASC) 2013, '*National Environmental Protection (Assessment of Site Contamination) Measures*'

NSW DEC 2006, '*Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd edition)*'.

NSW EPA 1995, '*Contaminated Sites: Sampling Design Guidelines*'.

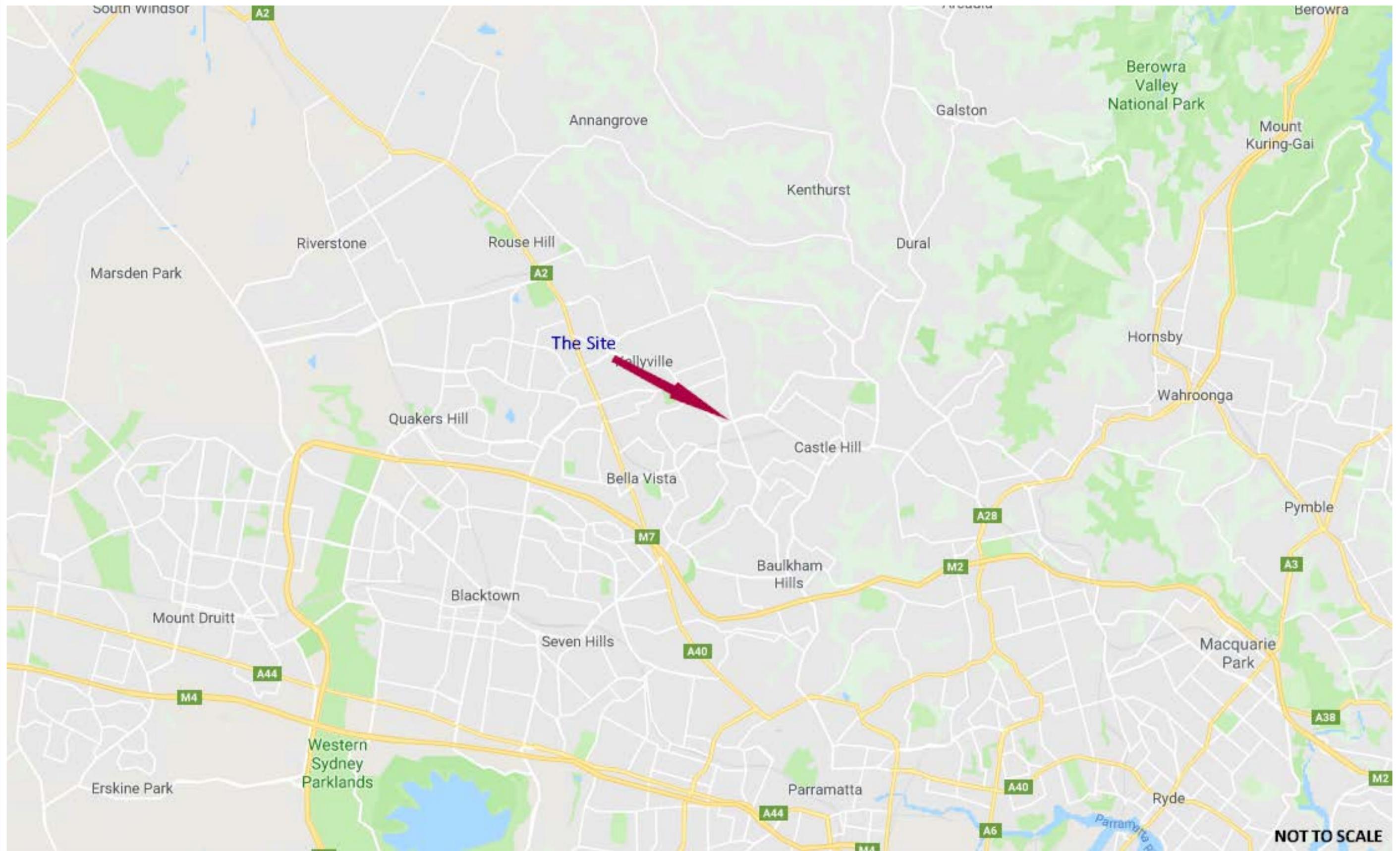
NSW EPA 1997 '*Polychlorinated Biphenyl (PCB) Chemical Control Order*'.

NSW EPA 2012, '*Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases*'

NSW OEH 2011, '*Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites*'.

WA DOH 2009, '*Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia*' dated May 2009.

FIGURES



Site Locality

Client Name:	Northrop Consulting Engineers P/L
Project Name:	Stage 2 Detailed Site Investigation
Project Location:	172 Showground Road, Castle Hill NSW

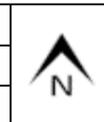


Figure Number:	1
Figure Date:	17 September 2019
Report Number:	8325-ER-1-2



Source: NearMap (Nearmap.com)

Site Layout

Client Name:	Northrop Consulting Engineers P/L
Project Name:	Stage 2 Detailed Site Investigation
Project Location:	172 Showground Road, Castle Hill NSW



Figure Number:	2
Figure Date:	17 September 2019
Report Number:	8325-ER-1-2



Source: NearMap (Nearmap.com)

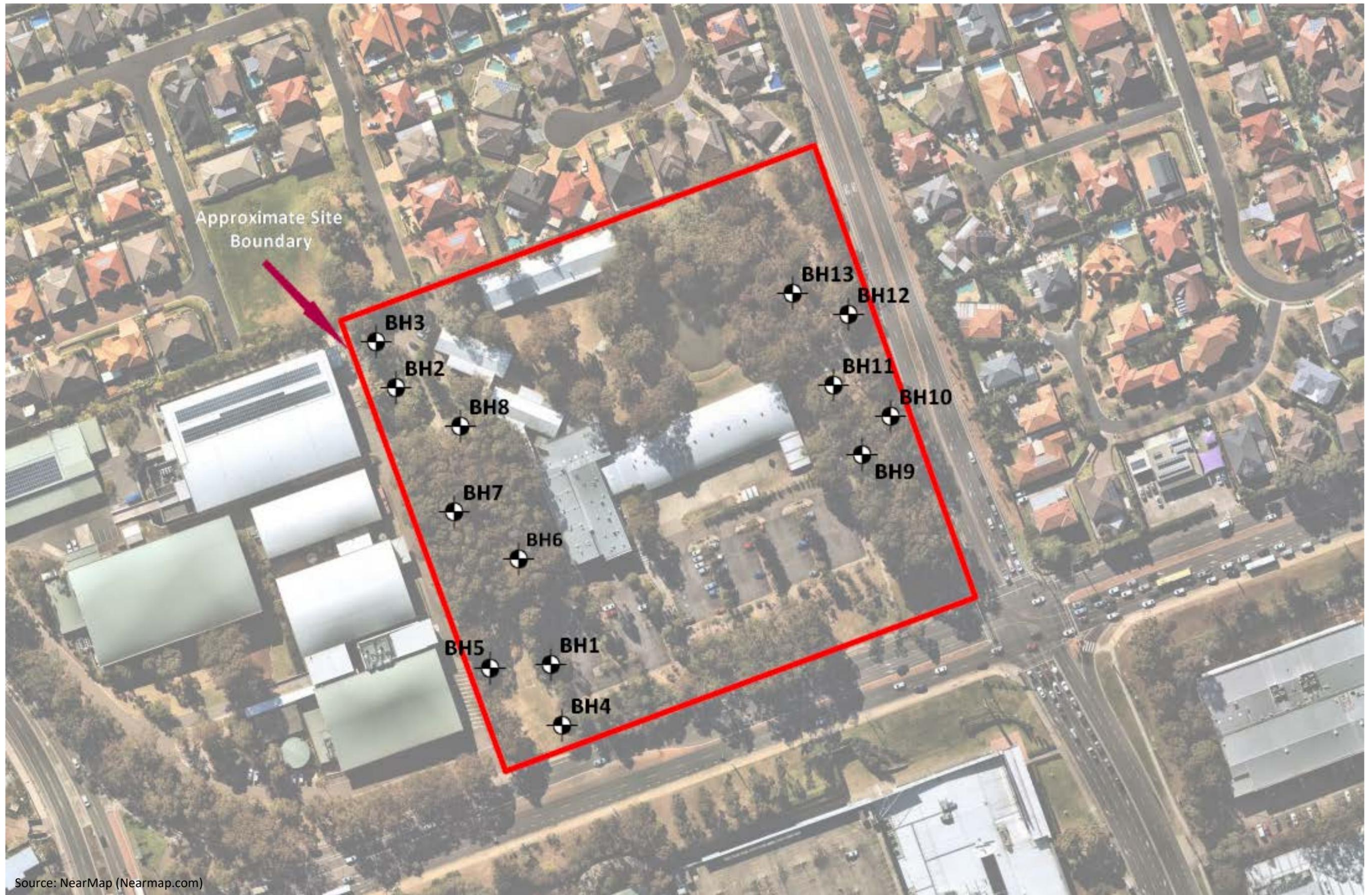
Areas of Environmental Concern



Client Name:	Northrop Consulting Engineers P/L
Project Name:	Stage 2 Detailed Site Investigation
Project Location:	172 Showground Road, Castle Hill NSW



Figure Number:	3
Figure Date:	17 September 2019
Report Number:	8325-ER-1-2



Sampling Point Layout Plan



TABLES

Table LAR2
172 Showground Road, Castle Hill NSW
Soil Results & Adopted Site Criteria
8325-ER-1-2

				Reference	S19-Se20205	S19-Se20218	
				Sample ID	BH01-0.1-0.3	DUP01	
				Date Sampled	9/9/2019	9/9/2019	
				Sample Matrix	Soil	Soil	
Group	Analyte	Units	PQL				RPD (%)
Metals	Arsenic	mg/kg	<1	8.2	7.3	12	
	Cadmium	mg/kg	<0.3	< 0.4	< 0.4	N/A	
	Chromium	mg/kg	<0.3	24	24	0	
	Copper	mg/kg	<0.5	8.1	6.6	20	
	Lead	mg/kg	<1	32	21	42	
	Nickel	mg/kg	<0.5	5.3	< 5	N/A	
	Zinc	mg/kg	<0.5	19	5.2	114	
	Mercury	mg/kg	<0.05	< 0.1	< 0.1	N/A	

APPENDIX A
PROPOSED DEVELOPMENT PLANS



BUILDING J
Siting option 3a

NORTH / SOUTH

Museums Discovery Centre
Expansion Project

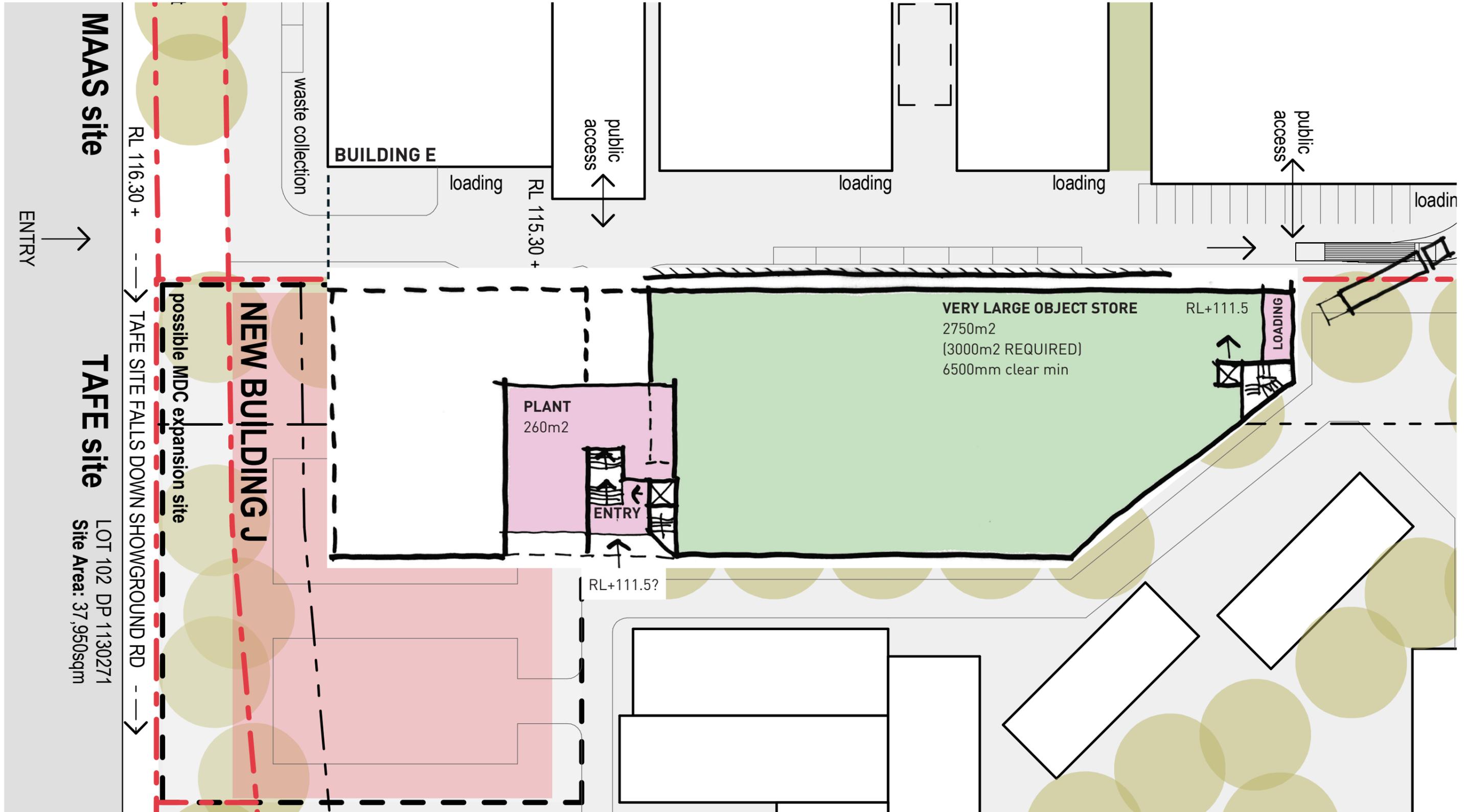


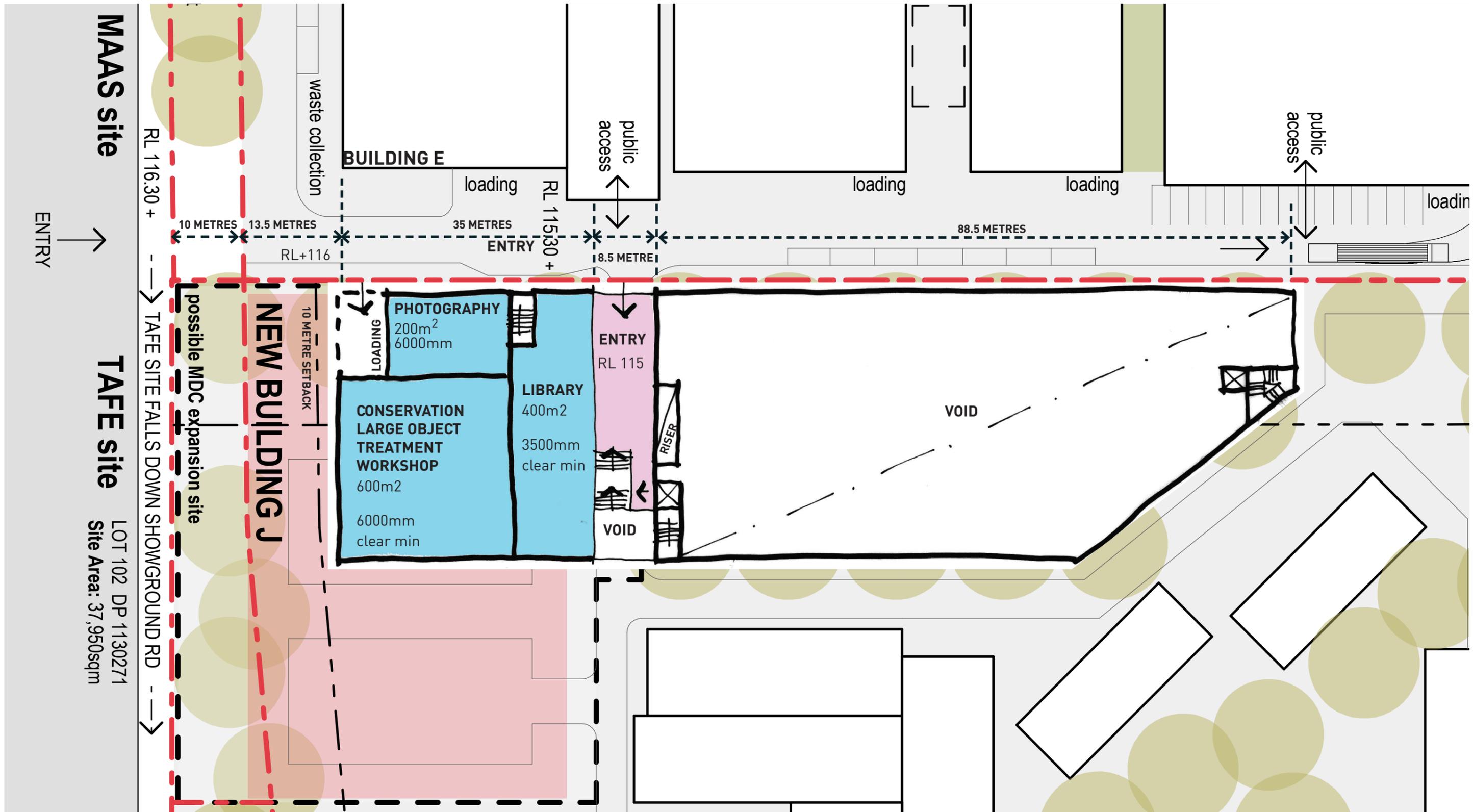
Create NSW
Arts, Screen & Culture

October 2018

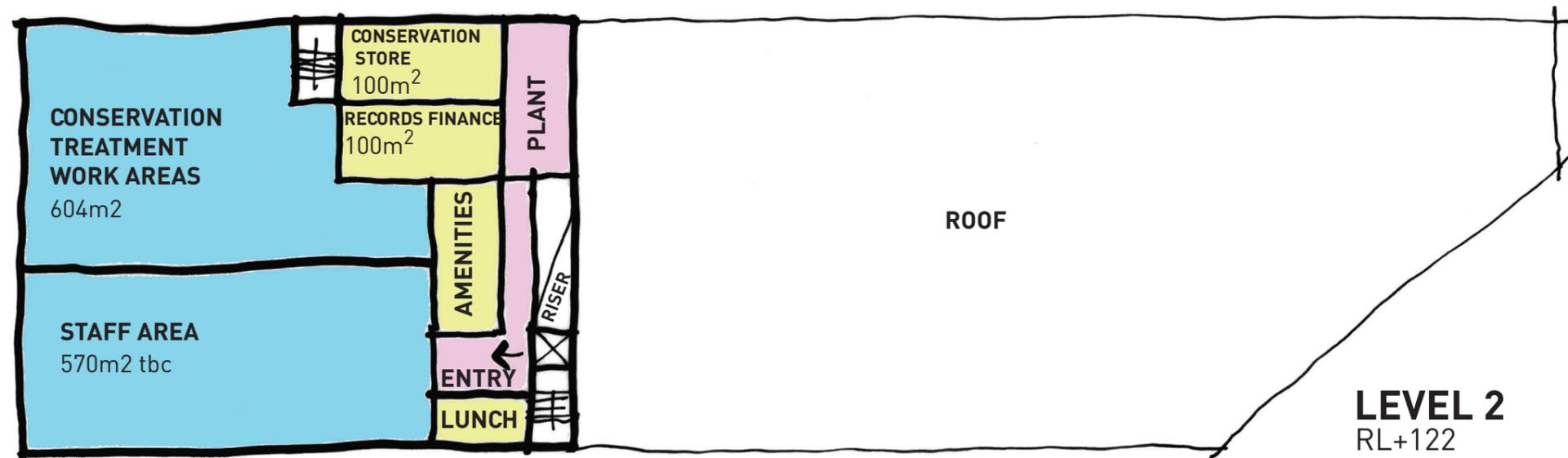
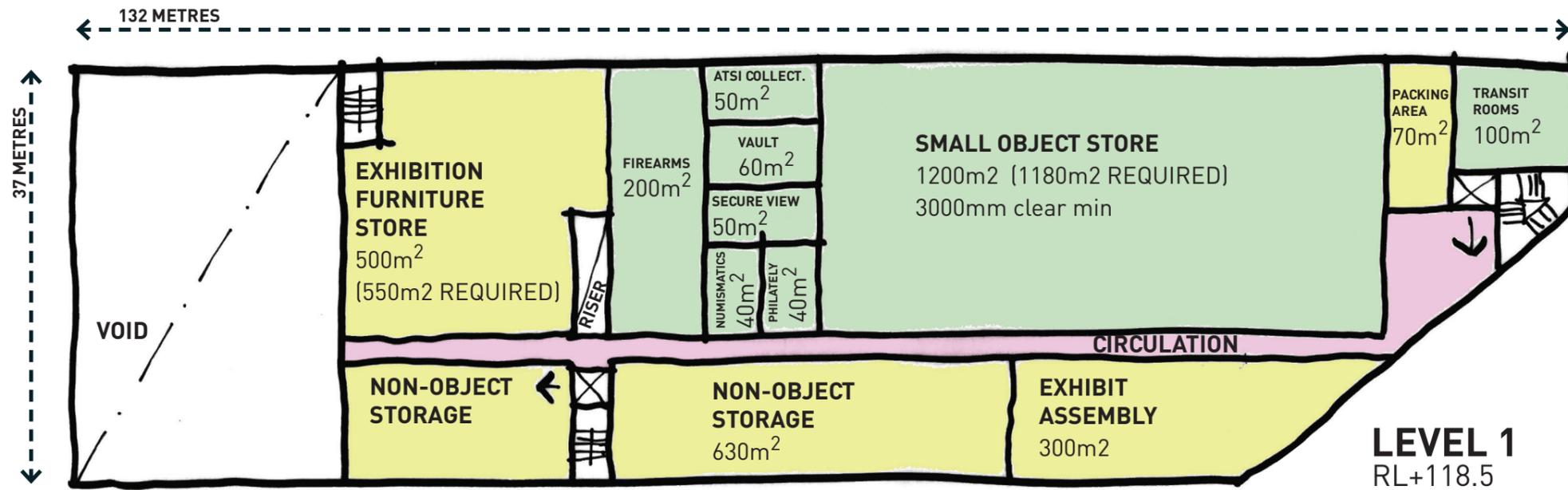
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architects

OPTION 3a - NORTH SOUTH
LOWER GROUND
 RL+111.5

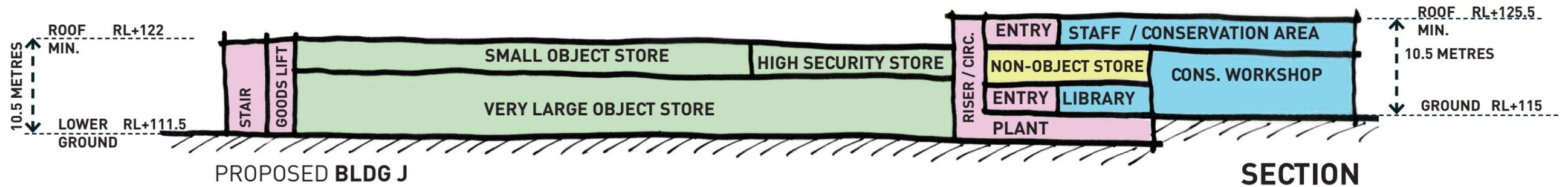




OPTION 03a - NORTH SOUTH
UPPER FLOORS



OPTION 03a - NORTH SOUTH
UPPER FLOOR + SECTION



SCALE CHECK 0m 10m 20m
1:500 (A3)



APPENDIX B
BOREHOLE LOGS



Borehole Log

Client: Northrop Consulting Engineers P/L	Started: 11/9/19
Project: Stage 2 DSI	Finished: 11/9/19
Location: 172 Showground Road Hole Location: Refer to figure 4	Borehole Size: mm
Rig Type: Push Tube	Hole Coordinates: , m
RL Surface: m	Contractor:
Driller: JW	Logged: JW
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
Push Tube					TS	GRASS				
						FILL: Silty CLAY, brown, soft, dry.	0.1-0.3 (PID: 0.8ppm)	D	No potential ACM, odours or staining noted.	
			0.5		CL	CLAY w/ trace silt, pale brown/orange, stiff, dry.	0.6-0.8 (PID: 0.3ppm)	D	No potential ACM, odours or staining noted.	
			1.0			Borehole BH01 terminated at 1m				



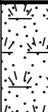
Borehole Log

Client: Northrop Consulting Engineers P/L	Started: 11/9/19
Project: Stage 2 DSI	Finished: 11/9/19
Location: 172 Showground Road Hole Location: Refer to figure 4	Borehole Size: mm
Rig Type: Push Tube	Hole Coordinates: , m
Driller: JW	Logged: JW
RL Surface: m	Contractor:
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
Push Tube						FILL: Silty CLAY, brown, soft, dry.				No potential ACM, odours or staining noted.
							0.1-0.3 (PID: 0.6ppm)		D	
					CL	CLAY, brown/orange, stiff, moist.		0.5-0.7 (PID: 1.2ppm)	D	
			0.5							
			1.0			Borehole BH02 terminated at 1m				

Borehole Log

Client: Northrop Consulting Engineers P/L	Started: 11/9/19
Project: Stage 2 DSI	Finished: 11/9/19
Location: 172 Showground Road Hole Location: Refer to figure 4	Borehole Size: mm
Rig Type: Push Tube	Hole Coordinates: , m
RL Surface: m	Contractor:
	Driller: JW
	Logged: JW
	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
Push Tube					TS	Leaf litter				
						FILL: Silty CLAY, brown, soft, dry.	0.1-0.3 (PID: 4.8ppm)	D		No potential ACM, odours or staining noted.
					CL	CLAY, orange/grey, hard/friable, dry.	0.3-0.5 (PID: 3.2ppm)	D		No potential ACM, odours or staining noted.
			1.0			Borehole BH03 terminated at 1m				

Borehole Log

Client: Northrop Consulting Engineers P/L		Started: 11/9/19	
Project: Stage 2 DSI		Finished: 11/9/19	
Location: 172 Showground Road		Hole Location: Refer to figure 4	
Rig Type: Push Tube		Borehole Size: mm	
RL Surface: m		Contractor:	
Hole Coordinates: , m		Driller: JW	
Contractor:		Logged: JW	
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
Push Tube				[Graphic: Dotted pattern]	TS	GRASS				
				[Graphic: Cross-hatch pattern]		FILL: Silty CLAY, brown, soft, dry.	0.1-0.3 (PID: 0.1ppm)	D		No potential ACM, odours or staining noted.
			0.5	[Graphic: Diagonal lines]	CL	CLAY, brown/orange, stiff, moist.	0.4-0.6 (PID: 2.1ppm)	D		No potential ACM, odours or staining noted.
			1.0			Borehole BH04 terminated at 1m				

Borehole Log

Client: Northrop Consulting Engineers P/L		Started: 11/9/19	
Project: Stage 2 DSI		Finished: 11/9/19	
Location: 172 Showground Road		Hole Location: Refer to figure 4	
Rig Type: Push Tube		Borehole Size: mm	
RL Surface: m		Contractor:	
Hole Coordinates , m		Driller: JW	
Bearing: ---		Logged: JW	
Checked: SW			

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/Density Index	Additional Observations
Push Tube				[Graphic: Dotted pattern]	TS	GRASS				
				[Graphic: Cross-hatch pattern]		FILL: Silty CLAY, brown, soft, dry.	0.1-0.3 (PID: 0.9ppm)	D		No potential ACM, odours or staining noted.
			0.5	[Graphic: Diagonal lines]	CL	CLAY, brown/orange, stiff, dry.	0.4-0.6 (PID: 0.8ppm)	D		No potential ACM, odours or staining noted.
			1.0			Borehole BH05 terminated at 1m				



Borehole Log

Client: Northrop Consulting Engineers P/L	Started: 11/9/19
Project: Stage 2 DSI	Finished: 11/9/19
Location: 172 Showground Road Hole Location: Refer to figure 4	Borehole Size: mm
Rig Type: Push Tube	Hole Coordinates: , m
Driller: JW	Logged: JW
RL Surface: m	Contractor:
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
Push Tube			0.5			FILL: Silty CLAY, brown, soft, dry.	0.1-0.3 (PID: 6.7ppm)	D	No potential ACM, odours or staining noted.
			1.0		CL	CLAY, grey/orange, hard/friable, dry.	0.5-0.7 (PID: 1.8ppm)	D	No potential ACM, odours or staining noted.
						Borehole BH06 terminated at 1m			

Borehole Log

Client: Northrop Consulting Engineers P/L	Started: 11/9/19
Project: Stage 2 DSI	Finished: 11/9/19
Location: 172 Showground Road Hole Location: Refer to figure 4	Borehole Size: mm
Rig Type: Push Tube	Hole Coordinates: , m
RL Surface: m	Contractor:
Driller: JW	Logged: JW
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
Push Tube						FILL: Silty CLAY, brown, soft, dry.				No potential ACM, odours or staining noted.
			0.5		CL	CLAY, grey/orange, hard/friable, dry.	0.1-0.3 (PID: 5.1ppm) 0.4-0.6 (PID: 0.9ppm)	D	D	
			1.0			Borehole BH07 terminated at 0.9m				

Borehole Log

Client: Northrop Consulting Engineers P/L	Started: 11/9/19
Project: Stage 2 DSI	Finished: 11/9/19
Location: 172 Showground Road Hole Location: Refer to figure 4	Borehole Size: mm
Rig Type: Push Tube	Hole Coordinates: , m
Driller: JW	Logged: JW
RL Surface: m	Contractor:
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
Push Tube						FILL: Silty CLAY, brown, soft, dry.	0.0-0.2 (PID: 0.8ppm)			No potential ACM, odours or staining noted.
			0.5		CL	CLAY, grey/orange, hard/friable, dry.	0.3-0.5 (PID: 1.1ppm)			No potential ACM, odours or staining noted.
			1.0			Borehole BH08 terminated at 0.7m				

Borehole Log

Client: Northrop Consulting Engineers P/L		Started: 11/9/19	
Project: Stage 2 DSI		Finished: 11/9/19	
Location: 172 Showground Road		Hole Location: Refer to figure 4	
Rig Type: Push Tube		Borehole Size: mm	
RL Surface: m		Contractor:	
Hole Coordinates , m		Driller: JW	
Bearing: ---		Logged: JW	
Checked: SW			

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/Density Index	Additional Observations
Push Tube						FILL: Silty CLAY, brown, soft, dry.				No potential ACM, odours or staining noted.
					CL	CLAY, grey, hard/friable, dry.	0.1-0.3 (PID: 6.1ppm)			No potential ACM, odours or staining noted.
			0.5				0.3-0.5 (PID: 3.3ppm)			
			1.0			Borehole BH09 terminated at 1m				



Borehole Log

Client: Northrop Consulting Engineers P/L	Started: 11/9/19
Project: Stage 2 DSI	Finished: 11/9/19
Location: 172 Showground Road Hole Location: Refer to figure 4	Borehole Size: mm
Rig Type: Push Tube	Hole Coordinates: , m
Driller: JW	Logged: JW
RL Surface: m	Contractor:
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
Push Tube						FILL: Silty CLAY, brown, soft, dry.	0.0-0.2 (PID: 4.6ppm)	D	No potential ACM, odours or staining noted.
			0.5		CL	CLAY, grey/orange, hard/friable, dry.	0.3-0.5 (PID: 0.2ppm)	D	No potential ACM, odours or staining noted.
			1.0			Borehole BH10 terminated at 1m			



Borehole Log

Client: Northrop Consulting Engineers P/L	Started: 11/9/19
Project: Stage 2 DSI	Finished: 11/9/19
Location: 172 Showground Road Hole Location: Refer to figure 4	Borehole Size: mm
Rig Type: Push Tube	Hole Coordinates: , m
RL Surface: m	Contractor:
Driller: JW	Logged: JW
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
Push Tube						FILL: Silty CLAY, brown, soft, dry.	0.1-0.3 (PID: 4.0ppm)	D	No potential ACM, odours or staining noted.
			0.5		CL	CLAY, grey, hard/friable, dry.	0.4-0.6 (PID: 7.1ppm)	D	No potential ACM, odours or staining noted.
			1.0			Borehole BH11 terminated at 1m			



Borehole Log

Client: Northrop Consulting Engineers P/L	Started: 11/9/19
Project: Stage 2 DSI	Finished: 11/9/19
Location: 172 Showground Road Hole Location: Refer to figure 4	Borehole Size: mm
Rig Type: Push Tube	Hole Coordinates: , m
RL Surface: m	Contractor:
Driller: JW	Logged: JW
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
Push Tube					TS	GRASS				
						FILL: Silty CLAY, brown, soft, dry.	0.1-0.3 (PID: 6.2ppm)	D	No potential ACM, odours or staining noted.	
					CL	CLAY, grey, hard, dry.	0.7-0.9 (PID: 2.3ppm)	D	No potential ACM, odours or staining noted.	
			1.0			Borehole BH12 terminated at 1m				



Borehole Log

Client: Northrop Consulting Engineers P/L	Started: 11/9/19
Project: Stage 2 DSI	Finished: 11/9/19
Location: 172 Showground Road Hole Location: Refer to figure 4	Borehole Size: mm
Rig Type: Push Tube	Hole Coordinates: , m
Driller: JW	Logged: JW
RL Surface: m	Contractor:
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
Push Tube					TS	GRASS				
						FILL: Silty CLAY, brown, soft, dry.	0.1-0.3 (PID: 4.7ppm)	D	No potential ACM, odours or staining noted.	
			0.5		CL	CLAY w/ sandstone cobbles, pale grey, hard/friable, dry.	0.5-0.7 (PID: 3.2ppm)	D	No potential ACM, odours or staining noted.	
			1.0			Borehole BH13 terminated at 0.8m				

APPENDIX C
CALIBRATION CERTIFICATES



Air-Met Scientific Pty Ltd
1300 137 067

Multi Parameter Water Meter

Instrument **YSI Quatro Pro Plus**
Serial No. **18G103299**

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	1. pH	✓	
	2. mV	✓	
	3. EC	✓	
	4. D.O	✓	
	5. Temp	✓	
Alarms	Beeper		
	Settings		
Software	Version		
Data logger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. pH 10.00		pH 10.00		324189	pH 9.64
2. pH 7.00		pH 7.00		330737	pH 6.88
3. pH 4.00		pH 4.00		324985	pH 4.05
4. mV		234mV		324355/325421	234.8mV
5. EC		2.76mS		322349	2.76mS
6. D.O		0.00ppm		329994	0.05ppm
7. Temp		20.2°C		MultiTherm	19.8°C

Calibrated by: _____ **Sarah Lian**

Calibration date: **11/06/2019**

Next calibration due: **11/12/2019**

APPENDIX D

LABORATORY DOCUMENTATION

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 **676756-S**
 Project name **CASTLE HILL**
 Project ID **8325**
 Received Date **Sep 12, 2019**

Client Sample ID			BH01-0.1-0.3	BH02-0.1-0.3	BH03-0.1-0.3	BH04-0.1-0.3
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-Se20205	S19-Se20206	S19-Se20207	S19-Se20208
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50	< 50	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	95	98	100	91
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	< 100
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

Client Sample ID			BH01-0.1-0.3	BH02-0.1-0.3	BH03-0.1-0.3	BH04-0.1-0.3
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-Se20205	S19-Se20206	S19-Se20207	S19-Se20208
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 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	< 0.5	< 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	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	89	108	94	105
p-Terphenyl-d14 (surr.)	1	%	107	122	106	119
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	-	< 0.1	-
4.4'-DDD	0.05	mg/kg	< 0.05	-	< 0.05	-
4.4'-DDE	0.05	mg/kg	< 0.05	-	< 0.05	-
4.4'-DDT	0.05	mg/kg	< 0.05	-	< 0.05	-
a-BHC	0.05	mg/kg	< 0.05	-	< 0.05	-
Aldrin	0.05	mg/kg	< 0.05	-	< 0.05	-
b-BHC	0.05	mg/kg	< 0.05	-	< 0.05	-
d-BHC	0.05	mg/kg	< 0.05	-	< 0.05	-
Dieldrin	0.05	mg/kg	< 0.05	-	< 0.05	-
Endosulfan I	0.05	mg/kg	< 0.05	-	< 0.05	-
Endosulfan II	0.05	mg/kg	< 0.05	-	< 0.05	-
Endosulfan sulphate	0.05	mg/kg	< 0.05	-	< 0.05	-
Endrin	0.05	mg/kg	< 0.05	-	< 0.05	-
Endrin aldehyde	0.05	mg/kg	< 0.05	-	< 0.05	-
Endrin ketone	0.05	mg/kg	< 0.05	-	< 0.05	-
g-BHC (Lindane)	0.05	mg/kg	< 0.05	-	< 0.05	-
Heptachlor	0.05	mg/kg	< 0.05	-	< 0.05	-
Heptachlor epoxide	0.05	mg/kg	< 0.05	-	< 0.05	-
Hexachlorobenzene	0.05	mg/kg	< 0.05	-	< 0.05	-
Methoxychlor	0.2	mg/kg	< 0.2	-	< 0.2	-
Toxaphene	1	mg/kg	< 1	-	< 1	-
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	-	< 0.05	-
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	-	< 0.05	-
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.2	-	< 0.2	-
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.2	-	< 0.2	-
Dibutylchloroendate (surr.)	1	%	137	-	137	-
Tetrachloro-m-xylene (surr.)	1	%	105	-	106	-
Polychlorinated Biphenyls						
Aroclor-1016	0.5	mg/kg	-	< 0.5	-	< 0.5
Aroclor-1221	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1232	0.5	mg/kg	-	< 0.5	-	< 0.5
Aroclor-1242	0.5	mg/kg	-	< 0.5	-	< 0.5
Aroclor-1248	0.5	mg/kg	-	< 0.5	-	< 0.5
Aroclor-1254	0.5	mg/kg	-	< 0.5	-	< 0.5
Aroclor-1260	0.5	mg/kg	-	< 0.5	-	< 0.5
Total PCB*	0.5	mg/kg	-	< 0.5	-	< 0.5
Dibutylchloroendate (surr.)	1	%	-	131	-	139
Tetrachloro-m-xylene (surr.)	1	%	-	112	-	118

Client Sample ID			BH01-0.1-0.3	BH02-0.1-0.3	BH03-0.1-0.3	BH04-0.1-0.3
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-Se20205	S19-Se20206	S19-Se20207	S19-Se20208
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	8.2	17	7.2	7.1
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	24	40	26	23
Copper	5	mg/kg	8.1	6.3	6.2	6.2
Lead	5	mg/kg	32	19	16	21
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	5.3	< 5	5.2	< 5
Zinc	5	mg/kg	19	7.5	12	16
% Moisture	1	%	10	13	12	14

Client Sample ID			BH05-0.1-0.3	BH06-0.1-0.3	BH07-0.1-0.3	BH08-0.0-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-Se20209	S19-Se20210	S19-Se20211	S19-Se20212
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50	< 50	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	105	93	105	95
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	< 100
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

Client Sample ID			BH05-0.1-0.3	BH06-0.1-0.3	BH07-0.1-0.3	BH08-0.0-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-Se20209	S19-Se20210	S19-Se20211	S19-Se20212
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
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	< 0.5	< 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	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	92	106	92	110
p-Terphenyl-d14 (surr.)	1	%	101	114	109	131
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	-	< 0.1	-
4.4'-DDD	0.05	mg/kg	< 0.05	-	< 0.05	-
4.4'-DDE	0.05	mg/kg	< 0.05	-	< 0.05	-
4.4'-DDT	0.05	mg/kg	< 0.05	-	< 0.05	-
a-BHC	0.05	mg/kg	< 0.05	-	< 0.05	-
Aldrin	0.05	mg/kg	< 0.05	-	< 0.05	-
b-BHC	0.05	mg/kg	< 0.05	-	< 0.05	-
d-BHC	0.05	mg/kg	< 0.05	-	< 0.05	-
Dieldrin	0.05	mg/kg	< 0.05	-	< 0.05	-
Endosulfan I	0.05	mg/kg	< 0.05	-	< 0.05	-
Endosulfan II	0.05	mg/kg	< 0.05	-	< 0.05	-
Endosulfan sulphate	0.05	mg/kg	< 0.05	-	< 0.05	-
Endrin	0.05	mg/kg	< 0.05	-	< 0.05	-
Endrin aldehyde	0.05	mg/kg	< 0.05	-	< 0.05	-
Endrin ketone	0.05	mg/kg	< 0.05	-	< 0.05	-
g-BHC (Lindane)	0.05	mg/kg	< 0.05	-	< 0.05	-
Heptachlor	0.05	mg/kg	< 0.05	-	< 0.05	-
Heptachlor epoxide	0.05	mg/kg	< 0.05	-	< 0.05	-
Hexachlorobenzene	0.05	mg/kg	< 0.05	-	< 0.05	-
Methoxychlor	0.2	mg/kg	< 0.2	-	< 0.2	-
Toxaphene	1	mg/kg	< 1	-	< 1	-
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	-	< 0.05	-
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	-	< 0.05	-
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.2	-	< 0.2	-
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.2	-	< 0.2	-
Dibutylchloroendate (surr.)	1	%	125	-	128	-
Tetrachloro-m-xylene (surr.)	1	%	107	-	105	-
Polychlorinated Biphenyls						
Aroclor-1016	0.5	mg/kg	-	< 0.5	-	< 0.5
Aroclor-1221	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1232	0.5	mg/kg	-	< 0.5	-	< 0.5
Aroclor-1242	0.5	mg/kg	-	< 0.5	-	< 0.5
Aroclor-1248	0.5	mg/kg	-	< 0.5	-	< 0.5
Aroclor-1254	0.5	mg/kg	-	< 0.5	-	< 0.5

Client Sample ID			BH05-0.1-0.3	BH06-0.1-0.3	BH07-0.1-0.3	BH08-0.0-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-Se20209	S19-Se20210	S19-Se20211	S19-Se20212
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Polychlorinated Biphenyls						
Aroclor-1260	0.5	mg/kg	-	< 0.5	-	< 0.5
Total PCB*	0.5	mg/kg	-	< 0.5	-	< 0.5
Dibutylchloroendate (surr.)	1	%	-	140	-	143
Tetrachloro-m-xylene (surr.)	1	%	-	113	-	127
Heavy Metals						
Arsenic	2	mg/kg	10	11	12	8.6
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	22	35	33	24
Copper	5	mg/kg	10	5.3	< 5	5.3
Lead	5	mg/kg	16	16	14	17
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	< 5	< 5	< 5	< 5
Zinc	5	mg/kg	15	8.8	7.3	14
% Moisture	1	%	9.1	7.8	8.2	8.4

Client Sample ID			BH09-0.1-0.3	BH10-0.0-0.2	BH11-0.1-0.3	BH12-0.1-0.3
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-Se20213	S19-Se20214	S19-Se20215	S19-Se20216
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	140	< 50	96
TRH C29-C36	50	mg/kg	< 50	140	< 50	180
TRH C10-C36 (Total)	50	mg/kg	< 50	280	< 50	276
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	100	103	98	99
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	220	< 100	240
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	120
TRH >C10-C40 (total)*	100	mg/kg	< 100	220	< 100	360

Client Sample ID			BH09-0.1-0.3	BH10-0.0-0.2	BH11-0.1-0.3	BH12-0.1-0.3
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-Se20213	S19-Se20214	S19-Se20215	S19-Se20216
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 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	< 0.5	< 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	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	94	101	95	104
p-Terphenyl-d14 (surr.)	1	%	101	96	92	103
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	-	< 0.1	-
4.4'-DDD	0.05	mg/kg	< 0.05	-	< 0.05	-
4.4'-DDE	0.05	mg/kg	< 0.05	-	< 0.05	-
4.4'-DDT	0.05	mg/kg	< 0.05	-	< 0.05	-
a-BHC	0.05	mg/kg	< 0.05	-	< 0.05	-
Aldrin	0.05	mg/kg	< 0.05	-	< 0.05	-
b-BHC	0.05	mg/kg	< 0.05	-	< 0.05	-
d-BHC	0.05	mg/kg	< 0.05	-	< 0.05	-
Dieldrin	0.05	mg/kg	< 0.05	-	< 0.05	-
Endosulfan I	0.05	mg/kg	< 0.05	-	< 0.05	-
Endosulfan II	0.05	mg/kg	< 0.05	-	< 0.05	-
Endosulfan sulphate	0.05	mg/kg	< 0.05	-	< 0.05	-
Endrin	0.05	mg/kg	< 0.05	-	< 0.05	-
Endrin aldehyde	0.05	mg/kg	< 0.05	-	< 0.05	-
Endrin ketone	0.05	mg/kg	< 0.05	-	< 0.05	-
g-BHC (Lindane)	0.05	mg/kg	< 0.05	-	< 0.05	-
Heptachlor	0.05	mg/kg	< 0.05	-	< 0.05	-
Heptachlor epoxide	0.05	mg/kg	< 0.05	-	< 0.05	-
Hexachlorobenzene	0.05	mg/kg	< 0.05	-	< 0.05	-
Methoxychlor	0.2	mg/kg	< 0.2	-	< 0.2	-
Toxaphene	1	mg/kg	< 1	-	< 1	-
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	-	< 0.05	-
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	-	< 0.05	-
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.2	-	< 0.2	-
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.2	-	< 0.2	-
Dibutylchloroendate (surr.)	1	%	125	-	86	-
Tetrachloro-m-xylene (surr.)	1	%	106	-	99	-

Client Sample ID			BH09-0.1-0.3	BH10-0.0-0.2	BH11-0.1-0.3	BH12-0.1-0.3
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-Se20213	S19-Se20214	S19-Se20215	S19-Se20216
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Polychlorinated Biphenyls						
Aroclor-1016	0.5	mg/kg	-	< 0.5	-	< 0.5
Aroclor-1221	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1232	0.5	mg/kg	-	< 0.5	-	< 0.5
Aroclor-1242	0.5	mg/kg	-	< 0.5	-	< 0.5
Aroclor-1248	0.5	mg/kg	-	< 0.5	-	< 0.5
Aroclor-1254	0.5	mg/kg	-	< 0.5	-	< 0.5
Aroclor-1260	0.5	mg/kg	-	< 0.5	-	< 0.5
Total PCB*	0.5	mg/kg	-	< 0.5	-	< 0.5
Dibutylchloroendate (surr.)	1	%	-	54	-	75
Tetrachloro-m-xylene (surr.)	1	%	-	54	-	85
Heavy Metals						
Arsenic	2	mg/kg	8.2	9.1	6.3	9.1
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	30	33	21	26
Copper	5	mg/kg	8.6	12	11	14
Lead	5	mg/kg	22	32	19	22
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	< 5	5.4	< 5	< 5
Zinc	5	mg/kg	12	18	9.8	6.5
% Moisture	1	%	13	10	11	9.9

Client Sample ID			BH13-0.1-0.3	DUP01	DUP01A
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			S19-Se20217	S19-Se20218	S19-Se20219
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions					
TRH C6-C9	20	mg/kg	< 20	-	-
TRH C10-C14	20	mg/kg	42	-	-
TRH C15-C28	50	mg/kg	160	-	-
TRH C29-C36	50	mg/kg	220	-	-
TRH C10-C36 (Total)	50	mg/kg	422	-	-
BTEX					
Benzene	0.1	mg/kg	< 0.1	-	-
Toluene	0.1	mg/kg	< 0.1	-	-
Ethylbenzene	0.1	mg/kg	< 0.1	-	-
m&p-Xylenes	0.2	mg/kg	< 0.2	-	-
o-Xylene	0.1	mg/kg	< 0.1	-	-
Xylenes - Total	0.3	mg/kg	< 0.3	-	-
4-Bromofluorobenzene (surr.)	1	%	94	-	-
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	52	-	-
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	52	-	-
TRH >C16-C34	100	mg/kg	330	-	-

Client Sample ID			BH13-0.1-0.3	DUP01	DUP01A
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			S19-Se20217	S19-Se20218	S19-Se20219
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions					
TRH >C34-C40	100	mg/kg	< 100	-	-
TRH >C10-C40 (total)*	100	mg/kg	382	-	-
Polycyclic Aromatic Hydrocarbons					
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	-	-
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	-	-
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	-	-
Acenaphthene	0.5	mg/kg	< 0.5	-	-
Acenaphthylene	0.5	mg/kg	< 0.5	-	-
Anthracene	0.5	mg/kg	< 0.5	-	-
Benz(a)anthracene	0.5	mg/kg	< 0.5	-	-
Benzo(a)pyrene	0.5	mg/kg	< 0.5	-	-
Benzo(b&j)fluoranthene ^{N07}	0.5	mg/kg	< 0.5	-	-
Benzo(g,h,i)perylene	0.5	mg/kg	< 0.5	-	-
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	-	-
Chrysene	0.5	mg/kg	< 0.5	-	-
Dibenz(a,h)anthracene	0.5	mg/kg	< 0.5	-	-
Fluoranthene	0.5	mg/kg	< 0.5	-	-
Fluorene	0.5	mg/kg	< 0.5	-	-
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	-	-
Naphthalene	0.5	mg/kg	< 0.5	-	-
Phenanthrene	0.5	mg/kg	< 0.5	-	-
Pyrene	0.5	mg/kg	< 0.5	-	-
Total PAH*	0.5	mg/kg	< 0.5	-	-
2-Fluorobiphenyl (surr.)	1	%	101	-	-
p-Terphenyl-d14 (surr.)	1	%	96	-	-
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	-	-

Client Sample ID			BH13-0.1-0.3	DUP01	DUP01A
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			S19-Se20217	S19-Se20218	S19-Se20219
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit			
Organochlorine Pesticides					
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	%	104	-	-
Tetrachloro-m-xylene (surr.)	1	%	91	-	-
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	%	104	-	-
Tetrachloro-m-xylene (surr.)	1	%	91	-	-
Heavy Metals					
Arsenic	2	mg/kg	8.9	7.3	6.7
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	23	24	22
Copper	5	mg/kg	26	6.6	6.2
Lead	5	mg/kg	30	21	19
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	8.0	< 5	< 5
Zinc	5	mg/kg	39	5.2	< 5
% Moisture	1	%	9.8	8.9	8.8

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.

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 - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Sep 12, 2019	14 Days
BTEX - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Sep 12, 2019	14 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Sep 12, 2019	14 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Sep 12, 2019	
Polycyclic Aromatic Hydrocarbons - Method: LTM-ORG-2130 PAH and Phenols in Soil and Water	Sydney	Sep 12, 2019	14 Days
Metals M8 - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Sep 12, 2019	180 Days
Organochlorine Pesticides - Method: LTM-ORG-2220 OCP & PCB in Soil and Water	Sydney	Sep 12, 2019	14 Days
Polychlorinated Biphenyls - Method: LTM-ORG-2220 OCP & PCB in Soil and Water	Sydney	Sep 12, 2019	28 Days
% Moisture - Method: LTM-GEN-7080 Moisture	Sydney	Sep 12, 2019	14 Days

Company Name: Alliance Geotechnical	Order No.:	Received: Sep 12, 2019 6:00 PM
Address: 10 Welder Road Seven Hills NSW 2147	Report #: 676756	Due: Sep 13, 2019
Project Name: CASTLE HILL	Phone: 1800 288 188	Priority: 1 Day
Project ID: 8325	Fax: 02 9675 1888	Contact Name: Steven Wallace

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Asbestos - AS4964	CANCELLED	HOLD	Organochlorine Pesticides	Polychlorinated Biphenyls	Metals M8	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
Brisbane Laboratory - NATA Site # 20794													
Perth Laboratory - NATA Site # 23736													
External Laboratory													
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID								
1	BH01-0.1-0.3	Sep 11, 2019		Soil	S19-Se20205	X			X			X	X
2	BH02-0.1-0.3	Sep 11, 2019		Soil	S19-Se20206	X				X		X	X
3	BH03-0.1-0.3	Sep 11, 2019		Soil	S19-Se20207	X			X			X	X
4	BH04-0.1-0.3	Sep 11, 2019		Soil	S19-Se20208	X				X		X	X
5	BH05-0.1-0.3	Sep 11, 2019		Soil	S19-Se20209	X			X			X	X
6	BH06-0.1-0.3	Sep 11, 2019		Soil	S19-Se20210	X				X		X	X
7	BH07-0.1-0.3	Sep 11, 2019		Soil	S19-Se20211	X			X			X	X
8	BH08-0.0-0.2	Sep 11, 2019		Soil	S19-Se20212	X				X		X	X
9	BH09-0.1-0.3	Sep 11, 2019		Soil	S19-Se20213	X			X			X	X

Company Name: Alliance Geotechnical	Order No.:	Received: Sep 12, 2019 6:00 PM
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	Phone: 1800 288 188	Priority: 1 Day
	Fax: 02 9675 1888	Contact Name: Steven Wallace
Project Name: CASTLE HILL		
Project ID: 8325		

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Asbestos - AS4964	CANCELLED	HOLD	Organochlorine Pesticides	Polychlorinated Biphenyls	Metals M8	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
Brisbane Laboratory - NATA Site # 20794													
Perth Laboratory - NATA Site # 23736													
10	BH10-0.0-0.2	Sep 11, 2019		Soil	S19-Se20214	X				X		X	X
11	BH11-0.1-0.3	Sep 11, 2019		Soil	S19-Se20215	X			X			X	X
12	BH12-0.1-0.3	Sep 11, 2019		Soil	S19-Se20216	X				X		X	X
13	BH13-0.1-0.3	Sep 11, 2019		Soil	S19-Se20217	X			X	X		X	X
14	DUP01	Sep 11, 2019		Soil	S19-Se20218						X	X	
15	DUP01A	Sep 11, 2019		Soil	S19-Se20219						X	X	
16	TRIP SPIKE	Sep 11, 2019		Soil	S19-Se20220		X						
17	TRIP BLANK	Sep 11, 2019		Soil	S19-Se20221		X						
18	BH01-0.6-0.8	Sep 11, 2019		Soil	S19-Se20222			X					
19	BH02-0.5-0.7	Sep 11, 2019		Soil	S19-Se20223			X					
20	BH03-0.3-0.5	Sep 11, 2019		Soil	S19-Se20224			X					
21	BH04-0.4-0.6	Sep 11, 2019		Soil	S19-Se20225			X					

Company Name: Alliance Geotechnical	Order No.:	Received: Sep 12, 2019 6:00 PM
Address: 10 Welder Road Seven Hills NSW 2147	Report #: 676756	Due: Sep 13, 2019
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Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Asbestos - AS4964	CANCELLED	HOLD	Organochlorine Pesticides	Polychlorinated Biphenyls	Metals M8	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
Brisbane Laboratory - NATA Site # 20794													
Perth Laboratory - NATA Site # 23736													
22	BH05-0.4-0.6	Sep 11, 2019		Soil	S19-Se20226			X					
23	BH06-0.5-0.7	Sep 11, 2019		Soil	S19-Se20227			X					
24	BH07-0.4-0.6	Sep 11, 2019		Soil	S19-Se20228			X					
25	BH08-0.3-0.5	Sep 11, 2019		Soil	S19-Se20229			X					
26	BH09-0.3-0.5	Sep 11, 2019		Soil	S19-Se20230			X					
27	BH10-0.3-0.5	Sep 11, 2019		Soil	S19-Se20231			X					
28	BH11-0.4-0.6	Sep 11, 2019		Soil	S19-Se20232			X					
29	BH12-0.7-0.9	Sep 11, 2019		Soil	S19-Se20233			X					
30	BH13-0.5-0.8	Sep 11, 2019		Soil	S19-Se20234			X					
Test Counts						13	2	13	7	7	2	15	13

Internal Quality Control Review and Glossary
General

- 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 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
- 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 5.3
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 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 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

- 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.
- 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.
- Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
- 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.
- 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.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
- 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							
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	%	100			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	95			70-130	Pass	
Toluene	%	90			70-130	Pass	
Ethylbenzene	%	89			70-130	Pass	
m&p-Xylenes	%	94			70-130	Pass	
o-Xylene	%	92			70-130	Pass	
Xylenes - Total	%	94			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	93			70-130	Pass	
TRH C6-C10	%	82			70-130	Pass	
TRH >C10-C16	%	94			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	90			70-130	Pass	
Acenaphthylene	%	86			70-130	Pass	
Anthracene	%	102			70-130	Pass	
Benz(a)anthracene	%	96			70-130	Pass	
Benzo(a)pyrene	%	95			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code	
Benzo(b&j)fluoranthene	%	80			70-130	Pass		
Benzo(g,h,i)perylene	%	103			70-130	Pass		
Benzo(k)fluoranthene	%	86			70-130	Pass		
Chrysene	%	93			70-130	Pass		
Dibenz(a,h)anthracene	%	123			70-130	Pass		
Fluoranthene	%	106			70-130	Pass		
Fluorene	%	98			70-130	Pass		
Indeno(1,2,3-cd)pyrene	%	103			70-130	Pass		
Naphthalene	%	91			70-130	Pass		
Phenanthrene	%	92			70-130	Pass		
Pyrene	%	95			70-130	Pass		
LCS - % Recovery								
Organochlorine Pesticides								
Chlordanes - Total	%	95			70-130	Pass		
4,4'-DDD	%	75			70-130	Pass		
4,4'-DDE	%	83			70-130	Pass		
4,4'-DDT	%	89			70-130	Pass		
a-BHC	%	82			70-130	Pass		
Aldrin	%	78			70-130	Pass		
b-BHC	%	83			70-130	Pass		
d-BHC	%	88			70-130	Pass		
Dieldrin	%	75			70-130	Pass		
Endosulfan I	%	83			70-130	Pass		
Endosulfan II	%	94			70-130	Pass		
Endosulfan sulphate	%	73			70-130	Pass		
Endrin	%	90			70-130	Pass		
Endrin aldehyde	%	100			70-130	Pass		
Endrin ketone	%	110			70-130	Pass		
g-BHC (Lindane)	%	90			70-130	Pass		
Heptachlor	%	110			70-130	Pass		
Heptachlor epoxide	%	103			70-130	Pass		
Hexachlorobenzene	%	90			70-130	Pass		
Methoxychlor	%	124			70-130	Pass		
Toxaphene	%	87			70-130	Pass		
LCS - % Recovery								
Polychlorinated Biphenyls								
Aroclor-1260	%	72			70-130	Pass		
LCS - % Recovery								
Heavy Metals								
Arsenic	%	107			70-130	Pass		
Cadmium	%	106			70-130	Pass		
Chromium	%	106			70-130	Pass		
Copper	%	107			70-130	Pass		
Lead	%	103			70-130	Pass		
Mercury	%	104			70-130	Pass		
Nickel	%	105			70-130	Pass		
Zinc	%	100			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 C10-C14	S19-Se20131	NCP	%	107		70-130	Pass	
Spike - % Recovery								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1				
TRH >C10-C16	S19-Se20131	NCP	%	101		70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
Polycyclic Aromatic Hydrocarbons				Result 1				
Acenaphthene	S19-Se20110	NCP	%	86		70-130	Pass	
Acenaphthylene	S19-Se20110	NCP	%	87		70-130	Pass	
Anthracene	S19-Se20110	NCP	%	77		70-130	Pass	
Benz(a)anthracene	S19-Se20110	NCP	%	89		70-130	Pass	
Benzo(a)pyrene	S19-Se20110	NCP	%	80		70-130	Pass	
Benzo(b&j)fluoranthene	S19-Se20110	NCP	%	69		70-130	Fail	Q08
Benzo(g,h,i)perylene	S19-Se20110	NCP	%	70		70-130	Pass	
Benzo(k)fluoranthene	S19-Se20110	NCP	%	72		70-130	Pass	
Chrysene	S19-Se20110	NCP	%	90		70-130	Pass	
Dibenz(a,h)anthracene	S19-Se20110	NCP	%	79		70-130	Pass	
Fluoranthene	S19-Se20110	NCP	%	92		70-130	Pass	
Fluorene	S19-Se20110	NCP	%	83		70-130	Pass	
Indeno(1,2,3-cd)pyrene	S19-Se20110	NCP	%	75		70-130	Pass	
Naphthalene	S19-Se20110	NCP	%	85		70-130	Pass	
Phenanthrene	S19-Se20110	NCP	%	75		70-130	Pass	
Pyrene	S19-Se20110	NCP	%	84		70-130	Pass	
Spike - % Recovery								
Organochlorine Pesticides				Result 1				
Chlordanes - Total	S19-Se20110	NCP	%	98		70-130	Pass	
4,4'-DDE	S19-Se20110	NCP	%	93		70-130	Pass	
4,4'-DDT	S19-Se20110	NCP	%	106		70-130	Pass	
a-BHC	S19-Se20110	NCP	%	93		70-130	Pass	
Aldrin	S19-Se20110	NCP	%	87		70-130	Pass	
b-BHC	S19-Se20110	NCP	%	95		70-130	Pass	
d-BHC	S19-Se20110	NCP	%	95		70-130	Pass	
Dieldrin	S19-Se20110	NCP	%	84		70-130	Pass	
Endosulfan I	S19-Se20110	NCP	%	99		70-130	Pass	
Endosulfan II	S19-Se20110	NCP	%	107		70-130	Pass	
Endosulfan sulphate	S19-Se20110	NCP	%	103		70-130	Pass	
Endrin ketone	S19-Se20110	NCP	%	112		70-130	Pass	
g-BHC (Lindane)	S19-Se20110	NCP	%	91		70-130	Pass	
Heptachlor epoxide	S19-Se20110	NCP	%	129		70-130	Pass	
Hexachlorobenzene	S19-Se20110	NCP	%	95		70-130	Pass	
Spike - % Recovery								
Heavy Metals				Result 1				
Arsenic	S19-Se20109	NCP	%	100		70-130	Pass	
Cadmium	S19-Se20109	NCP	%	96		70-130	Pass	
Chromium	S19-Se20109	NCP	%	95		70-130	Pass	
Copper	S19-Se20109	NCP	%	89		70-130	Pass	
Lead	S19-Se16919	NCP	%	119		70-130	Pass	
Mercury	S19-Se20109	NCP	%	96		70-130	Pass	
Nickel	S19-Se20109	NCP	%	98		70-130	Pass	
Zinc	S19-Se20109	NCP	%	85		70-130	Pass	
Spike - % Recovery								
Polychlorinated Biphenyls				Result 1				
Aroclor-1260	S19-Se10078	NCP	%	77		70-130	Pass	
Spike - % Recovery								
Organochlorine Pesticides				Result 1				
4,4'-DDD	S19-Se19139	NCP	%	78		70-130	Pass	
Endrin	S19-Se19139	NCP	%	125		70-130	Pass	
Endrin aldehyde	S19-Se19139	NCP	%	118		70-130	Pass	
Heptachlor	S19-Se19139	NCP	%	117		70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Methoxychlor	S19-Se19139	NCP	%	116			70-130	Pass	
Toxaphene	S19-Au32511	NCP	%	113			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	S19-Se20217	CP	%	83			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	S19-Se20217	CP	%	97			70-130	Pass	
Toluene	S19-Se20217	CP	%	90			70-130	Pass	
Ethylbenzene	S19-Se20217	CP	%	87			70-130	Pass	
m&p-Xylenes	S19-Se20217	CP	%	89			70-130	Pass	
o-Xylene	S19-Se20217	CP	%	87			70-130	Pass	
Xylenes - Total	S19-Se20217	CP	%	88			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S19-Se20217	CP	%	93			70-130	Pass	
TRH C6-C10	S19-Se20217	CP	%	89			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S19-Se20108	NCP	mg/kg	5.2	6.2	17	30%	Pass	
Cadmium	S19-Se20108	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S19-Se20108	NCP	mg/kg	8.4	9.2	10	30%	Pass	
Copper	S19-Se20108	NCP	mg/kg	29	36	19	30%	Pass	
Lead	S19-Se20108	NCP	mg/kg	82	92	11	30%	Pass	
Mercury	S19-Se20108	NCP	mg/kg	0.2	0.2	<1	30%	Pass	
Nickel	S19-Se20108	NCP	mg/kg	10	9.1	15	30%	Pass	
Zinc	S19-Se20108	NCP	mg/kg	120	140	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S19-Se20206	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S19-Se20206	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	S19-Se20206	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	S19-Se20206	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	S19-Se20206	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	S19-Se20206	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	S19-Se20206	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S19-Se20206	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	S19-Se20206	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C10-C14	S19-Se20209	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	S19-Se20209	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	S19-Se20209	CP	mg/kg	< 50	< 50	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	S19-Se20209	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	S19-Se20209	CP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	S19-Se20209	CP	mg/kg	< 100	< 100	<1	30%	Pass	

Duplicate								
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD		
Acenaphthene	S19-Se20209	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Acenaphthylene	S19-Se20209	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Anthracene	S19-Se20209	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Benz(a)anthracene	S19-Se20209	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Benzo(a)pyrene	S19-Se20209	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Benzo(b&j)fluoranthene	S19-Se20209	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Benzo(g,h,i)perylene	S19-Se20209	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Benzo(k)fluoranthene	S19-Se20209	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Chrysene	S19-Se20209	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Dibenz(a,h)anthracene	S19-Se20209	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Fluoranthene	S19-Se20209	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Fluorene	S19-Se20209	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Indeno(1,2,3-cd)pyrene	S19-Se20209	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Naphthalene	S19-Se20209	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Phenanthrene	S19-Se20209	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Pyrene	S19-Se20209	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Duplicate								
Organochlorine Pesticides				Result 1	Result 2	RPD		
Chlordanes - Total	S19-Se20209	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
4,4'-DDD	S19-Se20209	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
4,4'-DDE	S19-Se20209	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
4,4'-DDT	S19-Se20209	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
a-BHC	S19-Se20209	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Aldrin	S19-Se20209	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
b-BHC	S19-Se20209	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
d-BHC	S19-Se20209	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Dieldrin	S19-Se20209	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Endosulfan I	S19-Se20209	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Endosulfan II	S19-Se20209	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Endosulfan sulphate	S19-Se20209	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Endrin	S19-Se20209	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Endrin aldehyde	S19-Se20209	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Endrin ketone	S19-Se20209	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
g-BHC (Lindane)	S19-Se20209	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Heptachlor	S19-Se20209	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Heptachlor epoxide	S19-Se20209	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Hexachlorobenzene	S19-Se20209	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Methoxychlor	S19-Se20209	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
% Moisture	S19-Se20212	CP	%	8.4	8.0	4.0	30%	Pass
Duplicate								
Polychlorinated Biphenyls				Result 1	Result 2	RPD		
Aroclor-1016	S19-Se16835	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Aroclor-1221	S19-Se16835	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Aroclor-1232	S19-Se16835	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Aroclor-1242	S19-Se16835	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Aroclor-1248	S19-Se16835	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Aroclor-1254	S19-Se16835	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Aroclor-1260	S19-Se16835	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Duplicate								
Organochlorine Pesticides				Result 1	Result 2	RPD		
Toxaphene	S19-Se16835	NCP	mg/kg	< 1	< 1	<1	30%	Pass

Duplicate								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD		
TRH C6-C9	S19-Se20216	CP	mg/kg	< 20	< 20	<1	30%	Pass
Duplicate								
BTEX				Result 1	Result 2	RPD		
Benzene	S19-Se20216	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Toluene	S19-Se20216	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Ethylbenzene	S19-Se20216	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
m&p-Xylenes	S19-Se20216	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass
o-Xylene	S19-Se20216	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Xylenes - Total	S19-Se20216	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD		
Naphthalene	S19-Se20216	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
TRH C6-C10	S19-Se20216	CP	mg/kg	< 20	< 20	<1	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
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference

Authorised By

Andrew Black	Analytical Services Manager
Andrew Sullivan	Senior Analyst-Organic (NSW)
Gabriele Cordero	Senior Analyst-Metal (NSW)
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](#).

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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 676756-AID
Project Name CASTLE HILL
Project ID 8325
Received Date Sep 12, 2019
Date Reported Sep 13, 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 CASTLE HILL
Project ID 8325
Date Sampled Sep 11, 2019
Report 676756-AID

Client Sample ID	Eurofins Sample No.	Date Sampled	Sample Description	Result
BH01-0.1-0.3	19-Se20205	Sep 11, 2019	Approximate Sample 75g Sample consisted of: Dark-brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
BH02-0.1-0.3	19-Se20206	Sep 11, 2019	Approximate Sample 85g 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 trace asbestos detected.
BH03-0.1-0.3	19-Se20207	Sep 11, 2019	Approximate Sample 96g 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 trace asbestos detected.
BH04-0.1-0.3	19-Se20208	Sep 11, 2019	Approximate Sample 133g 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 trace asbestos detected.
BH05-0.1-0.3	19-Se20209	Sep 11, 2019	Approximate Sample 95g 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 trace asbestos detected.
BH06-0.1-0.3	19-Se20210	Sep 11, 2019	Approximate Sample 135g 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 trace asbestos detected.
BH07-0.1-0.3	19-Se20211	Sep 11, 2019	Approximate Sample 92g 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 trace asbestos detected.
BH08-0.0-0.2	19-Se20212	Sep 11, 2019	Approximate Sample 68g 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 trace asbestos detected.

Client Sample ID	Eurofins Sample No.	Date Sampled	Sample Description	Result
BH09-0.1-0.3	19-Se20213	Sep 11, 2019	Approximate Sample 84g 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 trace asbestos detected.
BH10-0.0-0.2	19-Se20214	Sep 11, 2019	Approximate Sample 119g 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 trace asbestos detected.
BH11-0.1-0.3	19-Se20215	Sep 11, 2019	Approximate Sample 125g 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 trace asbestos detected.
BH12-0.1-0.3	19-Se20216	Sep 11, 2019	Approximate Sample 104g 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 trace asbestos detected.
BH13-0.1-0.3	19-Se20217	Sep 11, 2019	Approximate Sample 125g 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 trace asbestos 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.

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	Sep 12, 2019	Indefinite

Company Name: Alliance Geotechnical	Order No.:	Received: Sep 12, 2019 6:00 PM
Address: 10 Welder Road Seven Hills NSW 2147	Report #: 676756	Due: Sep 13, 2019
Project Name: CASTLE HILL	Phone: 1800 288 188	Priority: 1 Day
Project ID: 8325	Fax: 02 9675 1888	Contact Name: Steven Wallace

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Asbestos - AS4964	CANCELLED	HOLD	Organochlorine Pesticides	Polychlorinated Biphenyls	Metals M8	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
Brisbane Laboratory - NATA Site # 20794													
Perth Laboratory - NATA Site # 23736													
External Laboratory													
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID								
1	BH01-0.1-0.3	Sep 11, 2019		Soil	S19-Se20205	X			X			X	X
2	BH02-0.1-0.3	Sep 11, 2019		Soil	S19-Se20206	X				X		X	X
3	BH03-0.1-0.3	Sep 11, 2019		Soil	S19-Se20207	X			X			X	X
4	BH04-0.1-0.3	Sep 11, 2019		Soil	S19-Se20208	X				X		X	X
5	BH05-0.1-0.3	Sep 11, 2019		Soil	S19-Se20209	X			X			X	X
6	BH06-0.1-0.3	Sep 11, 2019		Soil	S19-Se20210	X				X		X	X
7	BH07-0.1-0.3	Sep 11, 2019		Soil	S19-Se20211	X			X			X	X
8	BH08-0.0-0.2	Sep 11, 2019		Soil	S19-Se20212	X				X		X	X
9	BH09-0.1-0.3	Sep 11, 2019		Soil	S19-Se20213	X			X			X	X

Company Name: Alliance Geotechnical	Order No.:	Received: Sep 12, 2019 6:00 PM
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Sample Detail						Asbestos - AS4964	CANCELLED	HOLD	Organochlorine Pesticides	Polychlorinated Biphenyls	Metals M8	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
Brisbane Laboratory - NATA Site # 20794													
Perth Laboratory - NATA Site # 23736													
10	BH10-0.0-0.2	Sep 11, 2019		Soil	S19-Se20214	X				X		X	X
11	BH11-0.1-0.3	Sep 11, 2019		Soil	S19-Se20215	X			X			X	X
12	BH12-0.1-0.3	Sep 11, 2019		Soil	S19-Se20216	X				X		X	X
13	BH13-0.1-0.3	Sep 11, 2019		Soil	S19-Se20217	X			X	X		X	X
14	DUP01	Sep 11, 2019		Soil	S19-Se20218						X	X	
15	DUP01A	Sep 11, 2019		Soil	S19-Se20219						X	X	
16	TRIP SPIKE	Sep 11, 2019		Soil	S19-Se20220		X						
17	TRIP BLANK	Sep 11, 2019		Soil	S19-Se20221		X						
18	BH01-0.6-0.8	Sep 11, 2019		Soil	S19-Se20222			X					
19	BH02-0.5-0.7	Sep 11, 2019		Soil	S19-Se20223			X					
20	BH03-0.3-0.5	Sep 11, 2019		Soil	S19-Se20224			X					
21	BH04-0.4-0.6	Sep 11, 2019		Soil	S19-Se20225			X					

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Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Asbestos - AS4964	CANCELLED	HOLD	Organochlorine Pesticides	Polychlorinated Biphenyls	Metals M8	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
Brisbane Laboratory - NATA Site # 20794													
Perth Laboratory - NATA Site # 23736													
22	BH05-0.4-0.6	Sep 11, 2019		Soil	S19-Se20226			X					
23	BH06-0.5-0.7	Sep 11, 2019		Soil	S19-Se20227			X					
24	BH07-0.4-0.6	Sep 11, 2019		Soil	S19-Se20228			X					
25	BH08-0.3-0.5	Sep 11, 2019		Soil	S19-Se20229			X					
26	BH09-0.3-0.5	Sep 11, 2019		Soil	S19-Se20230			X					
27	BH10-0.3-0.5	Sep 11, 2019		Soil	S19-Se20231			X					
28	BH11-0.4-0.6	Sep 11, 2019		Soil	S19-Se20232			X					
29	BH12-0.7-0.9	Sep 11, 2019		Soil	S19-Se20233			X					
30	BH13-0.5-0.8	Sep 11, 2019		Soil	S19-Se20234			X					
Test Counts						13	2	13	7	7	2	15	13

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. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
5. 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.



CHAIN OF CUSTODY RECORD

AS/NZS 50 095 085 521

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, Marano 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, Cokleigh VIC 3166
03 8554 5000 EnviroSampleVic@eurofins.com

Company		ALLIANCE GEOTECHNICAL		Project No	8325			Project Manager	Steven Wallace		Sampler(s)	JW		
Address		10 WELDER ROAD, SEVEN HILLS NSW		Project Name	Caste Hill			EDD Format (ESdat, EQUIS, Custom)			Handed over by	JW		
Contact Name				Analysis <small>Please Note: Where a matrix is not specified, please refer to the relevant Eurofins Laboratory Standard Method for the analysis.</small>	TRH / BTEX	PAH	OCP	PCB	METALS (8)	ASBESTOS (ABSENCE / PRESENCE)	BTEX	HOLD		
Phone No		0424066612												
Special Directions														
Purchase Order														
Quote ID No														
Email for Invoice												Enviro@allgeo.com.au		
Email for Results												Enviro@allgeo.com.au		
										Containers		Turnaround Time (TAT) Requirements (Default will be 5 days if not stated)		
										1L Plastic 250ml Plastic 125ml Plastic 200ml Amber Glass 40ml VOA vial 500ml PEAS Bottle Jar (Glass or HDPE) <small>Other (Adapted AS4688.1A Guidelines)</small>		<input type="checkbox"/> Overnight (9am)* <input type="checkbox"/> 1 Day* <input type="checkbox"/> 2 Day* <input type="checkbox"/> 3 Day* <input type="checkbox"/> 5 Day* <input type="checkbox"/> Other () <small>*Surcharges apply</small>		
												Sample Comments / Dangerous Goods Hazard Warning		
No	Client Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix (Solid (S) Water (W))											
1	BH01-0.1-0.3	11/09/19	S	X	X	X		X	X					
2	BH01-0.6-0.8	11/09/19	S							X				
3	BH02-0.1-0.3	11/09/19	S	X	X		X	X	X					
4	BH02-0.5-0.7	11/09/19	S							X				
5	BH03-0.1-0.3	11/09/19	S	X	X	X		X	X					
6	BH03-0.3-0.5	11/09/19	S							X				
7	BH04-0.1-0.3	11/09/19	S	X	X		X	X	X					
8	BH04-0.4-0.6	11/09/19	S							X				
9	BH05-0.1-0.3	11/09/19	S	X	X	X		X	X					
10	BH05-0.4-0.6	11/09/19	S							X				
11	BH06-0.1-0.3	11/09/19	S	X	X		X	X	X					
12	BH06-0.5-0.7	11/09/19	S							X				
13	BH07-0.1-0.3	11/09/19	S	X	X	X		X	X					
14	BH07-0.4-0.6	11/09/19	S							X				
15	BH08-0.0-0.2	11/09/19	S	X	X		X	X	X					
16	BH08-0.3-0.5	11/09/19	S							X				
17	BH09-0.1-0.3	11/09/19	S	X	X	X		X	X					
18	BH09-0.3-0.5	11/09/19	S							X				
19	BH10-0.0-0.2	11/09/19	S	X	X		X	X	X					
20	BH10-0.3-0.5	11/09/19	S							X				
Total Counts				10	10	5	5	10	10	10				

Method of Shipment	<input checked="" type="checkbox"/> Courier (#)	<input type="checkbox"/> Hand Delivered	<input type="checkbox"/> Postal	Name	Jacob Walker	Signature		Date		Time	
Eurofins mgt Laboratory Use Only	Received By	<i>Caec D</i>		Signature	<i>[Signature]</i>	Date	12/09	Time	6:00 PM	Temperature	18.3°C
	Received By			Signature		Date		Time		Report No	676756

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.

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Company		ALLIANCE GEOTECHNICAL		Project No	8325			Project Manager	Steven Wallace		Sampler(s)	JW		
Address		10 WELDER ROAD, SEVEN HILLS NSW		Project Name	Caste Hill			EDD Format (ESdat, EQuIS Custom)			Handed over by	JW		
Contact Name				Analyses (This column is used to capture the specific analyses requested for each sample. It is not to be used for the purpose of capturing the results of the analyses.)	TRH / BTEX	PAH	OCP	PCB	METALS (8)	ASBESTOS (ABSENCE / PRESENCE)	BTEX	HOLD		
Phone No		0424066612												
Special Directions														
Purchase Order														
Quote ID No														
Email for Invoice										Email for Results		Enviro@allgeo.com.au		
Email for Results										Containers		Turnaround Time (TAT) Requirements (Turnout will be 3 days if not ticked)		
										1L Plastic 250ml Plastic 125ml Plastic 250ml Amber Glass 40ml Vials 500ml LPTAS Bottle Jar (Glass or HDPE) Other (Please Specify Vial Size/Labeling)		<input type="checkbox"/> Overnight (9am)* <input checked="" type="checkbox"/> 1 Day* <input type="checkbox"/> 2 Day* <input type="checkbox"/> 3 Day* <input type="checkbox"/> 5 Day* <input type="checkbox"/> Other () * Surcharges apply		
												Sample Comments / Dangerous Goods Hazard Warning		
No	Client Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix (Solid (S) Water (W))	TRH / BTEX	PAH	OCP	PCB	METALS (8)	ASBESTOS (ABSENCE / PRESENCE)	BTEX	HOLD			
1	BH11-0.1-0.3	11/09/19	S	X	X	X		X	X					
2	BH11-0.4-0.6	11/09/19	S								X			
3	BH12-0.1-0.3	11/09/19	S	X	X		X	X	X					
4	BH12-0.7-0.9	11/09/19	S								X			
5	BH13-0.1-0.3	11/09/19	S	X	X	X	X	X	X					
6	BH13-0.5-0.8	11/09/19	S								X			
7	DUP01	11/09/19	S					X						
8	DUP01A	11/09/19	S					X						
9	TRIP-SPIKE									X				
10	TRIP-BLANK									X				
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														
Total Counts				3	3	2	2	5	3	2	3			

Method of Shipment	<input checked="" type="checkbox"/> Courier (#)	<input type="checkbox"/> Hand Delivered	<input type="checkbox"/> Postal	Name	Jacob Walker	Signature	Date	Time	
Eurofins mgt Laboratory-Use Only	Received By	<i>[Signature]</i>	SVD BNE MEL PER ADL NTL DRW	Signature	<i>[Signature]</i>	Date	12/09	Time	
	Received By	<i>[Signature]</i>	SVD BNE MEL PER ADL NTL DRW	Signature	<i>[Signature]</i>	Date		Time	
								Temperature	18.3°C
								Report No	676756

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